



# National Drug Control Strategy

**2001 Counterdrug Research and  
Development Blueprint Update**

**2001 ANNUAL REPORT**



Office of National Drug Control Policy

# Table of Contents

<b>Message from the Director</b> .....	i
<b>Executive Summary</b> .....	iii
<b>1.0 INTRODUCTION</b> .....	1
1.1 Scope.....	1
1.2 Counterdrug Technology Assessment Center .....	1
<b>2.0 CTAC R&amp;D PROGRAM SUMMARY</b> .....	2
2.1 Demand Reduction .....	3
2.2 Supply Reduction.....	5
<b>3.0 TECHNOLOGY TRANSFER PROGRAM</b> .....	8
<b>4.0 OVERSIGHT AND COORDINATION</b> .....	9
<b>5.0 FUTURE PLANS</b> .....	9
5.1 Demand Reduction .....	9
5.2 Supply Reduction.....	10
5.3 Technology Transfer Program.....	12
5.4 Oversight and Coordination .....	12
<b>6.0 CONCLUSION</b> .....	12
<b>7.0 REFERENCE DOCUMENTS</b> .....	13
<b>APPENDICES</b>	
A. Applicable Legislation	
B. Counterdrug Scientific and Technological Needs	
C. Counterdrug Research and Development Projects	
D. Annual Report on the Development and Deployment of Narcotics Detection Technologies by Federal Agencies	
E. Technology Transfer Program	
F. Acknowledgements	

# Message from the Director

Through the diligent efforts of our Nation's drug abuse medical researchers and drug control counterdrug law enforcement technologists, substance abusers are completing treatment and reentering society and traffickers in illicit drugs are being apprehended and removed from society. Real progress is being made through the dedicated efforts of scientists and engineers in academia, government, and industry. This Blueprint Update provides a periodic report on the successes of the scientific and technical initiatives accomplished with sponsorship from the Counterdrug Research and Development Program.

Drug abuse medical researchers at the premier academic institutions across the Nation are helping ONDCP to exploit advancements in science and technology for eliminating the effects of illicit drugs on our society. New neuroimaging facilities at the University of Pennsylvania, University of California at Los Angeles, Massachusetts General Hospital, Emory University, and Harvard University's McLean Hospital will be installed and calibrated so that new images can be processed to advance the Nation's understanding of the causes of drug abuse. Scientists operating with grants from the National Institute on Drug Abuse and private foundations will use this sophisticated brain-imaging equipment to map human reward circuitry along with blood volume and flow associated with drug metabolism as well as interactions with potential therapeutic medicines.

Engineers and scientists are developing concepts for advanced systems and devices to overcome some of the limitations in x-ray systems and the disadvantages in neutron inspection systems. These technology initiatives will allow Customs inspectors with nonintrusive inspection systems to inspect cargo containers, conveyances, and cargo in which illicit drugs are hidden. Other technology initiatives are developing devices and systems to allow federal counterdrug law enforcement officers to share drug crime information, conduct surveillance, and to achieve interoperable communications. Devices and systems developed to support federal law enforcement officers are being made available to local law enforcement through a highly successful technology transfer program. This program has greatly improved the day to day and drug crime investigation capabilities of the state and local police and sheriff's offices across the Nation.

Technology will continue to play a key role in maintaining our progress toward attaining a drug-free America. Your steadfast support is appreciated.

Barry R. McCaffrey, Director  
Office of National Drug Control Policy

# Executive Summary

The Counterdrug Technology Assessment Center (CTAC), established within the Office of National Drug Control Policy (ONDCP) in 1990, is the central counterdrug technology research and development (R&D) organization of the U.S. Government. The counterdrug R&D program supports the five goals of the *National Drug Control Strategy (NDCS)* to:

- educate and enable America's youth to reject illegal drugs as well as alcohol and tobacco,
- increase the safety of America's citizens by substantially reducing drug-related crime and violence,
- reduce health and social costs to the public of illegal drug use,
- shield America's air, land and sea frontiers from the drug threat, and
- break foreign and domestic drug sources of supply.

Since 1990, CTAC has been overseeing and coordinating the counterdrug research and development (R&D) programs of the federal drug control agencies. It sponsors a counterdrug technology R&D program to advance the technological capabilities of federal drug control agencies and a Technology Transfer Program (TTP) to enhance the capabilities of state and local law enforcement agencies (LEAs) for counterdrug missions. The counterdrug R&D program addresses the scientific and technological (S&T) needs of the federal drug control agencies. The R&D program supports improved counterdrug capabilities that transcend the need of any single federal agency. It includes demand reduction projects in brain imaging technology, therapeutic medications,

assessment of treatment programs; supply reduction projects for cargo inspection, for drug smuggling, drug crime information handling, communications, and surveillance. The counterdrug R&D program also includes operational test and evaluation activities to evaluate off the shelf and emerging technology prototypes for use in the field.

The demand reduction R&D program supports the *NDCS, Goal 3: to reduce health and social costs to the public of illegal drug use* by expanding the understanding of substance abuse and addiction. In conjunction with the National Institute on Drug Abuse (NIDA), the demand reduction R&D program sponsors advanced neuroimaging technology, medical instrumentation and facilities at leading academic medical research institutions. The research facilities being sponsored through the R&D program have all agreed to concentrate on drug abuse research and to train other professionals who will continue to advance our state of knowledge.

By the second quarter of FY 2002, new neuroimaging facilities at University of Pennsylvania, University of California at Los Angeles, Massachusetts General Hospital, Emory University, and Harvard University/McLean Hospital will be installed and processing images that advance the Nation's drug abuse research program. Researchers will use the advanced brain imaging equipment to map brain reward circuitry, blood volume and flow associated with drug metabolism, interactions with potential therapeutic medicines, localization of brain circuitry that mediates drug

## EXECUTIVE SUMMARY

addiction, and eventually relate addiction to gene expression. Clinically, these efforts will contribute to the development of real-time diagnostic tools and optimum treatment for substance abuse disorders.

The supply reduction R&D program supports *Goal 2 and Goal 4 of the NDCS* through applied developments for nonintrusive inspection, tactical technologies, and test and evaluation. Over the past two years, technologies have been developed to provide improvements to communications, surveillance and drug crime information sharing capabilities to make the law enforcement missions more effective, safe, and to ensure successful prosecutions. Advanced nonintrusive inspection concepts employing gamma ray and neutron technologies are being developed to detect illegal drug shipments concealed within containerized cargo entering the United States. These technologies, along with those still to come from ongoing field and laboratory research, are being deployed by our law enforcement agencies and will improve our ability to search conveyances and cargo for hidden drugs at U.S. ports-of-entry.

The \$39,052,000 appropriated over the past three years for the Technology Transfer Program has made possible the delivery of 1,808 pieces of equipment to 1,325 state and local law enforcement agencies. Hands-on training and limited maintenance support are provided to all recipients. Over this period, equipment and training were provided to approximately nine percent of the 16,000 sheriffs and police departments in the United States. The comments from the recipient agencies indicate that the technologies provided by the program have resulted in improved operational capabilities that otherwise would not have been possible because of limited budgets or lack of technical expertise.

# Counterdrug Research and Development Blueprint Update

## 1.0 INTRODUCTION

The Counterdrug Technology Assessment Center (CTAC), established within the Office of National Drug Control Policy (ONDCP) in 1990, is the central counterdrug technology research and development (R&D) organization of the U.S. Government. The counterdrug R&D program supports the five goals of the *National Drug Control Strategy (NDCS)* to:

- educate and enable America's youth to reject illegal drugs as well as alcohol and tobacco,
- increase the safety of America's citizens by substantially reducing drug-related crime and violence,
- reduce health and social costs to the public of illegal drug use,
- shield America's air, land and sea frontiers from the drug threat, and
- break foreign and domestic drug sources of supply.

### 1.1 Scope

This seventh *Counterdrug R&D Blueprint Update* provides the status of the counterdrug R&D program, the counterdrug Technology Transfer Program, oversight and coordination activity with federal drug control agencies, and a summary of plans for future counterdrug R&D initiatives. Appendices provide the following related material:

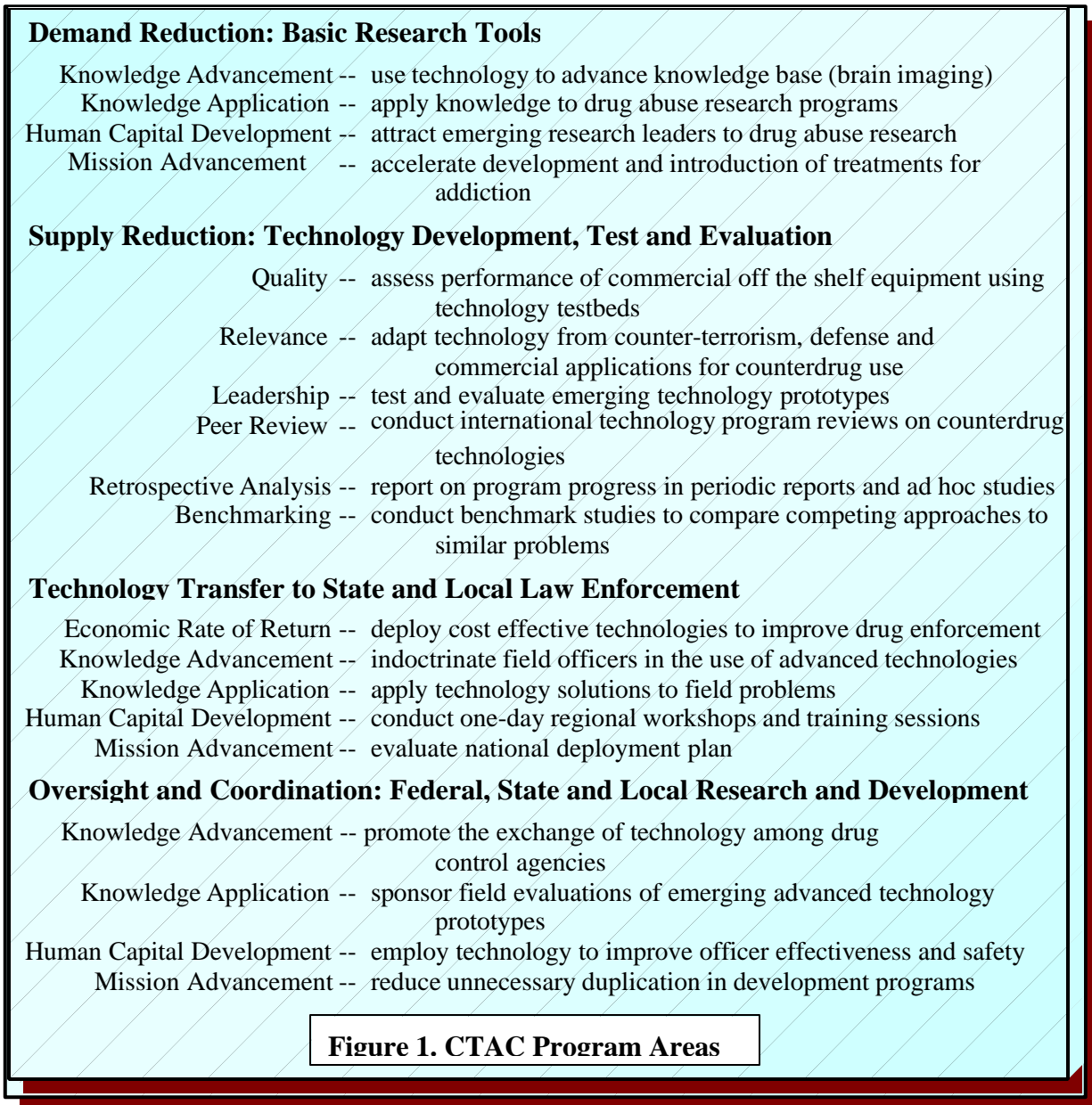
- Appendix A provides excerpts from recent legislation and conference reports,

- Appendix B provides a listing of priority scientific and technological needs by agency,
- Appendix C provides a listing of drug-related R&D projects by agency,
- Appendix D provides the Annual Report on the Development and Deployment of Narcotics Detection Technologies (required by P.L. 105-85),
- Appendix E provides a summary of the Technology Transfer Program, and
- Appendix F acknowledges those who supported the preparation of this report.

### 1.2 Counterdrug Technology Assessment Center

Since 1990, CTAC has been overseeing and coordinating the counterdrug research and development (R&D) programs of the federal drug control agencies. In support of the goals and objectives of the *NDCS*, CTAC sponsors a counterdrug R&D program to advance the technological capabilities of federal drug control agencies and a Technology Transfer Program (TTP) to enhance the capabilities of state and local law enforcement agencies (LEAs) for counterdrug missions. In fiscal year 2000 and 2001, annual appropriations of \$16 and \$17.803 million, respectively, were received to sponsor counterdrug R&D initiatives and annual appropriations of \$13.052 and \$18.25 million, respectively, were received to continue and expand the Technology Transfer Program. These funds were used to support those areas shown in Figure 1 which correspond to ONDCP's *FY 2000 - FY 2007 Strategic Plan*.





## 2.0 CTAC R&D PROGRAM SUMMARY

The counterdrug R&D program addresses the scientific and technological (S&T) needs of the federal drug control agencies. The R&D program supports improvements to counterdrug capabilities that transcend the need of any single federal agency. It includes demand

reduction projects in brain imaging technology, therapeutic medications, and assessment of treatment programs; supply reduction projects for cargo inspection, for drug smuggling, drug crime information handling, communications, and surveillance. The R&D program also includes operational test and evaluation activities to evaluate off the shelf and emerging technology prototypes for use in the field. Priority scientific and technological needs are

gathered each year from the federal drug control agencies and are reported in Appendix B.

The demand reduction R&D program supports the *NDCS, Goal 3: to reduce health and social costs to the public of illegal drug use* by expanding the understanding of substance abuse and addiction. The supply reduction R&D program supports *Goal 2 and Goal 4 of the NDCS* through applied developments for nonintrusive inspection, tactical technologies, and test and evaluation. The listing in Appendix B serves as a guide for identifying counterdrug R&D initiatives that address the priority outstanding federal drug control agency needs.

## 2.1 Demand Reduction

Contributing to the expansion of understanding substance abuse and addiction and in conjunction with the National Institute on Drug Abuse (NIDA), ONDCP/CTAC is equipping leading academic and addiction research institutions with advanced neuroimaging technology, medical instrumentation and facilities. The research facilities receiving this equipment have all agreed to concentrate on drug abuse research and to train other professionals who will continue to advance our state of knowledge. Researchers will use the advanced brain imaging equipment to map brain reward circuitry, blood volume and flow associated with drug metabolism, interactions with potential therapeutic medicines, localization of brain circuitry that mediates drug addiction, and eventually relate addiction to gene expression. Clinically, these efforts will contribute to the development of real-time diagnostic tools and optimum treatment for substance abuse disorders.

### 2.1.1 Neuroimaging Technology Initiatives

During the last five years, high resolution Positron Emission Tomography (PET) brain scanning systems have been installed at NIDA's Intramural Research Program (IRP) and Brookhaven National Laboratory to support drug abuse research. Scientists from the Research Triangle Institute using the NIDA IRP PET brain scanning system are assessing the role of impaired cognitive functioning and looking for vulnerability factors or markers for specialized treatment regimens.

Last year, scientists at University of Pennsylvania designed and fabricated a PET system that uses gadolinium orthosilicate crystal detectors for imaging the human brain. The new PET scanner was designed to have improved spatial resolution, higher sensitivity, and higher count-rate capability compared to the current sodium iodide-based PET. The system will be completed in the first quarter of FY 2001.

CTAC has sponsored a research program at UCLA to develop a small diameter "MicroPET" instrument to study animals particularly non-human primates. The system will combine ultra-high resolution PET, and stereotactic injection of experimental probes and potential therapeutics and withdrawal of fluid and tissue samples for analysis. The program is located at the Sepulveda Veterans Administration Medical Center, adjacent to a unique vervet monkey colony of well-defined lineage. Grants will be solicited to study the role of specific genes important to brain reward functions, linking biochemical events with PET to behavior in the monkey population. This project is scheduled for completion in the third quarter FY 2002.

Several new advanced neuroimaging centers to support research on the effects of drugs of



abuse will be completed this year. During the first quarter of FY 2001, Massachusetts General Hospital received a 7 Tesla magnet that was installed at the Athanoula A. Martinos Center for Functional and Structural Biomedical Research in Charleston, Massachusetts. Harvard University and Massachusetts General Hospital will use the new 7 Tesla functional Magnetic Resonance Imaging (fMRI) system for collaborative research on brain circuitry. A 3 Tesla fMRI center at Emory University, partially sponsored by the R&D program, will support imaging studies of drug addiction.

McLean Hospital in Boston, Massachusetts has received a high field (4 Tesla) fMRI and magnetic resonance spectroscopy (MRS) scanner that will be used for clinical assessments of drug addicts and basic addiction research. Clinical research will begin in the second quarter of FY 2002. The system will acquire high-resolution images of drug metabolites, human chemistry and brain activity volume by using magnetic resonance (MR) visible carbon 13.

By the second quarter of FY 2002, new neuroimaging facilities at University of Pennsylvania, University of California at Los Angeles, Massachusetts General Hospital, Emory University, and Harvard University/McLean Hospital will be installed and processing images that advance the nation's drug abuse research program.

### **2.1.2 Drug Abuse, Therapeutic Medications and Treatment Effectiveness**

Two approaches to the development of anti-cocaine therapeutic medications for overdose and addiction are being investigated. The first approach at Columbia University College of Physicians and Surgeons is developing a peripheral blocker to render cocaine molecules not psycho-active in the bloodstream. A

research team from Emory University's Yerkes Primate Center, the second approach, is seeking to find a medication to serve as a "front line" initial step toward normalizing addicts for further treatment.

- Unlike typical agonists and antagonists that act on brain neurons, the peripheral blocker research project involves the development of catalytic antibodies that intercept cocaine in the bloodstream before it reaches the brain. The current challenge of the research is to improve reaction rates and to collaborate with University of Michigan on humanization experiments. The experimental trials of the anti-cocaine antibody Mab 15A10 in a rat model have been completed and results accepted for publication in the Journal of Pharmacology and Experimental Therapeutics. The University of Michigan will use Medimmune, Incorporated derived mutants of the humanized anti-cocaine catalytic antibody in small non-human primate tests.
- The second approach involves cocaine analog medication research that would be a substitute compound that could be used by a physician as a medication to assist in normalization of the cocaine addict in order to begin rehabilitation. The substitute medication would partially block the receptor, but would still allow dopamine re-uptake while preventing the cocaine from adhering to the receptor site. Experiments are being conducted to determine whether the compounds are reinforcing by themselves by allowing the monkeys to self-administer. Another goal is to establish the time course and the inhibitory effects of these cocaine analogs on neurotransmitter uptake. The pretreatment times and doses for testing the cocaine analog compounds RTI 112 and RTI 117 have been established. The

current phase of the effort includes determining the effects of RTI 51 on the stimulus-termination and to establish its time course. Completion is scheduled for the second quarter of FY 2002

For the past four years, researchers at the National Center for Addiction and Substance Abuse (CASA) at Columbia University and Treatment Research Institute at University of Pennsylvania have been developing the Drug Evaluation Network System (DENS). DENS is a central computer system using the latest database and executive information system technology to track "treatment entry" addicts. The Addiction Severity Index (ASI) constitutes the primary screening and assessment instrument for the system. Researchers from the Treatment Research Institute have extended ASI capabilities to incorporate up to 40 additional questions and comments. This information is made available to treatment providers, researchers and managers. This year, DENS transitioned to the Substance Abuse and Mental Health Services Administration as the drug abuse treatment data collection backbone for the National Treatment Outcome Monitoring System (NTOMS). The National Evaluation of Substance Abuse Treatment (NESAT) methodology also will be completed this year.

