



National Drug Control Strategy

Counterdrug Research and Development Blueprint Update

**The White House
February 2002**

MESSAGE FROM THE DIRECTOR

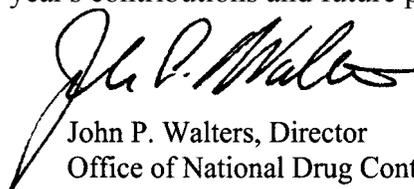
Developing sound technology to support our national strategy is crucial in meeting the complex challenges posed by the trafficking and abuse of illicit drugs. Progress is vital on an array of demand-reduction and supply-reduction technology initiatives that focus on expanding our knowledge of the science behind prevention and treatment, and improvements to interdiction and law enforcement capabilities.

Funding from the ONDCP's Counterdrug Technology Assessment Center (CTAC) has been applied in attempts to answer the basic questions of what changes occur in the brain that result in addiction, and what can be done to reverse or mitigate the process. Dedicated addiction research neuroimaging facilities have opened at the University of Pennsylvania, Massachusetts General Hospital, Emory University, and McLean Hospital. Scientists operating with grants from the National Institute on Drug Abuse and private foundations are using this brain-imaging equipment to map human reward circuitry, blood flow associated with drug metabolism, and interactions with potential therapeutic medicines. Efforts to relate addiction to gene expression also are essential to the development of real-time diagnostic tools and optimum treatment for substance abuse disorders.

Technology advancements are steadily enhancing our ability to interdict illicit drugs at our borders and on the high seas. Our overall goal is to attain the capability to nonintrusively inspect cargo containers and vessels in an efficient manner consistent with the free flow of legitimate trade and commerce. These same technologies also are being used for detecting smuggled explosives, weapons and other contraband used for terrorist activities. Projects developed for Federal agencies are evaluated in operational testbeds for use by state and local law enforcement. For example, communications interoperability systems for wireless radios were evaluated and tested last year in conjunction with five metropolitan Denver, Colorado, drug task forces consisting of some 20 Federal, state, and local law enforcement agencies. The systems allowed each agency operating on its own radio system to communicate with other agencies operating on their own dissimilar and otherwise incompatible radio systems.

Once the technology is proven effective in the state and local setting, it is added to the Technology Transfer Program (TTP). Over the past four years, the TTP has brought advanced drug crime fighting technology and associated training to approximately 15 percent of the state and local police departments and sheriffs' offices in the United States.

Technology will continue to play a key role in fostering our progress toward reducing the use of illicit drugs in America. This Blueprint Update of the Counterdrug Research and Development Program provides a summary of this year's contributions and future plans.



John P. Walters, Director
Office of National Drug Control Policy

This page blank

EXECUTIVE SUMMARY

This *Counterdrug Research and Development Blueprint Update* provides a periodic report on the counterdrug research and development (R&D) program. The report concentrates on those accomplishments made with CTAC-sponsored R&D projects and the Technology Transfer Program (TTP). The six appendices to this update provide information mandated by CTAC's role as the central counterdrug technology research and development organization of the U.S. Government.

CTAC, in collaboration with the National Institute on Drug Abuse (NIDA), has sponsored the installation of advanced neuroimaging centers across the U.S. In Fiscal Year 2001, two advanced neuroimaging centers became operational at Emory University's 3 Tesla functional Magnetic Resonance Imaging (fMRI) system and at Massachusetts General Hospital (bringing the number of neuroimaging centers to ten). This expansion of the national infrastructure of advanced neuroimaging systems is enabling research into the underlying causes of substance abuse.

The Drug Evaluation Network System (DENS), a national electronic information system focused on addicts who enter treatment, is helping addiction researchers compare treatment outcomes across treatment modalities. This project has provided a database rich in detail on the profiles of 2,000 patients enrolled in 21 treatment programs. This year DENS is building a Website and will add another 29 randomly selected programs. The new sites will support the collection of a nationally representative sample of drug treatment centers. Programs, such as the Random Access Monitoring of Narcotics Abusers, will allow monitoring over time of the size, characteristics, and geo-

graphic distribution of the "hardcore" drug using population in the U.S.

In the supply reduction area, CTAC works with the Federal drug control agencies in the development and evaluation of technology to interdict drug shipments and disrupt drug trafficking organizations. Western Kentucky University, this year, will complete the test of a prototype transportable fast neutron-based probe designed for inspecting pallet-sized volumes of cargo for illicit drugs and other contraband.

In conjunction with the U.S. Customs Service, substance detection canines bred using the Australian Custom Service's selective method are now working at U.S. ports of entry. This scientific approach, based upon quantitative genetic principles, is extending the useful life and overall effectiveness of "sniffer" dogs for the detection of illicit drugs, explosives, and other contraband.

Tactical technology development efforts to support the law enforcement officer in performing daily operations include projects to improve information management and data sharing, tracking and surveillance, and communications interoperability capabilities. Successful tactical technology projects become candidates for the TTP.

The TTP has brought advanced drug crime fighting technology and the necessary training to more than 2,500 state and local law enforcement agencies across all fifty states. A national deployment strategy has been developed for the TTP. This strategy includes supporting the officer on the street by providing high technology equipment, supporting specialized regional drug crime task forces and major city departments, and assuring that the proper set of technologies is being offered.

This page blank

TABLE OF CONTENTS

| | |
|--|-----|
| Message from the Director | i |
| Executive Summary | iii |
| 1.0 INTRODUCTION | 1 |
| 1.1 Federal Agency R&D Spending..... | 1 |
| 1.2 CTAC R&D Spending | 2 |
| 2.0 CTAC R&D PROGRAM SUMMARY | 2 |
| 2.1 Demand Reduction..... | 2 |
| 2.2 Supply Reduction..... | 5 |
| 3.0 TECHNOLOGY TRANSFER PROGRAM | 8 |
| 4.0 OVERSIGHT AND COORDINATION | 10 |
| 4.1 Scientific Working Group for the Analysis of Forensic Drug Samples | 10 |
| 4.2 Technology Symposia..... | 10 |
| 5.0 FUTURE PLANS | 10 |
| 5.1 Demand Reduction..... | 11 |
| 5.2 Supply Reduction..... | 11 |
| 5.3 Testbeds | 12 |
| 5.4 Technology Transfer Program | 12 |
| 5.5 Oversight and Coordination..... | 13 |
| 6.0 CONCLUSION | 14 |
| 7.0 REFERENCE DOCUMENTS | 14 |
| 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. Acknowledgements | |

This page blank

COUNTERDRUG RESEARCH AND DEVELOPMENT BLUEPRINT UPDATE

1.0 INTRODUCTION

This *Counterdrug Research and Development Blueprint Update* provides a periodic report on the counterdrug research and development (R&D) program. The report concentrates on those accomplishments made with CTAC-sponsored R&D projects and the Technology Transfer Program. Appendices contain information on those activities undertaken by other Federal drug control agencies.

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

1.1 Federal Agency R&D Spending

Drug-related R&D budgets for the Federal drug control agencies are given in Table 1 for fiscal years (FY) 2001 through 2003. Historically, the bulk of drug-related research funding goes to support drug abuse prevention and treatment. Less than 10% of the drug-related R&D funding supports law enforcement applications.

**Table 1. National Drug Control Budget
Research & Development
FY 2001 – FY 2003**
(\$ millions)

| Department/Agency | FY 2001 Final | FY 2002 Enacted | FY2003 Request |
|--|------------------|--------------------|-------------------|
| R&D (Law Enforcement) | | | |
| Agriculture | | | |
| Agricultural Research Service | 4.765 | 4.765 | 4.765 |
| U.S. Forest Service | 0.115 | 0.115 | 0.115 |
| Defense | 56.124 | 31.917 | 20.019 |
| Interior | | | |
| Bureau of Indian Affairs | 2.662 | 2.171 | 2.182 |
| Judiciary | 4.553 | 5.406 | 6.159 |
| Justice | | | |
| Federal Bureau of Investigation | 3.235 | 3.235 | 3.235 |
| Immigration & Naturalization Service | 0.292 | 0.292 | 0.292 |
| ONDCP | | | |
| Operations (S&E) | 0.366 | 0.450 | 0.450 |
| CTAC | 7.264 | 6.064 | 4.000 |
| HIDTA | 1.796 | 2.100 | 2.100 |
| Special Forfeiture Fund | 0.000 | 0.000 | 0.666 |
| Transportation | | | |
| U.S. Coast Guard | 4.553 | 2.781 | 2.831 |
| Treasury | | | |
| U.S. Customs Service | 4.862 | 4.893 | 4.893 |
| Subtotal, R&D (Law Enforcement) | 90.587 | 64.189 | 51.707 |
| R&D (Treatment) | | | |
| Health & Human Services | | | |
| National Institutes of Health | 471.846 | 532.677 | 566.486 |
| ONDCP | | | |
| Operations (S&E) | 0.366 | 0.450 | 0.450 |
| CTAC | 10.500 | 14.000 | 14.000 |
| Special Forfeiture Fund | 3.293 | 4.800 | 2.467 |
| Veterans Affairs | 11.180 | 12.298 | 13.527 |
| Subtotal, R&D (Treatment) | 497.185 | 564.225 | 596.930 |
| R&D (Prevention) | | | |
| Health & Human Services | | | |
| National Institutes of Health | 350.835 | 400.329 | 427.597 |
| ONDCP | | | |
| Operations (S&E) | 0.366 | 0.450 | 0.450 |
| Special Forfeiture Fund | 0.000 | 0.000 | 0.667 |
| Transportation | | | |
| Federal Aviation Administration | 1.100 | 1.200 | 1.200 |
| National Highway Traffic Safety Administration | 0.250 | 0.400 | 0.400 |
| Subtotal, R&D (Prevention) | 352.551 | 402.379 | 430.314 |
| Total, R&D | 940.323 | 1,030.793 | 1,078.951 |

1.2 CTAC R&D Funding

In FY 2002, CTAC received appropriations of \$42,300,000:

- \$20,064,000 for R&D projects in support of demand and supply reduction technologies, and
- \$22,236,000 for the Technology Transfer Program to provide technologies directly to state and local law enforcement agencies.

