



# National Drug Control Strategy

Counterdrug Research and  
Development Blueprint Update

2000 ANNUAL REPORT



Office of National Drug Control Policy

# TABLE OF CONTENTS

<b>MESSAGE FROM THE DIRECTOR</b> .....	<b>i</b>
<b>EXECUTIVE SUMMARY</b> .....	<b>iii</b>
<b>1.0 INTRODUCTION</b> .....	<b>1</b>
1.1 COUNTERDRUG TECHNOLOGY ASSESSMENT CENTER.....	1
1.2 FEDERAL BUDGETS FOR COUNTERDRUG RESEARCH AND DEVELOPMENT .....	2
<b>2.0 CTAC R&amp;D PROGRAM SUMMARY</b> .....	<b>2</b>
2.1 DEMAND REDUCTION .....	3
2.2 SUPPLY REDUCTION.....	5
<b>3.0 TECHNOLOGY TRANSFER PROGRAM</b> .....	<b>7</b>
<b>4.0 OVERSIGHT AND COORDINATION</b> .....	<b>7</b>
<b>5.0 FUTURE PLANS</b> .....	<b>8</b>
5.1 DEMAND REDUCTION .....	8
5.2 SUPPLY REDUCTION.....	9
5.3 INFRASTRUCTURE SUPPORT .....	11
5.4 TECHNOLOGY TRANSFER PROGRAM.....	11
5.5 CONCLUSIONS.....	12
<b>6.0 REFERENCE DOCUMENTS</b> .....	<b>12</b>

## APPENDICES

- 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. ACKNOWLEDGMENTS

# Message From the Director

Today, scientists and engineers from many disciplines are assisting the Office of National Drug Control Policy in exploiting advances in science and technology to stem substance abuse and stop the illicit drug trade. The Counterdrug Technology Assessment Center (CTAC) technology development programs support the goals and objectives of the *National Drug Control Strategy*. This Blueprint Update provides a periodic report on progress achieved this year. The technologies are being developed to advance the capabilities of the medical, academic, scientific and criminal justice communities as they cooperate to solve the drug abuse problem.

CTAC, in consultation with the National Institute on Drug Abuse, is providing the most advanced facilities to the nation's premier teams of medical researchers working on the underlying causes of drug dependence. The goal has been accomplished by providing leading medical research institutions with neuro-imaging facilities, infrastructure, and technology necessary to support their substance abuse research.

Technologies that meet the needs of police officers, narcotics investigation units, and prosecuting attorneys are being pursued, too. These technologies provide improved drug detection, communications, and surveillance devices and methods to share drug crime investigative information. After these technologies are proven at the federal level, they are provided to state and local law enforcement agencies through the continuing Technology Transfer Program.

Technology plays an important role in safeguarding our borders from the flow of illicit drugs. To examine shipments as they enter the country coded aperture and neutron probe technologies are being developed. These advanced nonintrusive inspection technology concepts will, in time, replace the X-ray and gamma ray systems now used to search conveyances and cargo for hidden drugs at ports-of-entry.

Barry R. McCaffrey  
Director  
Office of National Drug Control Policy

## EXECUTIVE SUMMARY

The Counterdrug Technology Assessment Center (CTAC) was established within the Office of National Drug Control Policy (ONDCP) as the central counterdrug enforcement research and development (R&D) organization of the U.S. Government. The CTAC counterdrug R&D program supports the *National Drug Control Strategy* and its five goals:

- 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.

This sixth Counterdrug R&D Blueprint Update provides the status of the CTAC counterdrug R&D program, the Technology Transfer Program, oversight and coordination activity, and a summary of plans for future counterdrug R&D initiatives. Appendices provide the following related material:

- Appendix A provides a listing of recent legislation and conference reports,
- Appendix B provides a listing of scientific and technological needs by technology area and agency,
- Appendix C provides a listing of R&D projects being sponsored by each agency,
- Appendix D provides the Annual Report on the Development and Deployment of Narcotics Detection

Technologies (required by P.L. 105-85), and

- Appendix E provides a summary of the Technology Transfer Program.

### CTAC R&D Program

The applied technology efforts that comprise the CTAC R&D program address technology for demand reduction in areas, such as, brain imaging technology, therapeutic medications assessment and addiction treatment, and for supply reduction in areas such as drug detection, communications, and surveillance. In 1998, Congress authorized a Technology Transfer Program (TTP) for CTAC to provide successfully developed technologies to State and local law enforcement agencies. Congress continued the TTP program in 1999 and 2000.

In reducing the demand for illicit drugs, CTAC has worked in conjunction with the National Institute on Drug Abuse to provide the most advanced facilities to the nation's premier teams of medical researchers working on the underlying causes of substance abuse, dependence, and addiction. This has been accomplished by providing the leading medical research institutions with the neuro-imaging facilities, infrastructure, and technology necessary to support their substance abuse research programs.

The R&D efforts are heavily concentrated in the area of brain imaging technology and the development of catalytic antibodies, therapeutic drug assessment, treatment effectiveness, juvenile diversion from the criminal

## EXECUTIVE SUMMARY

justice system, and studies of the use of banned substances in intercollegiate and Olympic sports.

Additionally, the Drug Evaluation Network System backbone is being used to accommodate innovative methodologies for estimating the number of hardcore drug users by region and nationwide. The vision is to provide a system architecture to project drug abuse trends, treatment modalities, and populations at risk across the nation in real time.

In Supply Reduction, efforts are concentrated on finding technological solutions to meet the needs of the officer on the beat. These technologies provide improved communications, surveillance and drug crime information sharing capabilities to make the law enforcement missions more effective, safe, and to ensure successful prosecutions. Technologies proven at the Federal level are being provided to State and local law enforcement through the continuing Technology Transfer Program.

Advanced coded aperture and neutron probe technologies are being developed to examine drug shipments as they enter the country. These advanced nonintrusive inspection technology concepts will, in time, replace the X-ray and gamma ray technology now used to search conveyances and cargo for hidden drugs at our ports-of-entry.

The Technology Transfer Program was established to provide technologies developed with Federal funding directly to State and local law enforcement agencies. The technology areas available for transfer include information technology and analytical tools,

communications, tracking and surveillance, and drug detection devices. Hands-on training and limited maintenance support are provided to all recipients.

Over the past two years, the Technology Transfer Program has made possible the delivery of 892 pieces of equipment to 631 State and local law enforcement agencies. The evaluation reports from the recipient agencies 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.

To reach out to the national and international counterdrug R&D community, a fifth International Technology Symposium was held last March in Washington, DC. Last year CTAC also participated in the first United States-United Kingdom (UK) Drug Summit in London, several international scientific meetings, and in technology exchange meetings with the Federal Police of Israel.

The *Ten-Year Counterdrug Technology Plan and Development Roadmap* organized the technology development efforts of the Federal drug control agencies. Each agency now prepares annual plans, performance reports and five-year strategic plans. CTAC continues to review and monitor the progress of each agency's technology development program based on these submissions.

## 1.0 INTRODUCTION

The Counterdrug Technology Assessment Center (CTAC) was established within the Office of National Drug Control Policy (ONDCP) and is the central counterdrug enforcement 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)*:

- 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.

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

- Appendix A provides a listing of recent legislation and conference reports,
- Appendix B provides a listing of scientific and technological needs by technology area and agency,
- Appendix C provides a listing of R&D projects being sponsored by each agency,

- Appendix D provides the Annual Report on the Development and Deployment of Narcotics Detection Technologies (required by P.L. 105-85), and
- Appendix E provides a summary of the Technology Transfer Program.

## 1.1 Counterdrug Technology Assessment Center

CTAC's mission is to serve as the central counterdrug enforcement research and development organization of the U.S. Government. Since 1992, Congress has appropriated funding to sponsor a counterdrug R&D program to advance the technological capabilities of Federal drug control agencies responsible for both supply and demand reduction activities. In 1998, CTAC's role was expanded to support a program to transfer successful counterdrug technologies developed with federal funding directly to State and local law enforcement agencies. The Technology Transfer Program (TTP) concentrates on providing state-of-the-art, affordable, easily integrated and maintainable tools to enhance the capabilities of State and local law enforcement agencies (LEAs) for counterdrug missions. Special emphasis was placed on providing technology to LEAs within High Intensity Drug Trafficking Areas (HIDTA).

In Fiscal Year 1999 and 2000, annual appropriations of \$16 million were received to sponsor counterdrug technology development initiatives and annual appropriations of \$13 and \$13.25 million, respectively, to continue the Technology Transfer Program. These funds were used to support those areas shown in Figure 1 which correspond to ONDCP's *FY 2001 Annual Performance Plan and FY 1999 Performance Report*.



**Figure 1. CTAC PROGRAM AREA**

## **1.2 Federal Budgets for Counterdrug Research and Development**

Those expenditures reported for drug-related R&D by the Federal drug control agencies are listed in Table 1.

## **2.0 CTAC R&D PROGRAM SUMMARY**

The CTAC R&D program can be separated into functional areas based on each project's application to either demand reduction or supply reduction activities. Individual R&D projects address technology needs related to

demand reduction in areas such as brain imaging technology, therapeutic medications assessment and addiction treatment, and related to supply reduction in areas such as drug detection, 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.