### **2.1.3 Juvenile Diversion**

A project with the New Orleans District Attorney's Office to improve approaches for drug abuse treatment on youth offenders will be completed this year. This research project examines the effectiveness of therapeutic approaches with 12 to 16 year old, first-time, non-violent juvenile arrestees who are substance abusers. These juveniles have their case "diverted" out of the normal judicial process pending completion of program requirements. Changes in outcome measures are examined from information obtained

through follow-up contacts at approximately 6 and 12 months following arrest. The methodology developed by this project has the potential to provide a national model for dealing with non-violent juvenile substance abusers outside the judicial process.

### **2.1.4 Substance Abuse and Drugs in Sports**

An analysis of the abuse of banned performance enhancing substances among Olympic athletes was conducted by the National Center on Addiction and Substance Abuse. The report entitled "Winning at any Cost" dated September 2000 provided recommendations for improvement in substance abuse regulations, testing, sanctions and treatment for Olympic athletes.

In FY 2000 Congress provided ONDCP funding for a research grant to the U.S. Anti-Doping Agency (USADA) to learn more about human growth hormones, androgens, anabolic steroids, and addiction. USADA held its first Antidoping Research Summit in October 2000 where they adopted an aggressive, comprehensive research agenda. CTAC attends USADA planning meetings and monitors their progress.

## **2.2 Supply Reduction**

### **2.2.1 Nonintrusive Inspection Technologies**

ONDCP/CTAC works closely with the federal drug control agencies in the development and evaluation of nonintrusive inspection systems for the detection of illicit drugs concealed in cargo, containers, and conveyances. R&D projects for nonintrusive inspection capabilities were conducted in the areas of enhanced gamma ray detectors, surface acoustic wave sensors, selective breeding of detector dogs, location of drugs "secreted" on-board maritime vessels, and portable capability to detect drugs and contraband in

sea vessels, compartments and containers of all sizes. The following summaries provide brief descriptions of these projects.

Scientists from Massachusetts Institute of Technology (MIT) are working to overcome some of the limitations inherent in x-ray and disadvantages in pulsed fast neutron analysis inspection systems. A breadboard coded aperture fast neutron array (CAFNA) test stand has been fabricated and experiments are being conducted to identify individual elemental constituents of the materials within a pallet of cargo. An innovative spin-off application of the coded aperture array has been demonstrated with Single Photon Emission Computed Tomography (SPECT). By mounting a coded aperture to an existing SPECT camera, preliminary experiments show substantial improvements in the clarity and resolution of images of a small animal.

A prototype transportable neutron-based probe was fabricated by Western Kentucky University and will be tested in conjunction with U.S. Customs Service in fourth quarter of FY 2001 for inspecting pallet-sized volume of commodities. The system concept is based on the detection and analysis of elemental images from the characteristic gamma rays emitted from inelastic and thermal neutron interactions. The probe is being evaluated in configurations that are integrated with x-ray and gamma ray systems used for inspecting vehicles, pallets and cargo for illicit drugs.

A drug detection dog breeding strategy has been formulated in conjunction with the U. S. Customs Service based upon quantitative genetic principles proven by the Australian Customs Service. The first graduates are currently working at ports of entry. Initial results indicate the potential to establish a world-wide gene pool for substance detection canines. This project will be completed in FY 2001.

A near infrared Raman spectroscopy method is being developed to identify drugs in solid mixtures (e.g., pills) and aqueous solutions. This device will incorporate a fiber optic probe feature to minimize sample preparation and allow in situ analysis of the contents of transparent containers. Five prototype systems will be delivered for testing by DEA, Customs, and Coast Guard personnel in third quarter of FY 2001.

A dual detector prototype is being developed at MIT Lincoln Laboratory for drug detection in contaminated backgrounds using two types of ion mobility spectrometers (proton affinity and ultra-violet photo-ionization). The prototype will be tested for its ability to discriminate across a broad spectrum of background materials.

A high selectivity surface acoustic wave sensor (SAW) and immunoassay system is being developed for the detection of trace amounts of cocaine. The SAW sensor developed by researchers at Georgia Institute of Technology uses antibodies to recognize the presence of trace cocaine. Testing of a prototype system will begin in fourth quarter of FY 2001.

A handheld, ultrasonic transmitter and receiver prototype was tested in third quarter of FY 2000 for its capability to assist in inspecting liquid filled containers on maritime vessels and storage tanks. The system, designed by scientists from Los Alamos National Laboratory working with personnel from the Coast Guard R&D Center, generates a tunable tone burst and detects the return echoes using a single piezoelectric transducer. Digital signal processing is used to determine the distances and magnitudes of the return echoes. A small quantity of prototypes will be fabricated by a commercial vendor for additional testing later this year.

A methodology similar to the approach used to detect nerve agents in biological and chemical warfare scenarios is being investigated by scientists at John Hopkins University Applied

Physics Laboratory to detect trace amounts of drugs. The approach involves developing a molecularly imprinted polymer-based sensor to detect methyl benzoate vapor as an indicator of the presence of cocaine. The project will be completed in third quarter of FY 2002.

### 2.2.2 Tactical Technologies

ONDCP/CTAC assists law enforcement agencies in applying technological solutions to meet operational counterdrug technical needs. Advanced concepts for solutions to scientific and technological needs reported in last year's *Blueprint* Future Plans section were used to initiate R&D projects for tactical capabilities in the areas of miniaturized covert tagging and tracking devices, next generation "tags" for aircraft, maritime and ground targets, low power GPS tracking devices which utilize national terrestrial packet switch communications networks, improved communications systems to share data across platforms, unmanned aerial vehicles which can be operated from large cutters at sea, and secure, digital wireless and interoperable agency wide communications. The following summaries provide descriptions for those projects. Projects for anhydrous ammonia inhibition and interactive training for seizing clandestine methamphetamine laboratories were identified two years ago and are now beginning.

Agricultural anhydrous ammonia is frequently stolen from farmers in the midwestern United States to be used in the production of illicit methamphetamine. A feasibility study is being performed by scientists at John Hopkins University Applied Physics Laboratory to determine potential methods for altering agricultural anhydrous ammonia to render it unsuitable for methamphetamine production while retaining its current safety characteristics and agricultural benefits.

A family of electronic tags was developed in conjunction with DoD and DEA for tracking airborne platforms, land vehicles and maritime vessels. The tags use GPS satellite communications systems (such as INMARSAT) to report data to a central control center. They all feature small, lightweight packages with low power consumption and long battery life. This project was completed and the tags are being deployed by DEA.

An interactive training module on clandestine laboratory seizures and courtroom testimony is being developed in conjunction with DEA. The module will be available for use by all federal, state and local law enforcement agencies. This project is scheduled for completion in fourth quarter of FY 2001.

In conjunction with the U.S. Coast Guard and DoD, a project is being conducted to exploit emerging commercial-off-the-shelf technology for the development of a small lightweight flight control system for small low-cost UAV systems. A novel control scheme is used to make the control and navigation systems "user friendly" to significantly reduce operator-training requirements. Flight tests are scheduled for third quarter FY 2001.

A scalable information tool for organizing and presenting crime and case-related information in conjunction with tracking and surveillance management systems is being developed. The system will allow users to visualize possible associations of criminal activity to a target under surveillance against a geographic positional background. The system enables the integration of real-time location and tracking systems with current and past criminal associations to permit both strategic and tactical planning and execution. This project will be completed in third quarter FY 2001.

An advanced information technology system is being developed in the Rio Grande Valley area

of south Texas. The system will enable participating police departments to share information from individual data bases and analyze the information using advanced data mining and link analysis tools. The system overcomes typical problems associated with incompatible records management systems.

A project with the DEA for developing a new and improved method for digital recording of ridge details from fingers and palms in support of automated fingerprint identification systems will begin in FY 2001.

### **2.2.3 Test and Evaluation Support**

Significant advancements have been made in communications, sensors and information technology over the past few years. Two technology testbeds have been established to focus these recent technical advances on improving drug-related law enforcement capabilities. The Communications and Sensors Testbed concentrates on the evaluation of interoperability issues of wireless communications, tracking and surveillance sensors and displays, telephone intercept technologies, and voice and facial recognition systems. Technology demonstration sites have been established with participating law enforcement organizations in New York, Maryland, Colorado, Texas, Arizona and California.

A wireless communications interoperability project will be continued in Colorado to evaluate and demonstrate innovative communications concepts and advanced capabilities to overcome technical difficulties encountered in areas of the country with conditions similar to Columbine, CO. A survey of commercially available off the shelf radio interoperability systems was conducted last year. Those systems meeting the initial requirements were evaluated by testbed engineers and law enforcement personnel for use in rural and urban environments.

Other testbed efforts include evaluations of sensors on remotely operated vehicles for the underwater search of ship hulls for hidden or parasitic appendages.

The Information Technology (IT) Testbed capitalizes on a substantial contribution from the FBI's Information Resources Division Infrastructure Testbed and focuses on applying emerging capabilities to the development of advanced case management tools for federal, state and local agencies of all sizes. Use of the FBI's investments in systems such as CampCon, a web-enabled, enterprise-class operational investigative system that supports the management, search, and analysis of over 2 million pages of evidence with typical responses received in seconds, pays dividends through our IT testbed when we can operate sophisticated case management tools in police departments of all sizes.

Technology demonstration sites have been established with participating law enforcement organizations in California, Colorado, Idaho and Iowa to provide investigators with improved software technology to assist in solving drug related cases more effectively. Case management system prototypes are being configured to develop temporal pattern detection algorithms, to evaluate prototype software tools for crime analysis, and to deploy advanced data mining tools to track offenders. Other emerging system concepts include superfast computer backup capabilities that could be deployed on-site.

## **3.0 TECHNOLOGY TRANSFER PROGRAM**

The \$39,052,000 appropriated over the past three years has made possible the delivery of 1,808 pieces of equipment to 1,325 state and local law enforcement agencies. Hands-on training and limited maintenance support are

provided to all recipients. Over this period, equipment and training were provided to approximately nine percent of the 16,000 sheriffs and police departments in the United States. During FY 2000, three new items were added to the Technology Transfer Program: Audio Surveillance System, Advanced Vehicle Tracking System, and the AIRNET-32 portable digital pager intercept system.

The comments from the recipient agencies indicate that the technologies provided by the program have resulted in improved operational capabilities that otherwise would not have been possible because of limited budgets or lack of technical expertise. Appendix E provides a current update to the evaluation report, which was submitted to Congress on September 20, 1999 and updated on March 24, 2000.

For FY 1998 and FY 1999, all 659 agencies that qualified under the program received at least one requested item. A total of 1,055 applications were received in FY 2000 alone. Program funding was sufficient to fill 666 applications. FY 2001 appropriations of \$18.25 million included additional resources to help offset this unmet demand.

#### **4.0 OVERSIGHT AND COORDINATION**

CTAC leads the Interagency Working Group for Technology (IAWG-T) that is composed of technology representatives from each of the federal drug control agencies. The IAWG-T meets periodically to exchange information regarding agency programs and common technical problems. Annually the IAWG-T provides an update of the listing of priority scientific and technological needs by technology area and agency (Appendix A), a listing of drug-related R&D projects being sponsored by each agency (Appendix C), and

the Annual Report (required by P.L. 105-85) on the Development and Deployment of Narcotics Detection Technologies (Appendix D).

Outreach activities including technology workshops, technical symposia, and conferences have been created to promote the exchange of information throughout the entire counterdrug scientific and technical community. Outreach activities provide another mechanism to create awareness of the R&D programs, to oversee and coordinate counterdrug technology initiatives throughout the scientific, academic, communities and with Federal, state, and local drug control agencies and, to reduce unnecessary duplication of effort.

### **5.0 FUTURE PLANS**

The R&D program will continue to develop and evaluate technologies that support neuroimaging and treatment, noninvasive inspection, tactical technology, technical assessments and operational use of emerging technologies, and transfer of federally developed technology directly to state and local law enforcement organizations.

#### **5.1 Demand Reduction**

This year will be a significant year for those projects begun over the past three years. In May 2001, the first viable human brain images will become available from the 7 Tesla fMRI at Massachusetts General Hospital. The PET brain scanner at University of Pennsylvania will be operational in December 2000 to support continuing research in FY 2001. Scientists from Research Triangle Institute will complete their studies of cognitive impairment using the NIDA PET located in Baltimore, MD in FY 2001.

Plans over the next two years include the installation of neuroimaging facilities at additional locations. Research using these facilities will investigate adolescent drug abuse and its connection with sleep disturbance, daytime sleepiness and the evaluation of interventions and vulnerability to relapse.

The overall goal is to answer several basic questions:

- Why do some drug users become addicted while others do not?
- What changes occur in the brain that result in addiction and what can be done to reverse or mitigate the process?

A strategic plan (within limited funding levels) should be developed with NIDA to establish an integrated multimodal program for brain imaging. CTAC supported technology would more effectively enable NIDA's drug addiction research and clinical treatment.

Support is also needed to establish a national in-house dedicated facility to quickly respond to issues such as: computational techniques to integrate across space (fMRI), time (MEG/EEG), neurochemistry (PET), and related chemistry instrumentation.

The R&D program will continue to support:

- Expansion of advanced neuroimaging research facilities and training of research teams who are devoted to studies of drug abuse and therapeutic medications. Participating research institutions will continue to receive advanced neuroimaging research equipment suites and facilities with positron emission tomography (PET), functional magnetic resonance imaging (fMRI), magnetic resonance spectroscopy (MRS), brain scan image processing and interpretation, and

other noninvasive brain imaging technology.

- Through the use of these facilities, scientific studies will provide the platform for key research areas such as: cocaine antibodies; substitute medications and partial agonists for addiction; curtailment of drug-induced adaptive behavior such as compulsive self-administration; assessment of functional neuroanatomy and effects of cognitive impairment; pharmacological phenomena and neurochemical effects relating to sensitization and tolerance; cue induced craving; the study of the effects and degree of genetic contributions to drug use; and sound clinical techniques, rehabilitation, and treatment protocols to deal with overdoses, withdrawal, and long term maintenance.

## 5.2 Supply Reduction

CTAC's support to federal law enforcement is based upon priority scientific and technological needs reported by the IAWG-T. The priority counterdrug scientific and technological needs for U.S. Customs Service, Department of Defense, U.S. Coast Guard, Drug Enforcement Administration, Immigration and Naturalization Service, National Institute of Justice and Federal Bureau of Investigation are listed in Appendix B. Individual projects in those counterdrug R&D programs for each agency are summarized in Appendix C.

The direction of CTAC's R&D program is established according to the following criteria:

- address broad-based, multi-agency needs that transcend the requirements of any single agency, and
- concentrate on those applications that are potential candidates for the Technology Transfer Program.



Areas of work that support future activities include the development of technologies for nonintrusive inspection of conveyances and cargo containers and for tactical use in daily operations.

### 5.2.1 Nonintrusive Inspection

Priority needs in nonintrusive inspection technology (from Appendix B) for which CTAC will continue projects or solicit advanced concepts are:

- improved x-ray and gamma ray detector technology,
- computer assisted drug recognition for imaging systems,
- portable/transportable capability to detect drugs and contraband in vessels, compartments and containers of all sizes during at-sea and port-side inspections,
- portable/transportable capability to detect false compartments or other anomalies in vessels, compartments and containers of all sizes,
- rapid and noninvasive screening of individuals for internal carries (ingested drugs), and
- portal detection systems for screening passengers for carrying drugs.

### 5.2.2 Tactical Technologies

The tactical technology effort supports development of advanced techniques and concepts for information management and exploitation, surveillance, tracking, and communications to support daily operations. These technologies are also candidates for transfer to state and local law enforcement

organizations with similar requirements. Priority needs in tactical technologies (from Appendix B) for which CTAC will continue projects or solicit advanced concepts are:

- drug destruction technology,
- improved communications systems to share data across platforms, including tactical picture, from multiple sensor inputs: voice, data imagery, tactical situation information,
- methods for verifying the authenticity of digital videotape to assure that digital recordings have not been altered or modified, and
- rapid, reproducible and improved method of digitally recording ridge detail from the palmar side of the hand.

### 5.2.3 Test and Evaluation Support

Information technology will be one of the cornerstones of the testbed program in FY 2001. Working with technology experts from the Navy's Space and Naval Warfare Systems Center - San Diego (SPAWAR), FBI and DEA, an innovative set of case management tools will be developed. The controlling concept for these efforts will be the use of web-based tools and standard interfaces between tracking and surveillance sensor systems and data access and management systems. Historical criminal data will be accessed in concert with real-time positional data to provide strategic and tactical information to criminal investigation teams. These tools will support improved operations in HIDTAs as well as state and local police departments across the nation.

In FY 2001, additional funding was provided to continue the evaluation of innovative wireless communications interoperability concepts in the state of Colorado. Initial

testing last year of commercially available off the shelf (COTS) equipment, identified technologies that address the current interoperability problems between dissimilar radio systems. Continued evaluation of emerging technologies will address unique topographic and demographic features in Colorado and along the southwest border that present challenges to state of the art equipment performance.

### 5.3 Technology Transfer Program

The goal of the TTP is to demonstrate the impact and benefit of advanced systems to state and local law enforcement organizations. Some of these benefits include improved use of personnel resources, increased officer safety, better time efficiency, and reduced crime.

A "sources sought" demonstration and evaluation was conducted in September 2000 in conjunction with the regional experts and commercially vendors who responded to the advertisement with mature technologies to determine potential candidates to be added to the program.

In FY 2001, TTP is expected to receive over 1,000 applications. Additional fiscal resources will be needed to continue to meet this demand. The strategy for nationwide deployment of technology will continue to be:

- support the officer on the street with high technology tools to increase effectiveness of personnel resources and improve officer safety by continuing the deployment of items, such as, thermal imagers and mini-busters, to those agencies requesting these technologies,
- target specialized LEA groups and organizations that will benefit from the successful deployment of more complex,

larger scale systems for communications interoperability and data mining applications in support of longer-term drug trafficking conspiracy investigations. This will be accomplished by refining the outreach effort and increasing the training provided to receiving agencies, and

- assure that the optimum set of technologies is being offered. This effort will include the introduction of new technologies to the program, improvements to existing systems, and elimination of technologies that no longer meet the operational requirements or can be replaced with next-generation technology.