2.0 CTAC R&D PROGRAM SUMMARY

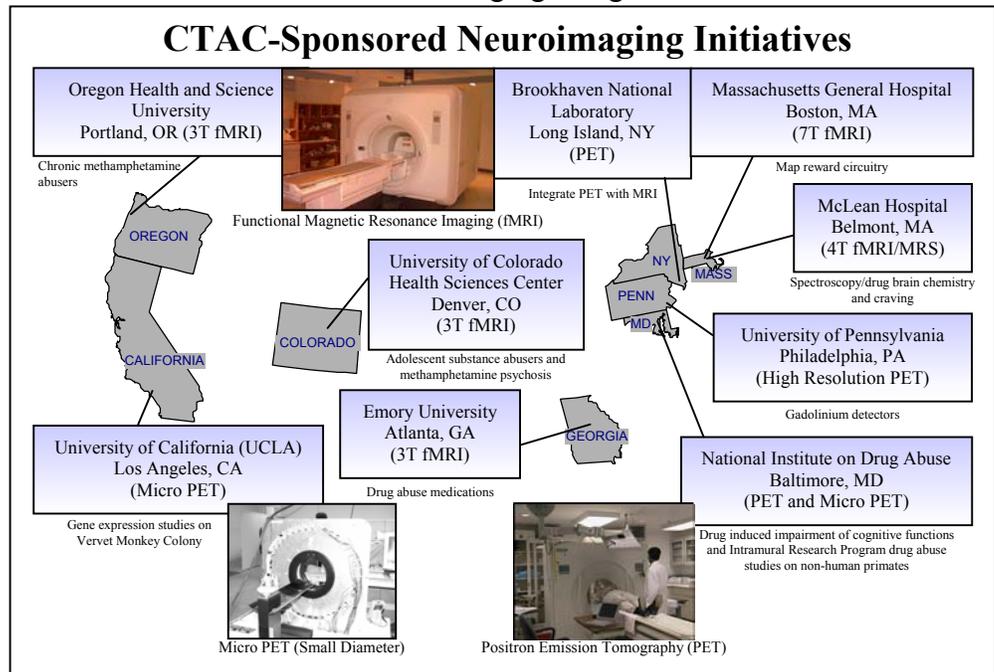
2.1 Demand Reduction

CTAC, in collaboration with the National Institute on Drug Abuse (NIDA), has developed advanced technology to penetrate the deeply shrouded areas of the brain in a quest for important new knowledge on drugs of abuse, addiction, treatment and prevention. The nation's world class substance abuse research centers are being equipped with the most modern neuroimaging facilities that reveal the brain with a depth, clarity, and delineation previously unavailable.

The figure to the right indicates the location of the substance abuse research centers that have received leading-edge neuroimaging facilities or medical instrumentation. These institutions have all agreed to focus on drug

abuse research and to train other professionals pledged to continue the advancement of our knowledge. This equipment is enabling substance abuse research to map brain reward circuitry, blood volume and flow associated with drug metabolism, and localization of brain circuitry that mediates drug addiction, and eventually to relate addiction to gene expression. These neuroimaging systems enable researchers to identify specific human brain circuits involved in craving, euphoria, and other sequelae of drug addiction. This information will make possible the development of new medications to block individual effects of drugs. These advancements continue to improve the understanding of the genetic and environmental risk and protective factors that can lead to or prevent drug abuse and addiction. Peer reviewed neuroscience journals are becoming filled with substance abuse research results made possible by CTAC's investment of public funds in these brain imaging systems.

This program will now focus on technology and subsystems to be integrated into systems specifically designed for substance abuse neuroimaging and genetics research.



2.1.1 Neuroimaging Technology Initiatives

Two advanced neuroimaging centers became operational in FY 2001 to support research on drug abuse:

- Emory University's 3 Tesla functional Magnetic Resonance Imaging (partially sponsored) system supports studies for developing potential cocaine blockers and partial agonist-type compounds.



- Scientists at Massachusetts General Hospital will use the powerful 7 Tesla fMRI brought on line this year to characterize the brain reward circuitry and response to substances of abuse. Operating under grants from NIDA, scientists from Harvard University and Massachusetts General Hospital will continue their collaborative research on brain circuitry.



During FY 2002, another two advanced neuroimaging centers will become operational:

- McLean Hospital's Brain Imaging Center in Belmont, Massachusetts has begun using a high field (4 Tesla) fMRI/MRS scanner for clinical assessments of drug addicts. This system will provide a spectroscopic means to measure the drug chemistry and metabolism in the brain. In addition to supporting post-doctoral fellows developing their skills in assessing drug abusers, McLean Hospital scientists are also studying the acute and chronic effects of MDMA ("Ecstasy") on brain activity. Studies on the effects of cocaine, methadone, cannabis, and amphetamine on the central nervous system also will continue.
- Scientists at the University of Pennsylvania are using a specially designed and fabricated ultra high resolution Positron Emission Tomography (PET) camera to study the neurobiological substrates of addiction. Gadolinium orthosilicate crystal detectors provide improved spatial resolution, higher sensitivity, and higher count-rate capability compared to the current sodium iodide-based PET. Patient studies will begin mid-year.

Research Triangle Institute is completing tests with human subjects as validation of the PET system at NIDA's Brain Imaging Center to assess the role of cognitive impairment from drug abuse and to identify vulnerability factors and markers for targeted treatment regimens.

At UCLA's Crump Institute, an ultra-high resolution "MicroPET" instrument will enable scientists to investigate drugs of abuse and addiction in the monkey brain. The program will study a unique Vervet monkey colony of well-defined lineage to link biochemical events to the specific genes critical to brain reward functions. Construction of UCLA's state-of-the-art PET facility at the Sepulveda VA Medical Center will be completed in June 2003 with the addition of a compact biomedical cyclotron and radiochemistry equipment.

New fMRI projects have also started at Oregon Health and Science University and the University of Colorado Health Sciences Center.

2.1.2 Drug Abuse Treatment Effectiveness

The Drug Evaluation Network System (DENS) is used to collect and track "treatment entry" data on addicts using the addiction severity index (ASI) screening and assessment system. DENS, a national electronic information system focused on addicts who enter treatment, is helping addiction researchers compare treatment outcomes across treatment modalities. This project has provided a database rich in detail on the profiles of 2,000 patients enrolled in 21 treatment programs. The DENS Website tracks treatment program data from clinics in such major cities as Philadelphia, Chicago, San Francisco, New York and Miami.



The National Evaluation of Substance Abuse Treatment (NESAT) methodology was completed in FY 2001 using DENS data and is now being used to prepare revised analytic plans.

This year the DENS network adds another 29 randomly selected programs. The new sites will help support the Random Access Monitoring of Narcotics Abusers Program. RAMONA will allow monitoring over time of the size, characteristics, and geographic distribution of the "hardcore" drug using population in the U.S.

2.1.3 Substance Abuse and Drugs in Sports

The U.S. Anti-Doping Agency (USADA) is developing human growth hormone (hGH) test methodology and protocols. Plans are underway to develop and validate screening and confirmation immunoassays for markers of hGH use. USADA recently purchased equipment to allow blood testing for erythropoietin (EPO) use at the 2002 Olympic Winter Games. The equipment will be used after the games to support out of competition testing.



2.1.4 Sleep Disturbance and Adolescent Drug Abuse

Researchers at the University of Arizona will conduct an 18-month study of the intriguing link between adolescents' sleep needs and patterns and their use of drugs. These researchers are developing treatments for sleep disturbance and daytime sleepiness as a means of reducing relapse of adolescent drug abuse.

2.1.5 Juvenile Diversion

The project with the New Orleans District Attorney's Office to improve approaches for drug abuse treatment on youthful offenders was completed last year. This project examined the effectiveness of therapeutic approaches with 12 to 16 year old, first-time, non-violent juvenile arrestees who are substance abusers. These juveniles had their cases "diverted" out of the normal judicial process pending completion of program requirements. The methodology developed by this project has the potential to provide a national model for dealing with non-violent juvenile substance abusers outside the judicial process.

2.2 Supply Reduction

CTAC works with the Federal drug control agencies in the development and evaluation of technology to interdict drug shipments and to disrupt drug trafficking organizations. The following development projects have been completed or are being evaluated by Federal law enforcement agencies for use in the field.

2.2.1 Nonintrusive Inspection

Nonintrusive inspection technologies provide the capability to determine if a cargo container, conveyance, or vehicle has illicit drugs or other contraband concealed within legitimate cargo or hidden in false compartments without physically entering the cargo space.



Western Kentucky University, this year, will complete the test of a prototype transportable fast neutron-based probe designed for inspecting pallet-sized volumes of cargo for illicit drugs and other contraband. While x-ray and gamma ray systems provide an image or shape, the neutron system would provide a characterization of the imaged object based on its elemental composition (nitrogen, carbon, etc.).

In conjunction with the U.S. Customs Service, the graduates of a breeding program for substance detection canines are now working at U.S. ports of entry. Based on quantitative genetic principles proven by the Australian Customs Service, initial results indicate the potential to establish a worldwide gene pool for substance detection canines.



Scientists at Auburn University are analyzing functional olfaction characteristics to improve our understanding of the biological and behavioral processes in substance detection with canines. A dynamic three-dimensional model has been constructed of olfactory laminar flow, recovery, and adap-

tation. Further study will verify the mechanisms of the particle filtration process. Findings are being disseminated to all substance detection canine training agencies.

A handheld device is being tested by Drug Enforcement Administration, U.S. Customs



Service, and U.S. Coast Guard personnel to identify drugs in solid mixtures (e.g., pills) and aqueous solutions. This near infrared Raman spectroscopy method incorporates a fiber optic probe feature to minimize sample preparation and allow in situ analysis of the contents of transparent containers.

A prototype system is being developed to detect the presence of trace amounts of cocaine based upon a technique similar to that used to detect biological and chemical agents. The approach includes developing a molecularly imprinted polymer-based sensor to detect methyl benzoate vapor as an indicator of the presence of cocaine.

2.2.2 Tactical Technologies

Tactical technology development efforts to support the law enforcement officer in performing daily operations include projects to improve information management and data sharing, tracking and surveillance, and communications interoperability capabilities. The results from successful R&D projects are considered for inclusion in the Technology Transfer Program (TTP).

In the Rio Grande Valley of south Texas, participating police departments are now able to share and analyze information from neighboring jurisdictions' databases using advanced data mining and link analysis

tools. This new system overcomes typical problems associated with incompatible records management systems.

Integrating real-time location and tracking systems with current and past criminal associations will give law enforcement new tools for strategic and tactical planning and execution of drug-related criminal investigations. This scalable information tool, CRYSTAL, developed in conjunction with the Rockland County (NY) Narcotics Task Force, will enable agencies to organize and present criminal and case-related information in conjunction with real-time positional data from tracking and surveillance management systems. Users can visually link possible criminal activity under surveillance against a geographic positional background. This project will be completed in FY 2002 and is expected to transition to the TTP.