**Table 1. FY1999 - FY 2001 FEDERAL COUNTERDRUG RESEARCH AND DEVELOPMENT BUDGET SUMMARY BY AGENCY**

Agency	FY1999 (\$M)	FY2000 (\$M)	FY2001 (\$M)
	Actual	Enacted	Requested
Agricultural Research Service	5.299	4.765	4.765
U.S. Forest Service	0.115	0.115	0.115
Department of Defense	31.430	32.197	26.644
Department of Education	0.627	0.523	0.524
National Institute of Health	653.706	730.228	767.467
Bureau of Indian Affairs	1.278	1.689	1.828
The Federal Judiciary	3.808	4.299	4.770
Drug Enforcement Administration	4.894	5.034	5.468
Federal Bureau of Investigation	26.564	26.564	26.564
Office of Justice Programs	10.681	10.606	17.285
Office of National Drug Control Policy (Operations)	1.100	1.056	1.100
Counterdrug Technology Assessment Center	16.000	19.000	16.700
High Intensity Drug Trafficking Areas	0.000	1.530	1.800
Special Forfeiture Fund*	9.500	0.0	3.000
U.S. Coast Guard	3.482	3.713	4.563
Federal Aviation Administration	1.031	1.076	1.124
National Highway Traffic Safety Administration	0.400	0.450	1.200
U.S. Customs Service	4.000	4.000	4.000
Department of Veterans Affairs	7.345	9.341	9.341
<b>Total</b>	<b>781.260</b>	<b>856.186</b>	<b>898.258</b>
<b>Total Federal Drug Budget without '00/'01 Supplemental for Colombia and the Andean Region</b>	<b>17,711.200</b>	<b>17,500.554</b>	<b>18,896.400</b>
<b>R&amp;D Total as a Percentage of Federal Drug Budget</b>	<b>4.41%</b>	<b>4.89%</b>	<b>4.75%</b>

\*Special Forfeiture Fund total includes \$5 million for Treatment Research in FY99

Source: *National Drug Control Strategy, Budget Volume*, Office of National Drug Control Policy, 2000

## 2.1 Demand Reduction

The Demand Reduction technology development program supports the *NDCS, Goal 3: Reduce health and social costs to the public of illegal drug use.*

CTAC, in conjunction with the National Institute on Drug Abuse (NIDA), is committed to improving the tools available for world-class research scientists to explore and understand the underlying causes of substance abuse, dependence, and addiction. The Demand Reduction program provides the nation's leading medical research institutions with the technology and



equipment necessary to support their research teams and faculties. The R&D efforts are heavily concentrated in the area of brain imaging technology and the development of catalytic antibodies, therapeutic drug assessment, treatment effectiveness, juvenile diversion from the criminal justice system, and studies of the use of banned substances in intercollegiate and Olympic sports.

### **2.1.1 Brain Imaging Technology Initiatives**

For the past two years, CTAC has been sponsoring brain imaging technology development projects that complement one another in contributing to the sound understanding of the most complex human organ and behavior known.

- Functional Magnetic Resonance Imaging (fMRI) to map brain reward circuitry, blood volume and flow associated with drug metabolism and interactions with potential therapeutic medicines (Massachusetts General Hospital and Emory University).
- Positron Emission Tomography (PET) for ultra high resolution of neurobiological substrates of addiction via use of radioisotope tracers (University of Pennsylvania).
- Magnetic Resonance Spectroscopy (MRS) to image the drug's metabolic and chemical processes (Harvard University/McLean Hospital).

For several years, Columbia University has been synthesizing highly active protein compounds of catalytic antibodies. The objective is to produce an anti-cocaine medication that acts as a peripheral blocker. This approach reduces serum

cocaine concentrations in the blood thereby depriving the cocaine abuser of the behavioral reinforcing effect of the drug. A promising candidate compound (15A10) has been demonstrated to be effective in blocking cocaine in small animals.

Yerkes Regional Primate Research Center at Emory University has found that analogs of certain phenyltropane compounds prove to be effective candidate compounds for agonist medications to combat cocaine abuse. The team, partially under CTAC sponsorship, has recently characterized eighteen NIDA-identified compounds in rodents and is now testing two of the best candidates in monkey models. The ideal pretreatment time and doses for RTI 177 have been determined.

### **2.1.2 Drug Abuse Treatment Effectiveness**

For the past three years, the Center for Addiction and Substance Abuse (CASA) at Columbia University has 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, in real time, patients entering treatment, their characteristics and discharge status. This information is online and made available to treatment providers, researchers and managers. The DENS software architecture can host a variety of trend and treatment effectiveness methodologies. It currently is being configured to support the following two methodologies.

- The National Evaluation of Substance Abuse Treatment (NESAT) is a nationally representative, randomly

selected longitudinal study of 2,000 patients enrolled in treatment for drug and/or alcohol abuse at 200 programs nationwide. The study is designed to document the range of effectiveness of various treatment modalities and to identify those patient and program characteristics that are predictive of successful outcomes. Treatment programs were selected and periodic interviews were conducted. Follow-up interviews have started for the initial patients.

- The Random Access Monitoring of Narcotic Addicts (RAMONA) provides national estimates of the size of the hardcore drug using population in the United States. It is based on a methodology demonstrated in Cook County, IL for estimating the number of drug users in a given geographic area based on arrest, shelter stay, and treatment admission activity.

### **2.1.3 Juvenile Diversion**

A project is being conducted by the New Orleans District Attorney's Office to improve approaches for drug abuse treatment on new youth offenders involved in substance abuse. This 33-month research project examines the effectiveness of two 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.

Eligible juvenile arrestees who volunteer for the study are randomly assigned to one of three groups: two "diverted" groups or a third control group where the juveniles face normal prosecution. 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.

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

A comprehensive analysis of the use of banned substances and drugs of abuse among Olympic, professional, collegiate and high school athletes in America is being sponsored to identify more effective substance abuse testing, sanctions and treatment. The analysis will identify problematic substances, masking agents, and gaps in current testing procedures. Recommendations will be developed for how future research into new testing procedures should be directed.

## **2.2 Supply Reduction**

The Supply Reduction Technology Development, Test and Evaluation initiatives address Goal 2 and Goal 4 of the *NDCS*. The supply reduction program addresses applied developments in technology areas such as nonintrusive inspection, tactical technologies and test and evaluation. The goal of the supply reduction program is to support improved counterdrug capabilities that transcend the need of any single Federal agency. Additionally, CTAC resources in supply reduction are concentrated on those applications that also can be transitioned to the State and local agencies under the Technology Transfer Program.

### **2.2.1 Nonintrusive Inspection Technologies**

CTAC works closely with the Federal drug control agencies, especially the U.S. Customs Service and Department of Defense, in the development and evaluation of nonintrusive inspection systems for the detection of illicit drugs concealed in cargo, containers, and conveyances. CTAC's concentrates its efforts on the development of the higher risk technologies, such as, gamma ray and neutron-based inspection systems.

A project is being conducted to develop and evaluate a fixed-site gamma ray imaging system for the inspection of railroad cars. The system design is based upon prototypes developed for vehicle and truck inspections. Using a stationary radioactive source and detectors, the system is expected to image rail cars at a speed of 5 mph.

Researchers at the Massachusetts Institute of Technology (MIT) are developing an advanced means of signal processing for neutron interrogation techniques for cargo inspection. The goal is to overcome some of the primary disadvantages of X-ray and large-scale neutron systems; including the need for particle accelerators, mechanical scanning, and tight pulsing while reducing system costs.

A drug detection dog-breeding center has been established in conjunction with the U.S. Customs Service. The breeding strategy is based upon quantitative genetic principles proven by the Australian Customs Service. The U.S. program is following the Australian protocols and ultimately may open the way for a worldwide canine gene pool.

### **2.2.2 Tactical Technologies**

CTAC assists law enforcement agencies in applying state-of-the-art tactical tools to exploit the capabilities of high-speed computer and communications networks to meet operational counterdrug technical needs. This program continues investigations into the use of computer networks and case-building software tools for law enforcement applications.

Software tools under development include data mining, link analysis, and multimedia case management applications. Demonstration projects with State and local law enforcement agencies on computer-based drug crime data sharing technologies have been conducted in California, Idaho, Iowa, and Colorado. Operational systems are located in Texas, New York and New Hampshire. Successful projects will be made available for transition to other State and local law enforcement organizations through the Technology Transfer Program.

An evaluation of mobile/transportable drug destruction technologies also was conducted for the Drug Enforcement Administration.

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

This work area includes efforts such as technology assessments, phenomenology research, and test and evaluation of emerging and advanced systems. The test and evaluation activity includes advanced concept theoretical studies and experimental evaluations in operational testbeds of promising law enforcement systems. For example, CTAC sponsored a test and evaluation program to assess the performance of tracking and navigation systems (such as, GPS based systems) as they are used in counterdrug law enforcement applications.

### **3.0 TECHNOLOGY TRANSFER PROGRAM**

The fiscal year 1998 appropriations for ONDCP directed CTAC to establish a \$13,000,000 Counterdrug Technology Transfer Pilot Program (TTP). The program was continued in fiscal year 1999 (\$13,000,000) and fiscal year 2000 (\$13,250,000). A web site located at [www.epgctac.com](http://www.epgctac.com) has been established to provide up-to-date information.

The 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 located in 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 conference report that accompanied the enabling legislation directed CTAC to submit a performance evaluation of the Technology Transfer Program and a strategic plan for countrywide deployment of technology. Blueprint Update Appendix A provides the language for Conference Report 105-284 and Appendix E provides excerpts from the evaluation report, which

was submitted, to Congress on September 20, 1999.

The \$26,000,000 appropriated over the past two years has made possible the delivery of 892 pieces of equipment to 631 State and local law enforcement agencies. These transfers were sufficient to satisfy the first, second, or third priority request of these agencies. 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.

### **4.0 OVERSIGHT AND COORDINATION**

CTAC heads the Interagency Working Group for Technology (IAWG-T) that is composed of technology representatives from each of the Federal drug control agencies. This forum is used to oversee and coordinate counterdrug technology development initiatives that transcend Federal agency lines of responsibility. Supporting activities include a variety of regional one-day workshops at the State and local level, technical symposia, interagency working group meetings and ad hoc studies to promote the exchange of relevant information throughout the entire scientific and technical community. These outreach activities serve to reduce unnecessary duplication of effort and provide the mechanism for CTAC to oversee and coordinate counterdrug technology initiatives with other Government agencies.

The fifth International Counterdrug Technology Symposium, held March 8-10, 1999 in Washington, DC provides an

example of the coordination and oversight efforts provided by CTAC. Over 100 technical papers were presented with an attendance of 400 medical research scientists, engineers and law enforcement professionals from academic, Federal, State and local organizations.

## 5.0 FUTURE PLANS

CTAC plans efforts in five areas of work:

- demand reduction technology,
- nonintrusive inspection technology,
- tactical technology,
- technical assessments and operational test of emerging technologies, and
- transfer of federally developed technology directly to State and local law enforcement organizations.

These areas of work concentrate on those counterdrug technologies needed by all Federal drug control agencies as outlined in the *Ten-Year Counterdrug Technology Plan and Development Roadmap*.