### 5.4 Oversight and Coordination

In addition to the IAWG-T, CTAC also sponsors international technical symposia, leadership conferences and workshops to gather the latest developments in prevention, treatment and counterdrug law enforcement technologies for world-class research scientists and user experts to evaluate the advancing state-of-the-art. The sixth ONDCP International Counterdrug Technology Symposium will be held during June 2001 in San Diego, CA. Over 100 technical papers will be presented with an expected attendance of 400 medical research scientists, engineers and law enforcement professionals from academic, federal, state and local government organizations. Members of the IAWG-T will serve as chairpersons for the sessions that are of interest to their respective agencies.

### 6.0 CONCLUSION

This *Blueprint Update* provides a summary of this year's contributions and future plans. Technology will continue to play a key role in fostering our progress toward attaining a drug-free America.

Developing sound technology that addresses our national drug control strategy is a crucial aspect in meeting the multifaceted challenges posed by illicit drugs. Progress is vital on an array of demand-reduction and supply-reduction technology initiatives that focus on basic brain addiction science, prevention, treatment, therapeutic medicines, law enforcement, and interdiction.

Technology initiatives sponsored by the ONDCP's Counterdrug Technology Assessment Center have been applied in attempts to achieve an understanding of what changes occur in the brain that result in addiction, and what can be done to reverse or mitigate the process. By early 2002, dedicated addiction research neuro-imaging facilities will be operating at the University of Pennsylvania, University of California at Los Angeles, Massachusetts General Hospital, Emory University, and Harvard University/ McLean Hospital. Scientists operating with grants from the National Institute on Drug Abuse and private foundations will use these brain-imaging facilities to map human reward circuitry, blood flow associated with drug metabolism, interactions with potential therapeutic medicines, and eventually relate addiction to gene expression. Clinically, these efforts will contribute to the development of real-time diagnostic tools and optimum treatment for substance abuse disorders.

Engineers and scientists are developing concepts for advanced systems and devices to overcome some of the limitations in x-ray systems and the disadvantages in neutron inspection systems. These technology initiatives will allow Customs inspectors with nonintrusive inspection systems to inspect cargo containers, conveyances, and cargo in which illicit drugs are hidden. Other technology initiatives are developing devices and systems to allow federal counterdrug law

enforcement officers to share drug crime information, conduct surveillance, and to achieve interoperable communications. Devices and systems developed to support federal law enforcement officers are being made available to local law enforcement through a highly successful technology transfer program. This program has greatly improved the day to day and drug crime investigation capabilities of the state and local police and sheriff's offices across the Nation.

The overall goal is to attain the capability to nonintrusively inspect cargo containers and vessels in an efficient manner consistent with the free flow of legitimate trade and commerce. The continuing success of the Technology Transfer Program demonstrates the commitment and dedication of the men and women of our federal, state and local law enforcement agencies to use advanced technology to defeat drug crime throughout the Nation.

## 7.0 REFERENCE DOCUMENTS

The following is a list of documents pertinent to the *Blueprint Update*.

- *Counterdrug Technology Transfer Program Performance Evaluation Report and Strategic Plan*, Office of National Drug Control Policy, Counterdrug Technology Assessment Center, March 2000.
- *FY 2000 - FY 2007 Strategic Plan*, Office of National Drug Control Policy, 2000.
- *2000 Annual Report: National Drug Control Strategy - Counterdrug Research and Development Blueprint Update*, Office of National Drug Control Policy, Counterdrug Technology Assessment Center, NCJ-180085, 2000.

- *2000 Annual Report: National Drug Control Strategy, Performance Measures of Effectiveness: Implementation and Findings*, Office of National Drug Control Policy, NCJ-180143, 2000.
- *2000 Annual Report: National Drug Control Strategy*, Office of National Drug Control Policy, NCJ-180082, 2000.
- The Sixth Triennial Report to Congress from the Secretary of Health and Human Services. *Drug Abuse and Addiction Research: 25 Years of Discovery to advance the Health of the Public*. National Institute on Drug Abuse. September 1999, [NIDA Research Priorities and Highlights, pp. 23-32.]
- *Bringing the Power of Science to Bear on Drug Abuse and Addiction, Five-Year Strategic Plan*. National Institute on Drug Abuse. September 2000. NIH Publication Number 00-4774.

# Appendix A - Applicable Legislation

The following highlights from applicable legislation summarize Counterdrug Technology Assessment Center appropriations, functions, staff levels and roles.

- **Conference Report 104-863 of September 28, 1996 [To accompany H.R. 3610] Making Omnibus Consolidated Appropriations For Fiscal Year 1997**

**(f) For programs, projects or activities in the Treasury, Postal Service, and General Appropriations Act, 1997, provided as follows, to be effective as if it had been enacted into law as the regular appropriations Act:**

"For necessary expenses of the Office of National Drug Control Policy; for research activities pursuant to title I of Public Law 100-690; not to exceed \$8,000 for official reception and representation expenses; and for participation in joint projects or in the provision of services on matters of mutual interest with nonprofit, research, or public organizations or agencies, with or without reimbursement; \$35,838,000, of which \$19,000,000 shall remain available until expended, consisting of \$1,000,000 for policy research and evaluation and \$18,000,000 for the Counter-Drug Technology Assessment Center for counternarcotics research and development projects of which \$1,000,000 shall be obligated for state conferences on model state drug laws: Provided, That the \$17,000,000 for the Counter-Drug Technology Assessment Center shall be available for transfer to other Federal departments or agencies: Provided further, That

the Office is authorized to accept, hold, administer, and utilize gifts, both real and personal, for the purpose of aiding or facilitating the work of the Office: Provided further, That not before January 31, 1997, the Director of the Office of National Drug Control Policy shall transfer all balances in the Special Forfeiture Fund established by section 6073 of the Anti-Drug Abuse Act of 1988 (21 U.S.C. § 1509) to the Treasury Forfeiture Fund (31 U.S.C. 9703(a))."

- **P.L. 104-208 of September 30, 1996 - Making omnibus consolidated appropriations for the fiscal year ending September 30, 1997, and for other purposes.**

"For necessary expenses of the Office of National Drug Control Policy; for research activities pursuant to title I of Public Law 100-690; ... \$35,838,000, of which \$19,000,000 shall remain available until expended, consisting of \$1,000,000 for policy research and evaluation and \$18,000,000 for the Counter-Drug Technology Assessment Center for counternarcotics research and development projects of which \$1,000,000 shall be obligated for state conferences on model state drug laws: Provided, That the \$17,000,000 for the Counter-Drug Technology Assessment Center shall be available for transfer to other Federal departments or agencies:"

- **Conference Report 105-284 of September 29, 1997, [To accompany H.R. 2378] Making Appropriations for the Treasury Department, The United States Postal Service, The Executive Office Of The**

**President, and certain independent agencies, for the fiscal year ending September 30, 1998, and for other purposes**

"For necessary expenses of the Office of National Drug Control Policy; for research activities pursuant to title I of Public Law 100-690; not to exceed \$8,000 for official reception and representation expenses; and for participation in joint projects or in the provision of services on matters of mutual interest with nonprofit, research, or public organizations or agencies, with or without reimbursement; \$35,016,000, of which \$17,000,000 shall remain available until expended, consisting of \$1,000,000 for policy research and evaluation and \$16,000,000 for the Counterdrug Technology Assessment Center for counternarcotics research and development projects: Provided, That the \$16,000,000 for the Counterdrug Technology Assessment Center shall be available for transfer to other Federal departments or agencies: Provided further, That the Office is authorized to accept, hold, administer, and utilize gifts, both real and personal, for the purpose of aiding or facilitating the work of the Office: Provided further, That not before December 31, 1997, the Director of the Office of National Drug Control Policy shall transfer all balances in the Special Forfeiture Fund established by section 6073 of the Anti-drug Abuse Act of 1988 (21 U.S.C. section 1509) to the Treasury Forfeiture Fund (31 U.S.C. section 9703(a))."

"The conferees provide \$13,000,000 to the Counterdrug Technology Assessment Center (CTAC) of the Office of National Drug Control Policy (ONDCP) to establish a program for transferring technology directly to State and local law enforcement agencies. Since its inception, CTAC has worked with many law enforcement agencies and prosecutors to find technological solutions to critical law enforcement problems, and many valuable

applications have been developed. The conferees direct that this new funding be used to initiate a pilot program to transfer these technologies directly to State and local law enforcement agencies who may otherwise be unable to profit from the developments due to limited budgets or a lack of technological expertise. The conferees direct CTAC to initiate this program under the direction of the Chief Scientist, ONDCP, with the advice of experts from State and local law enforcement, and in cooperation with High Intensity Drug Trafficking Area (HIDTA) programs to identify the technologies to be transferred and locations to be served. The conferees expect that priority will be given to identifying candidates for transfer in the currently designated HIDTAs, and expect that CTAC and HIDTA will also weigh the ability and willingness of potential recipients to share in the costs of new technology, either through in-kind or direct contributions. The conferees also direct the Chief Scientist to submit a report to the Committees on Appropriations evaluating the performance of the program not later than 18 months from the date of the first transfer, as well as a strategic plan for countrywide deployment of technology. Additionally, the Chief Scientist is directed to consult with the Committees on Appropriations prior to the obligation of these funds to ensure that the money appropriated is going toward providing State and local law enforcement agencies access to counterdrug technology and not unreasonable administrative or otherwise unintended purposes."

"The conferees agree to provide \$35,016,000 instead of \$43,516,000 as proposed by the House and \$36,016,000 as proposed by the Senate. Of this amount, the conferees have included \$16,000,000 for the basic program of the Counterdrug Technology Assessment Center, and \$1,000,000 for policy research and evaluation. The conference agreement separately funds \$13,000,000 for a new technology transfer program by the Counterdrug Technology Assessment Center, as well as \$1,200,000 for

model state drug law conferences, through the Violent Crime Reduction Trust Fund."

- **P.L. 105-61 of October 10, 1997 - Treasury, Postal Service, and General Government Appropriations of fiscal year ending September 30, 1998**

"For necessary expenses of the Office of National Drug Control Policy; for research activities pursuant to title I of Public Law 100-690; ...\$35,016,000, of which \$17,000,000 shall remain available until expended, consisting of \$1,000,000 for research and evaluation and \$16,000,000 for the Counterdrug Technology Assessment Center for counternarcotics research and development projects: *Provided*, That the \$16,000,000 for the Counterdrug Technology Assessment Center shall be available for transfer to other Federal departments or agencies:"

"For activities authorized by Public Law 103-322, to remain available until expended, which shall be derived from the Violent Crime Reduction Trust Fund, as follows:

(1) As authorized by section 19001(e), \$131,000,000; ... of which \$20,200,000 shall be available to the Office of National Drug Control Policy, including \$13,000,000 to the Counterdrug Technology Assessment Center for a program to transfer technology to State and local law enforcement agencies, ..."

- **P.L. 105-85 of November 18, 1997 National Defense Authorization Act for fiscal year 1998**

"(a) Report Requirement. -- Not later than December 1st of each year, the Director of the Office of National Drug Control Policy shall submit to Congress and the President a report on the development and deployment of narcotics detection technologies by Federal Agencies. Each such report shall be prepared in consultation with the Secretary of Defense, the

Secretary of State, the Secretary of Transportation, and the Secretary of Treasury."

(b) Matters To Be Included. -- Each report under subsection (a) shall include -

(1) a description of each project implemented by a Federal agency relating to the development or deployment of narcotics detection technology;

(2) the agency responsible for each project described in paragraph (1);

(3) the amount of funds obligated or expended to carry out each project described in paragraph (1) during the fiscal year in which the report is submitted or during any fiscal year preceding the fiscal year in which the report is submitted;

(4) the amount of funds estimated to be obligated or expended for each project described in paragraph (1) during any fiscal year after the fiscal year in which the report is submitted to Congress; and

(5) a detailed timeline for implementation of each project described in paragraph (1).

- **Conference Report 105-760 of October 1, 1998 [to Accompany H.R. 4104] Appropriations For The Treasury Department, The United States Postal Service, The Executive Office Of The President, And Certain Independent Agencies, For The Fiscal Year Ending September 30, 1999**

"For necessary expenses of the Office of National Drug Control Policy; for research activities pursuant to title I of Public Law 100-690; not to exceed \$8,000 for official reception and representation expenses; and for participation in joint projects or in the provision of services on matters of mutual interest with nonprofit, research, or public organizations or agencies, with or without reimbursement, \$48,042,000, of which \$30,100,000 shall remain available until expended, consisting of \$1,100,000 for policy research and evaluation, and \$16,000,000 for the



counterdrug Technology Assessment Center for counternarcotics research and development projects, and \$13,000,000 for the continued operation of the technology transfer program: Provided, That the \$16,000,000 for the Counterdrug Technology Assessment Center shall be available for transfer to other Federal departments or agencies: Provided further, That the Office is authorized to accept, hold, administer, and utilize gifts, both real and personal, public and private, without fiscal year limitation, for the purpose of aiding or facilitating the work of the Office."

"The conferees agree to provide \$2,500,000 for ONDCP, instead of \$14,000,000 as proposed by the House and no funding as proposed by the Senate. \$1,000,000 of this funding would cover the costs of continuing support for Model State Drug Law Conferences, as proposed by the House. \$13,000,000 proposed by the House for continued funding for the technology transfer program run by the Counterdrug Technology Assessment Center will instead be funded in the ONDCP Salaries and Expenses account, as proposed by the Senate."

"The conferees agree to provide \$48,042,000 for the Office of National Drug Control Policy (ONDCP) as proposed by the Senate, instead of \$36,442,000 as proposed by the House. This includes \$13,000,000 to continue the technology transfer pilot program managed by the Counterdrug Technology Assessment Center (CTAC). It also includes \$17,942,000 for ONDCP operations, as proposed by the Senate, \$16,000,000 for the basic CTAC program, and \$1,100,000 for policy research of which \$100,000 is to be used for evaluating the Drug-Free Communities Act, as proposed by the Senate. The conferees agree to modify language governing the authority of ONDCP to accept and use gifts. The conference agreement separately funds \$1,000,000 for Model State Drug Law Conferences through the Violent Crime Reduction Trust Fund."

"The conferees expect the multiagency research and development programs to be coordinated by the Counterdrug Technology Assessment Center (CTAC) in order to prevent duplication of effort and to assure that, whenever possible, those efforts provide capabilities that transcend the need of any single Federal agency. Prior to obligation of these funds, the conferees expect to be notified by the chief scientist on how these funds will be spent. The conferees also expect to receive periodic reports from the chief scientist on the priority counterdrug enforcement research and development requirements identified by the Center and on the status of projects funded by CTAC."

- **Conference Report 105-789 of October 7, 1998 [To accompany H.R. 4104] Appropriations For The Treasury Department, The United States Postal Service, The Executive Office Of The President, and Certain Independent Agencies, For the Fiscal Year Ending September 30, 1999**

"The conferees agree to provide \$48,042,000 for the Office of National Drug Control Policy (ONDCP) as proposed by the Senate, instead of \$36,442,000 as proposed by the House. This includes \$13,000,000 to continue the technology transfer pilot program managed by the Counterdrug Technology Assessment Center (CTAC). It also includes \$17,942,000 for ONDCP operations, as proposed by the Senate, \$16,000,000 for the basic CTAC program, and \$1,100,000 for policy research of which \$100,000 is to be used for evaluating the Drug-Free Communities Act, as proposed by the Senate. The conferees agree to modify language governing the authority of ONDCP to accept and use gifts. The conference agreement separately funds \$1,000,000 for Model State Drug Law Conferences through the Violent Crime Reduction Trust Fund."

"The conferees expect the multiagency research and development programs to be coordinated by the Counterdrug Technology Assessment Center (CTAC) in order to prevent duplication of effort and to assure that, whenever possible, those efforts provide capabilities that transcend the need of any single Federal agency. Prior to obligation of these funds, the conferees expect to be notified by the chief scientist on how these funds will be spent. The conferees also expect to receive periodic reports from the chief scientist on the priority counterdrug enforcement research and development requirements identified by the Center and on the status of projects funded by CTAC. "

- **Conference Report 105–825 of October 19, 1998 [To accompany H.R. 4328] Making Omnibus Consolidated and Emergency Supplemental Appropriations for Fiscal Year 1999**

"The conferees agree to provide \$48,042,000 for the Office of National Drug Control Policy (ONDCP) as proposed by the Senate, instead of \$36,442,000 as proposed by the House. This includes \$13,000,000 to continue the technology transfer pilot program managed by the Counterdrug Technology Assessment Center (CTAC). It also includes \$17,942,000 for ONDCP operations, as proposed by the Senate, \$16,000,000 for the basic CTAC program, and \$1,100,000 for policy research of which \$100,000 is to be used for evaluating the Drug-Free Communities Act, as proposed by the Senate. The conferees agree to modify language governing the authority of ONDCP to accept and use gifts. The conference agreement separately funds \$1,000,000 for Model State Drug Law Conferences through the Violent Crime Reduction Trust Fund."

"The conferees expect the multiagency research and development programs to be coordinated by the Counterdrug Technology Assessment Center (CTAC) in order to prevent duplication of effort

and to assure that, whenever possible, those efforts provide capabilities that transcend the need of any single Federal agency. Prior to obligation of these funds, the conferees expect to be notified by the chief scientist on how these funds will be spent. The conferees also expect to receive periodic reports from the chief scientist on the priority counterdrug enforcement research and development requirements identified by the Center and on the status of projects funded by CTAC."

- **P.L. 105-277 of October 21, 1998 [H.R. 4328] Omnibus Consolidated and Emergency Supplemental Appropriations Act, 1999. Executive Office Appropriations Act of 1999**

"For necessary expenses of the Office of National Drug Control Policy; for research activities pursuant to title I of Public Law 100–690; not to exceed \$8,000 for official reception and representation expenses; and for participation in joint projects or in the provision of services on matters of mutual interest with nonprofit, research, or public organizations or agencies, with or without reimbursement; \$48,042,000, of which \$30,100,000 shall remain available until expended, consisting of \$1,100,000 for policy research and evaluation, and \$16,000,000 for the Counterdrug Technology Assessment Center for counternarcotics research and development projects, and \$13,000,000 for the continued operation of the technology transfer program: *Provided*, That the \$16,000,000 for the Counterdrug Technology Assessment Center shall be available for transfer to other Federal departments or agencies: *Provided further*, That the Office is authorized to accept, hold, administer, and utilize gifts, both real and personal, public and private, without fiscal year limitation, for the purpose of aiding or facilitating the work of the Office."