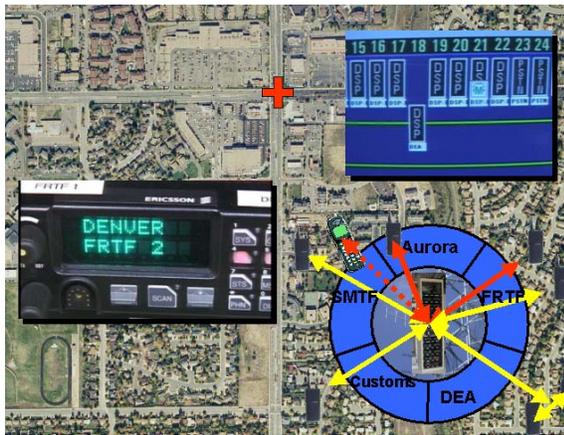


Tactical tools to improve capabilities to intercept and process drug-related criminal communications and to improve law enforcement capabilities to communicate with each other are under development. Advanced tactical repeaters and phone intercept systems developed under CTAC funding are being evaluated in the field by Federal, state, and local law enforcement agencies in the New York City and Baltimore/Washington areas.

Scientists are investigating techniques for altering agricultural anhydrous ammonia to render it useless or very difficult to use for the manufacture of methamphetamine. The goal is to develop an additive that will effectively inactivate the solvated electron, the active reagent in the synthesis of methamphetamine.

2.2.3 Test and Evaluation Support

Last August, the Colorado wireless communications interoperability testbed project demonstrated interoperability of the U.S. Customs Service, Drug Enforcement Administration, Lakewood, CO Police Department, Front Range Task Force and the Aurora, CO Police Department. Since the August 2001 demonstration hosted by the Lakewood Police Department, the system has been used on a regular basis. By next summer, a Colorado-wide capability will be demonstrated to law enforcement agencies from across the country.



The SPAWAR Systems Center San Diego (SSC San Diego) manages CTAC's tactical technology testbed project. This testbed examines tactical technologies that will become part of an overall system architecture of law enforcement current and future counterdrug systems. The overall system architecture is especially useful for evaluating software development products. The architecture will include tactical support technologies developed by either government agencies or commercial vendors. The system architecture allows the engineers to explore the technologies relating to information management across multiple platforms, validated to be secure by using a combination of various security products in a system

environment. Testbed model documentation was developed and used to perform technical assessments of several stand-alone case management tools. The model documentation was designed to capture the user requirements, test the product or system end-to-end, and provide conclusions and recommendations to the developer.

An operational technical assessment of an integrated case management system with access to live surveillance, tracking, and mapping data from multiple stand-alone systems was performed on-site with the Rockland County Narcotics Task Force. Several other case management systems were developed in conjunction with the Idaho National Engineering and Environmental Laboratory and evaluated for use by state and local organizations:

- Criminal Records, Investigation and Management Network (CrimNET) and
- Colorado Justice Information Network (CJIN).

All of these systems provide advanced capabilities for state and local law enforcement officers to conduct criminal investigations using historical and current suspect information shared from several jurisdictions. SSC San Diego demonstrated a prototype system at the ONDCP International Technology Symposium in June 2001 that combined Internet and database technology. The prototype employs a Web-based interface to several existing databases. The software development for this prototype used a combination of commercially available tools and illustrated an approach to sharing information across multiple platforms.

3.0 TECHNOLOGY TRANSFER PROGRAM

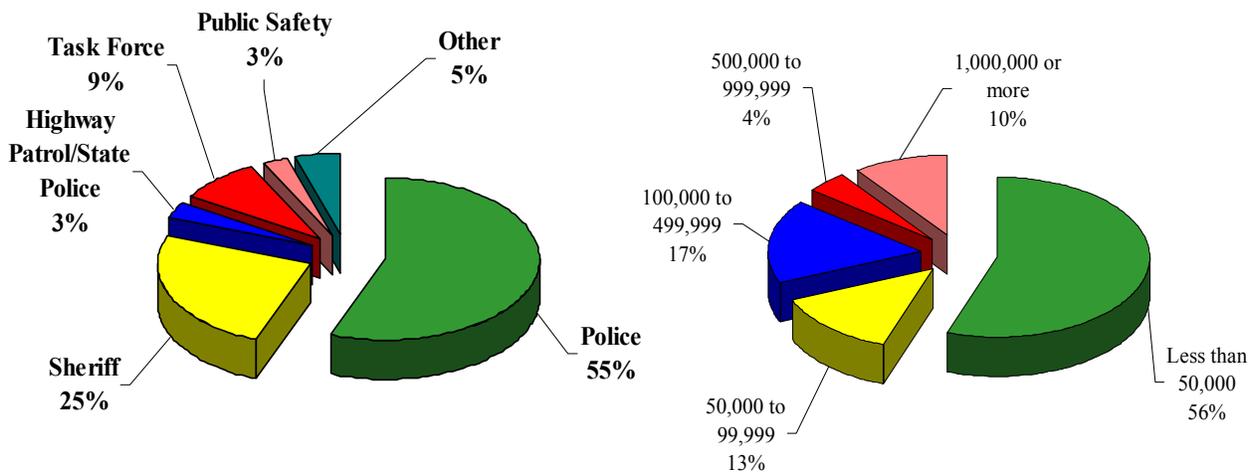
The Technology Transfer Program, initiated in 1998, has brought advanced drug crime fighting technology and the necessary training to more than 2500 state and local law enforcement agencies across all fifty states. The Technology Transfer Program has changed the way Federally developed advanced technology is made available to state and local law enforcement agencies. The technologies available for transfer include information technology and analytical tools, communications intercept, tracking and surveillance, and drug detection devices.

Overall, police departments and sheriffs' offices receive 80 percent of the deliveries. By population, agencies serving populations of 500,000 or less received 86 percent of the deliveries. Thermal imagers, drugwipes, mini-buster kits, and body worn transmitters comprise the predominant mix of technologies provided to police departments and sheriffs' offices in smaller jurisdictions. Task forces, police departments, and sheriffs' offices in larger jurisdictions serving populations of 500,000 or more request the more complex systems (AG-SMS, AVTS, VoiceBox, data locator, video stabilization, and wireless interoperability).

Table 2 provides a summary of the funding appropriated for TTP.

Table 2. CTAC Technology Transfer Program Appropriations

| FY 1998 | FY 1999 | FY 2000 | FY 2001 | FY 2002 |
|---------|---------|-----------|-----------|-----------|
| \$13.0M | \$13.0M | \$13.052M | \$18.210M | \$22.236M |



Deliveries By Agency Type / Population Size (FY 1998 - 2001)

The U.S. Army Electronic Proving Ground (EPG), Fort Huachuca, Arizona, manages the TTP as technical and contracting agent. EPG has technical and administrative responsibility for program management, engineering analysis, acquisition, logistics, outreach awareness efforts, and informative publications.

Law enforcement technical personnel supported by the vendors conduct TTP training sessions. When needed, the recipients receive certification in the operation of the equipment (e.g., thermal imagers) as well. Regional one-day workshops, leadership meetings, and centralized training sessions held in 2001 are summarized below. Appendix E contains more details on the TTP.

Technology Transfer Program 2001 Events

| 2001 Training Sessions | | |
|-------------------------------|------------------------|-------------------------|
| <u>Dates</u> | <u>Location</u> | <u>Attendees</u> |
| April 8-13 | Phoenix, Arizona | 587 |
| May 28-31 | San Antonio, Texas | 393 |
| December 10-14 | Phoenix, Arizona | 307 |

| 2001 Workshops, Meetings, Conferences and Demos | | |
|--|--|------------------------|
| <u>Dates</u> | <u>Event</u> | <u>Location</u> |
| March 21-22 | CTAC Workshop | Seattle, WA |
| March 22 | Massachusetts Chiefs of Police | Boxborough, MA |
| April 17-20 | Law Enforcement Coordinating Committee (LECC) | Sandestin, FL |
| May 1-3 | Law Enforcement Coordinating Committee (LECC) | Gatlinburg, TN |
| May 24 | Senate Law Enforcement Technology Demo | Washington D.C. |
| June 13 | Consultant Meeting (Evaluations) | Orlando, FL |
| June 22-26 | National Sheriff's Association (NSA) | Ft. Lauderdale, FL |
| June 25-28 | ONDCP Symposium | San Diego, CA |
| July 17 | Consultant Meeting (Evaluations) | Tucson, AZ |
| August 2-4 | Badger State Sheriffs' Association | Racine, WI |
| August 20 | Colorado Wireless Demo | Denver, CO |
| August 21-23 | Program Review/Sources Sought | Denver, CO |
| August 27-31 | Interdiction Conference | St. Louis, MO |
| October 27-31 | International Association of Chiefs of Police (IACP) | Toronto, Canada |

4.0 OVERSIGHT AND COORDINATION

CTAC leads the Interagency Working Group for Technology (IAWG-T) composed of technology representatives from each of the Federal drug control agencies. The IAWG-T meets periodically to exchange information regarding agency programs and common technical problems. Annually the IAWG-T provides an update of the listing of priority scientific and technological needs by technology area and agency (Appendix B), a listing of drug-related R&D projects being sponsored by each agency (Appendix C), and the Annual Report (required by P.L. 105-85) on the Development and Deployment of Narcotics Detection Technologies (Appendix D).

Sponsored outreach activities include technology workshops, technical symposia, and conferences--activities that promote the exchange of information throughout the entire counterdrug scientific and technical community. Outreach activities provide another mechanism to create awareness of the R&D programs and to oversee and coordinate counterdrug technology initiatives throughout the scientific and academic communities and with Federal, state, and local drug control agencies.

4.1 Scientific Working Group for the Analysis of Forensic Drug Samples (SWGDRUG)

SWGDRUG was formed in 1997 to initiate and develop minimum standards for the identification of drug exhibits in forensic science laboratories. CTAC has sponsored the SWGDRUG meetings in support of DEA, which serves as the principal organ-

izer. Meetings are international in scope with participation from the United States, Canada, the United Kingdom, Japan, Germany, the Netherlands, Australia, and the United Nations.

4.2 Technology Symposia

In June 2001, CTAC held the sixth ONDCP International Technology Symposium in San Diego, California. Some 450 scientists, engineers, and law enforcement professionals gathered for four days to review technical papers on 85 R&D projects sponsored by CTAC, U.S. Customs Service, DoD, DEA, FBI, INS, National Guard Bureau, and NIDA. Luncheon speeches and plenary sessions were held with research scientists and law enforcement experts to discuss the pressing issues of both demand and supply reduction technologies. Proceedings of the symposium are being produced and distributed.