### 5.1 Demand Reduction

*In support of Goal 3: Reduce health and social costs to the public of illegal drug use.*

Resources will be applied to initiatives that complement those of the National Institute on Drug Abuse in prevention and treatment research, and the development of state-of-the-art medical research instrumentation and equipment. R&D program initiatives support and highlight research and technology, including the acquisition and

analysis of scientific data, to reduce health and social costs of illegal drug use.

The Demand Reduction 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. The technology will provide neuro-imaging research equipment suites and facilities with the best positron emission tomography (PET), functional nuclear magnetic resonance (fNMR) imaging, brain scan image processing and interpretation, and other noninvasive brain imaging techniques.
- Contribute to the development of magnetic resonance spectroscopy (MRS), functional magnetic resonance imaging (fMRI) and positron emission tomography (PET) systems development or improvements to image the drug's metabolic and chemical processes, map brain reward circuitry, blood volume and flow associated with drug metabolism, analyze interactions with potential therapeutic medicines, ligand development, and study of localized active areas of the brain.
- Micro-PET with stereotactic probes/injectors to enhance ligand development and studies on small localized areas of the brain and on non-human primates.
- Scientific studies and technologies that could provide the platform for key research areas such as: catalytic antibodies as peripheral blockers or circulating drug interceptors; substitute medications and partial agonists for

addiction; blocking drug effects by regulating uptake of neurotransmitters; 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; significance of various rewards; 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.

- Psychology, pharmacology, and chemical assay techniques to improve our understanding of the effects of drugs on the body, techniques for assessing and monitoring drug addiction and abuse severity, and techniques for treatment/client matching.
- Drug testing in sports, investigate innovative approaches for screening for doping and other performance enhancing substances and drugs currently not detectable by urine tests, and to develop cheaper test procedures for handling urine specimens collected from competing athletes. Systems, methods, and protocols that will assist understanding and detecting the use of performance-enhancing drugs such as anabolic and androgenic steroids by athletes competing locally, nationally, and internationally.
- Youth/first time offender diversion, expansion of the analytical capabilities of the National Evaluation of Substance Abuse Treatment computer

network, and therapeutic treatments for cocaine addiction.

## 5.2 Supply Reduction

CTAC's plan is based upon priority scientific and technological needs. The outstanding priority 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. The direction of CTAC's R&D program is established according to the following criteria:

- Fulfill the highest priority, unmet needs of the largest user set possible,
- Address broad-based, multi-agency needs that transcend the requirements of any single agency,
- Concentrate on those applications that will lead to transfer to the Technology Transfer Program.

Last year, CTAC participated in the bilateral meetings held at the first United States-United Kingdom (UK) Drug Summit in London. CTAC also held its first joint project-planning meeting in Israel. Based on the success of these meetings, the cooperative efforts with the UK (Police Scientific Development Branch) will be expanded to include an R&D project to develop a hand held roadside drug testing breathalyzer-type system. The meeting with the Israeli Federal Police has lead to a project for tactical intelligence support data relay to officers at the scene of a drug crime.

Areas of work that support future activities include technologies for nonintrusive inspection of conveyances and cargo

containers, and for tactical use in daily activities.

### 5.2.1 Nonintrusive Inspection

*In support of Goal 4: Shield America's air, land, and sea frontiers from the drug threat.*

R&D program initiatives will support and highlight research and technology, including the development of scientific information and data to detect, disrupt, deter, and seize illegal drugs in transit to the United States and at U.S. borders.

A project is planned with the Police Science Development Branch of the Home Office (UK) to extend the use of Surface Enhanced Resonance Raman Spectroscopy (SERRS) technology, currently being used for detection of explosives, to applications to detect illicit drugs. The feasibility of using Raman spectrometry in a drug analyzer to detect drugs in solid mixtures is also being considered in conjunction with the DEA, Customs and Coast Guard.

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

- improved X-ray and gamma ray detector technology,
- Surface Acoustic Wave - Immunoassay technology for narcotics detection,
- program for selective breeding of dogs for special applications,
- canine enforcement program R&D facility,
- hand-held bulk currency detector,
- rapid location of drugs "secreted" on-board maritime vessels during at-sea and port-side searches,
- rapid detection of drugs in cars, without removing occupants,

- accurate signatures for detectable illicit drug emissions in operational environments for physical and chemical detection,
- portable/transportable capability to detect and classify drugs and contraband in vessels, compartments and containers of all sizes.

### 5.2.2 Tactical Technologies

*In support of Goal 2: Increase the safety of America's citizens by substantially reducing drug related crime and violence.*

R&D initiatives strengthen Federal law enforcement capabilities to combat drug-related violence, disrupt criminal organizations, and arrest and prosecute the leaders of illegal drug syndicates through the development of advanced technology tools. The tactical technologies effort supports development of advanced techniques and concepts for drug detection, location and monitoring of clandestine methamphetamine labs, surveillance, tracking, and communications technologies for 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 solicit advanced concepts are:

- miniaturized covert tagging and tracking devices,
- next generation "tags" for aircraft, maritime, and ground targets,
- improved communications systems to share data across platforms, including tactical picture, from multiple sensor inputs: voice, data imagery, tactical situation information,

- unmanned aerial vehicles which can be operated from large cutters at sea,
- information and decision support systems,
- 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,
- a system that provides facial identification under surveillance conditions,
- a method to detect operating clandestine cocaine manufacturing labs,
- a method to detect operating clandestine methamphetamine manufacturing labs,
- the capability to combine future wide bandwidth Internet devices with full or near full motion video imaging,
- miniature, low power GPS tracking devices which utilize national terrestrial packet switch communications networks,
- miniature, low power GPS data loggers embedded in common equipment and packages,
- night vision capability, including fixed and mobile long range surveillance target acquisition systems, wearable goggles, hand-held "pocket" units,
- secure, digital, wireless and interoperable agency wide communications, and
- portable "helicopter to ship" transmission link of detailed photographs.

### 5.3 Infrastructure Support

This CTAC program element provides testbeds, instrumentation and engineering support to perform testing of prototype

systems in operational environments. Planned testbed efforts include covert tags, video stabilization, wireless intercept systems, methamphetamine laboratory analysis techniques, tactical communications systems and communications interoperability technology. Federally sponsored tactical and nonintrusive inspection systems qualified as mature by the testbed program will be considered for the Technology Transfer Program.

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.

### 5.4 Technology Transfer Program

The latest information on the Technology Transfer Program can be accessed on-line at [www.epgctac.com](http://www.epgctac.com). Over the past three years, CTAC has sponsored 18 regional one-day workshops and/or meetings to promote the use of advanced technology and increase an awareness of the 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.

The strategy for nationwide deployment of technology will continue to concentrate on:

- support the officer on the street with high technology tools to increase effectiveness of personnel resources and



improve officer safety by continuing the transfer of systems to requesting agencies,

- target specialized law enforcement 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 operational requirements or can be replaced with next-generation technology.

## 5.5 Conclusions

In the Demand Reduction area, technology and infrastructure capabilities that complement NIDA initiatives in prevention and treatment research are being pursued. Additionally, the DENS backbone is being used to accommodate innovative methodologies for estimating the number of hardcore drug users by region and nationwide. The vision is to provide a system architecture to project drug abuse trends, treatment modalities, and populations at risk across the nation in real time.

In Supply Reduction, efforts are concentrated on finding technological solutions to meet the needs of the officer on the beat. These technologies provide improved communications, surveillance and drug crime information sharing

capabilities to make the law enforcement missions more effective and safe. Technologies proven at the Federal level are being provided to State and local law enforcement through the continuing Technology Transfer Program.

Advanced coded aperture and neutron probe technologies are being developed to examine drug shipments as they enter the country. These advanced nonintrusive inspection technology concepts will, in time, replace the X-ray and gamma ray technology now used to search conveyances and cargo for hidden drugs at our ports-of-entry.

An outreach program was begun several years ago which included one-day regional workshops held at strategic locations across the country. These workshops served to increase the awareness of technologies developed by Federal agencies that could improve operations for State and locals. The success of the Technology Transfer Program, made possible with funding from Congress, has demonstrated that the users at the State and local level are eager to receive advanced tools, but they need associated training and support to effectively deploy new systems.

## 6.0 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, 1999.

- *FY 2001 Annual Performance Plan and FY 1999 Performance Report*, Office of National Drug Control Policy, 1999.
- *Counterdrug Research and Development Blueprint Update*, Office of National Drug Control Policy, Counterdrug Technology Assessment Center, NCJ-174434, 1999.
- *National Drug Control Strategy, Performance Measures of Effectiveness: Implementation and Findings*, Office of National Drug Control Policy, NCJ-174462, 1999.
- *National Drug Control Strategy, Budget Volume*, Office of National Drug Control Policy, NCJ-174461, 1999.
- *National Drug Control Strategy*, Office of National Drug Control Policy, NCJ-174460, 1999.
- *ONDCP International Technology Symposium Proceedings*, Office of National Drug Control Policy, Counterdrug Technology Assessment Center, NCJ-176973, 1999.
- *Ten-Year Counterdrug Technology Plan and Development Roadmap*, Office of National Drug Control Policy, Counterdrug Technology Assessment Center, NCJ-172201, 1998.

## 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

## APPENDIX A - APPLICABLE LEGISLATION

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

APPENDIX A - APPLICABLE LEGISLATION

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 anti-doping program within 30 days of the enactment of this Act."

## **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, and Tactical Technologies applications. The needs have been cited "as submitted" with the agencies specifically citing a particular need shown in parenthesis beside the description. The Demand Reduction basic and applied research needs and initiatives have been identified according to two categories: (1) improving treatment through neuroscientific advances, and (2) improving the transfer of biomedical research to the clinical setting.