- **P.L. 105-277 of October 21, 1998 [H.R. 4328] (title VII of Division C) Office of**

**National Drug Control Policy  
Reauthorization Act of 1998**

**SEC. 708. COUNTER-DRUG  
TECHNOLOGY ASSESSMENT CENTER.**

(a) **ESTABLISHMENT.**—There is established within the Office the Counter-Drug Technology Assessment Center (referred to in this section as the “Center”). The Center shall operate under the authority of the Director of National Drug Control Policy and shall serve as the central counter-drug technology research and development organization of the United States Government.

(b) **DIRECTOR OF TECHNOLOGY.**—There shall be at the head of the Center the Director of Technology, who shall be appointed by the Director of National Drug Control Policy from among individuals qualified and distinguished in the area of science, medicine, engineering, or technology.

(c) **ADDITIONAL RESPONSIBILITIES OF THE DIRECTOR OF NATIONAL DRUG CONTROL POLICY.**—

(1) **IN GENERAL.**—The Director, acting through the Director of Technology shall—

(A) identify and define the short-, medium-, and long-term scientific and technological needs of Federal, State, and local drug supply reduction agencies, including—

- (i) advanced surveillance, tracking, and radar imaging;
- (ii) electronic support measures;
- (iii) communications;
- (iv) data fusion, advanced computer systems, and artificial intelligence; and
- (v) chemical, biological, radiological (including neutron, electron, and graviton), and other means of detection;

(B) identify demand reduction basic and applied research needs and

initiatives, in consultation with affected National Drug Control Program agencies, including—

- (i) improving treatment through neuroscientific advances;
- (ii) improving the transfer of biomedical research to the clinical setting; and
- (iii) in consultation with the National Institute on Drug Abuse, and through interagency agreements or grants, examining addiction and rehabilitation research and the application of technology to expanding the effectiveness or availability of drug treatment;

(C) make a priority ranking of such needs identified in subparagraphs (A) and (B) according to fiscal and technological feasibility, as part of a National Counter-Drug Enforcement Research and Development Program;

(D) oversee and coordinate counter-drug technology initiatives with related activities of other Federal civilian and military departments;

(E) provide support to the development and implementation of the national drug control performance measurement system; and

(F) pursuant to the authority of the Director of National Drug Control Policy under section 704, submit requests to Congress for the reprogramming or transfer of funds appropriated for counter-drug technology research and development.

(2) **LIMITATION ON AUTHORITY.**—The authority granted to the Director under this subsection shall not extend to the award of contracts, management of individual projects, or other operational activities.

(d) ASSISTANCE AND SUPPORT TO OFFICE OF NATIONAL DRUG CONTROL POLICY.—The Secretary of Defense and the Secretary of Health and Human Services shall, to the maximum extent practicable, render assistance and support to the Office and to the Director in the conduct of counter-drug technology assessment.

- **Conference Report 106-319 of September 14, 1999 [To accompany H.R. 2490] Making Appropriations for The Treasury Department, The United States Postal Service, The Executive Office Of The President, And Certain Independent Agencies, For The Fiscal Year Ending September 30, 2000, And For Other Purposes**

"For necessary expenses for the Counterdrug Technology Assessment Center for research activities pursuant to the Office of National Drug Control Policy Reauthorization Act of 1998 (title VII of Division C of Public Law 105–277), \$29,250,000, which shall remain available until expended, consisting of \$16,000,000 for counternarcotics research and development projects, and \$13,250,000 for the continued operation of the technology transfer program: Provided, That the \$16,000,000 for counternarcotics research and development projects shall be available for transfer to other Federal departments or agencies."

"The conferees agree to provide \$29,250,000 instead of \$31,100,000 as proposed by the Senate. The House had proposed \$29,250,000 in ONDCP's Salaries and Expenses Appropriation. The conferees agree to establish this new, separate appropriation account for the Counterdrug Technology Assessment Center (CTAC) as authorized in Public Law 105–277 and proposed by the Senate. It consists of \$16,000,000 for the core research and assessment activities of CTAC, as well as

\$13,250,000 for the counterdrug technology transfer program."

- **P.L. 106-58 of September 29, 1999 [H.R. 2490] Treasury And General Government Appropriations Act, 2000**

"For necessary expenses for the Counterdrug Technology Assessment Center for research activities pursuant to the Office of National Drug Control Policy Reauthorization Act of 1998 (title VII of Division C of Public Law 105–277), \$29,250,000, which shall remain available until expended, consisting of \$16,000,000 for counternarcotics research and development projects, and \$13,250,000 for the continued operation of the technology transfer program: *Provided*, That the \$16,000,000 for counternarcotics research and development projects shall be available for transfer to other Federal departments or agencies."

- **Conference Report (H. Rept. 106-479) on H.R. 3194, Consolidated Appropriations Act, 2000 (House of Representatives - November 17, 1999)**

**Division B, Title II -- Other Appropriations Matters**

"Sec. 237. In addition to amounts appropriated to the Office of National Drug Control Policy, \$3,000,000 is appropriated: Provided, That this amount shall be made available by grant to the United States Olympic Committee for its anti-doping program within 30 days of the enactment of this Act."

- **P.L. 106-113 of November 29, 1999: An act making consolidated appropriations for the fiscal year ending September 30, 2000, and for other purposes.**

**Division B, Appendix E, Title II -- Other Appropriations Matters**

"Sec. 237. In addition to amounts appropriated to the Office of National Drug Control Policy, \$3,000,000 is appropriated: Provided, That this amount shall be made available by grant to the United States Olympic Committee for its antidoping program within 30 days of the enactment of this Act."

- **Conference Report (H. Rept. 106-796) to Accompany H.R. 4516 Making Appropriations for the Legislative Branch for the Fiscal Year Ending September 30, 2001, and for Other Purposes. - July 27, 2000**

#### **Division B; Incorporation of H.R. 4985**

For necessary expenses for the Counterdrug Technology Assessment Center for research activities pursuant to the Office of National Drug Control Policy Reauthorization Act of 1998 (title VII of Division C of Public Law 105-277), \$29,053,000, which shall remain available until expended, consisting of \$15,803,000 for counternarcotics research and development projects, and \$13,250,000 for the continued operation of the technology transfer program: Provided, That the \$15,803,000 for counternarcotics research and development projects shall be available for transfer to other Federal departments or agencies.

- **Conference Report (H. Rept. 106-940) to Accompany H.R. 4475 Making Appropriations for the Department of Transportation and Related Agencies for the Fiscal Year Ending September 30, 2001, and for Other Purposes. - October 5, 2000**

Title V - Executive Office of The President and Funds Appropriated to the President, Office of National Drug Control Policy, Counterdrug Technology Assessment Center

The conferees agree to provide an additional \$7,000,000 for the Counterdrug Technology Assessment Center, including \$5,000,000 for the continued operation of the technology transfer program and \$2,000,000 for the continued development of the wireless interoperability communication project currently underway in Colorado. This much-needed project is in direct response to the wireless communication difficulties experienced by State and local law enforcement during the Columbine High School tragedy.

# Appendix B – Counterdrug Scientific and Technological Needs

The following list of priority scientific and technological needs reflects inputs from U.S. Customs Service (USCS), Department of Defense (DoD), U.S. Coast Guard (USCG), Drug Enforcement Administration (DEA), Immigration and Naturalization Service (INS), National Institute of Justice (NIJ), Federal Bureau of Investigation (FBI) and the National Institute on Drug Abuse. The Agricultural Research Service of the Department of Agriculture has also provided substantial input on their research program needs which is included in Appendix C.

The individual scientific and technological needs for each agency were combined into one composite listing according to "short" (1-2 years), "medium" (3-5 years) and "long-term" (over 5 years) time horizons for Nonintrusive Inspection, Wide Area Surveillance, Tactical Technologies and Demand Reduction applications. The needs have been annotated with the agencies specifically citing a particular need shown in parenthesis beside the description. The Federal Aviation Administration (FAA) also has been consulted on the scientific and technological needs for nonintrusive inspection. While the FAA nonintrusive inspection interests concentrate on explosives detection, many of the technologies and systems used to detect and identify explosives also can be adapted for the detection of illicit drugs.

## NONINTRUSIVE INSPECTION

### Short Term (1-2 years)

Improved x-ray and gamma ray detector technology (USCS)

Accurate signatures for detectable illicit drug emissions in operational environments for physical and chemical detection (USCG)

Computer assisted drug recognition for imaging systems (USCS)

Portable vapor and space detection (USCG/FBI)

Portable/transportable capability to detect and classify drugs and contraband in vessels, compartments and containers of all sizes during at-sea and port-side inspections (DoD/USCG)

Portable/transportable capability to detect false compartments or other anomalies in vessels, compartments and containers of all sizes (USCS/USCG/INS/FBI)

Technology/System for rapid and noninvasive screening of individuals for internal carries (drug swallowers) (USCS)

Portal Detection Systems for screening passengers for carrying drugs (USCS)

Standards for technologies that detect the presence of drugs on individuals (NIJ)

Cost-effective technology to detect small amounts of drugs in large volumes of mail or other packages (NIJ)

Cheaper, quicker, more reliable, and less invasive inmate drug testing device (NIJ)

Reliable replacement for urinalysis for drug use screening in a correctional environment (NIJ)

Surface Acoustic Wave - Immunoassay technology for narcotics detection (USCS)

Requirements/Design analysis for canine enforcement program R&D facility (USCS)

OTH technology that will provide 1nm positional accuracy for airborne targets (DoD)

Hand-held bulk currency detector (USCS/FBI)

Effective computer “data-mining” to identify (1) commercial maritime smuggling vessels/containers, (2) air smuggling aircraft in South America, and (3) land smuggling trucks/companies on the Southwest Border (DoD/USCS)

**Medium Term (3-5 years)**

R&D program for selective breeding of dogs (USCS)

Wide area surveillance technology to locate active major cocaine hydrochloride labs (DoD)

Rapid and safe detection of drugs in vehicles (cars and trucks) without removing occupants (USCS)

Improved automatic target detection, sorting, classification, tracking and identification, including OTH detection and tracking (USCS/USCG)

Rapid and safe detection of drugs in moving vehicles (USCS)

Improved correlation of multiple sensor inputs into one presentation (USCG)

Technology to rapidly detect drugs hidden on the underside of vehicles (USCS)

Automatic sorting and tracking (legitimate vs. suspect targets) (USCG)

Multi-purpose portal device that will detect soft and hard contraband (NIJ)

**Long Term (over 5 years)**

Develop unmanned aerial vehicles (UAV) applications with a multi-sensor package (>1000 nautical miles) (USCG)

Improvements to next generation nonintrusive tools for drug detection and space accountability (better, cheaper, lighter, smaller, more power efficient) (USCG/USCS/FBI)

Satisfy airspace control concerns for UAVs (USCG)

Improved (higher throughput, lower cost) large container inspection systems (USCS)

Command and control workstation that integrates surveillance, tracking, analysis and map data and includes communication interface with other computer information systems and voice communication networks (USCG)

**WIDE AREA SURVEILLANCE**

**Short Term (1-2 years)**

Ultra-wide area ocean surveillance tracking of low radar cross-section small craft (DoD/USCS)

Remote seismic, magnetic and infrared ground sensing to provide monitoring without agent presence at localized border areas (INS)

Over-the-Horizon (OTH) radar technology to effectively detect and track specific types of maritime targets (1) small craft (30-foot) with low radar cross-section and (2) 100-foot slow moving ships (10-15 knots) (DoD)

Long range stabilized EO/IR technology systems for maritime detectors and tracking applications (USCS)



Long range go-fast boat detection, classification, and tracking technology/system (USCS)

Night vision capability, including fixed and mobile long range surveillance target acquisition systems, wearable goggles, hand-held "pocket" units (INS)

Sensor alarm and dispatch support to communicate appropriate responses to agents in the field for events requiring response (INS)

Centralized command and control system integrating data from unattended ground sensors; infrared and other night vision systems, including an elaborate system of fixed cameras along the border; and dispatch data (INS)

Remote long line ground sensing to provide monitoring without agent presence in distant areas (INS)

Faster, more agile, quieter, and safer rotary wing capability (INS)

### **Medium Term (3-5 years)**

Advanced maritime platform (hull) design for surveillance and interceptor applications (USCS)

Miniaturized next generation covert tagging and tracking devices for airborne, maritime, and ground targets (DoD/USCS)

Airborne, standoff "tagging" of aircraft targets (DoD)

Airborne wide-area surveillance technology to detect masked marijuana cultivation and Meth laboratories (DoD)

Next generation of tunnel detection technology (DoD/INS)

Track recording system sufficient to reveal patterns and changes to patterns and routes used by drug traffickers on land, sea, and in the air. Integrate this capability with graphical information systems. Automatic integration of all source databases. Significantly improve the positional accuracy and integrated tracking of OTH and relocatable OTH radar to 1-2 nautical miles (USCG)

### **Long Term (over 5 years)**

Improvements to next generation wide area surveillance tools for integrated target tracking and positional accuracy (better, cheaper, lighter, smaller, more power efficient) (USCG)

## **TACTICAL TECHNOLOGIES**

### **Short Term (1-2 years)**

Environmentally friendly drug destruction technology (USCS)

Transportable system for the destruction of seized illicit substances in-situ (DEA)

Improved surveillance sensors for maritime (including aviation and unmanned aerial vehicle) use (radar, acoustic, high resolution night vision, low light TV, infrared, other electro optical systems) (USCG)

Computer forensic tools (FBI)

Internet/data processing tools (FBI)

Portable, non lethal capability to control, stop, or disable fleeing vehicles, vessels and aircraft on the ground (to include non-ordnance and ordnance delivery systems adapted to aircraft and high speed surface assets) (USCG/USCS)

Improved communications systems to share data across platforms, including tactical picture, from

APPENDIX B – COUNTERDRUG SCIENTIFIC AND TECHNOLOGICAL NEEDS

multiple sensor inputs: voice, data imagery, tactical situation information (USCG/FBI)	System for interception of traffickers communications over Digital Subscriber Line, Internet, and CATV (DEA)
Real-time worldwide tracking system for aircraft, vessels, vehicles, and packages (USCS)	Digital narrowband audio transmitter secreted in an operational wristwatch (DEA/FBI)
Shallow tunnel detection system that is highly mobile, easy to use, and can be readily interpreted by a law enforcement officer (INS)	Combination digital narrowband audio transmitter/recorder (DEA/FBI)
Methods for verifying the authenticity of digital videotape to assure that digital recordings have not been altered or modified (DEA)	Remote audio transmitter that operates off the existing cellular phone service networks and has user programmable formats (DEA)
Rapid, reproducible and improved method of digitally recording ridge detail from the palmar side of the hand (DEA)	500 MW digital narrowband transmitter that can be secreted in multiple concealments (DEA/FBI)
Comprehensive searchable digital database of spectral information for authenticated standards. The standards will include controlled substances, adulterants, diluents, starting products for drug synthesis, along with intermediates and by-products from drug manufacture (DEA)	Covert drop and run video surveillance system (USCS)
Personnel safety and security system for counterdrug agents with worldwide coverage (DEA)	Interception and direction finding of trafficker's communications over satellite telephone (DEA)
Title III voice identification system (DEA)	Conversion of T-III collections systems from analog to digital (FBI)
Facial identification system for surveillance (DEA)	Capability to transmit full or near full motion video imagery over conventional telephone lines using enhanced video compression techniques (DEA/FBI)
Go-fast boat detection and classification method (DEA, USCS, USCG, DoD)	Capability to combine future wide bandwidth Internet devices with full or near full motion video imaging (DEA)
Detection methods for identifying and locating operating clandestine cocaine manufacturing labs (DEA)	Stand-alone tracking display system supporting existing and future tracking and communications devices and systems designed to provide position data in the forms of latitudinal and longitudinal data and text messaging to a central monitoring site (DEA)
Detection methods for identifying and locating operating clandestine methamphetamine manufacturing labs (DEA)	Satellite based sensor relay unit with increased bandwidth efficiency and lower power requirements. Devices to accept input from

sensors, switches, etc. and transmit via global network (DEA)

Acoustic airfield monitor with long life, satellite data link and simplified deployment (DEA)

Integration of a GPS chipset in a miniature, high power search and rescue satellite (SARSAT) beacon (DEA)

Upgrade the current ONDCP funded Map N Track display software to operate with the additional GPS tracking devices. Expand coverage to include low-resolution world maps and high-resolution maps of U.S. territories. Add a data backup feature and incorporate a database (DEA)

Miniature, low power GPS tracking devices which utilize national terrestrial packet switch communications networks (DEA)

Off air digital cellular collection systems (FBI)

Miniature, low power GPS data loggers embedded in common equipment and packages (DEA)

Automated enforcement case tracking that supports the INS in its law enforcement mission, including identification, apprehension and removal of illegal aliens; the filing of administrative and criminal charges against aliens who commit illegal acts; and the seizure of contraband associated with illegal alien activity (INS)

Secure, digital, wireless and interoperable agency wide communications (INS/FBI)

Establishment of a law enforcement Antenna Systems Development Facility (ASDF). The ASDF would provide expert capabilities in radio frequency propagation technology (FBI)

Geographic information system which assembles, stores, manipulates and displays data over a map background (INS)

Rapid state-of-the-art fingerprint matching technology to ensure accurate identification of all apprehended aliens (INS)

Capability to rapidly capture fingerprints (INS)

### **Medium Term (3-5 years)**

Unmanned aerial vehicles which can be operated from large cutters at sea (USCG)

Information and decision support systems (USCG)

Track recording capability sufficient to reveal land/sea/air drug trafficking routes (USCG)

Low cost, easy to deploy airfield monitoring system (USCS)

Remote non-contact sensor for assessing passenger veracity during interviews (USCS)

Conversion of T-III collections systems from analog to digital (FBI)

Ability to retrieve and fuse information from heterogeneous databases including text (USCG)

Web-based intelligence/information architecture. Identification of potentially suspicious activity and of aggregate patterns and trends from large databases by linking together relevant information and by search for similar (versus identical) information (USCG/USCS)

Off air digital cellular collection systems (FBI)

Decision support systems to improve effectiveness of searches. (e.g., patterns recognition and profile development systems for targeting suspect vessels and traffickers) (USCG)

Mobile push to talk, low probability of intercept communications (USCG/FBI)

Improved “hands-free” surveillance (video/audio) recorders for maritime small high-speed surface vessel use: video, high resolution night vision, low light TV, infrared, other electro-optical systems (USCG)

**Long Term (over 5 years)**

Advanced tools to process collected communications (FBI)

Advanced tracking systems (FBI)

Improved next generation sensors, UAVs and database (better, cheaper, lighter, smaller, more power efficient) (USCG)

Unmanned aerial vehicles which can be operated from small cutters at sea (USCG)

High performance database systems which allow for aggregate queries on arbitrary criteria (USCG)

Software to automatically extract information from text and populate databases (USCG)

**DEMAND REDUCTION (National Institute on Drug Abuse)**

Demand reduction research priorities for drug abuse and addiction research are provided in two reports prepared by the National Institute on Drug Abuse (NIDA):

- The Sixth Triennial Report to Congress from the Secretary of Health and Human Services. *Drug Abuse and Addiction Research: 25 Years of Discovery to advance the Health of the Public*. National Institute on Drug Abuse. September 1999,

[NIDA Research Priorities and Highlights, pp. 23-32.]