5.0 FUTURE PLANS

CTAC's niche in supporting the instrumentation and infrastructure needs of neuroimaging will be extended through new brain imaging centers in Colorado, Oregon, Maryland, and North Dakota. On the tactical front, CTAC will continue to improve the communications interoperability capabilities of state and local law enforcement agencies, passing many of these improvements directly to these agencies through the TTP.

5.1 Demand Reduction

CTAC demand reduction initiatives will continue to complement those of the National Institute on Drug Abuse (NIDA) by improving the investigative tools and instruments available for research on the underlying causes of substance abuse, dependence, and addiction.

Planning has begun for a three-phased technology development program:

- Phase One – to understand and document the capabilities and limitations imposed by technology on current substance abuse research.
- Phase Two – to define a development program to advance technology for neuroimaging systems, image interpretation algorithms, improved detectors, magnet design, and signal processing.
- Phase Three – to identify the biochemical, mechanistic, and genomic variables associated with responses to drugs and examine possible relationships to known genetic linkages and correlations with any genetic predisposition to drug abuse.

Plans over the next three years include the installation of advanced neuroimaging facilities at locations in Colorado, Oregon, Maryland, and North Dakota. Research using these facilities will investigate adolescent drug abuse and its connection with sleep disturbance, the evaluation of interventions and vulnerability to relapse, and the identification of the biochemical and mechanistic variables that may predispose an individual to drug abuse.

As technical challenges are identified, CTAC plans to evaluate the imaging modalities that are most appropriate and provide the infrastructure and validation. Some research requires nuclear imaging capabilities (PET) while others may require magnetic resonance imaging (fMRI) or spectrometry (MRS) instrumentation. CTAC is also exploring improved imaging methods using existing technologies by investigating innovative processing algorithms. For example, the use of a coded aperture in conjunction with single photon emission computed tomography (SPECT) will be explored by scientists at Massachusetts Institute of Technology.

Plans have begun to provide neuroimaging technology dedicated for substance abuse research and devoted to train Native American physicians in such research. Project planning has also begun to investigate the relationship between genetic and environmental factors that may indicate a genetic predisposition or susceptibility to substance abuse.

5.2 Supply Reduction

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

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

The most significant near-term opportunities for improving operational capabilities are believed to lie in information management and communications interoperability technology. Plans for FY 2002 include potential projects for:

- Development of a digital narrowband audio surveillance transmitter that is compatible with Project 25 digital standards.
- Development of a 360 degree camera and lens system.
- Improvements to the capability to intercept and exploit cellular communications.
- Improvements to wireless video surveillance systems.

5.3 Testbeds

In FY 2002 CTAC will complete and deploy a communications interoperability architecture in Colorado that can be used as a nationwide model for optimizing the use of existing wireless radios and infrastructure (towers and repeaters). These capabilities provide a near-term solution to difficulties experienced in joint, coordinated operations when state and local law enforcement agencies must communicate with each other and with Federal agencies using dissimilar, incompatible wireless radios. When this project is completed, the interoperability systems and interfaces will become a part of the Technology Transfer Program.

A technology testbed will continue at the SPAWAR Systems Center in San Diego where scientists and engineers are working with law enforcement officers to develop interfaces to accommodate dissimilar software capabilities under one user-friendly information management architecture. The resultant architecture will provide the capability to integrate components for case management with real-time access to tracking and surveillance data including authorized wire intercepts. Capabilities emerging from the testbed also will be added to the Technology Transfer Program as they mature and are successfully tested.

5.4 Technology Transfer Program

In four years, the TTP has provided support to approximately 15 percent of the state and local police departments and sheriffs' offices in the United States. The strategy for continuing the deployment of technology on a nationwide scale includes supporting individual officers in small departments and increasing the use of technology to support large-scale criminal investigations in the larger departments. The approach includes the following items:

- Support to the officer on the street by providing high technology equipment to increase effectiveness of personnel resources and improve officer safety by continuing the deployment of items such as thermal imagers and minibusters to those agencies requesting these technologies.
- Support to specialized regional drug crime task forces and major city police departments that will benefit from the successful deployment of more complex, larger scale systems for communications interoperability and data min-

ing 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.

- Assurance that the proper 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 of law enforcement agencies or that can be replaced with next-generation technology.

Over the next year, two initiatives are being pursued: (1) advanced communications interoperability capabilities, and (2) providing a centerpiece for case management tools.

- **Communication Interoperability:** interoperable systems capable of providing interface between incompatible radios have been evaluated over the past year. Plans include adding two systems to the TTP: one for interfacing up to 20 agencies and another, smaller system for interfacing 5 or fewer agencies.
- **Case Management Tool Architecture:** a centerpiece is being developed to link criminal historical data with real-time tracking and surveillance information to assist investigators in analyzing case information and in coordinating surveillance and apprehension operations.

5.5 Oversight and Coordination

CTAC is planning a demand reduction symposium in July 2002 dedicated to the future equipment and instrumentation requirements of substance abuse research. CTAC has hosted a series of planning meetings with researchers to identify equipment limitations that restrict or hamper research. Manufacturers of medical diagnostic equipment are beginning to show interest in producing the more expensive, higher resolution equipment needed for research studies. While the motivation for industry to begin investing in these machines may be for more glamorous items such as Alzheimer's research, the same regions of the brain are believed to be responsible for craving and addictive behavior.

Continued support is planned for DEA and the SWGDRUG in gaining international acceptance of SWGDRUG standards. Plans include hosting an international drug profiling conference in support of DEA to assess chemical drug profiling programs and methodologies used by forensic laboratories to identify the specific compounds in the controlled substances and the geographic area where drug production took place.

6.0 CONCLUSION

This Blueprint Update provides a summary of this year's contributions and future plans. While advancements in technology can improve capabilities tremendously, these improvements are useless when an agency is unable to acquire existing technology because of budget limitations. The union of the R&D program with the TTP has allowed over 2,500 state and local agencies to overcome that obstacle. Periodic follow-up allows the TTP program office to identify whether additional training may be necessary.

Increasing our knowledge of the causes of addiction and substance abuse is bearing fruit. Images of the interactions of drugs in the brain are leading research scientists to find that many disorders of the nervous system (e.g., Alzheimer's) may occur in the same regions of the human brain affected by the abuse of drugs. A program is being developed by CTAC to provide these scientists with the proper equipment and technology to assess potential linkages of drug addiction with the genetic predisposition to other diseases of the brain.

Ongoing, broad-based community support for these programs has led to success. This success demonstrates the commitment and dedication of our Federal, state, and local law enforcement agencies and the teams of research scientists who have sacrificed the glamour of discovering "wonder drugs" to devote their talents to solving the causes of drug addiction. These people are using advancements in technology to make our streets safer and to offer promise to those hopelessly addicted to lives of drug abuse.

7.0 REFERENCE DOCUMENTS

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

- *Counterdrug Technology Transfer Program Status Report*, Office of National Drug Control Policy, Counterdrug Technology Assessment Center, February 2001.
- *FY 2001 - FY 2007 Strategic Plan*, Office of National Drug Control Policy, 2001.
- *FY 2002 Annual Performance Plan and FY 2000 Annual Program Performance Report*, Office of National Drug Control Policy, June 2001.
- *2001 Annual Report: National Drug Control Strategy - Counterdrug Research and Development Blueprint Update*, Office of National Drug Control Policy, Counterdrug Technology Assessment Center, NCJ-185399, 2001.
- The Sixth Triennial Report to Congress from the Secretary of Health and Human Services. *Drug Abuse and Addiction Research: 25 Years of Discovery to Advance the Health of the Public*. National Institute on Drug Abuse. September 1999, [NIDA Research Priorities and Highlights, pp. 23-32.]
- *Bringing the Power of Science to Bear on Drug Abuse and Addiction, Five-Year Strategic Plan*. National Institute on Drug Abuse. September 2000. NIH Publication Number 00-4774.

APPENDIX A - APPLICABLE LEGISLATION

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

- **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 inter-agency 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."

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

Division B; Incorporation of H.R. 4985

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

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

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

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

P.L. 106-346 October 23, 2000 An Act Making Appropriations for the Department of Transportation and Related Agencies for the Fiscal Year Ending September 30, 2001, and for Other Purposes

For an additional amount, \$7,000,000: Provided, That \$5,000,000 shall be available for continued operation of the technology transfer program: Provided further, That \$2,000,000, to remain available until expended, shall be available for counter-narcotics research and development projects, to be used for the continued development of a wireless interoperability communication project in Colorado.

House Report 106-756 to Accompany H.R. 4871 making appropriations for the Treasury Department, United States Postal Service, the Executive Office of the President, and Certain Independent Agencies for the Fiscal Year ending September 30, 2001 and for Other Purposes.

The Committee remains strongly supportive of the technology transfer program, which allows CTAC to provide technologies developed with Federal funding directly to state and local law enforcement agencies that might otherwise be unable to benefit from the developments due to limited budgets or technological expertise. Priority is given to candidates in High Intensity Drug Trafficking Areas, and on the ability and willingness of candidates to share in costs, either through in-kind or direct contributions. The basic technology for transfer includes information technology, analytical tools, communications, tracking and surveillance, and drug detection devices. The program has gained significant support from state and local law enforcement agencies, and the Committee understands that the funding provided in the this bill addresses

less than a quarter of the unmet demand. As of March 2000, the program has delivered over 1,570 pieces of equipment to 1,159 state and local law enforcement agencies. The program has demonstrated a very low administrative cost, with equipment purchases making up 84 percent of costs. The program, which has received very high evaluation ratings from its users, is also heavily represented in local police and sheriff's organizations and in communities with populations under 500,000 (80 percent). Given the substantial unmet need for this relatively low-cost and high-payoff program, the Committee strongly encourages ONDCP and the Administration to increase the funding level for this program as it develops its fiscal year 2002 budget.

Conference Report (H. Rept. 106-1033) to Accompany H.R. 4577 Making Omnibus Consolidated and Emergency Supplemental Appropriations for the Fiscal Year, December 15, 2000

Enactment of Provisions of H.R. 5658 as introduced on December 14, 2000, A bill making appropriations for the Treasury Department, United States Postal Service, the Executive Office of the President and Certain Independent Agencies for the fiscal year ending September 30, 2001 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), \$29,053,000, which shall remain available until expended, consisting of \$15,803,000 for counter-narcotics research and development projects, and \$13,250,000 for the continued operation of the technology transfer program: Provided, That the

\$15,803,000 for counternarcotics research and development projects shall be available for transfer to other Federal departments or agencies.