### **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)

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 (USCG/INS)

Device for detecting narcotics swallowers (USCS)

Portal detection system for passenger screening (USCS)

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

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

A cheaper, quicker, more reliable, and less invasive inmate drug testing device is needed (NIJ)

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

B-1

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

Canine enforcement program R&D facility (USCS)

Hand-held bulk currency detector (USCS)

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

Program for selective breeding of dogs for special applications (USCS)

Rapid detection of drugs in cars, without removing occupants (DoD)

**Long Term (over 5 years)**

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

**WIDE AREA SURVEILLANCE**

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

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

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)

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

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)

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

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

Improve the capability to correlate multiple sensor inputs into one presentation (USCG)

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

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

Satisfy airspace control concerns for UAVs (USCG)

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)

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

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 interceptor vessel hull design (USCS)

Miniaturized covert tagging and tracking devices (USCS)

Next generation “tags” for aircraft, maritime, and ground targets (DoD)

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)

Develop track recording 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 of OTH and relocatable OTH radar to 1-2 nautical miles (USCG)

**Long Term (over 5 years)**

Improvements to wide area surveillance tools for drug detection and space accountability (better, cheaper, lighter, smaller, more power efficient) (USCG)

**TACTICAL TECHNOLOGIES**

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

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)

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

Improved communications systems to share data across platforms, including tactical picture, from multiple sensor inputs: voice, data imagery, tactical situation information (USCG)

Real-time worldwide tracking system for aircraft, vessels, vehicles, and packages (DEA)

Personnel safety and security system for counterdrug agents with worldwide coverage (DEA)

A system that provides voice identification at a Title III workstation (DEA)

A system that provides facial identification under surveillance conditions (DEA)

A method to detect and classify go-fast boats (DEA)

A method to detect operating clandestine cocaine manufacturing labs (DEA)

A method to detect operating clandestine methamphetamine manufacturing labs (DEA)

Interception of traffickers communications over Digital Subscriber Line, Internet, and CATV (DEA)

A digital narrowband audio transmitter secreted in an operational wristwatch (DEA)

Combination digital narrowband audio transmitter/recorder (DEA)

A remote audio transmitter that operates off the existing cellular phone service networks and has user programmable formats (DEA)

A 500 MW digital narrowband transmitter that can be secreted in multiple concealments (DEA)

Interception and direction finding of trafficker's communications over satellite telephone (DEA)

The capability to transmit full or near full motion video imagery over conventional telephone lines using enhanced video compression techniques (DEA)

The capability to combine future wide bandwidth Internet devices with full or near full motion video imaging (DEA)

A 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)

A satellite based sensor relay unit with increased bandwidth efficiency and lower power requirements. Device to accept input from sensors, switches, etc. and transmit via global network (DEA)

An acoustic airfield monitor with long life, satellite data link and simplified deployment. 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)

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 aliens illegally in the United States; 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)

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

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

State-of-the-art fingerprinting matching technology to ensure accurate identification of all apprehended aliens (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)

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)

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)

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

**Long Term (over 5 years)**

Improved sensors (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**

**Improving treatment through neuroscientific advances**

Expansion of advanced neuroimaging research facilities and training of research teams who are devoted to studies of drug abuse and therapeutic medications. The technology should provide neuro-imaging research equipment suites and facilities with the best positron emission tomography (PET), functional nuclear magnetic resonance (fNMR) imaging, brain scan image processing and interpretation, and other noninvasive brain imaging techniques.



Contribute to the development of magnetic resonance spectroscopy (MRS), functional magnetic resonance imaging (fMRI) and positron emission tomography (PET) systems development or improvements to image the drug's metabolic and chemical processes, map brain reward circuitry, blood volume and flow associated with drug metabolism, analyze interactions with potential therapeutic medicines, ligand development, and study of localized active areas of the brain.

Micro-PET with stereotactic probes/injectors to enhance ligand development and studies on small localized areas of the brain and on non-human primates.

### **Improving the transfer of biomedical research to the clinical setting**

Scientific studies and technologies that could provide the platform for key research areas such as: catalytic antibodies as peripheral blockers or circulating drug interceptors; substitute medications and partial agonists for addiction; blocking drug effects by regulating uptake of neurotransmitters; 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; significance of various rewards; 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.

Psychology, pharmacology, and chemical assay techniques to improve our understanding of the effects of drugs on the body, techniques for assessing and monitoring drug addiction and abuse severity, and techniques for treatment/client matching.

Drug testing in sports, investigate innovative approaches for screening for doping and other performance enhancing substances and drugs currently not detectable by urine tests, and to develop cheaper test procedures for handling urine specimens collected from competing athletes. Systems, methods, and protocols that will assist understanding and detecting the use of performance-enhancing drugs such as anabolic and androgenic steroids by athletes competing locally, nationally, and internationally

Youth/first time offender diversion, expansion of the analytical capabilities of the National Evaluation of Substance Abuse Treatment computer network, and therapeutic treatments for cocaine addiction.

## **APPENDIX C – COUNTERDRUG RESEARCH AND DEVELOPMENT PROJECTS**

### **Research and Development Projects - Counterdrug Technology Assessment Center (1999)**

#### **Demand Reduction**

##### Vaccine For Cocaine Addiction

This project is developing an effective catalytic antibody that acts as a circulating interceptor in the blood stream to render cocaine inactive after which the antibody becomes available again.

##### Agonist Drug Development

This project is developing an agonist-type compound that will reduce cocaine induced effects of blocking the uptake of the neurotransmitter dopamine.

##### Brain Imaging Technology

This initiative provides advances in brain imaging to increase the level of drug abuse research activity conducted at various medical research facilities. These advanced brain imaging facilities will employ positron emission tomography and functional magnetic resonance imaging technologies to accelerate the development and evaluation of new drugs for treatment.

##### Drug Evaluation Network

The Drug Evaluation Network System (DENS) project, in conjunction with the Center on Addiction and Substance Abuse (CASA), is a computer system with algorithms to evaluate and monitor substance abuse treatment programs in real time. Treatment data on patients are aggregated and organized by a central computer system using the latest database and executive information system technology and made accessible to treatment providers, researchers and managers.

##### Drug Treatment And Testing Technologies

This project provides for a comprehensive analysis of substance abuse among Olympic, professional, collegiate and high school athletes in America and provides recommendations for improvement in substance abuse testing, sanctions and treatment. Investigators will identify problematic substances, masking agents, and gaps in current testing procedures. A set of recommendations is being prepared that outline future research for new testing procedures.

##### Diversion Program for Juveniles & First Offenders

A New Orleans District Attorney diversion program to evaluate the treatment technologies used in court diversion programs for juvenile offenders with drug abuse problems is being supported.

## **Supply Reduction**

### Coded Aperture Fast Neutron Analysis

A breadboard coded aperture array is being designed and fabricated to develop an advanced means of signal processing for neutron interrogation. Investigators are attempting to overcome some of the disadvantages of X-ray and pulsed fast neutron analysis, including the need for particle accelerators, mechanical scanning, and tight pulsing while reducing system costs.

### Neutron Interrogation Probe

A transportable neutron-based probe is being developed to nonintrusively inspect commodities for illicit drugs. The system concept detects and analyzes inelastic and thermal gamma ray signatures to provide elemental images.

### Detector Dog Breeding Program

A drug detection dog breeding program was established with the Customs Service. The program is based upon quantitative genetic principles proven by the Australian Customs Service.

### Surface Enhanced Resonance Raman Spectroscopy

A two-year project is being conducted with the Police Scientific Development Branch of the Home Office to extend the use of current SERRS technology being used for detection of explosives to applications to detect illicit drugs.

### RIONet

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

### 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 that could be deployed on-site and an integration of forensics systems utilizing digital recording advancements for the capture and analysis of fingerprints.

### Inhibition of Anhydrous Ammonia for Methamphetamine Production

A feasibility study was performed to investigate the potential for altering agricultural anhydrous ammonia to make it unsuitable for methamphetamine production while retaining its agricultural benefit. Also related to clandestine laboratory operations, CTAC is sponsoring the development of an online interactive training module on clandestine laboratory seizures.

### Mobile Drug Destruction Technology

Several concepts for the use of a mobile/portable incinerator to dispose of seized drugs were evaluated for the Drug Enforcement Administration.

### **Technology Testbeds And T&E Support**

The support program provides testbeds, instrumentation and engineering support to perform testing of prototypes in operational environments. While the Federal law enforcement agencies provide the lead for much of the testing program, many prototype tests include State and local organizations. The testbed program will continue in FY2000 with a concentration on nonintrusive inspection technologies, computer science, and benchmark comparisons of similar systems under development.

CTAC sponsored the fifth ONDCP International Technology Symposium in March 1999 in Washington, DC. The program was supported by the federal drug control agencies and included the presentation of over 100 technical papers with 400 attendees. In addition, CTAC supports 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.

## **Research and Development Projects - U.S. Customs Service (1999)**

### **Non-Intrusive Inspection**

#### Gamma Pallet Scanner

The device is intended to scan large pallets and provide imaging in a limited space. Use of a Cobalt-60 source will enable penetration of nominal 4' W x 4' L x 8' H pallets in a single pass

and pallets up to 6 feet wide and any length in multiple passes. A Cesium source is included for research purposes. Footprint width of the device is expected to be less than 14 feet total.

### CTX Mobile System

This project utilizes a leased Computer Tomography X-ray (CTX) scanning system to examine suitcase-size objects, 25" W x 20" H x 39" L, with automatic detection of drugs and other contraband. The InVision CTX-2500 is mounted in a 31-foot long (24-foot box) truck. The unit provides its own power, appropriate conveyor belts, and auxiliary input and exit conveyors.

### Automated Drug Recognition Software

The software developed in a previous joint Customs Service/Navy project will be attached to an AS&E 101XL x-ray and evaluated for effective operation in a field environment. A second computer will be attached for this proof-of-concept operation.

### Portal Radiation Detector

This device provides final screening of commercial truck traffic leaving U.S. ports of entry. This is a passive system capable of detecting weapons of mass destruction, radioactive contamination, and marijuana. This Technical Support Working Group/Customs Service project continues with the addition of a software upgrade and repairs/modifications to improve reliability and operator interfacing.

### Pulsed Fast Neutron Analysis Field Test

Customs Service will conduct a four to six month field test of a Pulsed Fast Neutron Analysis (PFNA) - based cargo inspection system at the Ysleta (El Paso) Texas port of entry. 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.

## **Tactical Technologies**

### Clandestine Detection and Tracking of Maritime Vessels

Halting the transport of narcotics in commercial maritime vessels continues to present a significant challenge to Customs Service. This project will link the output of existing clandestine maritime vessel detection and tracking systems and techniques to a GIS-driven application designed to facilitate data collection, analysis and dissemination within Customs Service.

### Go-Fast Interdiction Technology

This multi-agency project will develop non-lethal techniques for stopping go-fast drug smuggling boats.