- *Bringing the Power of Science to Bear on Drug Abuse and Addiction, Five Year Strategic Plan*. National Institute on Drug Abuse. September 2000. NIH Publication Number 00-4774.

CTAC's commitment to providing advanced neuroimaging tools to drug abuse research facilities provides much of the infrastructure needed for NIDA-sponsored scientists to pursue NIDA's strategic plan and five year goal, especially in the translation of basic neurobiological and behavioral research into new treatments. Scientists have used advanced imaging techniques to identify specific human brain circuits involved in craving, euphoria, and other sequelae of drug addiction and have used this information to provide the foundation for the development of new medications to block individual effects of drugs. These advancements will continue in improving the understanding of the genetic and environmental risk and protective factors that can prevent or lead to drug abuse and addiction.

# Appendix C – Counterdrug Research and Development Projects

## Research and Development Projects - Counterdrug Technology Assessment Center (2000)

### Demand Reduction

#### Cocaine Blockers

Two approaches to anti-cocaine therapeutic medications are being investigated. The first approach at Columbia University College of Physicians and Surgeons is developing a peripheral blocker that renders cocaine molecules not psycho-active in the bloodstream. A research team from Emory University's Yerkes Primate Center, the second approach, is seeking to find a medication to serve as a "front line" initial step toward normalizing addicts for further treatment.

- The peripheral blocker research project which uses catalytic antibodies has altered the development approach for anti-cocaine therapeutics away from molecules that compete with drug binding sites in the brain and toward large molecules (antibodies) that intercept cocaine in the bloodstream before it reaches the brain. The current stage of the research is to improve rates per reaction and to collaborate with University of Michigan on humanization experiments. The experimental trials of the anti-cocaine antibody 15A10 in a rat model have been completed. The results of these trials have been accepted for publication in the Journal of Pharmacology and Experimental Therapeutics. The University of Michigan

will use Medimmune derived mutants of the humanized anti-cocaine catalytic antibody in small primate tests.

- The second approach involves cocaine analog medication research that would be a substitute compound that could be used by a physician as a medication to assist in normalization of the cocaine addict in order to begin rehabilitation. The substitute medication would partially block the receptor, but would still allow dopamine re-uptake while preventing the cocaine from adhering to the receptor site. Experiments are being conducted to determine whether the compounds are reinforcing by themselves by allowing the monkeys to self-administer. Another goal is to establish the time course and the inhibitory effects of these cocaine analogs on neurotransmitter uptake. The pretreatment times and doses for testing the cocaine analog compounds RTI 112 and RTI 117 has been established. The current phase of the effort includes determining the effects of RTI 51 on the stimulus-termination and to establish its time course. Completion is scheduled for the second quarter of FY002

#### Brain Imaging Technology

This initiative provides advances in neuro-imaging technology and infrastructure to increase the level of drug abuse research activity conducted at various medical research facilities. These advanced brain imaging facilities employ positron emission tomography and functional magnetic resonance imaging technologies, ranging in strength from three to seven Tesla, to expand drug abuse research and to accelerate the development and evaluation of new drugs for treatment.

Last year, the University of Pennsylvania designed and fabricated a PET system that uses gadolinium orthosilicate crystal detectors for imaging the human brain. The new PET scanner was designed to have improved spatial resolution, higher sensitivity, and higher count-rate capability compared to PET systems using sodium iodide crystal detectors. This PET scanner will be used to support receptor binding site studies that use  $^{11}\text{C}$ -tagged raclopride radio-ligands to map the pathways of cocaine and heroin addiction with high resolution and specificity. The system was completed in the second quarter of FY 2001.

In order to push forward our understanding of molecular brain pathology due to drug abuse, there is a need to apply PET in animal models, particularly non-human primates. Crump Institute for Biological Imaging at UCLA has received a new MicroPET laboratory that will combine ultra-high resolution PET and stereotactic injection of experimental probes. The laboratory is located at the Sepulveda Veterans Administration Medical Center, adjacent to the vervet monkey colony. The program offers the opportunity to study the role of specific genes important to brain function, linking biochemical events that can be studied with PET to behavior that can be studied in a monkey population of well-defined lineage. The project will be completed in third quarter of FY 2002.

Several new advanced neuroimaging centers to support research on the effects of drugs of abuse will be complete this year. During the first quarter of FY2001, Massachusetts General Hospital received a 7 Tesla magnet that was installed at the Athanoula A. Martinos Center for Functional and Structural Biomedical Research in Charleston. Harvard University and Massachusetts General Hospital will use the new 7 Tesla functional Magnetic Resonance Imaging (fMRI) system for a collaborative

research on brain circuitry. A 3 Tesla fMRI center at Emory University partially sponsored by the R&D program will support imaging studies to map the pathways of drug craving and addiction in the brain.

McLean Hospital in Boston has received a high field (4 Tesla) fMRI and magnetic resonance spectroscopy (MRS) scanner that will be used for clinical assessments of drug addicts and basic addiction research. Clinical research will begin in the second quarter of FY 2002. The system will acquire high-resolution images of drug metabolites, human chemistry and brain activity volume by using magnetic resonance (MR) visible carbon 13.

By the second quarter of FY 2002, new neuroimaging facilities at University of Pennsylvania, University of California at Los Angeles, Massachusetts General Hospital, Emory University, and Harvard University/McLean Hospital will be installed, calibrated and processing images that advance the nation's drug abuse research program.

Scientists from the Research Triangle Institute using the NIDA IRP PET brain scanning system are assessing the role of impaired cognitive functioning and looking for vulnerability factors or markers for specialized treatment regimens. The first phase of this project addressed the elements of patient selection, task assignments and planning to optimize the PET scans in the second phase. The second phase, which includes PET scans, began in second quarter of FY 2001. The project should be completed in third quarter of FY 2002.

#### Drug Evaluation Network System

For the past four years, researchers at the National Center for Addiction and Substance Abuse (CASA) at Columbia University and Treatment Research Institute at University of Pennsylvania have been developing the Drug Evaluation Network System (DENS). DENS is a

central computer system using the latest database and executive information system technology. It contains algorithms to evaluate and monitor substance abuse treatment programs by tracking patients entering treatment, their characteristics and discharge status. The Addiction Severity Index (ASI) constitutes the primary screening and assessment instrument for the system. Researchers from the Treatment Research Institute have extended ASI capabilities to incorporate up to 40 additional questions and comments. This information is online and is made available to treatment providers, researchers and managers. This year, DENS transitioned to the Substance Abuse and Mental Health Services Administration as the drug abuse treatment data collection backbone for the National Treatment Outcome Monitoring System (NTOMS). The National Evaluation of Substance Abuse Treatment (NESAT) methodology also will be completed this year.

Diversion Program for Juveniles & First Offenders

The juvenile diversion project with the New Orleans District Attorney's Office is an innovative attempt to improve drug abuse treatment for first time youthful offenders. It examines the effectiveness of treatment approaches with 12 to 16 year old, first-time, non-violent juvenile arrestees who are substance abusers. The juveniles have their case "diverted" out of the normal judicial process, pending completion of program requirements. The program includes supervised treatment, expanded after school curriculum, case management and counseling services for the entire family. Changes in outcome measures are examined from information obtained through follow-up contacts at approximately 6 and 12 months following arrest. These measures include self-reported drug use, drug testing results, criminal recidivism and aspects of psychological functioning. This

research project will be completed during the third quarter of FY 2001.

Substance Abuse and Drugs in Sports

An analysis of the abuse of banned performance enhancing substances among Olympic athletes was conducted by the National Center on Addiction and Substance Abuse. The report entitled "Winning at Any Cost: Doping in Olympic Sports" dated September 2000 provided recommendations for improvement in substance abuse regulations, testing, sanctions and treatment for Olympic athletes. This project is complete.

In FY 2000 ONDCP provided a grant to the U.S. Anti-Doping Agency (USADA) to support research on human growth hormones, androgens, anabolic steroids, and addiction. USADA held its first Anti-Doping Research Summit in October 2000 where they adopted an aggressive, comprehensive research agenda. As this research agenda is developed, ONDCP/CTAC will attempt to identify research areas of mutual interest.

**Supply Reduction**

Coded Aperture Fast Neutron Analysis

Scientists from Massachusetts Institute of Technology (MIT) are working to overcome some of the limitations inherent in x-ray and disadvantages in pulsed fast neutron analysis inspection systems, including the need for expensive particle accelerators, mechanical scanning, and tight pulsing while reducing system costs. A breadboard coded aperture array test stand has been fabricated and experiments are being conducted to identify individual elemental constituents of the materials within a pallet cargo volume. An innovative spin-off application of the coded aperture array has been demonstrated with Single Photon Emission Computed Tomography (SPECT). By mounting a coded aperture to an existing SPECT camera,



preliminary experiments show substantial improvements in the clarity and resolution of images of a small animal.

#### Neutron Interrogation Probe

A prototype transportable neutron-based probe was fabricated by Western Kentucky University and will be tested in conjunction with U.S. Customs Service in fourth quarter of FY 2001 for inspecting pallet-sized commodities. The system concept is based on the detection and analysis of elemental images based upon characteristic gamma rays emitted from inelastic and thermal neutron interactions. The probe is being evaluated in configurations that are integrated with x-ray and gamma ray systems used for inspecting vehicles, pallets and cargo for illicit drugs.

#### Detector Dog Breeding Strategy

A drug detection dog breeding strategy has been formulated in conjunction with the U. S. Customs Service based upon quantitative genetic principles proven by the Australian Customs Service. The first graduates are currently working at ports of entry. Initial results indicate the potential to establish a world-wide gene pool for substance detection canines. This project will be completed in FY 2001.

#### Raman Spectrometry Drug Analyzer

A near infrared Raman spectroscopy method is being developed to identify drugs in solid mixtures (e.g., pills) and aqueous solutions. This device will incorporate a fiber optic probe feature to minimize sample preparation and allow in situ analysis of the contents of transparent containers. Five prototype systems will be delivered for testing by DEA, Customs, and Coast Guard personnel in third quarter of FY 2001.

#### Dual-Detector Ion Mobility Spectrometer

A dual detector prototype is being developed at MIT Lincoln Laboratory for drug detection in contaminated backgrounds using two types of ion mobility spectrometers (proton affinity and UV photo-ionization). The prototype will be tested for its ability to discriminate across a broad spectrum of background materials.

#### Surface Acoustic Wave and Immunoassay Sensors for Illicit Drugs

A system concept is being developed by researchers at Georgia Institute of Technology is investigating a surface acoustic wave sensor and immunoassay system. Its selectivity is based upon molecular recognition by antibodies for the highly specific detection and identification of trace amounts of cocaine. Testing of a prototype system will begin in fourth quarter of FY 2001.

#### Ultrasonic Flashlight Probe

A handheld, ultrasonic transmitter and receiver prototype was tested in third quarter of FY 2000 for its capability to assist in inspecting liquid filled containers on maritime vessels and storage tanks. The system, designed by scientists from Los Alamos National Laboratory working with personnel from the Coast Guard R&D Center, generates a tunable tone burst and detects the return echoes using a single piezoelectric transducer. Digital signal processing is used to determine the distances and magnitudes of the return echoes. A small quantity of prototypes will be fabricated by a commercial vendor for additional testing later this year.

#### Molecular Imprint Polymer for Detection of Methyl Benzoate

A methodology similar to the approach used to detect nerve agents in biological and chemical warfare scenarios is being investigated by scientists at John Hopkins University Applied Physics

Laboratory to detect trace amounts of drugs. The approach involves developing a molecularly imprinted polymer-based sensor to detect methyl benzoate vapor as an indicator of the presence of cocaine. The project will be completed in third quarter of FY 2002.

Inhibition of Anhydrous Ammonia for Methamphetamine Production

Agricultural anhydrous ammonia is frequently stolen from farmers in the midwestern United States to be used in the production of illicit methamphetamine. A feasibility study is being performed by scientists at John Hopkins University Applied Physics Laboratory to determine potential methods for altering agricultural anhydrous ammonia to render it unsuitable for methamphetamine production while retaining its current safety characteristics and agricultural benefits.

INMARSAT Tags

A family of electronic tags was developed in conjunction with DoD and DEA for tracking airborne platforms, land vehicles and maritime vessels. The tags use GPS satellite communications systems (such as INMARSAT) to report data to a central control center. They all feature small, lightweight packages with low power consumption and long battery life. This project is completed and the tags are being deployed by DEA.

Automated Unmanned Air Vehicle (UAV) Flight Control Systems

In conjunction with the U.S. Coast Guard and DoD, a project is being conducted to exploit emerging commercial-off-the-shelf technology for the development of a small lightweight flight control system for small low-cost UAV systems. A novel control scheme is used to make the control and navigation systems "user friendly" to significantly reduce operator training

requirements. Flight tests are scheduled for third quarter FY 2001.

CRYSTAL

A scalable information tool for organizing and presenting crime and case-related information in conjunction with tracking and surveillance management systems is being developed. The system will allow users to visualize possible associations of criminal activity to a target under surveillance against a geographic background. The system enables the integration of real-time location and tracking systems with the associations to permit both strategic and tactical planning and execution. This project will be completed in third quarter FY 2001.

RIONet

An advanced information technology system is being developed in the Rio Grande Valley area of south Texas. The system will enable participating police departments to share information from individual data bases and analyze the information using advanced data mining and link analysis tools. The system overcomes typical problems associated with incompatible records management systems.

**Technology Testbeds and T&E Support**

The support program provides testbeds, instrumentation and engineering support to perform testing of prototypes in operational environments. The testbed program will continue in FY2001 with a concentration on communications interoperability, information technology, and benchmark comparisons of similar systems under development.

Communications and Sensors

Technology demonstration sites have been established with participating law enforcement organizations in New York, Maryland, Colorado, Texas, Arizona and California to evaluate operational surveillance and communications

solutions to drug-related law enforcement operations.

A wireless communications interoperability project will be continued in Colorado to evaluate and demonstrate innovative communications concepts and advanced capabilities to overcome technical difficulties encountered in areas of the country with conditions similar to Columbine, CO.

Information Management and Exploitation

Technology demonstration sites have been established with participating law enforcement organizations in California, Colorado, Idaho and Iowa to provide investigators with improved software technology to assist in solving drug related cases more effectively. Case management system prototypes are being configured to develop temporal pattern detection algorithms, to evaluate prototype software tools for crime analysis, and to deploy advanced data mining tools to track offenders. Other emerging system concepts include superfast computer backup capabilities that could be deployed on-site.

Outreach

The sixth ONDCP International Technology Symposium will be held during June 2001 in San Diego, CA. The program will be supported by the federal drug control agencies and include the presentation of over 100 technical papers with 400 attendees. In addition, support is provided to interagency technical working groups, such as the Scientific Working Group for the Analysis of Forensic Drug Samples (SWGDRUG). The objective of the SWGDRUG is to initiate and develop a minimum standard for the identification of controlled substances in forensic science laboratories.

**Technology Transfer Program**

The Technology Transfer Program provides technologies developed with federal funding directly to State and local law enforcement agencies that may otherwise be unable to benefit from the developments due to limited budgets or lack of technological expertise. This program matches existing technology systems with state or local law enforcement agencies in need of those technologies and funds the technology transfer.

The \$39,052,000 appropriated over the past three years has made possible the delivery of 1,808 pieces of equipment to 1,325 state and local law enforcement agencies. Hands-on training and limited maintenance support are provided to all recipients. Over this period, equipment and training were provided to approximately nine percent of the 16,000 sheriffs and police departments in the United States. The comments from the recipient agencies indicate that the technologies provided by the program have resulted in improved operational capabilities that otherwise would not have been possible because of limited budgets or lack of technical expertise.

**Research and Development Projects - U.S. Customs Service (2000)**

**Nonintrusive Inspection**

Railroad Car Gamma Ray Imager

Testing of a prototype system using a Cesium-137 gamma ray source to inspect railroad cars for contraband and drugs will be completed in FY 2001. The system reads the car identification numbers and records an image of each car along with the transmission image.

Currency Training Aids for Canines

Improved training aids for canines in the currency detection program will continue to be developed this year.

### Evaluation of Trace Detection Systems

Test and evaluation activities of several trace detection systems using ion mass spectroscopy will be continued.

### Thunder Mountain Evaluation Center

The Thunder Mountain Evaluation Center, located in Fort Huachuca, Arizona, provides a controlled operational test environment for nonintrusive inspection systems prior to the introduction of the systems to operations at ports of entry on the border. The location provides facilities and personnel to support test, evaluation, technical analysis, and operator training and logistic support for the systems.

### Pulsed Fast Neutron Analysis Field Test

Beginning in FY 2002, Customs Service will evaluate a prototype Pulsed Fast Neutron Analysis (PFNA) - based cargo inspection system at the Ysleta (El Paso) Texas port of entry in conjunction with DoD and FAA. The purpose of this test is to evaluate the detection capability, throughput, and other operational characteristics of the system under sustained operational conditions and with stream-of-commerce vehicles for counter-terrorism and counterdrug missions.

## **Research and Development Projects - Department of Defense (2000)**

### **Non-Intrusive Inspection**

#### Maritime Container X-ray System

This system will provide for dockside inspection of large intermodal (sea/land) cargo containers. It is mounted in a modified self-propelled container transporter. It uses a two setting (2 MeV or 6 MeV) linear accelerator to generate transmission x-ray images. Demonstration and

evaluation testing is scheduled to be completed in CY00. If successful, transition of this technology to the Customs Service is anticipated.

#### Large Pallet X-ray System

This system can accommodate pallets and air cargo containers up to 8 ft high and 8.5 ft wide. It has been designed to use a special 1 MeV nested high voltage x-ray source, and is capable of generating both transmission and backscatter images. It was evaluated during CY00 in a joint demonstration with the Customs Service and the Federal Aviation Administration.

#### Portable Inspection System

Law enforcement agencies boarding boats at sea suspected of drug trafficking require a portable inspection system that can penetrate up to 2 inches of steel to search for hidden compartments and drug packages. This project will develop a portable detection system for that application that is affordable and effective for a variety of inspection applications.

#### Nonintrusive Inspection (NII) Testbed

The Thunder Mountain Evaluation Center, located in Fort Huachuca, Arizona, provides a controlled operational test environment for NII systems prior to the introduction of the systems to operations at ports of entry on the border. The location provides facilities and personnel to support test, evaluation, technical analysis, and operator training and logistic support for the systems. DoD is discontinuing support of this facility this year while U.S. Customs Service is going to continue in support of their counterdrug and contraband detection missions.

### **Wide Area Surveillance**

#### Relocatable Over-The-Horizon Radar (ROTHR) Technology Enhancements

The Department of Defense operates the relocatable OTH radar systems to detect and track aircraft engaged in illicit drug trafficking. Enhancements currently under development or being installed in the operational system include 1) boat detection and tracking algorithms, 2) improved tracker for airfield surveillance, 3) tracker improvements to decrease false alarm rate, 4) Azimuth nulling to reduce effects of range coincident spread Doppler, 5) automated ray tracing and terrain mapping to support enhanced coordinate registration and, 6) advanced CFAR thresholding for proper noise environment characterization.