P.L. 106-554, December 21, 2000, Making consolidated appropriations for the fiscal year ending September 30, 2001, 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), \$29,053,000, which shall remain available until expended, consisting of \$15,803,000 for counternarcotics research and development projects, and \$13,250,000 for the continued operation of the technology transfer program: *Provided*, That the \$15,803,000 for counternarcotics research and development projects shall be available for transfer to other Federal departments or agencies.

House Report 107-52 to Accompany H.R. 2590 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, 2002, and for other purposes. - July 23, 2001.

The CTAC technology transfer program has been enormously successful, demonstrating the impact that can be achieved with a relatively small level of funding by transferring mature, tested technology that has practical and immediate usefulness to local and state law enforcement agencies that would otherwise not have access to such tools. The Committee therefore includes \$22,236,000, a \$4,026,150 increase over the level funded in fiscal year 2001. As of the end of fiscal

year 2000, there has been 1,909 deliveries of targeted, relatively low-cost technology to 1,325 state and local law enforcement agencies nationwide. In fiscal year 2001, there are 1,234 outstanding requests for law enforcement technology transfer to date, and the expectation that over 800 of these can be met this year. The Committee believes that this additional funding will help increase the capability of CTAC to meet this need for technology to help leverage the ability of chronically short-staffed law enforcement agencies to take on major drug crime at the local level.

Senate Report 107-57 to Accompany S. 1398 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, 2002, and for other purposes. - September 4, 2001.

The Committee fully supports the continuation of this program and, therefore, has provided \$22,000,000 for its operation in fiscal year 2002. The Committee believes that this program demonstrates the best that the Federal Government has to offer to state and local law enforcement in their efforts to combat drug related crimes. The Committee is encouraged by the positive reception this program has received by state and local law enforcement agencies as current requests for technology continue to outpace resources by over four to one. The Committee expects CTAC will conduct further outreach to state and local agencies to educate them about the program. Finally, the Committee would encourage CTAC to work with private industry to make their developed technology available to state and local law enforcement through this program. The Committee requests that ONDCP report within 60 days after the date of this enactment of the fiscal

year 2002 appropriations bill on the number of requests received, promotion efforts to state and local law enforcement, and the effectiveness and interest in this program by these law enforcement communities.

Conference Report (H. Rept 107-253) to Accompany H.R. 2590 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, 2002, and for other purposes. - October 26, 2001

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 (21 U.S.C. 1701 et seq.), \$42,300,000, which shall remain available until expended, consisting of \$20,064,000 for counternarcotics research and development projects, and \$22,236,000 for the continued operation of the technology transfer program: Provided, That the \$20,064,000 for counternarcotics research and development projects shall be available for transfer to other Federal departments or agencies.

The conferees agree to provide \$42,300,000 instead of \$42,000,000 as proposed by the Senate and \$40,000,000 as proposed by the House. Of this funding, \$20,064,000 is for the basic research and development program and \$22,236,000 is for continuation of the technology transfer program. The conferees include \$2,000,000 to provide neuroimaging technology to an institution that can conduct substance abuse research and train Native American physicians in substance abuse research as described in the Senate report, and \$300,000 to support research into the relationship between genetic factors leading to conditions such as Alzheimer's Disease and

environmental factors, particularly substance abuse.

P.L. 107-67 November 12, 2001 An Act 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, 2002, 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 (21 U.S.C. 1701 et seq.), \$42,300,000, which shall remain available until expended, consisting of \$20,064,000 for counternarcotics research and development projects, and \$22,236,000 for the continued operation of the technology transfer program: Provided, That the \$20,064,000 for counternarcotics research and development projects shall be available for transfer to other Federal departments or agencies.

APPENDIX B - COUNTERDRUG SCIENTIFIC AND TECHNOLOGICAL NEEDS

The following list of priority counterdrug 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 (NIDA). The Federal Aviation Administration (FAA) also has been consulted on the scientific and technological needs for nonintrusive inspection. While the FAA nonintrusive inspection interests concentrate on explosives detection, many of the technologies and systems used to detect and identify explosives also can be adapted for the detection of illicit drugs.

The individual scientific and technological needs for each agency were combined into one composite listing according to “short” (1-2 years), “medium” (3-5 years) and “long term” (over 5 years) time horizons for Nonintrusive Inspection, Wide Area Surveillance, Tactical Technologies, and Demand Reduction applications. The needs have been annotated with the agencies specifically citing a particular need shown in parenthesis beside the description.

NONINTRUSIVE INSPECTION

Short Term (1-2 years)

System for rapid and non-invasive screening of individuals for internal carries (drug swallowers) (USCS)

Portal detection systems for screening passengers for carrying drugs (USCS)

Hand-held bulk currency detector (USCS/FBI)

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

Portable vapor and space detection (USCG/FBI)

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

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

Inexpensive, faster, more reliable, and less invasive inmate drug testing device (NIJ)

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

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

Medium Term (3-5 years)

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

Rapid and safe detection of cocaine in vehicles without removing occupants (USCS/DoD)

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

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

Long Term (over 5 years)

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

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

WIDE AREA SURVEILLANCE

Short Term (1-2 years)

Ultra-wide area ocean surveillance tracking of low radar cross-section small craft and 100-foot slow moving ships (10-15 knots) (DoD)

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

OTH technology that will provide one nautical mile positional accuracy for airborne targets (DoD)

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

Long range stabilized electro-optic/infrared technology/systems for maritime detection and tracking applications (USCS/USCG/ DEA/INS)

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

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

Ultra-wide area surveillance technology to locate active major cocaine hydrochloride labs (DoD)

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

Employ unmanned aerial vehicles (UAV) 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 long line ground sensing to provide monitoring without agent presence in distant areas (INS)

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

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

Miniaturized “next generation” covert, low probability of intercept/low probability of detection, encrypted tagging and tracking devices for airborne, maritime and ground targets (USCS)

Medium Term (3-5 years)

Airborne, standoff “tagging” of aircraft targets (DoD)

Capability to create and manipulate a composite image and data overlays using data from commercial and national satellite imagery assets (DoD)

Real-time worldwide encrypted tracking systems for cooperative targets such as aircraft, vessels, vehicles and packages (USCS)

Advancement in battery life for remote sensor applications while retaining capability for disposal without special handling (INS)

Next generation of tunnel detection technology (DoD/INS)

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

Long Term (over 5 years)

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

TACTICAL TECHNOLOGIES

Short Term (1-2 years)

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

Automated targeting systems improvements (USCS)

Ubiquitous computing (wireless computing, PDA applications, etc.) (USCS)

Environmentally friendly, low cost, mobile drug destruction technology for the destruction of seized illicit substances *in-situ* (USCS/DEA)

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

Advanced low probability of intercept tracking devices (FBI)

Computer forensic tools (FBI)

Internet/data processing tools (FBI)

APPENDIX B - COUNTERDRUG SCIENTIFIC AND TECHNOLOGICAL NEEDS

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

Methods for verifying the authenticity of digital videotape to assure that digital recordings have not been altered or modified (DEA/INS)

Rapid, reproducible, and improved method of digitally recording ridge detail from the palmar side of the hand (DEA)

Comprehensive searchable digital database of spectral information for authenticated standards. The standards will include controlled substances, adulterants, diluents, starting products for drug synthesis, along with intermediates and by-products from drug manufacture (DEA)

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

Conversion of Title III collection systems from analog to digital (FBI/INS)

Title III voice identification system (DEA/INS)

Facial identification system for surveillance (DEA/INS)

System for interception of traffickers' communications over digital subscriber line, Internet, and cable TV (DEA)

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

Off air digital cellular collection systems (FBI)

Digital narrowband audio transmitter secreted in an operational wristwatch (DEA/FBI)

Combination digital narrowband audio transmitter/recorder (DEA/FBI)

500 MW digital narrowband transmitter that can be secreted in multiple concealments (DEA/FBI/INS)

Capability to transmit full or near full motion video imagery over conventional telephone lines using enhanced video compression techniques (DEA/FBI)

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

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

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

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

Shallow tunnel detection system that is highly mobile, easy to use, and can be readily interpreted by a law enforcement officer (INS)

Automated enforcement case tracking that supports the INS in its law enforcement mission, including identification, apprehension and probable removal of illegal aliens; the

filing of administrative and criminal charges against aliens who commit illegal acts; and the seizure of contraband associated with illegal alien activity (INS)

Medium Term (3-5 years)

Detection methods for identifying and locating operating clandestine cocaine manufacturing labs (DEA)

Detection methods for identifying and locating operating clandestine methamphetamine manufacturing labs (DEA)

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

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

Information and decision support systems (USCG)

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

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

Standalone, non-GPS tracking devices with low probability of intercept data links (FBI)

Advanced power sources and extremely low power devices (FBI)

Long Term (over 5 years)

Advanced tools to process collected communications (FBI)

Advanced tracking devices with seamless, low probability of intercept, worldwide coverage (FBI)

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

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

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

DEMAND REDUCTION (National Institute on Drug Abuse)

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

- The Sixth Triennial Report to Congress from the Secretary of Health and Human Services. *Drug Abuse and Addiction Research: 25 Years of Discovery to ad-*

vance the Health of the Public. National Institute on Drug Abuse. September 1999, [NIDA Research Priorities and Highlights, pp. 23-32.]

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

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

standing of the genetic and environmental risk and protective factors that can prevent or lead to drug abuse and addiction.

These imaging studies are critical for insight into the phenotypic evaluation of the effects of drugs of abuse and how the brain changes as a result of drug exposure. Recent instrumentation advances in bioinformatics, and electrophysiological and biochemical indices in drug abusers will be critically important for designing new treatment strategies. Instrumentation needs in these new areas are also markedly deserving of CTAC infrastructural support.

Finally, with the elucidation of the human genome, a unique opportunity presents itself to understand the genotype of drug abuse and the vulnerability to drug addiction. New mass spectrometry-based instrumentation will allow a much greater through-put of clinical material for analysis of genome sequences and polymorphisms. These genomic infrastructural needs also critically depend on CTAC support.

APPENDIX C - COUNTERDRUG RESEARCH AND DEVELOPMENT PROJECTS

R&D Projects – Counterdrug Technology Assessment Center (2001)

Nonintrusive Inspection

Nonintrusive inspection technologies provide the capability to determine if a cargo container, conveyance or vehicle has illicit drugs or other contraband concealed within legitimate cargo or hidden in false compartments without physically entering the cargo space.