### Advanced 40-Foot Interceptor Boat Design

This project will develop a new catamaran hull boat which will substantially improve boat handling, speed and comfort in rough seas.

### **Contraband Detection**

#### Detection of Drug Swallowers

One of the most difficult challenges facing Customs Service is the detection of smugglers who swallow sealed packets of narcotics. This study, conducted with the cooperation of the DoD, focuses on the detection of markers in breath that would indicate ingestion of drug-filled packets.

### **Port Operations Support**

#### Plasma ARC Contraband Destruction System

This project involves the development and acquisition of a thermal destruction system capable of destroying seized contraband, including Freon. The system uses a Russian-designed ARC plasma torch and is expected to have a throughput of greater than 300 pounds per hour. The processed material will be completely destroyed, leaving no ash or slag.

## **Research and Development Projects - Department of Defense (1999)**

### **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 will be demonstrated and evaluated during CY00.

#### 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 backscatter imaging system for that application.

#### 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. Indoor and outdoor test space, storage space for test cargoes and vehicles, and data reduction facilities are available. The facility has been used to evaluate a small package x-ray, the mobile truck x-ray, a gamma ray detector, a hyperspectral infrared vapor detector, and a number of vapor and particle detection systems.

#### 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) improved tracker for airfield surveillance, 2) tracker improvements to decrease false alarm rate, 3) elevation nulling to reduce effects of equatorial clutter, and 4) automated ray tracing to support target altitude estimation. Particular attention is being paid to enhancements for the Puerto Rico relocatable OTH radar in the areas of equatorial clutter rejection and airfield monitoring.

##### 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 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 installed in the Advanced Sensor Platform aircraft.

##### 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.

##### Advanced Sensor Platform

This project provides for the development of a multi-sensor airborne platform to detect drug processing laboratories hidden in the Colombian jungles. A complete system with a foliage

penetration radar, and electro-optical and infrared imaging sensors will be completed and transitioned to USSOUTHCOM in year 2000.

### 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.

### Tactical Technologies

#### 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. 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

Commercial off the shelf unattended ground sensors are being investigated and evaluated to provide an airfield monitoring capability.

#### Emergency Locator Beacon

A small, lightweight emergency locator beacon has been developed and demonstrated. Two versions have been developed – a vehicle mounted unit, and a small person carried unit. They interface with the existing satellite systems, using the GPS system for self-location and the SARSAT (search and rescue satellite) system to generate and transmit the emergency data. Demonstration of a prototype unit has been conducted with the U.S. Border Patrol at Marfa, Texas.

#### Remote Ranging and Location System

The Remote Ranging and Location System consists of a pair of high quality binoculars integrated with a built-in GPS receiver, magnetic compass, and laser rangefinder. The system



has numerous applications. Working with the National Guard, the system was successfully evaluated for use by aerial observers searching for marijuana crops. The airborne observer locates the crop using the binoculars, presses a button on the system, and the system automatically computes the geographic coordinates of the crop's location.

### 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 air delivered means although surface delivery also is being evaluated. Possible users are the interdiction forces of the USCS and USCG.

### 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. Working with several law enforcement agencies system it is planned to demonstrate and evaluate system 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 applications. It will utilize remote learning to effectively reach many users at low cost.

### Demand Reduction

#### Specimen Cup Automated Pouring (SCAP)

Optimized urinalysis testing methods, equipment, and procedures, and improved specimen sampling process are being developed. The Specimen Cup Automated Pouring consists of a new bottle concept that will greatly improve the integrity and efficiency of the urine sampling process. In addition, the system will provide an automated specimen bottle handling system to

identify/read the redesigned specimen bottle using bar code technology and automatically extract urine samples from the container for testing. Demonstration and evaluation of the system will begin in early CY00 at the beta test site.

## **Research and Development Projects - U.S. Department of Agriculture / Agricultural Research Service (1999)**

### **Chemical and Biocontrol of Illicit Narcotic Crops**

Agricultural Research Service (ARS) has screened various herbicides and evaluated their environmental impacts in support of the Department of State illicit narcotics control program since 1987. Their most current program is monitoring field applications of glyphosate for the eradication of coca and opium in Colombia. Recent accomplishments include the development of a glyphosate-adjuvant mixture for application in high-rainfall environments; this development has substantially increased the efficacy of the eradication program in Colombia. The program also supports Operation Breakthrough, an interagency effort to more accurately measure the increase in illicit narcotics cultivation in Colombia. ARS continues to work with the Department of State, the Drug Enforcement Administration, and the U.S. Embassy, Bogota, in an effort to convince Colombian authorities to expand the number of herbicides (most particularly drug formulations) that are more appropriate to the extremely varied ecosystems of that country.

### **Alternative Crop Research**

The rehabilitation and expansion of traditional tropical tree crop industries, which can be managed within forest ecosystems in narcotics-impacted areas, is the primary emphasis of the program. To date, research goals have focused upon limiting the impact of tropical pests specific to the coffee and cacao industry through biological control of diseases and insects, improved cultural practices and proper field management techniques for small-scale farmers. More recently, a long-term program to improve the genetic structure of cacao in terms of quality, productivity and disease tolerance has been initiated. The latter emphasis represents a long-term commitment to tropical agroforestry. The general philosophy has been to emphasize organic production, since this most probably represents a major growth market and a higher value-added component to small-scale growers in the Andean Region. This year, at the request of the Department of State, ARS will initiate an organic banana program for the Caribbean with emphasis upon Jamaica and the Windward Islands.

Accomplishments to date include the establishment of field stations in Peru, Costa Rica and Brazil. The Agency currently supports two post-doctoral candidates from Colombia and one candidate from Peru; their research emphasis has been upon coffee and cacao respectively. ARS has also supported small-farmer field training programs in Peru, a Costa Rican regional workshop, and a national cacao/agroforestry conference in Lima.

### **Crop Estimation and Identification**

This program has two components: the detection of illicit drug plants (primarily cannabis from aerial platforms) and the development of models for the estimation of illicit narcotics production overseas.

a. Detection: The detection of cannabis from aerial platforms remains a problem due to difficulty in developing spectral signatures unique to cannabis. This is primarily due to the high degree of genetic heterogeneity of illicit cannabis, as well as the general practice of concealing small plots within agricultural plantings, e.g., corn, or on public lands within state lands or the U.S. National Forests. Due to small plot size, satellite imagery is not an option within the United States. Despite these difficulties, ARS, in cooperation with NASA and the Naval Systems Weapons Laboratory, has made some progress in developing hand held sensors for deployment from helicopters. Unfortunately, some visual corroboration remains necessary. During the last year, ARS, in cooperation with DEA has conducted two workshops for State Police, National Guard and federal land management agencies; the Maryland State Police and Florida Department of Law Enforcement have provided logistical and classroom support for these workshops.

b. Crop Estimation: Public Law 481, as amended, mandates that the Secretary of State produce an annual report to Congress with estimates of the magnitude of the illicit narcotic crop overseas by country. ARS scientists collaborate closely with host country governments, the intelligence community, the Department of State and Drug Enforcement Administration in developing models of narcotic alkaloid yield which are then matched with spectral imagery produced by both the U.S. intelligence community and the United Nations. Current programs include support for Operation Breakthrough in Colombia and development of diversion estimates from the licit poppy crop in India. In recent years, the program has moved from applied research to the development of predictive mathematical plant growth models based upon known parameters including weather, rainfall, soil type and genetic characteristics of the target narcotic plant species. The ultimate goal will be to develop a predictive model of production which can be driven by spectral imagery with a more limited requirement for the collection of ground truth data, which involves expensive, relatively high-risk activities in narcotics producing areas.

### **Illicit Crop Chemistry**

This program effectively supports the other three by mapping the biochemical pathways of narcotic plant chemistry and mapping the genome and taxonomy of illicit narcotic species. It is an essential element of both in developing a narcotic crop eradication strategy, as well as, developing predictive models of illicit (and licit) narcotic alkaloid production.

Recently, the program has become more aligned with mapping narcotic plant genetics. Two related current initiatives, at the request of Department of State, involve the improvement of the Turkish and India licit poppy industries to meet expanding needs of the U.S. pharmaceutical industry. An additional similar initiative has been the characterization of the cacao genome collections worldwide with emphasis upon identifying genetic markers for the isolation of both alkaloids and flavanoids of high commercial value, which if introduced by breeding into traditional cacao culture in Latin America can provide significant value-added profits for small-

scale farmers. Similar technologies can be applied to other alternative crops, including bananas, mangosteens and plantain.

### **Development of Mycoherbicides**

Drug research funds in the amount of \$23 million were appropriated to the Department of State under the Western Hemisphere Drug Trafficking Emergency Supplemental in 1999. Of these funds, \$13 million were earmarked for the development of mycoherbicides for narcotic crop control. These funds have been provided by the Department of State to the United Nations Drug Control Program to further the research and development of mycoherbicides.

## **Research and Development Projects - Immigration and Naturalization Service (1999)**

### **Long Line Sensor Technology**

**BLUE ROSE** - The INS is exploring the merits of a new approach to long line fiber optic intrusion detection being developed by the Naval Undersea Warfare Center, Newport, Rhode Island for use along the Southwest Border. Development of a proof-of-concept demonstration sensor was initiated and completed with a successful demonstration of the concept on December 9, 1999. Continued development funding is to be determined.

## **Research and Development Projects - U.S. Coast Guard (1999)**

### **Improve Surveillance Technology**

Technical Evaluation of Acoustic Detection Systems for Go Fast Boats - A project to design, fabricate and test a prototype of an unattended underwater acoustic sensor capable of detecting and classifying small boats and communicating this information to operational forces in a timely manner.

Sensor Fusion - A project to enhance target detection, classification and tracking in support of tactical analysis and intercept decisions through an analysis of both imaging correlators and fusion algorithms as well as complete flight demonstration of the Sensor Integrated Tactical Workstation.

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.

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.

### **Improve Vessel Search Capabilities**

Boarding and Search Equipment - 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 Low Energy Imaging Techniques - Ultrasonic - 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.

Support Narcotic Detection Technology Assessment Team Activities - The USCG R&D Center participates in and supports the CTAC NDTA test and evaluation studies of illicit substance detection devices in laboratory, simulated field and real field operational conditions.

### **Compliance Technology**

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.