#### Advanced Jungle Laboratory Detection System Evaluations

Studies and evaluations are being performed with a variety of sensors to determine their ability to detect and identify drug laboratory activities hidden in jungles. These include multi-spectral and hyperspectral imaging systems, magnetic detection sensors, advanced radar systems, passive microwave and radio frequency detection systems. If successful, these evaluations could lead to the development of enhanced sensors to be used operationally.

#### Autonomous Acoustic Sensor System

An underwater acoustic sensor system is being developed to detect, classify, and report the presence of small boats in shallow water. The system, currently under development, consists of a buoy that contains a power source, GPS receiver, acoustic sensor, processor, and satellite data link transceiver. Once a target is detected, its location is sent via the satellite data link to a central control center.

#### Detection and Monitoring Studies

This project is an in-depth analysis addressing the detection, monitoring, and interdiction process for the counterdrug transit and source

zones (i.e., Central America, South America, and the Caribbean). This analysis provides an assessment of air and maritime detection and monitoring operations in the transit zone with particular emphasis on improved surveillance. The results of the analysis are provided to the DoD Coordinator for Drug Enforcement Policy and Support, the Joint Chiefs of Staff, and the United States Interdiction Coordinator. The results are used to assess and, as required, improve the effectiveness of detection, monitoring, and interdiction operations. In addition, studies and analyses are performed on existing and newly emerging sensors for use in the counterdrug mission area.

#### Checkpoint Monitoring for Bolivia

The purpose of this effort was to identify low-cost, commercially available, ground sensors suitable for supporting ground forces in denying nighttime circumvention of checkpoints and roadblocks in Bolivia. Requirements for this capability have been established. Site surveys and equipment mix has been determined. Equipment has been selected, purchased and shipped to Bolivia. Training of Bolivians by U.S. Marines was planned for August 00 but delayed due to vetting issues. Training is being re-planned and is expected to occur within the next 3-4 months. An operational capability will be demonstrated once training is complete.

#### Satellite Data Exploitation

Under this program multi-spectral and hyperspectral data collected from commercial satellites is exploited to provide imagery for Colombian Counterdrug forces, crop detection and characterization, and detection of unintended emissions from illegal drug labs. Colombian forces are being given an excellent tool to use in better understanding the lay of the land in their area of operations. Results of analysis of this data can be used to refine the assessments developed by CNC and provide policy makers with a snap

shot in time of the magnitude of coca cultivation in Colombia. Finally, unintended emissions, radiated or non-radiated, can be exploited in the detection of illegal drug labs hidden in the jungles.

## **Tactical Technologies**

### Data Mining and Analysis

Several data mining and analysis tools have successfully been developed and deployed at various government agencies including SOUTHCOM, JIATF-E, and along the Southwest Border POEs with the U.S. Customs. These tools process large amounts of data, graphically display connections and make predictions on future events or suspect actions based on these associations. Analysts and law enforcement officials have successfully used these tools to identify criminal intent and activities, provide investigative leads, and select vehicles for search at the POEs. Future enhancements will include strategic data mining capabilities intended to anticipate changes in the modus operandi of drug cartels.

### Tagging and Tracking Systems

This project provides support to the military, and as appropriate, the law enforcement agencies in the application of new global tagging technology. A family of electronic tags is under development that can be used for tracking airborne platforms, land vehicles, and maritime vessels. The tags use GPS satellites or other means to self locate, and satellite communication systems (such as INMARSAT) to report data to a central control center. They all feature small, lightweight packages with low power consumption and long battery life. The development of the first of these devices has been completed. It provides a real-time worldwide tracking capability and is also currently the world's smallest INMARSAT transceiver. A geographical information system

that enables a command center operator to display the location of each tag on a map display is completing development and is in beta testing. A data distribution network which will allow data to be viewed simultaneously by authorized users worldwide is under development. A geographic information system is also under development that enables a command center operator to display the location of each tag on a map display.

### Clandestine Airfield Monitor

Man emplaced and air deployed clandestine airfield monitors are in development that will allow the detection of personnel and approaching aircraft at clandestine airfields. This development is based on enhancements to existing unattended ground sensors. The equipment is small enough to be carried in a backpack, will have an unattended operational life of at least 6 months and be able to communicate from anywhere in the world via satellite.

### Fast Boat Interdiction

A variety of non-lethal means to stop go-fast boats have been developed and evaluated. Prototype surface-to-surface and air-to-surface capabilities have been developed. Current efforts are concentrating on the completion of an air delivered system. Surface delivery testing of the system has been successful and development of a delivery mechanism for surface craft is underway.

### Timeline Analysis System (TAS)

This project developed a series of automated graphical aids and visual analytical tools for analysts. It provided an easy to use interface that allowed the analyst to graphically track events on a map, on a timeline, or as a process display. It has been introduced at both SOUTHCOM and at Joint Interagency Task Force - East. Enhancements developed under this project allow the system to operate on a variety of platforms operating with different operating systems and

allow greater flexibility and utility for the operational commands.

### Biometric Integration

The objective of this project is to conduct integrated demonstrations of automated biometric recognition systems (facial, fingerprint, and voice) to positively identify suspects in a booking station and other applications. To achieve this objective, the program supports research in facial recognition algorithms; the collection of a large database of facial images; the integration of algorithms into a test bed; independent testing and evaluation of facial recognition algorithms; and demonstration of the fusion of biometrics in real-world situations. Excellent results have been achieved to date. DoD, in conjunction with DARPA and NIJ conducted the Facial Recognition Vendor Test 2000 (FRVT). FRVT was an independent performance evaluation of existing commercial facial recognition systems. This testing was successful and is being recognized as the next benchmark in facial recognition within the biometric community. Cooperative research between ONDCP-CTAC, DoD, DARPA, and NIJ is also continuing in the area of non-cooperative human identification at a distance. Development of an automated voice identification capability for Title III investigations is underway to automate speaker identification during the processing of large amounts of wiretap voice recordings. Working with several law enforcement agencies is planned to demonstrate and evaluate performance in real world applications.

### HAMMER

This is a multi-year development project to investigate advanced state-of-the-art training and simulation technology for use in Counterdrug multi-agency law enforcement applications. It will utilize remote learning to effectively reach many users at low cost.

## **Research and Development Projects - Drug Enforcement Administration (2000)**

### Digital Audio/Video Authenticity

The DEA is exploring methods for law enforcement agencies to assure that digital recordings have not been altered or modified in any manner.

## **Research and Development Projects - Federal Bureau of Investigation (2000)**

### Telecommunications Surveillance

In the area of Wireless Network Development, FBI is conducting an ongoing evaluation of commercial/emerging technologies of off-air and direction finding capabilities. In FY 2001, CDMA-based technologies are a priority. FBI is also conducting ongoing evaluation of high capacity technology circuits and digital loop carrier circuits to investigate tactical intercept techniques in support of electronic surveillance in drug related investigations.

### Remote Physical Surveillance/Tracking Technology

FBI is evaluating, testing, and modifying new remote surveillance devices necessary to conduct effective drug surveillance. FBI will continue to perform research and monitor developments for practical chemical taggant tracking solutions.

### Computer Forensics/Data Processing Tools

FBI is evaluating, testing and modifying commercial data analysis/processing tools and computer forensic tools to address growing backlog of collected digital evidence.

## **Research and Development Projects - Immigration and Naturalization Service (2000)**

### Shallow Tunnel Detection: Test and Evaluation

The INS is exploring the merits of a new approach to seismic tunnel detection using a proprietary Pulse-Detonation Wave Projector technology. The technology may allow for the capture of highly focused, clear image data from the subsurface in multiple focal lengths and in real time without moving or modifying the receiver configuration. The final result should be a system with high resolution and ease of deployment for use by the U.S. Border Patrol along the Southwest Border in detecting illegal traffic, including individuals and illicit drugs.

## **Research and Development Projects - U.S. Coast Guard (2000)**

Digital Nighttime Investigation of Telephoto Equipment for Identification System - A digital airborne image acquisition and target alignment/illumination system is being developed to facilitate positive, in-flight nighttime identification of target vessels.

Sensor Technology Evaluation – Sensor performance modeling & simulation tools are being created to develop the concept of operations and tactical procedures to most effectively use Coast Guard cutters and aircraft outfitted with several new sensor systems.

Technical Evaluation of Acoustic Detection Systems for Go Fasts - A prototype unattended underwater acoustic sensor is being developed which will be capable of detecting and classifying small boats and communicating this information to operational forces in a timely manner. This project is being done in conjunction with the DoD project “Autonomous Acoustic Sensor System.”

UAVs as Over-the-Horizon Sensors – Demonstration of how unmanned aerial vehicles can provide an Over-the-Horizon sensor platform for deployed Coast Guard cutters to detect, classify and identify maritime targets.

Vessel Search Via Detection of Contraband and Their Precursors - Analyzing new technology applications, methods and procedures in support of improved vessel searches. Specific areas of investigation include: (1) countermeasures against obscurants used in attempts to foil detection by ion mobility spectroscopy equipment and technology, and (2) the potential of adapting existing technologies to collect, analyze and accurately report the presence of cocaine vapor directly or via one of its vapor by-products.

Vessel Search via Detection of Anomalies - Using low energy interrogation technologies and techniques such as ultrasonics, the Coast Guard is developing a prototype imaging device and evaluating its potential as a tool for searching vessel tanks for contraband and locating hidden compartments.

Vessel Interception, Disabling and Marking - Development and assessment of new technologies, including non-lethal, that support Coast Guard interdiction of suspect vessels. They are demonstrating different technological approaches, which can be used at standoff distances to apply markers to suspect vessels; or to disable or inhibit them from evading the pursuit assets. Approaches under investigation include propulsion inhibitors, engine disrupters and direct disabling fire. Anti-personnel options being explored include chemical irritants, soft blunt trauma monitors, and acoustics and dazzlers.



## **Research and Development Projects - U.S. Department of Agriculture Agricultural Research Service (2000)**

### **Coffee and Cocoa Initiative**

In Fiscal Year 2000, Congress increased the ARS appropriation by \$800,000, specifically earmarked for research into the improvement of the coffee and cocoa genome and the development of integrated pest management and sustainability strategies relative to those crops. Both crops are integral to the stability of agricultural exports in tropical countries worldwide, and particularly in Central and South America, where both industries are dominated by small scale farmers. Total worldwide trade for coffee is estimated at \$4.2 billion annually and cocoa at \$2.6 billion annually, based upon 1999 production statistics. As value added crop, cocoa is especially important to U.S. industry and farmers. The U.S. is the second largest importer of cocoa beans, accounting for 12% of the 2.794 billion metric tons of bean grindings, worldwide. Substantial value added exists in the related manufacture, sale and export of chocolate products by the confectionary industry and related sales of milk products, peanuts and sweeteners by U.S. farmers in the industry. Milk and milk concentrate product sales to the chocolate industry alone account for over \$0.5 billion annually.

Additional considerations apply to these tropical tree crops. The relative health of both industries are pivotal in maintaining social, economic and political stability in key Latin American countries. Coffee alone accounts for over 9% of Colombian gross domestic product and engages fully 23% of the rural labor force. Cocoa is an important secondary tree crop in all of the Americas, well-adapted to a low-input, agroforestry environment. The potential loss or decline of either of the industries leaves few alternatives for small-holders other than out-

migration to either large cities or to narcotics producing areas. Both crops are under severe disease and insect pest pressure. In the case of the cocoa, Witches' Broom (*Crinipellis pernicioso*) and Frosty Pod (*Moniliophthora roreri*) have reduced the large Brazilian industry by 75% and have virtually negated Peruvian and Costa Rican production. Research strategies involve the use of biocontrol to establish competitive micro-organisms to both diseases since there are no apparent safe and effective fungicides. Long-term, the development of resistant cocoa strains is critical to a sustainable cropping system. Appropriate tissue culture and embryogenesis technologies for rapid propagation of elite material have already been identified. In the case of coffee, effective insect predators (wasps) have been identified for the biological control of the primary pest, the coffee berry borer (*Hypothenemus hampei*). Unfortunately, large scale releases of the control agents will only be cost-effective, if useful artificial diets for the predators are developed. Current control of the borer is dependent on endosulfans, the over-use of which has created severe environmental damage and the corollary development of resistance in the target pest species.

### **Narcotics Control Research**

ARS has maintained a narcotics control research budget since 1972. Since fiscal year 1990, the appropriation has remained unchanged. The core program has been oriented toward the control of illicit narcotic crops, including cocoa, opium poppy and cannabis using environmentally sound control agents including chemical herbicides. Non-traditional control techniques, including mechanical agents, biological control and the retardation of narcotic plant biochemistry, have also been examined. This program has resided at the Beltsville Agricultural Research Center, Beltsville, MD.

Customers of the core narcotic control program include the U.S. law enforcement community,

both federal and local, foreign affairs agencies, primarily the U.S. Department of State, and international organizations charged with reducing the traffic in illicit narcotics, primarily centered in the United Nations. In 1980, at the request of the new Administration, an alternative crop component was added, primarily focused on shifting tribal people from opium culture to legitimate economic crops in Southeast Asia. Since that time, the focus of this program element has shifted primarily to cocoa producing and transit areas of South America. As a response to legislative mandates imposed upon the U.S. department of State and the intelligence community to report accurate, worldwide estimates of illicit narcotic crop acreage and production, remote detection, estimation and narcotic plant chemistry and taxonomy elements were incorporated into the program in 1994.

The program requires approximately 11 full time scientists, as well as ancillary support personnel. Unfortunately, due to increasing personnel costs, there has been a net decrease in two scientist positions. Additionally, due to the unusual nature of the research, greenhouses and field stations must be maintained at high cost due to obvious security constraints. ARS acts as curator of both narcotic plant genetic material and living plants, with the exception of cannabis, which is the responsibility of the University of Mississippi, under a grant from the National Institutes of Health. These collections are used by a wide variety of federal and state agencies as well as cooperating international organizations. The program maintains significant international collaborations by necessity with the current emphasis upon Colombia. Other foreign collaborations include Peru, Panama, the former Soviet Union and Thailand.

The current program cannot be maintained even at reduced staffing levels, without a modest increase in budget.

## **Narcotics and Alternative Crop Research**

### Sustainable Alternative Crops in Tropical Environments:

Primary emphasis upon sustainable tree crops in tropical environments, with particular attention to cocoa and coffee. Linkages have been made with U.S. industry and cooperating foreign donor organizations. Secondary emphasis crops include banana, plantain, cassava, potato, cashews and other tree nuts. Integrated pest management strategies will include the exploration, characterization, bioassay and field trial of endophytes for disease control as competitive organisms and saprophytes as secondary control agents. Artificial diets for parasitoids of tree pests will also be a major secondary objective. The additional earmark received in FY 2000 will be primarily directed toward the identification of genetic markers of disease resistance in candidate tropical tree crops, with emphasis upon cocoa. The effort also envisages the breeding and dissemination of elite genetic material through the ARS Tropical Research Station in Mayaguez, PR.

### Narcotic Plant Detection and Remote Sensing

Remote detection of illicit narcotics, primarily cannabis, on U.S. public lands. (This program has been reduced from FY 1999. This effort will be re-directed to integrated pest management in tropical trees, primarily coffee.)

### Narcotic Plant Chemistry, Herbicides and Taxonomy

Maintenance of the ARS narcotic plant collection; characterization and genetic profile of narcotic plants, narcotic plant chemistry, herbicidal eradication including evaluation of environmental consequences. Substantial success has been achieved at developing environmentally safe herbicides and adjuvants for narcotic plant control overseas.

Biological Control of Narcotic Plants

Final evaluation and publication of results on the biological control potential for narcotic plants will be completed by December 2002. (This program has been reduced from 1999 levels; primary redirection will be towards integrated management of phytophthora in tropical and temperate environments).

**Research and Development Projects – National Institute of Justice, Office of Science and Technology (2000)**

**Tactical Technology Development**

Detection of Date Rape Drugs in Hair and Urine

This project will develop a methodology to detect flunitrazepam (rohypnol) in the hair of suspected date rape victims. Detection time in other biological fluids is limited because of the relative short half-life of the drug and its metabolite, 7-amino flunitrazepam. The extremely sensitive confirmatory assay was initially applied to the detection of the flunitrazepam and its metabolite in hair but will be expanded to include other benzodiazepines such as diazepam, clonazepam, triazolam and alprazolam. The project will be expanded to examine the detection feasibility of other date rape drugs in specimen samples. These include gamma hydroxy butyrate (GHB), ketamine and scopolamine. The information would be valuable in helping to get an overall picture of the role various drugs might play in criminal sexual assault.

Law Enforcement Data Mining Analytical Tool

This project supports the University of Maryland's Baltimore/Washington High Intensity Drug Trafficking Area's update of the Suspect Pointer Index Network (SPIN). SPIN is a case management/pointer index database used throughout the HIDTA region and in many

other locations across the nation to track case information. Its functionality provides a useful complement to the HIDTA's "Advanced Analytical Tool for Law Enforcement" initiative.

The SPIN update will include two versions of the case management/pointer index database. The first version will be a stand-alone Microsoft Access-Based version, with a Visual Basic user-interface, that can be provided on CD to law enforcement agencies. The second version will be a network version based on Microsoft SQL Server version.

COPLINK Center for Law Enforcement Information Sharing and Knowledge Management

The Tucson Police Department (TPD) proposes to continue the development and deployment of a database knowledge mining and analytical tool called COPLINK, developed under a previous NIJ cooperative agreement. This will be done in conjunction with technology development to be funded by the National Science Foundation (NSF). Specifically, NSF will be funding the development of text categorization and web spider agents. When developed, this technology will be integrated into the COPLINK application, currently planned for phase three of the proposed effort.

Version 1.0 of COPLINK has been deployed in Tucson. Currently, the COPLINK database is specifically set up for Oracle 8.0 and is not easily exported to other databases. This means that Version 1.0 of COPLINK has a limited capability to share data. Phase one of this effort will focus on modifying the third tier of the COPLINK database so that it is ODBC compliant (open architecture). This will make it possible to share data much more easily with other databases that are ODBC compliant.

Phase one will also develop a method for Tucson Police Department to use COPLINK in a mobile environment, relying on wireless technology to

retrieve data using COPLINK. Phase one will also bring the Phoenix Police Department into an operational mode with their own COPLINK node. Version 2.0 of the COPLINK application will be released during the summer of 2001, which will allow sharing of information in an operational setting between the Phoenix and Tucson COPLINK nodes.

Identification, Demo, and Assessment of Drug Detection and Non-Invasive Drug Screening Technology

This project is a coordinated effort with the Department of Defense Counterdrug Technology Development Program Office to identify, develop, demonstrate, and assess drug detection and non-invasive drug screening technologies applicable to a corrections environment. Specifically, this project will investigate alternative technology to replace urinalysis as the method for drug screening in corrections. In addition, the project will identify or develop technology capable of detecting small amounts of drugs introduced into correctional facilities through mail, packages or other means.