Neutron Interrogation Pallet Probe

A prototype transportable fast neutron-based probe is being evaluated for inspection of pallet-sized volumes of cargo. The probe may be used in conjunction with x-ray and gamma ray systems already in use at border entry points for inspecting vehicles, pallets, and cargo for illicit drugs and other contraband. While x-ray and gamma ray systems provide an image or shape, the neutron system provides a characterization of the imaged object based on its elemental composition (nitrogen, carbon, etc.).

Detector Dog Breeding Program

In conjunction with the U.S. Customs Service, the graduates of a breeding strategy for substance detecting canines are now working at U.S. ports of entry. Based on quantitative genetic principles proven by the Australian Customs Service, initial results indicate the potential to establish a worldwide gene pool for substance detection canines.

Canine Olfaction/Substance Detection

Scientists at Auburn University are analyzing functional olfaction characteristics to improve our understanding of the biological and behavioral processes in substance detection with canines. A dynamic three-dimensional model has been constructed of the olfactory laminar flow, recovery, and adaptation. Further study will verify the mechanisms of the particle filtration process. Findings are being disseminated to all substance detection canine training agencies.

Raman Spectrometry Drug Analyzer with Fiber Optic Probe

A handheld device is being tested by Drug Enforcement Administration, U.S. Customs Service, and U.S. Coast Guard personnel to identify drugs in solid mixtures (e.g., pills) and aqueous solutions. This near infrared Raman spectroscopy method incorporates a fiber optic probe feature to minimize sample preparation and allow in situ analysis of the contents of transparent containers.

Molecularly Imprinted Polymer Sensor for Detection of Methyl Benzoate

A prototype system is being developed to detect the presence of trace amounts of cocaine. This detection method employs techniques similar to that used to detect nerve agents in biological and chemical warfare. The approach includes developing a molecularly imprinted polymer-based sensor to detect methyl benzoate vapor as an indicator of the presence of cocaine.

Tactical Technologies

Tactical technology development efforts to support the law enforcement officer in performing daily operations include projects to improve information management and data sharing, tracking and surveillance, and communications interoperability capabilities. The results from successful R&D projects are considered for inclusion in the Technology Transfer Program (TTP).

RioNET

In the Rio Grande Valley of south Texas, participating police departments are now able to share and analyze information from neighboring jurisdictions' databases using advanced data mining and link analysis tools. This new system overcomes typical problems associated with incompatible records management systems.

CRYSTAL

Integrating real-time location and tracking systems with current and past criminal associations will give law enforcement new tools for strategic and tactical planning and execution of drug-related, criminal investigations. Development of this scalable information tool, CRYSTAL, in conjunction with the Rockland County Narcotics Task Force, New York, will enable agencies to organize and present criminal and case-related information in conjunction with real-time positional data from tracking and surveillance management systems. Users can visually link possible criminal activity under surveillance against a geographic positional background. This project will be completed in FY 2002 and is expected to transition to the TTP.

NTIA Compliant VHF Tactical Repeater

Tactical tools to improve capabilities to intercept and process drug-related criminal communications and to improve law enforcement capabilities to communicate with each other are under development. Advanced tactical repeaters and phone intercept systems developed under CTAC funding are being evaluated in the field by Federal, state and local law enforcement agencies in the New York City and Baltimore/Washington areas.

Inhibition of Anhydrous Ammonia to Prevent Methamphetamine Production

Scientists are designing techniques for altering agricultural anhydrous ammonia to render it useless for the manufacture of methamphetamine. The goal is to develop a catalyst that will effectively inactivate the solvated electron, the active reagent in the synthesis of methamphetamine.

Demand Reduction

Neuroimaging Technology Initiatives

Two advanced neuroimaging centers became operational in FY 2001 to support research on drug abuse:

- Using a 3 Tesla fMRI, partially sponsored by CTAC, studies in developing cocaine blockers continue at Emory University's Yerkes Regional Primate Research Center.

- Scientists at Massachusetts General Hospital, using the powerful 7 Tesla fMRI brought on line this year at the Athinoula A. Martinos Center for Functional and Structural Biomedical Research, are characterizing the brain's response to substances of abuse. Operating under grants from NIDA, scientists from Harvard University and Massachusetts General Hospital will continue their collaborative research on brain circuitry in FY 2002.

During FY 2002, another two advanced neuroimaging centers will become operational:

- McLean Hospital's Brain Imaging Center in Boston, Massachusetts plans to begin using its high field (4 Tesla) fMRI/MRS scanner for clinical assessments of drug addicts. This research will identify a scientific means to measure the drug chemistry of energy metabolism. In addition to supporting post-doctoral fellows developing their skills in the brain imaging of drug abusers, McLean Hospital scientists are also studying the acute and chronic effects of MDMA ("Ecstasy") on brain activity. Studies on the effects of cocaine, methadone, cannabis, and amphetamine on the central nervous system also continue in FY 2002.
- Scientists at University of Pennsylvania, using a specially designed and fabricated ultra high resolution PET camera, are developing protocols for imaging the neurobiological substrates of addiction. Employing gadolinium orthosilicate crystal detectors, the new PET scanner fea-

tures improved spatial resolution, higher sensitivity, and higher count-rate capability compared to the current sodium iodide-based PET. Patient studies will begin in the second quarter of FY 2002.

Research Triangle Institute is testing human subjects as validation studies using the PET facility at NIDA's Brain Imaging Center in Baltimore to assess the role of cognitive impairment from drug abuse and to identify vulnerability factors and markers for targeted treatment regimens.

At UCLA's Crump Institute, an ultra-high resolution "MicroPET" instrument will enable scientists to investigate drugs of abuse and addiction in the monkey brain. The UCLA program will study a unique Vervet monkey colony of well-defined lineage and the specific genes critical to brain reward functions. Researchers will use PET to link biochemical events to behavior in this monkey population. Construction of UCLA's state of the art PET facility at the Sepulveda VA Medical Center will be completed in June 2003 with the addition of a compact biomedical cyclotron and radiochemistry equipment.

Drug Abuse Treatment Effectiveness

The Drug Evaluation Network System (DENS) is used to collect and track "treatment entry" data on addicts using the addiction severity index (ASI) screening and assessment system. DENS, a national electronic information system focused on addicts who enter treatment, is helping addiction researchers compare treatment outcomes across treatment modalities. This project has provided a database rich in detail on the profiles of 2,000 patients enrolled in 21

treatment programs. The DENS Website tracks treatment program data from clinics in such major cities as Philadelphia, Chicago, San Francisco, New York and Miami.

The DENS database is being expanded in FY 2002 from 21 existing programs to add another 29 randomly selected programs using the DENS model to track variability in the effects of addiction treatment.

Substance Abuse and Drugs in Sports

The U.S. Anti-Doping Agency (USADA) is developing human growth hormone test methodology and protocols. They recently purchased equipment to allow blood testing for EPO use at the 2002 Olympic winter games. The equipment will continue to be used after the games at additional locations. Plans are underway to develop and validate screening and confirmation immunoassays for markers of hGH use. CTAC continues to attend USADA planning meetings and monitors their progress in eliminating the use of performance-enhancing substances in sports.

Sleep Disturbance and Adolescent Drug Abuse

Researchers at the University of Arizona are increasing their knowledge of the intriguing link between adolescents' sleep needs and patterns and their use of drugs. Under CTAC funding, researchers are developing treatments for sleep disturbance and daytime sleepiness as a means of reducing relapse of adolescent drug abuse.

Localization of Brain Responses to Highly Abused Drugs

Oregon's Health and Science University (OHSU) plans to use a dedicated fMRI to locate the genetic pathways leading to the abuse by adolescents of anabolic steroids, methamphetamine, and cocaine.

The Oregon project is one of a dozen around the country to employ advanced brain-imaging technology to research efforts on drug abuse. Researchers from the University of Colorado, the University of North Dakota/Grand Forks, and the NIDA Intramural Research Program will also soon be using high resolution brain imaging technologies to study drug use among young people.

Juvenile Diversion

A project with the New Orleans District Attorney's Office to improve approaches for drug abuse treatment on youth offenders was completed last year. This project examined the effectiveness of therapeutic approaches with 12 to 16 year old, first-time, non-violent juvenile arrestees who are substance abusers. These juveniles had their cases "diverted" out of the normal judicial process pending completion of program requirements. The methodology developed by this project has the potential to provide a national model for dealing with non-violent juvenile substance abusers outside the judicial process.

***R&D Projects –
Department of Defense (2001)***

Nonintrusive Inspection

Marijuana Detection at Ports of Entry

A system is being developed to detect prosecutable amounts (>10 kg) of marijuana being smuggled across land border ports of entries in private vehicles. The system detects natural radioactive decay of Potassium 40 in marijuana from a three to five foot standoff range. It is cost efficient and does not impede traffic flow.

Man Portable Ship Inspection System

A man portable inspection system for use by boarding teams is being developed that can penetrate up to one inch of steel to search for hidden compartments and drug packages on ships at sea.

Wide Area Surveillance

Remote Sensing of Cocaine Production

Software and analytical tools using sub-pixel multispectral technology are being developed that will automatically process images obtained by commercial satellite. These tools will assist in detecting large cocaine hydrochloride laboratory locations based on river water anomalies and in identifying and estimating the size of coca cultivation based on coca leaf signature.

Airborne Detection of Cocaine Manufacturing Infrastructure

Tests and demonstrations are being performed on hyperspectral imaging systems, magnetic detection sensors, optical and radio frequency detection systems to evaluate their efficacy to detect and identify clandestine drug processing

laboratories, illicit crops, and transportation methods by their man-made and naturally occurring emissions.

Northwest Florida Laboratory Test Facility

Set in dense foliage, this facility was designed to mimic a clandestine cocaine processing laboratory in South America. The facility includes the structures and equipment for drug production that facilitates realistic, accurate testing of new detection and surveillance technologies.

Autonomous Acoustic Sensor System

An autonomous acoustic sensor system is being developed to automatically detect, classify, and report the presence of Go-Fast boats in littoral waters. The system, currently under testing, consists of a buoy that contains a battery, GPS receiver, acoustic hydrophone, 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.

Puerto Rico Maritime Surveillance Radar

This project provides continuous maritime coastal surveillance of the major approaches to Puerto Rico through the use of surveillance radar. The concept uses an unattended radar and relay to report targets to an operations center for disposition.