### **Technology Investment**

Maritime Operations Simulation Upgrade - Provide the Coast Guard with the ability to sustain a flexible, low-cost and powerful maritime law enforcement operations modeling, simulation and analysis capability.

Fuel Cell Propulsion for a WMEC - Demonstrate the benefits of fuel cell propulsion and ship's service on board Coast Guard cutters performing counterdrug interdiction patrols. Provide technical and cost data necessary to evaluate future applications of marine fuel cells.

Mobile Communications Infrastructure - Evaluate new and emerging commercial systems to meet Coast Guard mobile communications requirements, including secure communications for counterdrug interdiction operations. Develop an architecture for wide area network connectivity between mobile platforms and shore units. Test and recommend alternatives that can be used to implement this architecture.

### **Completed Counterdrug R&D Initiatives (FY99)**

Operational Information Integration Technology - Develop an information model for operational information, including law enforcement, and analyzing this model for data integration requirements along the following dimensions: data discovery, data fusion, data conversion, and data display. Investigate innovative systems and methodological technologies for data integration.

Operational Information System Plus - Demonstrate how new state-of-the-market communications and information systems can greatly improve support for operations, including law enforcement, resulting in increased mission efficiency and effective use of Coast Guard resources.

### **Research and Development Projects – National Institute of Justice, Office of Science and Technology (1999)**

#### **Tactical Technology Development**

##### Body Cavity Screening: Supplemental Proposal for System Calibration and Procurement of Long-Term Lead Items for Phase II

A portion of this funding supplement proposal is for additional calibration work necessary to complete the optimization of parameters and demonstrate the effectiveness of the systems for detecting foreign objects in body cavities. Preliminary tests have shown the Body Cavity Screening System to be a non-invasive scanner for very small steel objects smuggled in body cavities. Calibration with human volunteers was not intended to be part of the system development effort and not included in the Phase II Statement of Work. However, the program has progressed to the point that realistic imaging targets must be used to more fully optimize the imaging parameters.

##### COPLINK Database Integration and Access for a Law Enforcement

The Tucson Police Department (TPD) and the University of Arizona Artificial Intelligence Group have partnered to research the application of state-of-the-art and cost effective database, Intranet, and multimedia technologies to computer justice information database integration, management, and access. The partnership blends two areas of expertise: law enforcement and information technologies.

##### 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.

Development of a Guideline for Explosives/ Drug Detectors for Law Enforcement Applications

The main objective of this project is to provide information about the capabilities of drug detection systems to local law enforcement agencies, and to provide a technical basis for the procurement of such equipment based on the development of an appropriate guideline on commercially available systems, standard test protocols, and testing results. Emphasis will be placed on systems that are small and lightweight enough to be transported in a standard police car, and on units that are low cost.

Facial Recognition Technology (Phase II)

Locating missing and exploited children, tracking known sex offenders, attempting to identify individuals in video surveillance are difficult, time consuming tasks that suffer from inadequate personnel support. Modern computer technology can substantially enhance these investigative efforts. Evolving technologies, such as automated still photo and video facial recognition and expert system analysis, already exist but must be integrated with advanced search methods to provide solutions that are useful in this context. This project will develop and integrate specialized software search agents with biometric identification “modules” that can be used as a system to find missing children and fugitives on the Internet, in video surveillance, or other large facial databases. These specialized software search agents can be used in a variety of combinations depending upon the specific type of search required.

Interlaboratory Studies on the Analysis of Hair for Drugs-of-Abuse

In recent years, there has been considerable interest in the use of hair analysis for detecting drug use. However, there are many analytical aspects of this procedure that have not been thoroughly investigated and resolved. The objective of this project is to conclude work on a quality assurance program for laboratories that use or are investigating using hair analysis for drugs of abuse. The results of this project have indicated the need for standard reference materials for the analysis of drugs of abuse in hair.

NIJ Standard 0604.00/0605.00, Chemical Spot Tests for Preliminary Identification of Drugs of Abuse

The objective of this project is to complete the revalidation of the chemical spot test for sensitivity, specificity, and color reaction, and to prepare a revised document that is a single comprehensive standard for the use of chemical spot tests. A report will update and issue one revised NIJ Standard for both of the two current standards for the Chemical Spot Tests and for Color test.

Non-Intrusive Detection and Determination of Drugs in the Human Body: Evaluation of Saliva as an Alternate Drug Testing Specimen

The objective of this project is to focus on the development of rapid non-intrusive methods for the detection and determination of drugs of abuse in the human body. It explores: (1) the use of saliva as a diagnostic sample medium, (2) correlation of the drugs concentration in the saliva with that in the blood for estimation of circulating concentration of drugs, and (3) electrophoresis, both in a capillary and on a microchip for the rapid separation and determination of the drugs concentration.

A Portable Voice-Command Translation System (IWT)

The Voice Response Translator (VRT) is an officer-portable device enabling law enforcement officers to communicate with persons having difficulty speaking or understanding English. The Voice-activated VRT device emits pre-recorded spoken phrases in either Vietnamese, Chinese (Cantonese) or Spanish, in response to an officer's prompting. The phrases are intended to elicit gestures and body language, in the form of head nods or hand motions, from persons the officer is addressing.

Real-Time Computer Surveillance for Crime Detection

The American Probation and Parole Association and the National Institute of Justice will work with a group of 25 manufactures, service providers, and product and service users from throughout the country to develop and deliver information on electronic monitoring tools, develop and implement procedures for testing equipment abilities and specifications, develop a list of equipment capabilities and specifications for users, report on potential applications of current technology, and develop data elements for future evaluation or equipment uses.

Technology Thrust Areas and Technical Solutions to Law Enforcement

Texas Instruments will deploy low-cost, uncooled thermal imaging systems for law enforcement in cities and countries in the corridor along Highway 75 between Dallas and Grayson Counties in Texas.

Voice Command Mobile Phone Technology for Community Policing

A technology matrix of the most promising counter terrorism technologies will be developed along with a prioritized listing of needs. A Final Report will provide the results of the seminar war game.



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

**Introduction**

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 report includes two sections on narcotics detection technology: a section on technologies under development, and a section on systems deployed or available for deployment.

**Narcotics Detection Technologies Under Development**

Table D-1 provides those reporting items specified for narcotics detection technologies under development or recently completed.

**Table D-1. NARCOTICS DETECTION TECHNOLOGIES UNDER DEVELOPMENT OR RECENTLY COMPLETED**

<b>Agency</b>	<b>Project Title/Short Description</b>	<b>FY 97 (\$K)</b>	<b>FY 98 (\$K)</b>	<b>FY 99 (\$K)</b>	<b>FY 00 (\$K)</b>
US Customs Service	Rail Gamma Prototype - Develop a prototype gamma ray imaging system to detect contraband in rail cars <i>Prototype due 3Q FY00</i>	0	442 (CTAC)	395	250
US Customs Service	Mobile Truck X-ray - Development of a "low under-carriage" mobile truck X-ray system <i>Prototype delivered 3QFY00</i>	100	1,700	0	0
US Customs Service	Potassium (K-40) Detector - Support to Revenue Canada for a joint Potassium-40 detection system for marijuana and tobacco products <i>Prototype deployed on SW border</i>	0	144	0	0
US Customs Service	Piezoelectric Resonance Detector - Investigation of the piezoelectric resonance characteristics of cocaine hydrochloride <i>Project discontinued.</i>	30	25	0	0

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<b>Agency</b>	<b>Project Title/Short Description</b>	<b>FY 97 (\$K)</b>	<b>FY 98 (\$K)</b>	<b>FY 99 (\$K)</b>	<b>FY 00 (\$K)</b>
US Customs Service	SAW Immunoassay - proof-of-concept demonstration of a surface acoustic wave filter to a biological immunoassay tag to identify cocaine vapors <i>2QFY01</i>	25	50	175 (CTAC)	50
US Customs Service	Forced Air Canine Sampling - Development and evaluation of application of canines to sea and land cargo containers through positive air expulsion <i>Deployed</i>	0	25	20	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>	0	90	10	20
US Customs Service	Evaluation of Trace Detection Systems - Support for the test and field evaluation of several IMS trace detection systems <i>Ongoing</i>	250	0	25	25
US Customs Service	Non-intrusive techniques to detect the presence of swallowed narcotics in high risk smuggling suspects <i>New Start</i>	0	0	0	200
FAA / DoD/ Customs	Pulsed Fast Neutron Analysis - to evaluate the PFNA prototype system at Ysleta (El Paso) TX in conjunction with DoD and Customs. Applications focus on both counter-terrorism and counterdrug missions. (Prior funding under DoD appropriations was about \$40 million) <i>Begin Evaluation 4QFY00 Completion 2QFY01</i>	0	2,700 (DoD)	2,500 (FAA) 650	5,000 estimate
US Coast Guard	Boarding and Search Equipment - Analyze new technology applications, methods and procedures in support of improved vessel searches. <i>Completion 4QFY00</i>	200	200	200	0

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<b>Agency</b>	<b>Project Title/Short Description</b>	<b>FY 97 (\$K)</b>	<b>FY 98 (\$K)</b>	<b>FY 99 (\$K)</b>	<b>FY 00 (\$K)</b>
US Coast Guard	Vessel Search via Low Energy Imaging Techniques - Ultrasonic - 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 (\$175K prior to FY97) <i>Completion 4QFY00</i>	0	175	225  50 (CTAC)	0
US Coast Guard	Support Narcotic Detection Technology Assessment Team Activities - The USCG R&D Center participates in and supports the CTAC NDTA T&E studies of illicit substance detection devices in laboratory, simulated field, and real field operational conditions <i>Completion: 1QFY00</i>	0	100	0	0
US Coast Guard	Shelf Technology Program - Assess emerging off-the-shelf technology and new contraband detection equipment for use by boarding teams. <i>Completion 1QFY99</i>	75	75	0	0
Department of Defense	Enhanced Canines - enhance drug detection by canines through understanding, evaluating, and applying performance limitations and variables that decrease performance. <i>Completed</i>	400	0	0	0
Department of Defense	Mobile System Testing and Integration – Test and demonstrate individual and multiple systems at testbeds and ports-of-entry. Successful systems will continue to be integrated with Customs/FAA activities involving stream of commerce inspections. <i>FY98/99: Completed demonstrations of individual system, conduct port-of-entry modeling, and completed test plan for controlled performance assessments and integrated field demonstrations involving air and sea cargo streams of commerce.</i>	1300	1400	1000	500