Demonstration and Assessment of Facial Recognition Technology

This project is a joint effort between the Department of Defense Counterdrug Technology Development Program Office and the National Institute of Justice to define a facial recognition program plan that will have immediate benefits for corrections. The design of this program plan will coincide with the release of the results from the Facial Recognition Vendor Test 2000, which both agencies are co-sponsoring. Activities for this program plan include, but are not limited to: further tests, developments, or installation, testing, and a demonstration of a facial recognition system in a jail environment.

Prison Contraband Study

The Department of Defense Counterdrug Technology Development Program Office will test modifications to the PharmChek™ sweat patch intended to reduce false positives.

Assessment of Saliva Drug Test Kits

The Department of Defense Counterdrug Technology Development Program Office and Naval Research Laboratory will assess commercially available saliva testing technology as an alternative technology to replace urinalysis as the method for drug screening in corrections and school applications. A report will be provided concerning the results of the assessment.

Research Program, on Non-Toxic Drug Detection & Identification Aerosol

This project will conduct a research program using a non-toxic, aerosol drug detection and identification system for marijuana, cocaine, heroin, and methamphetamine. It will focus on the use of the drug detection and identification system in a public and private secondary school environment and is designed specifically for the testing of an environment and not the individual. The project will be conducted as a partnership a public school Safe and Drug-Free Schools program and will include an independent evaluation of the program and follow-up recommendations.

# Appendix D - Annual Report on the Development and Deployment of Narcotics Detection Technologies by Federal Agencies

This appendix has been prepared to satisfy the reporting requirement for an annual report on development and deployment of narcotics detection technologies included in the National Defense Authorization Act for fiscal year 1998 (P.L. 105-85).

The statute is cited in Appendix A, Applicable Legislation, to the Blueprint Update.

The following system descriptions summarize those technologies that have been or are in the process of being developed for potential acquisition and deployment by U.S. Customs Service and other agencies.

Fixed Site Truck X-ray - This X-ray system uses dual 450 KeV transmission and side/ backscatter X-ray imagery to inspect empty or partially loaded trailer trucks and trailer-mounted cargo containers, for illicit drugs, currency and other contraband.

Mobile Truck X-ray - The mobile X-ray system can be rapidly redeployed at different border crossings. This X-ray systems uses 450 KeV transmission and side/ backscatter X-ray imagery to inspect empty or partially loaded trailer trucks and trailer-mounted cargo containers, for illicit drugs, currency and other contraband.

Gamma Ray Imager - The gamma ray imager uses a Cesium-137 gamma ray source to generate transmission images of trucks and cars. The system can be configured as a relocatable system or as a mobile system to be rapidly deployed among different sites.

Railroad Car Gamma Ray Imager - The system inspects railroad cars for contraband and drugs as

they roll along the rail line using a Cesium-137 gamma ray source as in the Gamma Ray Imager. The system reads the car identification numbers and records an image of each car along with the transmission image.

Marine Container X-ray System - This system will provide for dockside inspection of large intermodal (sea/land) cargo containers. It is mounted in a modified self-propelled container transporter. It uses a two setting (2 MeV or 6 MeV) linear accelerator to generate transmission X-ray images. Demonstration and evaluation testing is scheduled to be completed in CY01.

Small Pallet X-ray System - This is a relocatable fixed site X-ray system designed to rapidly inspect small warehouse cargo pallets up to 5 ft high by 5 ft wide, weighing up to 3,000 lbs. It uses as its source a 320 KeV X-ray tube, and generates both transmission and backscatter images.

Gamma Ray Imager - Pallet - This is a relocatable gamma ray imager the uses a Cesium-137 gamma ray source to inspect loaded pallets and air cargo containers.

Large Pallet X-ray System - This system can accommodate pallets and air cargo containers up to 8 ft high and 8.5 ft wide. It has been designed to use a special 1 MeV nested high voltage electron source, and generates both transmission and backscatter images.

Body Imaging Systems - These systems use ultra low levels of reflected and scattered X-ray energy to detect drugs and concealed objects hidden beneath

APPENDIX D - ANNUAL REPORT ON THE DEVELOPMENT AND DEPLOYMENT OF NARCOTICS DETECTION TECHNOLOGIES BY FEDERAL AGENCIES

clothing on a person's body. This is performed as an alternative to a pat down search after written permission of the subject is received.

Pulsed Fast Neutron Analysis - This system uses fast neutron interactions to yield characteristic gamma rays. An array of gamma ray detectors surrounds the object to yield spatial distribution of the elements of interest (i.e., carbon, chlorine, nitrogen) to determine if they are present. Investigations into the feasibility of detecting explosives and other contraband by PFNA are being conducted by the Federal Aviation

Administration, Department of Defense and U.S. Customs Service.

Table D-1 provides a summary of narcotics detection technologies under development by U.S. Customs Service, U.S. Coast Guard, Department of Defense, and ONDCP/CTAC. Table D-2 provides a summary of nonintrusive inspection systems undergoing test and evaluation in support of U.S. Customs Service. Table D-3 provides a summary of large-scale nonintrusive inspection systems being placed into service by the U.S. Customs Service.

**Table D-1. NARCOTICS DETECTION TECHNOLOGIES UNDER DEVELOPMENT**

<b>Agency</b>	<b>Project Title/Short Description</b>	<b>Prior (\$K)</b>	<b>FY 00 (\$K)</b>	<b>FY 01 (\$K)</b>
US Customs Service/ CTAC	Railroad Car Gamma Ray Imager - Develop a prototype gamma ray imaging system to detect contraband in rail cars <i>Prototype due 2Q FY01</i>	338 (Customs) 442 (CTAC)	463 (Customs)	0
US Customs Service	Currency Training Aids For Canines - Development of improved training aids for canines in the currency detection program <i>Under Development 2QFY01</i>	100 (Customs)	20 (Customs)	0
US Customs Service	Evaluation of Trace Detection Systems - Support for the test and field evaluation of several IMS trace detection systems <i>Ongoing</i>	275 (Customs)	25 (Customs)	25 (Customs)
US Customs Service	Pulsed Fast Neutron Analysis - to evaluate the PFNA prototype system at Ysleta (El Paso) TX in conjunction with FAA and DoD. Applications focus on both counter-terrorism and counterdrug missions. Only <u>counterdrug</u> related expenditures are shown. <i>Begin Evaluation 2QFY02 Completion 4QFY02</i> (prior funding for all applications was about \$40 million over the past 10 years)	650 (Customs)	240 (Customs)	To Be Determined

APPENDIX D - ANNUAL REPORT ON THE DEVELOPMENT AND DEPLOYMENT OF NARCOTICS  
DETECTION TECHNOLOGIES BY FEDERAL AGENCIES

<b>Agency</b>	<b>Project Title/Short Description</b>	<b>Prior (\$K)</b>	<b>FY 00 (\$K)</b>	<b>FY 01 (\$K)</b>
US Coast Guard / CTAC	Vessel Search via Low Energy Imaging Techniques. Using low energy interrogation technologies and techniques such as ultrasonics, develop a prototype imaging device and evaluate its potential as a tool for searching vessel tanks. <i>Completion: 4QFY01</i>	400 (USCG) 50 (CTAC)	50 (CTAC)	100 (CTAC)
Department of Defense	Law enforcement agencies boarding boats at sea suspected of drug trafficking require a portable inspection system that can penetrate up to 2 inches of steel to search for hidden compartments and drug packages. This project will develop a portable detection system for that application that is affordable and effective for a variety of inspection applications. <i>Completion: 4QFY02</i>	520 (DoD)	650 (DoD)	500 (DoD)
Department of Defense / U.S. Customs Service	The Thunder Mountain Evaluation Center, located in Fort Huachuca, Arizona, provides a controlled operational test environment for NII systems prior to the introduction of the systems to operations at ports of entry on the border. <i>Ongoing</i>	2,804 (DoD)	115 (DoD)	0 (DoD)  450 (Customs)
CTAC	SAW Immunoassay - proof-of-concept demonstration of a surface acoustic wave filter to a biological immunoassay tag to identify cocaine vapors <i>Completion: 2QFY01</i>	250 (CTAC)	0	75 (CTAC)
CTAC	Coded Aperture Fast Neutron Analysis - to develop an advanced means of signal processing for neutron interrogation <i>Completion: 2QFY01</i>	764 (CTAC)	0	0
CTAC	Neutron Probe - to develop a transportable neutron-based probe to inspect pallet-sized volume commodities for concealed illicit drugs. <i>Completion: 4QFY01</i>	597 (CTAC)	329 (CTAC)	0

APPENDIX D - ANNUAL REPORT ON THE DEVELOPMENT AND DEPLOYMENT OF NARCOTICS  
DETECTION TECHNOLOGIES BY FEDERAL AGENCIES

<b>Agency</b>	<b>Project Title/Short Description</b>	<b>Prior (\$K)</b>	<b>FY 00 (\$K)</b>	<b>FY 01 (\$K)</b>
CTAC	Drug Detector Dog Breeding Program - to establish a drug detection dog breeding strategy and center in the U.S. based upon quantitative genetic principles proven by Australian Customs. Leads to a world-wide canine gene pool. <i>Completion: 4QFY01</i>	200 (CTAC)	140 (CTAC)	125 (CTAC)
CTAC	Surface Enhanced Resonance Raman Spectroscopy (SERRS) - cooperative program with PSDB (UK) to extend the use of current SERRS technology being used for explosives detection to applications to detect illicit drugs. <i>Completion: 2QFY02</i>	0	0	340 (CTAC)
CTAC	Raman Spectrometry Drug Analyzer - to use a new infrared Raman spectroscopy method to detect drugs in solid mixtures. <i>Completion: 4QFY01</i>	0	453 (CTAC)	0
CTAC	IMS Proton Activity - Laser Induced. Develop means to selectively detect and identify drug vapors using two complementary ionization techniques and IMS detectors. <i>Prototype demonstration: 3QFY01</i>	0	150 (CTAC)	500 (CTAC)

**Table D-2. TEST AND EVALUATION OF NONINTRUSIVE INSPECTION SYSTEMS**

<b>Unit Designator</b>	<b>Type of Technology</b>	<b>Primary Target</b>	<b>Total Units Ordered</b>	<b>Units Delivered to Date</b>
Gamma Ray Imager - Pallet (Gamma Pallet Scanner)	Medium energy - 662 KeV - gamma ray source (Cesium-137)	To inspect loaded pallets and air cargo containers	1	0
Mobile X-ray System (Marine Container X-ray System)	Self contained X-ray uses two power levels: 2 MeV and 6 MeV	To inspect loaded trailer-mounted cargo containers and marine containers	1	1



APPENDIX D - ANNUAL REPORT ON THE DEVELOPMENT AND DEPLOYMENT OF NARCOTICS  
DETECTION TECHNOLOGIES BY FEDERAL AGENCIES

<b>Unit Designator</b>	<b>Type of Technology</b>	<b>Primary Target</b>	<b>Total Units Ordered</b>	<b>Units Delivered to Date</b>
Large Pallet X-ray System	1 MeV X-ray (transmission and backscatter images)	To inspect loaded pallets and air cargo containers	1	1
Rail GRI - Railroad Car Gamma Ray Imager (Rail VACIS)	Medium energy - 662 KeV - gamma ray source (Cesium-137)	To inspect railroad cars	1	1

**Table D-3. LARGE-SCALE NONINTRUSIVE INSPECTION SYSTEMS  
ENTERING U.S. CUSTOMS' INVENTORY**

<b>Unit Designator</b>	<b>Type of Technology</b>	<b>Primary Target</b>	<b>Total Units Ordered</b>	<b>Units Delivered to Date</b>
TXR - Fixed Truck X-ray	450 KeV transmission and side/ backscatter X-ray imagery	To inspect empty or partially loaded trailer trucks, trailer-mounted cargo containers, trucks and cars	9	9
MTXR - Mobile Truck X-ray	450 KeV transmission and side/ backscatter X-ray imagery	To inspect empty or partially loaded trailer trucks, trailer-mounted cargo containers, trucks and cars	19	4
GRI - Gamma Ray Imager (VACIS)	Medium energy - 662 KeV - gamma ray source (Cesium-137)	To inspect empty or partially loaded trailer trucks, trailer-mounted cargo containers, trucks and cars	30	21
MGRI - Mobile Gamma Ray Imager (Mobile VACIS)	Medium energy - 662 KeV - gamma ray source (Cesium-137)	To inspect empty or partially loaded trailer trucks, trailer-mounted cargo containers, trucks and cars	11	5
Small Pallet X-ray System	320 KeV transmission and backscatter X-ray imagery	small warehouse cargo pallets up to 5 ft high by 5 ft wide, weighing up to 3,000 lbs	1	1

# Appendix E -Technology Transfer Program

The Technology Transfer Program (TTP) was established to provide technologies developed with federal funding directly to state and local law enforcement agencies that may otherwise be unable to benefit from the developments due to limited budgets or lack of technological expertise. This program matches existing technology systems with state or local law enforcement agencies in need of those technologies and funds the technology transfer. Priority is given to identifying candidates for transfer in the currently designated HIDTAs and CTAC also weighs the ability and willingness of potential recipients to share in the costs of new technology, either through in-kind or direct contributions. The technology areas available for transfer include information technology and analytical tools, communications, tracking and surveillance, and drug detection devices.

The enabling legislation, which is provided in Appendix A, Applicable Legislation, directed CTAC to submit a performance evaluation of the Technology Transfer Program and a strategic plan for countrywide deployment of technology within 18 months of the first transfer. That report was submitted to Congress in September of 1999 and a subsequent update to that report was completed in March of 2000. This section of the Blueprint Update provides excerpts from the previous reports and an updated discussion of program statistics and trends since the last report.

The vision of the TTP is to enhance the capabilities of state and local law enforcement agencies (LEAs) by transferring and leveraging successful prior investments in technologies developed for

the federal LEAs. The TTP provides state and local LEAs with state-of-the-art, affordable, easily integrated and maintained technologies whose operational utility has been established by the federal LEAs.

## **Federal Research and Development Program Basis of the Technology Transfer Program**

Since 1991, CTAC has provided oversight and coordination for a national counterdrug law enforcement research and development (R&D) program. The goal is to advance the technological capabilities of federal drug control agencies with law enforcement responsibility. For several years, the federal law enforcement agencies have been using technologies developed within the national program to investigate drug-related crime and to apprehend drug traffickers.

Based upon the successful development, operational deployment and use by federal LEAs, these technologies were considered ready for transfer to state and local LEAs across the country. The TTP is not a grant program in the sense that, instead of money, an agency applies for a system or device offered by the Program. Technologies and training are provided directly to the state and local law enforcement agencies.

## **Successes of the TTP**

The \$39,052,000 appropriated over the past three years has made possible the delivery of 1,808 pieces of equipment to 1,325 state and local law enforcement agencies in all 50 states. These transfers were sufficient to

satisfy the first, second, or third priority request of these agencies.

To ensure the greatest benefit to the LEAs and to assist in the proper use and deployment of the technologies, hands-on training and limited maintenance support are provided to all recipients. The comments from the recipient agencies indicate that the technologies provided by the program have resulted in improved operational capabilities that otherwise would not have been possible because of limited budgets or lack of technical expertise.

**Program Evaluation**

**Program Administration and Management**

The U.S. Army Electronic Proving Ground (EPG), Fort Huachuca, Arizona, is the technical and contracting agent responsible for the day-to-day management of the program. They have employed an administrative process consisting of program management, engineering analysis, acquisition, logistics, and

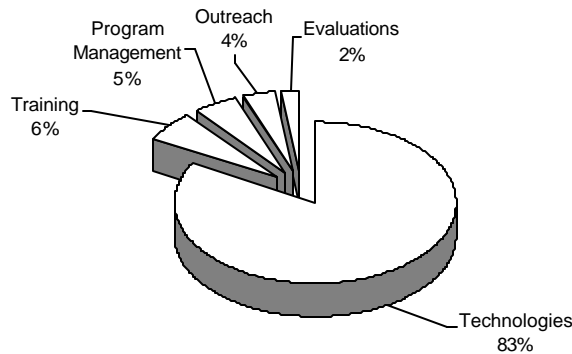
awareness efforts, including informative publications and establishment of an Internet web site to execute the program. Figure E-1 provides a breakdown of the financial management accounts set up by EPG.

The pie chart provides the distribution of the \$39,052,000: technologies (\$32,481,000 which includes the costs associated with procuring 1,808 systems and providing them to 1,325 agencies since the program started), LEA training (\$2,302,168 which includes the training sessions for the recipients when they first receive equipment and vendor support at the LEA location), administration (\$1,965,113 which includes all daily administrative and program management functions, extensive records management, and support to the recipients); outreach efforts (\$1,475,713 which includes all regional one-day workshops and meetings to demonstrate the technologies to LEAs); and evaluation (\$828,006 which includes follow up support, consultant services, and preparation of the evaluation reports).

**Table E-1. CTAC Technology Transfer Program Appropriations**

<b>FY 1998</b>	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>
\$13M	\$13M	\$13.052M	\$18.250M

**Fiscal Year 1998 - 2000 Program Costs  
\$39,052,000**



**Figure E-1. DISTRIBUTION OF PROGRAM COSTS**

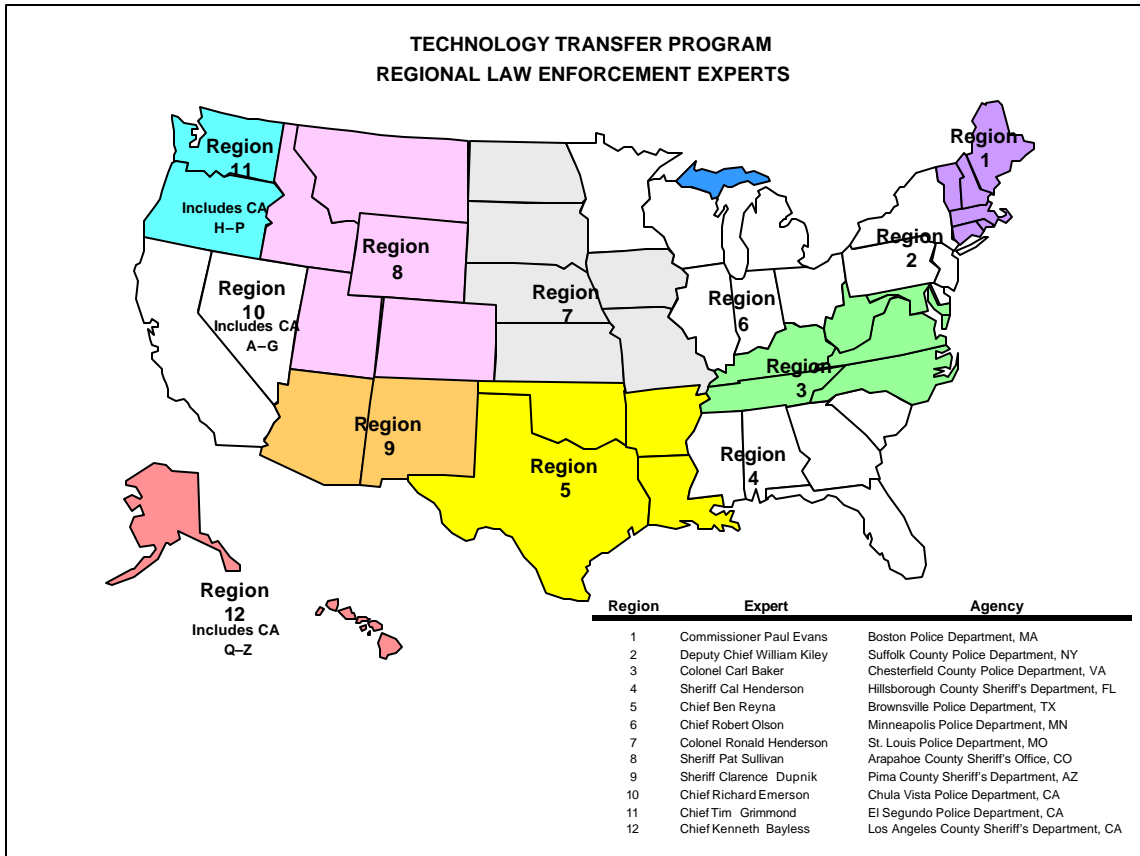
**Role of the Regional Law Enforcement Experts**

The TTP has secured the support of active-duty, nationally recognized, senior police chiefs and sheriffs to serve as regional law enforcement experts. They review the applications for equipment from agencies within their respective regions, assist in evaluating the program, and provide advice on the operational utility of the candidate technologies. Figure E-2 lists the names and shows the locations of the twelve regional experts.