Detection, Monitoring and Interdiction Operational Analysis

This project develops an analytical/economic understanding of all aspects of the cocaine industry in support of DoD's missions. Its findings will support an assessment of the effectiveness of cocaine detection, monitoring and interdiction efforts. Quarterly as-

assessments of U.S. interdiction performance are provided to the United States Interdiction Coordinator.

Advanced Aircraft Detection and Tracking Using ROTHr

This project is developing an operational capability for ROTHr to detect and track small aircraft in high clutter environments. Detection algorithms are being developed to detect and record take off and landing events at clandestine airfields. Efforts are being made to improve overland detection sensitivity by increasing location accuracy by using natural terrain features as calibration points. Adaptive clutter nulling algorithms are being developed to reduce equatorial clutter effects.

Advanced Ship Detection and Tracking Using ROTHr

This project is developing an operational capability for ROTHr against 30 to 120 foot metal and fiberglass maritime craft: Go-Fast boats, fishing vessels, and trawlers. Advanced ship detection and tracking algorithms are being developed for adaptive thresholding, advanced clutter processing, and target doppler and ionospheric compensation. Improved displays are being developed to aid in manual detection and a revolutionary signal inversion algorithm is being developed for extracting targets at or below the clutter/noise level.

Relocatable Over-The-Horizon Radar (ROTHR) Enhancements Demonstration System (REDS)

The Department of Defense operates a relocatable OTH radar enhancement demonstration system to provide a testbed where R&D projects can be evaluated to expedite transition of advancements in capability into ROTHr. The

testbed provides a real-time ROTHr data feed and a software test facility with operator interfaces to bridge the gap between research algorithms and operational software. Activities at the testbed include the assessment of adaptive processing algorithms, real-time ship detection and tracking experiments, development of new capabilities and displays for operator feedback and optimization, and opportunities to compare results of new software to current ROTHr performance using real-time ROTHr data.

End-to-End Worldwide Tracking Capability

This project develops improvements to real-time, worldwide tracking capabilities for cooperative and non-cooperative targets. Small tracking devices (14 cubic inches), employing commercial GPS positioning, have been developed to provide worldwide two-way communication with a miniature transceiver. The system has an open architecture for incorporating additional devices as appropriate. An integrated graphical data display is available for multiple units via dial-up or IP connection. Various covert enclosures and other features are also being made available.

Cooperative Tag for Colombian Aircraft

This project develops a cooperative GPS, SATCOM beacon for use on all Colombian civil aviation to assist in detecting illegal flights. The beacons employ a design to resist tampering, support global queries, provide cooperative installations, and provide real-time monitoring.

Remote Sensor Data Server/Router

This project develops an efficient server-based system to distribute beacon and other sensor data to JIATF-East and Co-

lombia. The system features allow simultaneous data access by multiple users, provide for independent client software, eliminate the need for redundant service provider contracts, and maintain data integrity and control access.

LPI Beacon Over NOAA Satellite

This project uses existing NOAA satellites for low probability of intercept beacon communication links. The signal will overlay and coexist with current TDMA users and provide continuous coverage of North and South America through NOAA satellites. Ten spread spectrum UHF transponder units, capable of waveform variation, will be built during the demonstration.

Ground Interdiction Bolivia

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

Ground Sensor, Aircraft Man Emplaced

This project develops a real-time satellite communicating ground sensor to detect aircraft at clandestine airfields. The sensor employs acoustic and seismic sensors to detect activity and uses a satellite link to report the detection and classification of aircraft. The system is also capable of detecting people and vehicles.

Ground Aircraft Sensors, Helo-Dropped

This project will modify the man emplaced ground aircraft sensors to be hand dropped from the air by helicopter.

Tactical Technologies

Data Mining on Colombian Air Industry

Data-mining capabilities are being developed that will assist the Colombian aircraft industry in identifying drug smugglers and their resources. Disparate data sources such as aircraft maintenance, fuel use records, aircraft sales, and pilot school attendees will be analyzed to detect patterns and provide targeting information.

Data Extraction Tool for SOUTHCOM

This project provides SOUTHCOM with an intelligent message processing capability by automatically extracting data from formatted and free text messages. Relationships between events and entities are determined, then formatted and forwarded to external databases for analysis and display.

Analysis Tools for SOUTHCOM

This project provides SOUTHCOM and JIATF-E with data archiving, mining, and visualization tools. Various information domains will be supported including DoD, Counter-Terrorism, Counter-Drug, Counter-Insurgency, and Law Enforcement to create an environment for data warehousing at SOUTHCOM. Analysis tools and web-based interfaces will be developed to perform analysis on internal and external databases. Several graphical user interfaces will be provided.

Data Mining and Targeting Using Point of Entry Information

This project provides a system that has the capability to target suspect vehicles for inspection in real time using historical border crossing data. The targeting rules are calibrated to identify suspicious patterns and trends often used by drug traffickers. The system identifies targets in three to five seconds and is expected to provide ten times greater accuracy than random inspections.

Speaker Identification on Title III Wire Taps

An automated voice identification capability is being developed for Title III investigations. Voice identification algorithms are being developed that require six seconds of speech in database and one half second live speech. Pre-identification channel normalization features will improve performance a minimum of three times. A pre-identification noise reduction feature is being developed to reduce noise by 18 to 48 db.

Evaluation of Facial Recognition Technology

This project provides an evaluation of systems for identifying known drug smugglers at ports of entry and other locations. An independent performance evaluation of existing commercial facial recognition systems was conducted last year and is now recognized as the next benchmark in facial recognition within the biometric community.

Fast Boat Interdiction

A variety of non-lethal means to stop Go-Fast boats have been developed and evaluated including prototype surface-to-surface and air-to-surface capabilities. Malodorants, which produce immediate crew sickness, outboard engine entan-

glement nets, and 12Ga FERRET rounds have all proven effective at stopping Go-Fast boats.

***R&D Projects –
U.S. Coast Guard (2001)***

Sensor Technology Evaluation

Sensor operating and performance parameters against Go-Fast boats and counterdrug campaign analysis modeling tools are being developed.

Technical Evaluation of Acoustic Detection Systems for Go-Fasts

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

UAVs as Over-the-Horizon Sensors

A 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 is being carried out.

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.

Vessel Search via Detection of Contraband and Their Precursors

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

Vessel Search via Detection of Anomalies

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

Vessel Interception, Disabling, and Marking

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

***R&D Projects –
Immigration and Naturalization
Service (2001)***

Shallow Tunnel Detection: Test and Evaluation

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

Mobile Structural Penetrating Radar Systems

In partnership with other Federal agencies, the INS is developing a mobile structural penetrating radar system. The system will be capable of detecting humans and weapons in a building without having to be in physical contact with the walls of the structure. It will be range-gateable, enabling imaging of a two-story structure, one story at a time, or limiting the imaging to a specific area. The imagery will be transmitted in near real time via a secure link to the entry team, displayed either on a helmet configured with flip-down display or on a small handheld unit. An identification friend or foe capability is expected to enhance the system design.

***R&D Projects –
National Institutes of Justice,
Office of Science and Technology
(2001)***

Tactical Technology Development

Detection of Date Rape Drugs in Hair and Urine

The objective of this project was to determine if it is possible to detect Flunitazepam and its major parts in the hair of a victim of a drug-related sexual assault. In addition to this clinical test, there was also a test performed to determine how long the date rape drug, Rohypnol, stayed in the victim's urine and hair. This test was done with volunteers only, using previously developed conformation techniques. The tests were able to detect a single dose of Rohypnol five days after its administration. This test used the Micro-plate enzyme immunoassay method. However, using the solid-phase extraction and highly sensitive gas chromatography, the single dose of Rohypnol was detected 14 days after administration. In a hair test performed later, traces of the 7-Aminoflunitazepam were present one month after dosage. Testing concluded that the 7-Aminoflunitazepam remains in hair much longer than that of its parent drug, Flunitazepam. This new technology not only detects the date rape drugs but also the compounds in low concentrations of Diazepam, Alprazolam, Triazolam, and Ketamine.

Law Enforcement Data Mining Analytical Tool

Using the University of Maryland's Baltimore/Washington High Intensity Drug Trafficking Area program as an initial test site, this grant will manage large volumes of data conversion and develop fully a text search, retrieval, and a link analysis software application to analyze information contained in law enforcement databases and large volumes of scanned search and seizure documents. This has been accomplished by three one-year phases. The final goal is to develop a proof-of-concept system capable of handling 100,000 images from a Prince George's County drug and fraud related document seizure to mirror the four step analytical process used in law enforcement (data collection, evaluation, analysis and product dissemination).

The Phase One system integrated commercial-off-the-shelf software (data mining, scanning, optical character recognition and conversion, full text storage and retrieval, online analytical processing, graphing, and handwriting and voice recognition) and government-off-the-shelf software (National Security Agency's "Propeller" link analysis tool) software into a workable architecture, a common user interface, and a reporting structure.

Phase Two built on the system developed in Phase One. Phase Two simulated multi-user scenarios, evaluated system stress, and increased the system's capability to handle more than 1,000,000 images (up from 100,000 in Phase One). Phase Two integrated facial recognition, mapping, and telephone number relational technologies, investigated better ways to convert existing documentation

(voice, handwriting, and forms), and incorporated appropriate security features.

Phase Three (recently awarded) will implement the Data Mining for Law Enforcement (DMLE) system to include a data smart function and a set of software tools designed to access the law enforcement data warehouse. The initial data warehouse will concentrate on a design that incorporates case data as well as strategic law enforcement data types from a variety of law enforcement sources.

COPLINK Center for Law Enforcement Information Sharing and Knowledge Management

The Tucson Police Department (TPD) continues the development and deployment of a set of database knowledge mining and analytical tools called COPLINK and DETECT, developed under a previous NIJ cooperative agreement. This has been done in conjunction with technology development funded by the National Science Foundation (NSF). Specifically, NSF is funding the development of text categorization and web spider agents. When developed, this technology will be integrated into the COPLINK application, currently planned for Phase Three of the proposed effort.

The Tucson Police Department has upgraded to Version 2.0 of COPLINK and has scheduled user training for everyone in the department. Version 2.0 differs from 1.0 by being ODBC compliant (use of an open architecture). This allows different vendor databases to share information with one another, as long as they are ODBC compliant, through the use of COPLINK. Tucson expects to be able to connect its COPLINK database

with Phoenix's COPLINK system early in 2002. Detect Version 2.0 will soon be deployed in Tucson for detectives and crime analysts, and is currently undergoing operational testing.