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<b>Agency</b>	<b>Project Title/Short Description</b>	<b>FY 97 (\$K)</b>	<b>FY 98 (\$K)</b>	<b>FY 99 (\$K)</b>	<b>FY 00 (\$K)</b>
Department of Defense	Small Package Inspection - Conduct evaluations on several commercially available state-of-the-art, small package X-ray systems for use in detecting illegal drugs and contraband. <i>FY98: Completed.</i>	50	25	0	0
Department of Defense	Automated Screening Equipment and Systems (Demand Reduction) - Development of an automated sampling system and specimen container to reduce cost and enhance military drug testing capability. <i>FY99/00: Complete development of system/specimen container prototype and testing at a DoD test site.</i>	650	675	635	0
Department of Defense	Mobile Detection System - Development of next generation mobile non-intrusive inspection systems. Investigate backscatter and transmission imaging techniques for rapidly inspecting cars and trucks. Includes development of mobile X-ray, pallet X-ray, gamma ray transportable system for inspecting cars and trucks, and high energy X-ray system for inspecting maritime containers. <i>FY98/99/00: Completed prototype development of transmission capable mobile truck X-ray; completed development of the gamma-ray system; and with USCS complete the development of the maritime container X-ray and large pallet X-ray prototypes.</i>	3200	2200	0	0
Department of Defense	Portable Inspection System -Lightweight portable system for use by maritime boarding parties to search for hidden compartments that may be used to conceal drugs. <i>FY97/98/99: Completed analysis and initiate development of a prototype system.</i>	0	270	250	750

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>FY 97 (\$K)</b>	<b>FY 98 (\$K)</b>	<b>FY 99 (\$K)</b>	<b>FY 00 (\$K)</b>
Dept of Agriculture	Narcotics crop plant identification and chemistry <i>Ongoing</i>	398	398	0	0
Dept of Agriculture	Cannabis detection in concealed areas not accessible to remote, aerial sensors <i>Ongoing</i>	275	275	0	0
CTAC	Drug Phenomenology Research - analytical evaluations to compare technical system performance using accurate measures of effectiveness and scientific comparison criteria <i>Ongoing</i>	250	225	50	0
CTAC	Narcotics Detection Technology Assessments - continue supporting the Narcotic Detection Technology Assessment program led by U.S. Customs Service. <i>Ongoing</i>	1,805	3,905	50	150
CTAC	Southwest Border Technology and Infrastructure Study - determine the optimum mix of advanced technologies to interdict drugs along the southwest border <i>Completed in FY99</i>	0	735	0	0
CTAC	Coded Aperture Fast Neutron Analysis - to develop an advanced means of signal processing for neutron interrogation <i>Completion: 2QFY01</i>	0	400	364	0
CTAC	Neutron Probe - to develop a transportable neutron-based probe to inspect commodities for concealed illicit drugs. <i>Completion: 4QFY00</i>	0	300	297	100
CTAC	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: 3QFY00</i>	0	100	100	100

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

Agency	Project Title/Short Description	FY 97 (\$K)	FY 98 (\$K)	FY 99 (\$K)	FY 00 (\$K)
CTAC	Surface Enhanced Resonance Raman Spectroscopy (SERRS) - to extend the use of current SERRS technology being used for explosives detection to applications to detect illicit drugs. <i>Completion: 2QFY01</i>	0	0	120	200
CTAC	Raman Spectrometry Drug Analyzer - to use a new infrared Raman spectroscopy method to detect drugs in solid mixtures. <i>Completion: 4QFY00</i>	0	0	0	250
CTAC	IMS Proton Activity - Laser Induced. Develop means to selectively detect and identify drug vapors using two complementary ionization techniques and IMS detectors. Prototype demonstration: <i>3QFY01</i>	0	0	0	250
CTAC	CTEC Support - continue support to community test and evaluation center <i>Ongoing</i>	0	0	50	50

### Systems Deployed or Available for Deployment

The following systems have been developed under DoD sponsorship and are ready or undergoing transition to U.S. Customs Service for deployment.

#### Fixed Site Truck X-ray

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. The USCS has installed eight of these systems along the Southwest border.

#### Mobile Truck X-ray

The mobile X-ray system can be rapidly redeployed at different border crossings. The system is self-contained in a truck, and uses a 450 KeV X-ray source. Initial system capability provided only backscatter images of trucks and cars. Enhanced capabilities have been developed and successfully demonstrated which provide both backscatter and transmission images, and expanded X-ray beam scan angles. The

USCS has deployed three systems and is in the process of acquiring additional systems for use at other ports of entry in Texas, Arizona, and California.

### Gamma Ray Imager

The gamma ray imager uses a medium energy gamma ray source (Cesium-137 or Cobalt -60) to generate X-ray type transmission images of trucks and cars. It can be rapidly deployed among different sites. The developmental system has been deployed to Florida and New Mexico, where it has been successfully demonstrated in multiple applications. The USCS has deployed four of the fixed systems with an additional nine systems on order. One additional system to be configured in mobile mode has been placed on order.

### 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 CY00.

### Small Pallet X-ray System

This is a relocatable fixed site X-ray system designed to rapidly inspect small warehouse cargo pallets up to 5ft high by 5 ft wide, weighing up to 3000 lbs. It uses as its source a 320 KeV X-ray tube, and generates both transmission and backscatter images. The prototype system is currently being evaluated at the Port of Philadelphia.

### 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.

### Image Enhancement Algorithms

Complementing the imaging system developments, image enhancement algorithms to automatically search the imagery and highlight suspected contraband for detailed examination by the image analyst are being investigated.

### Ion Trap Mobility Spectrometer

A prototype handheld ion mobility spectrometer has been developed and demonstrated. The system weighs eight pounds, including batteries sufficient for a one-hour mission. Sensitivity is in the one hundred picogram range. The design features include a high-efficiency atmospheric sampling system with more turbulent flow,

and improved trap geometry resulting in an improved ion collection efficiency, automatic calibration, and self-diagnosis. Approximately 40 units have been deployed for multi-threat use.

### Canine Substance Detection

The objective of this project is to analyze factors that contribute to the effectiveness of substance detection canines, and to provide procedures and techniques to improve detection capabilities and establish documented standards of reference/calibration. Results are available to Federal, State, and local law enforcement agencies. Furthermore, the results could augment the development of artificial biosensors for drug detection.



## **APPENDIX E -TECHNOLOGY TRANSFER PROGRAM**

The fiscal year 1998 appropriation for the ONDCP directed CTAC to establish a \$13,000,000 Counterdrug Technology Transfer Pilot Program (TTP). The program was continued in fiscal year 1999 (\$13,000,000) and fiscal year 2000 (\$13,250,000).

The Technology Transfer Program 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. This section of the Blueprint Update provides excerpts from that report which was submitted to Congress on September 20, 1999.

### **Vision of the Technology Transfer Program**

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 an agency can apply only for a system or device offered by the Program. Instead, technologies and training are provided directly to the State and local law enforcement agencies.

## **Basic Assumption of the TTP**

The assumption is that Federal, State, and local LEAs all need advanced technologies to conduct their drug-related criminal investigations, but to different scale and complexity. The Federal LEAs will employ the technologies to carry out complex, large-scale drug-related criminal investigations while the State and local LEAs will need the identical technologies but usually on a smaller scale for their drug-related criminal investigations and daily operations. Additionally, to ensure that drug crime task forces receive maximum benefit from the more sophisticated information sharing technologies, special emphasis has been placed on providing technology to LEAs within High Intensity Drug Trafficking Areas (HIDTA).

## **Successes of the TTP During its First Eighteen Months**

The \$26,000,000 appropriated over the past two years has made possible the delivery of 892 pieces of equipment to 631 State and local law enforcement agencies. These transfers were sufficient to satisfy the first, second, or third priority request of these agencies.

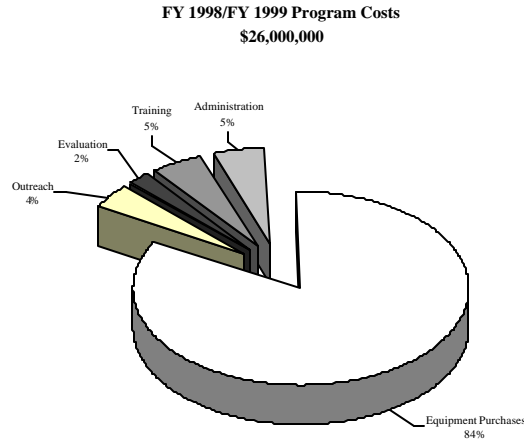
To ensure the greatest benefit to the LEAs and to assist in the proper use and deployment of the technologies, hands-on training and limited maintenance support are provided to all recipients. The comments from the recipient agencies indicate that the technologies provided by the program have resulted 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 1 provides a break down of the financial management accounts set up by EPG.

The pie chart provides the distribution of the \$26,000,000: technologies (\$21,770,000 which includes the costs associated with procuring 892 systems and providing them to 631 agencies since the program started), administration (\$1,400,000 which includes all daily administrative and program management functions, extensive records management, and support to the recipients); outreach efforts (\$950,000 which includes all regional one-day workshops and meetings to demonstrate the technologies to LEAs); LEA training (\$1,400,000 which includes the training sessions for the recipients when they first receive equipment and vendor support at the LEA location); and evaluation (\$480,000 which includes follow up support, consultant services, and preparation of the evaluation report).