The regional experts provide a subjective judgment as to whether:

- the technologies requested will improve the operational capabilities of the requesting department or organization,
- the organization has the requisite infrastructure to integrate the technology into its daily operations, and
- the equipment is too complex for the organization.

Five former law enforcement officials serve as consultants to support the TTP. These consultants interface directly with receiving agencies to ensure the smooth insertion of technology is achieved including follow up and evaluation of the deployed technologies. In addition, these consultants assist the regional experts as required and provide advice regarding candidate technologies and their potential for use by law enforcement agencies.



**Figure 2. REGIONAL LEA EXPERTS**

**Basis of the Performance Evaluation**

Each recipient completes 60, 180 and 270-day evaluations. The evaluation forms request specific objective, quantifiable comments on the utility, number of cases, specific operational experiences with the technology, and subjective comments on the strengths and weaknesses and suggestions to improve the program. The analyses of the information submitted forms the basis for evaluating the program.

**Commentary from the Evaluation Reports**

The evaluation reports indicate that the technologies have been readily integrated into the operations of these state and local agencies. The technologies have contributed to improved counterdrug operations. In general, the result

has been an increase in drug-related arrests with a dramatic improvement in officer safety at each agency.

Because most police departments do not publicly disclose information concerning technological capabilities, disclosure of specific details of the successes attributed to the use of any single device must be limited. The departments are concerned that the release of detailed operational employment information will result in increased countermeasures on the part of the criminals, especially for wiretap and conspiracy cases.

**Excerpts of the Evaluation Reviews for Three of the Systems**

Feedback received so far from user evaluations of equipment that has been in the field for at least 270 days indicates that agencies receiving systems or devices through the TTP:

- are using the equipment on a regular basis to enhance their current capabilities to conduct counterdrug related operations;
- feel that the equipment they receive is easy to operate and maintain, and the training they received was very useful; and
- are experiencing success using the equipment, both in terms of quantifiable results such as arrests, seizures, indictments, and convictions and less tangible factors such as increased productivity and officer safety.

A police department in South Carolina that received a Body Worn device reported a fifteen percent increase in the number of arrests compared to the previous year. Officers in this small department attribute this increase in operational effectiveness to the enhanced capability that the Body Worn device gave them in their efforts to pursue street-level crack dealers.

Three separate police departments in the state of Florida report similar success with Mini-Buster kits. Two of these departments reported using the Mini-Busters to verify specific locations of canine alerts on suspect vehicles. Numerous other departments have noted significant reduction in the amount of time required to search suspect vehicles using the Mini-Buster as well as savings from using the Mini-Buster to help reduce the number of suspect vehicles that may otherwise have been laboriously disassembled to locate a drug concealment.

Several agencies receiving thermal imagers have commented on the positive impact that

these devices have had on their ability to conduct surveillance operations for marijuana growth facilities, methamphetamine production labs and anhydrous ammonia storage areas. In addition, agencies are noting the added safety factor that the thermal imager provides for undercover officers to be monitored by their back up teams at night.

## **TTP Technologies**

The TTP embarked on a concerted effort to match the proper technologies to state and local agencies with drug-related crime according to the size and type of the force. It was found that the size of the jurisdiction was the predominant factor in the mix of technologies requested rather than type of department. Technologies currently offered by the program are listed in Tables E-2 and E-3.

The delivery distribution by population size is shown in Figure E-3 where it can be seen that eighty-three percent of deliveries went to populations of 500,000 or less. The predominant mix of technologies requested and provided to the police departments and sheriffs offices in the smaller jurisdictions was composed of thermal imagers, drugwipes, mini-buster kits, and body worn. Similarly, for the distribution of deliveries by agency type shown in Figure E-4, almost eighty percent of the deliveries (and requests) were allocated to police departments and sheriffs offices. The concentration of requests for the more complex systems (AG-SMS, VoiceBox, data locator, video stabilization, and wireless interoperability) was received by task forces, police departments and sheriffs offices from the larger jurisdictions with populations of 500,000 or more.

Those items used for case building in long-term investigations tend to be more complex and require comprehensive training, infrastructure and personnel resources for installation,

operation, and maintenance. Consequently, these items were requested by and were distributed predominantly to the larger jurisdictions that possess the organic resources for continued life-cycle support. Distribution of the tactical, portable items to support the individual officer on the scene was achieved independent of population size because such technologies tend to be easy to operate and require minimum training for use by personnel. These items can be distributed in large numbers and are especially appropriate for smaller jurisdictions because they do not require installation or sophisticated infrastructures for their operation. Compared to the complex systems, simple devices typically have a lower life-cycle cost and no requirement for organizational support other than operation and maintenance, which does not negatively affect the operating budgets of these organizations.

Over the past four years, CTAC has sponsored an outreach effort consisting of 14 regional one-day workshops to promote the use of advanced technology and increase LEA awareness of the Technology Transfer Program.

The strategy for nationwide deployment of technology continues to be:

- support the officer on the street with advanced technology tools to increase effectiveness of personnel resources and improve officer safety by continuing the deployment of items, such as, thermal imagers and mini-busters, to those agencies requesting these technologies,
- target specialized LEA groups and organizations that will benefit from the successful deployment of more complex, larger scale systems for communications interoperability and data mining applications in support of longer-term drug trafficking conspiracy investigations. This will be accomplished by refining the outreach effort and increasing the training provided to receiving agencies, and
- assure that the optimum set of technologies is being offered. This effort will include the introduction of new technologies to the program, improvements to existing systems, and elimination of technologies that no longer meet the operational requirements or can be replaced with next-generation technology.

**Table E-2. LIST OF TECHNOLOGIES:  
Complex Case Building Systems**

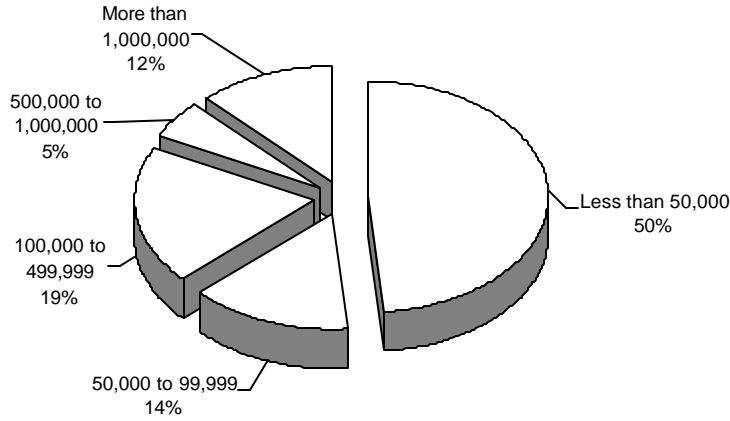
<b>TECHNOLOGY</b>	<b>DESCRIPTION</b>
<b>AG-SMS - Air-Ground Surveillance Management System</b>	Provides the ability to track and locate both field units and suspects. Tracking and other information is graphically displayed and archived on a moving map display at the base station. Database application incorporated to manage information relating to the units being tracked.
<b>Audio Surveillance System</b>	Covert body wire transmitter and receiver system. Includes a concealable body wire transmitter, repeater for extended range capability, and a receiver base station with various recording capabilities, either audio cassette or professional mini-disk.
<b>AVTS - Advanced Vehicle Tracking System</b>	Covert vehicle tracking system with mapping display. Includes vehicle location device ("tag") and a user-friendly mapping software package operating on a PC base station. Tags are designed for quick, discrete installation on cars and trucks. Base station includes the mapping software package, through which multiple vehicles can be tracked simultaneously.
<b>Data Locator / Direct Access System</b>	Provides capabilities for secure exchange of electronic mail, database access to existing or custom-built databases, and police intelligence analysis of information over a standard Internet connection.
<b>SPIN - Suspect Pointer Index Network</b>	Automated information management system for the entry, retention, and analysis of multimedia investigative data (images and text) Users at nodes throughout a given jurisdiction enter suspect and case data based on a wide choice of criteria.
<b>TACSCAN - Tactical Speech Collection &amp; Analysis System</b>	Voice identification system. The speaker source is collected from any audio input (radio, microphone, tape recorder, etc.) and fed directly into the laptop computer. Algorithms identify the speaker by performing comparisons between the voice samples and speaker source.
<b>Video Stabilization</b>	The system stabilizes and enhances real-time or previously recorded video. An electronic zoom mode increases image details for enhanced visualization.
<b>VoiceBox</b>	Multimedia digital Title III collection system designed to support all types of intercepts. The system supports traditional facility-based intercepts, using a proven built-in dialed number recorder (DNR) and is Communications Assistance for Law Enforcement Act (CALEA)-compliant. ,
<b>VisuaLinks Software</b>	Investigative tool for money laundering investigations enables graphical interaction with data to quickly expose patterns, spot anomalies, or discover new relationships. It allows the user to clearly see all of the relationships, dependencies, and connections that exist within the data.
<b>Wireless Interoperability</b>	This system uses computer-aided switching technology to connect numerous law enforcement agencies (LEAs) to a central radio system console for the purpose of improving interagency communications during counternarcotic investigations. Once connected, each agency can assign the circuit to an agent or patrol vehicle and the two agents can communicate directly in the field without requiring relay of information by dispatchers.



**Table E-3. LIST OF TECHNOLOGIES:  
Tactical Tools to Support the Officer**

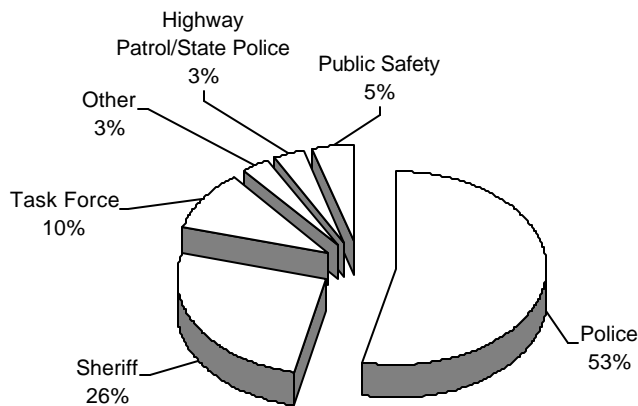
<b>TECHNOLOGY</b>	<b>DESCRIPTION</b>
<b>AIRNET32</b>	Portable digital pager intercept system. Messages sent to targeted digital pagers, either numeric or alphanumeric, are received, time-stamped, and recorded. In specific cases, the messages are relayed to the case officer's own pager.
<b>Body Worn</b>	Miniaturized, multi-channel transmitter with voice privacy, low probability of detection (VPLPD) capabilities. Can be worn inconspicuously and can defeat both detection and eavesdropping devices.
<b>Drugwipe</b>	Kit that identifies trace amounts of cannabis, cocaine, opiates, and amphetamines. Officer wipes swab across surface and inserts into vial. Color change indicates the presence of narcotics.
<b>Mini-Buster</b>	Suite of contraband detection search products which includes: A hand-held detector for uncovering a hidden compartment; an ultrasonic range finder for detection of false walls; a flexible fiber optic fiberscope for remote viewing inside inaccessible spaces such as fuel tanks; and other assorted steel probes, extension mirrors with flashlights, and pocket pencil probes.
<b>Night Vision</b>	Kit of imaging devices consists of four main items: Night vision goggles, with built-in infrared (IR) illuminator and a 50-millimeter (mm) lens; an interchangeable 70-300 mm lens; monocular with variable gain; a 3-power (3X) magnifier, very fast optic, high performance telescope
<b>Small Look</b>	Miniature, solid-state electronic camera system with low power consumption for prolonged battery life. Captures, processes, and stores hundreds of digital picture images in nonvolatile memory. The system is an integrated package consisting of hardware, software, and product training.
<b>Thermal Imager</b>	Provides night vision capability by sensing heat, not light, and generates real-time video pictures in all lighting conditions, including total darkness.

**Deliveries by Population**  
**1,808 Deliveries to 1,325 Agencies**



**Figure E-3. DELIVERIES BY POPULATION SIZE**

**Deliveries by Agency Type**  
**1,808 Deliveries to 1,325 Agencies**



**Figure E-4. DELIVERIES BY AGENCY TYPE**

# Appendix F - Acknowledgments

The Director, ONDCP, acknowledges the contributions of the following:

Dr. Albert E. Brandenstein  
Director, Counterdrug Technology Assessment  
Center

## **Office of National Drug Control Policy**

Mr. James A. Petrousky  
Ms. Jo R. Gann  
Ms. Florence M. Williams  
Mr. Francis X. Kinney  
Mr. John N. Legters  
Ms. Linda N. Bayer  
Ms. Kate D. Malliarakis  
Mr. David J. Rivait  
Ms. Michele C. Marx  
Ms. Michele A. Manatt  
Mr. Edward H. Jurith  
Ms. Rose M. Johnson  
Mr. Kent W. Lunsford  
Mr. Patrick W. Shier  
Ms. Zenobia N. Sadler

## **U.S. Army White Sands Missile Range, Electronic Proving Ground**

Mr. James L. Cole  
Major Laura J. Shnider  
Mr. Rafael C. Anton

## **U.S. Army, Fort Huachuca, Directorate of Contracts**

Ms. Patricia A. Woznick  
Ms. Rosie E. Gobeia  
Mr. Charles B. Fahs

## **U.S. Navy, Space and Naval Warfare Systems Command**

Dr. Wadad B. Dubbelday  
Mr. Richard S. Mellor  
Mr. Clark R. Hendrickson  
Mr. Edward E. Hayes  
Ms. Betty A. Carpenter

## **Technology Transfer Regional Experts**

### **Region #1**

Commissioner Paul F. Evans  
Boston Police Department

### **Region #2**

William P. Kiley  
Deputy Chief of Support Services  
Suffolk County Police Dept

### **Region #3**

Colonel Carl R. Baker  
Chief of Police  
Chesterfield County Police Department

### **Region #4**

Sheriff Cal Henderson  
Hillsborough County Sheriff's Office

### **Region #5**

Chief Benigno G. Reyna  
Brownsville Police Department

### **Region #6**

Chief Robert K. Olson  
Minneapolis Police Department

### **Region #7**

Colonel Ronald Henderson  
St. Louis Police Department

APPENDIX F - ACKNOWLEDGMENTS

**Region #8**

Sheriff Patrick J. Sullivan, Jr.  
Arapahoe County Sheriff's Office

**Region #9**

Sheriff Clarence W. Dupnik  
Pima County Sheriff's Department

**Region #10**

Chief Richard P. Emerson  
Chula Vista Police Department

**Region #11**

Chief Timothy J. Grimmond  
El Segundo Police Department

**Region #12**

Chief Kenneth L. Bayless  
Los Angeles County Sheriff's Department

**Federal Drug Control Agencies**

Mr. Eric M. Rosenquist  
National Program Leader, Alternative Crops  
Agricultural Research Service  
Department of Agriculture

Mr. William B. Simpkins  
Assistant Administrator  
Operational Support Division  
Drug Enforcement Administration

Mr. Thomas J. Janovsky  
Deputy Assistant Administrator  
Office of Forensic Sciences  
Drug Enforcement Administration

Mr. John T. Sheridan  
Deputy Assistant Administrator  
Office of Investigative Technology  
Drug Enforcement Administration

Mr. John J. Pennella  
Director, Applied Technology Division  
U.S. Customs Service

Mr. Lennard J. Wolfson  
Special Assistant for Intelligence and Technology  
Office of the Deputy Assistant Secretary of  
Defense for Drug Enforcement Policy & Support  
Department of Defense

Mr. Elmer C. Burgess  
R&D Program Manager  
DoD Counterdrug Technology Development  
Program Office  
Department of Defense

Mr. Johnny W. Walters  
Acting Program Executive  
DoD Counterdrug Technology Development  
Program Office  
Department of Defense

Mr. Edward L. Allen  
Deputy Assistant Director  
Laboratory Division  
Federal Bureau of Investigation

Dr. Joseph K. Kielman  
Chief Scientist  
Federal Bureau of Investigation

Special Agent John A. Cioffi  
Federal Bureau of Investigation

Mr. Stephen A. Schroffel  
Chief, Research and Development  
Immigration & Naturalization Service

Mr. Paul R. Rosenberg  
Acting Director  
Strategic Information and Technology Development  
Immigration and Naturalization Service

CDR Bradley M. Jacobs  
U.S. Coast Guard

Mr. Russell A. Doughty  
U.S. Coast Guard

APPENDIX F - ACKNOWLEDGMENTS

Dr. Lyle O. Malotky  
Scientific Advisor (ACS-20)  
Federal Aviation Administration

Dr. David G. Boyd  
Deputy Director  
National Institute of Justice

Mr. A. Trent DePersia  
Director, Research and Technology Development  
Division  
Office of Science and Technology  
National Institute of Justice

Dr. C. Allan Turner  
Social Science Analyst  
Office of Justice Programs  
National Institute of Justice

Col. Nickey W. Philpot  
National Guard Bureau  
ONDCP Liaison

**National Institute on Drug Abuse**

Dr. Alan I. Leshner  
Director

Mr. Richard A. Millstein  
Deputy Director

Dr. Barry J. Hoffer  
Director  
Intramural Research Program