**Figure 1. DISTRIBUTION OF PROGRAM COSTS**

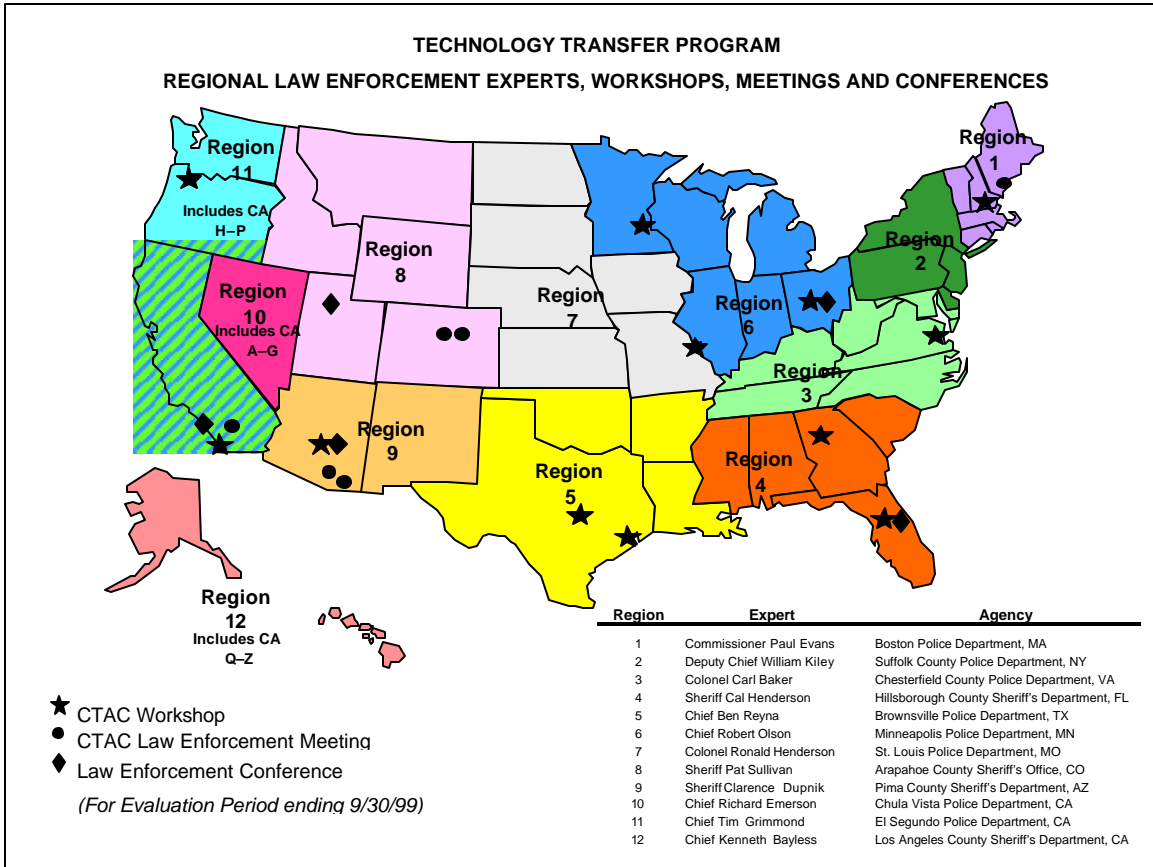
**Role of the Regional Law Enforcement Experts**

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. They receive and review every application. Figure 2 lists the names and shows the locations of the twelve regional experts.

To support the evaluation, 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 on a regular basis 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, CTAC LEA MEETINGS, WORKSHOPS AND CONFERENCES**

**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**

- **VoiceBox:** The VoiceBox system is a Title III telephone and cellular phone monitoring and recording system. It has been instrumental in conducting investigations of major organized crime groups and cartels. This system allows officers to monitor up to 12 telephone lines simultaneously. Agencies receiving this system comment about its ability to save time, reduce paper work, and work more efficiently while conducting wire intercepts. Significant results: Los Angeles County Sheriff's Department, Monterey Park, California has conducted 14,000 wire intercepts, 4 cases, with 35 targets - results are pending; Oklahoma State Bureau of Narcotics, Oklahoma City, Oklahoma has 11 defendants from their first case and presently are conducting a multi-state wire intercept conspiracy case investigation involving a major cartel. Rockland County Narcotics Task Force, New York City, New York has also had much success in targeting organized crime. Rockland County is thrilled with the efficiency of the system. Before receiving VoiceBox, a two-telephone line intercept conducted over a two-month period would overload the surveillance team resulting in a mountain of paperwork piling high above a desk. With VoiceBox, the team can fit all information related to a six-telephone line intercept over a one-month period on one recordable compact disk.
- **Mini-Buster Contraband Detector:** The Mini-Buster has been one of our most successful technology transfers. This device saves time and work-hours for field officers involved in narcotic search warrants and portal system check locations (i.e., border crossings, truck checkpoints and highway interdiction efforts.) It has taken the guesswork out of where and what to search. There were many comments about its ability to save time and to help eliminate locations that were thought to contain narcotics. Its success in locating hidden and false compartments containing large amounts of narcotics is phenomenal. Significant results: Imperial County Narcotics Task Force, El Centro, California, over 200 pounds of marijuana concealed in car gas tanks; Kansas City, Kansas Police Department, over 600 pounds of marijuana concealed in truck tires.
- **Thermal Imager:** This long-range night vision device has been praised by many LEAs in rural areas as their most effective counterdrug mission technology tool. Many marijuana growth sites and methamphetamine labs operating at night were located and dismantled. The device also assisted in surveillance operations on thefts of anhydrous ammonia (used in methamphetamine production) from farmers and farm suppliers. The equipment is attributed to have reduced work-hours and created a large margin of safety for agency personnel. The equipment helps in identifying sites and allows agencies to do long term covert surveillance with a safety for field personnel that they have never had before. Significant results: Reno, Nevada, Washoe County Sheriff's Office used a thermal imager to spot three suspects trying to flee a methamphetamine lab at night; St. Joseph, Missouri, Buchanan County Drug Strike Force used the system in the arrest of several narcotics suspects and a seizure of over \$150,000 of methamphetamine and marijuana; Muscatine, Iowa Police Department, 8 seizures of methamphetamine.

## **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 Table 1.

The delivery distribution by population size is shown in Figure 3 where it can be seen that seventy-six 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 drugwipes, body worn, mini-buster kits, and thermal imagers. Similarly, for the distribution of deliveries by agency type shown in Figure 4, over seventy-five 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, signcutter, video stabilization, and wireless interoperability) was received by task forces, police departments and sheriffs offices from the larger jurisdictions 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 requirements for organizational support other than operation and maintenance which does not negatively affect the operating budgets of these organizations.

Over the past three years, CTAC has sponsored an outreach effort consisting of 18 regional one-day workshops and/or meetings to promote the use of advanced technology and increase LEA awareness of the 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.

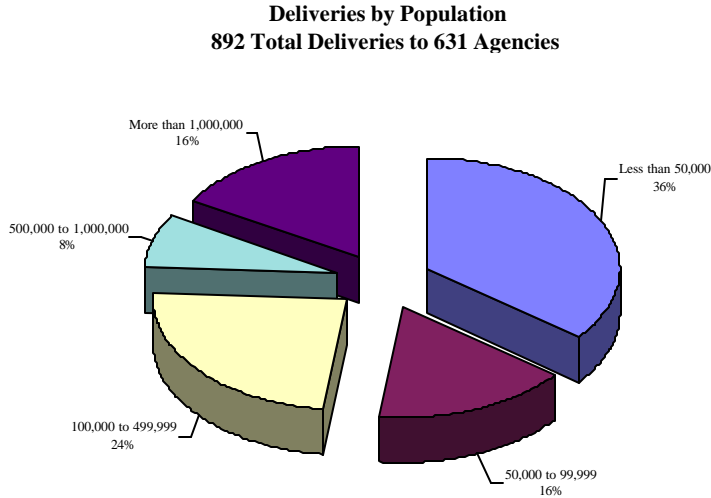
**Table 1. LIST OF TECHNOLOGIES**

<b>Technology</b>	<b>Number</b>	<b>Cost</b>
<b>Tactical Tools to Support the Officer</b>		
Drugwipes - Surface residue drug test kit (in quantities of 100)	169	\$169,000
Body Worn - Miniaturized covert audio device	81	\$1,053,000
Mini-Buster/ Mini-Buster Probes - Portable contraband detection kit/ fiber optic probes associated with the portable contraband detection kit	153	\$2,849,000
Small Look - Miniaturized video surveillance system	55	\$1,100,000
Thermal Imager (Handheld, Lenses, and Vehicle)	320	\$5,700,000
Vapor Tracer - Drug detection and identification instrument	50	\$1,900,000
<b>Complex Case Building Systems</b>		
AG-SMS - Air and/or ground covert vehicle tracking system	19	\$2,280,000
VoiceBox - Telephone intercept monitoring and recording system for Title III investigation	10	\$3,600,000
Data Locator – Client/server package that provides secure sharing of law enforcement data and intelligence	1	\$325,000
Money Laundering Software - Software used to detect suspicious financial transactions	8	\$240,000
Signcutter - Covert vehicle tracking system with mapping display	14	\$1,540,000
TACSCAN – Voice identification system	5	\$125,000
Video Stabilization - Video image enhancement system	6	\$600,000
Wireless Interoperability - Interagency radio communications system	1	\$289,000
<b>Total</b>	<b>892</b>	<b>\$21,770,000</b>

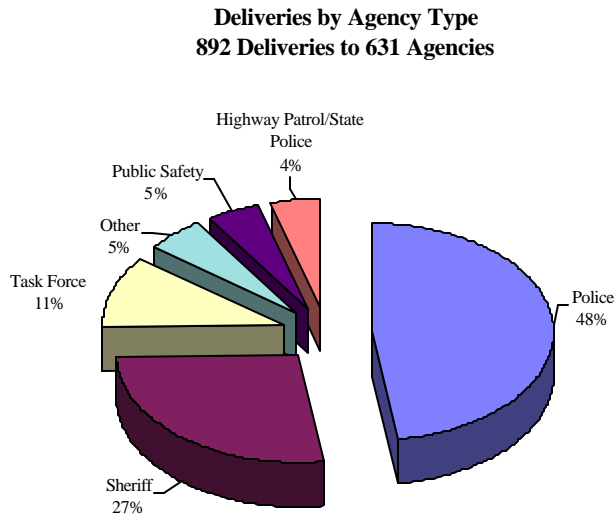
The strategy for nationwide deployment of technology can be expressed in three thrusts derived over the past 18 months from the evaluation of the pilot program. These thrusts are:

- 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.



**Figure 3. DELIVERIES BY POPULATION SIZE**



**Figure 4. DELIVERIES BY AGENCY TYPE**



## APPENDIX F - ACKNOWLEDGMENTS

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

Dr. Albert E. Brandenstein  
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APPENDIX F - ACKNOWLEDGMENTS

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