Knowledge Computing Corporation (KCC), a start-up company recently founded to commercialize and promulgate COPLINK for use by enforcement agencies across the country, plans on giving away the software licenses to COPLINK and contracting with public safety agencies for installation and maintenance.

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

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

Demonstration and Assessment of Facial Recognition Technology

This project is a joint effort between the Department of Defense Counterdrug Technology Development Program Office and the National Institute of Justice to define a facial recognition program plan that will have immediate benefits

for corrections. This program plan includes but is not limited to the following activities: leveraging existing DoD expertise in physical security and access control, selecting a combination of commercially available access control and facial recognition biometrics for verification, and evaluating personnel tracking in a jail environment.

Sweat Patch Modification and Testing

The Department of Defense Counterdrug Technology Development Program Office has evaluated contamination issues associated with the PharmChem™ Sweat Patch and identified new designs/techniques to mitigate contamination. A final report will provide the results of this study.

Assessment of Saliva Drug Test Kits

The Department of Defense Counterdrug Technology Development Program Office and Naval Research Laboratory will assess commercially available saliva testing technology as an alternative technology to replace urinalysis as the method for drug screening in corrections

and school applications. A final report will provide the results of the assessment.

Research Program on Non-Toxic Drug Detection and Identification Aerosol

This project is conducting a research program using a non-toxic aerosol drug detection and identification system for marijuana, cocaine, heroin, and methamphetamine. It focuses on the use of a drug detection and identification system in a public and private secondary school environment. The project is designed specifically for the testing of the environment and not of individuals. The project will be conducted as a partnership with a public school Safe and Drug-Free Schools program and will include an independent evaluation of the program and follow-up recommendations. In addition, the project will determine the system's usefulness in a corrections environment. Finally, the project will develop and demonstrate a drug detection device that can detect trace amounts of illicit substances within large quantities of mail in a prison or jail.

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

This appendix has been prepared to satisfy the reporting requirement for an annual report on development and deployment of narcotics detection technologies included in the National Defense Authorization Act for fiscal year 1998 (P.L. 105-85). The statute is cited in Appendix A, Applicable Legislation, to the *Blueprint Update*.

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

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

| Agency | Project Title/Short Description | Prior (\$K) | FY 01 (\$K) | FY 02 (\$K) |
|--------------------------|--|----------------|------------------|------------------|
| US Customs Service | Vapor Trace Detection Studies and Analysis: A compilation of studies, analyses and research in vapor detection projects involving illicit contraband, drugs, currency, or other substances. <i>Ongoing</i> | | 100 (Customs) | 100 (Customs) |
| US Customs Service | Passenger/Pedestrian Portal Detection: Demonstrate feasibility of a walk-through portal system for the identification of persons smuggling drugs on the outside of the body. <i>Laboratory Testing Complete 1QFY02/Field Testing to be Complete 4QFY02</i> | | 280 (Customs) | 50 (Customs) |
| US Customs Service | Customs Handheld Acoustical Inspection System (CHAIS): Prototype Development and Evaluation: This technology uses ultrasonic pulses to ascertain density of materials in sealed containers. <i>Prototype Complete 1QFY02</i> | | 150 (Customs) | 119 (Customs) |

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

| Agency | Project Title/Short Description | Prior (\$K) | FY 01 (\$K) | FY 02 (\$K) |
|-----------------------|---|--------------------------------|--------------------|--------------------|
| US Coast Guard / CTAC | Vessel Search via Low Energy Imaging Techniques: Using low energy interrogation technologies such as ultrasonics, develop a prototype imaging device and evaluate its potential as a tool for searching vessel tanks. <i>Completion: 2QFY03</i> | 400 (USCG) 100 (CTAC) | 100 (CTAC) | 610 (USCG) |
| Department of Defense | Development of a man portable detection system that is affordable and effective for a variety of inspection applications including use by boarding parties. Penetration required is 1 inch of steel to search for hidden compartments and drug packages. <i>Completion: 4QFY02</i> | 650 (DoD) | 350 (DoD) | 400 (DoD) |
| Department of Defense | Development of a system to detect marijuana (greater than 10 kg) at ports of entry: System detects natural radioactive decay of Potassium 40 in marijuana. <i>System Demonstration: 3QFY02</i> | 400 (DoD) | 350 (DoD) | 400 (DoD) |
| CTAC | Surface Acoustic Wave (SAW) Immunoassay: Proof-of-concept demonstration of a SAW sensor to antibody-specific cocaine vapors. <i>Completion: 2QFY02</i> | 250 (CTAC) | 75 (CTAC) | 0 |
| CTAC | Coded Aperture Fast Neutron Analysis: Develop an advanced means of signal processing for neutron interrogation <i>Completion: 1QFY02</i> | 764 (CTAC) | 0 | 0 |
| CTAC | Neutron Probe: Develop a transportable neutron-based probe to inspect pallet-sized volume commodities for concealed illicit drugs. <i>Completion: 3QFY02</i> | 926 (CTAC) | 0 | 0 |

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

| Agency | Project Title/Short Description | Prior (\$K) | FY 01 (\$K) | FY 02 (\$K) |
|---------------|--|--------------------|--------------------|--------------------|
| CTAC | Substance Detector Dog Breeding Program: Establish a substance detector dog breeding strategy and center in the U.S. based upon quantitative genetic principles proven by Australian Customs. Leads to a worldwide canine gene pool. <i>Completion: 4QFY01</i> | 340 (CTAC) | 125 (CTAC) | 0 (CTAC) |
| CTAC | Analysis of functional olfaction characteristics of substance detector dogs: Provide the basis for applying the understanding of biological and behavioral processes and effects in meeting increasing smuggling challenges. <i>Completion: 4QFY03</i> | 0 | 246 (CTAC) | 330 (CTAC) |
| CTAC | Raman Spectrometry Drug Analyzer: Use a new infrared Raman spectroscopy method to detect drugs in solid mixtures. <i>Completion: 4QFY01</i> | 423 (CTAC) | 0 | 0 |
| CTAC | Handheld Methybenzoate Vapor Detector: Produce hand-held sensors for the detection of methylbenzoate vapors as an indicator of the presence of cocaine. <i>Completion: 4QFY02</i> | 226 (CTAC) | 0 | 0 |

Table D-2. PROJECTS UNDERGOING TEST AND EVALUATION

| Title | Description | Total Units Ordered/Planned | Units Delivered to Date |
|---|--|-----------------------------|-------------------------|
| Large Pallet Gamma Ray System | Acquisition and evaluation of a VACIS-like prototype system to meet USCS requirements for NII of large pallets. Pallet sizes up to 6' W x 8' H and varying lengths, with weights up to 5,000 lbs. must be accommodated. Cesium (Cs137) and Cobalt (Co60) gamma ray sources are being evaluated. | 1 | 1 |
| High Energy Heavy Pallet X-RAY (HEHPXR) | The HEHPXR system is designed to inspect large air cargo containers and air cargo pallets for contraband and illicit drugs. Its large tunnel size will accommodate 8 ft high pallets weighing up to 10,000 pounds. <i>The prototype is undergoing simulated operational testing.</i> | 1 | 1 |
| Pulsed Fast Neutron Analysis (PFNA) | Evaluate PFNA prototype system in conjunction with FAA and DoD. Applications focus on both counterterrorism and counterdrug missions. A "stream of commerce" field evaluation of existing prototype has been funded to start in FY2002 <i>Previous major funding support has been provided by DoD and FAA.</i> | N/A | N/A |

Systems Entering U.S. Customs' Inventory

A Contraband Detection Kit (CDK) contains several items used by Customs inspectors to aid in their search for contraband. The kit includes a portable

contraband detector (Buster), a flexible fiber optic scope, a laser range finder, steel probes, an extension pole with an attached mirror and flashlight and pocket pencil probes. 24 Systems were deployed in FY01.

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

The Pallet x-ray system is designed for rapid inspection of outbound and inbound mail parcels as well as small boxes. One system is deployed and additional two systems planned.

The Vehicle and Cargo Inspection System (VACIS) is used to inspect empty or lightly loaded commercial trucks and containers, as well as privately owned vehicles. 24 systems have been deployed with an additional six units planned.

The Mobile Vehicle and Cargo Inspection System (M-VACIS) is used to inspect empty or lightly loaded commercial trucks and containers, as well as privately owned vehicles. 17 systems have been deployed with an additional 16 units planned.

The Rail Vehicle and Cargo Inspection System (Rail VACIS) employs Gamma radiation to inspect rail cars entering the U.S. One system has been deployed with an additional eight systems planned.

The Mobile Truck x-ray is used to inspect empty or lightly loaded commercial trucks and containers, as well as privately owned vehicles. 18 systems have been deployed with an additional four units planned. The original prototype has been retired from those deployed.

The Mobile Container x-ray System is a high-energy system for non-intrusive inspection of sea containers. Two systems utilizing different technologies are currently operational. An additional six systems are planned.

The Truck x-ray system is used to detect concealed contraband in suspect vehicles using x-ray technology. X-ray images are produced as a vehicle passes the x-ray source. The range of vehicles to be inspected includes empty or partially loaded 18 wheeled trailer trucks and smaller vehicles such as cars and pickup trucks. The x-ray equipment is housed in a x-ray cabinet large enough to allow the passage of the largest commercial vehicles using the public roadways. Nine systems are deployed.

Customs Test and Evaluation Facilities

In addition to the projects listed above as either under development, under test and evaluation, or entering the U.S. Customs inventory; activities such as acceptance tests, prototype and proof-of-concept evaluations, and simulated field tests overlap each of these three areas. As a result, U.S. Customs test and evaluation facilities play an important role in each of these phases of technology development and deployment. The Thunder Mountain Evaluation Center (TMEC) at Fort Huachuca, AZ was included in prior reports with technologies under development. Customs continues to rely heavily on test and evaluation facilities like TMEC to support technology development and deployment in all areas including narcotics detection, but does not separately account for use of these facilities by technology area.

This page blank

APPENDIX E - TECHNOLOGY TRANSFER PROGRAM

The Congress established the Technology Transfer Program (TTP) within the Office of National Drug Control Policy (ONDCP) Counterdrug Technology Assessment Center (CTAC) four years ago. Since then, the Technology Transfer Program (TTP) has been providing technologies that support narcotics officers during their daily operations and regional drug task forces and major city drug crime investigative units conducting large-scale conspiracy cases.

The typical police department spends eighty-five percent of its budget on salaries and personnel costs, leaving little for state-of-the-art technology. The purpose of the TTP is to ensure that state and local law enforcement agencies with limited budgets or lack of technological expertise can obtain these cutting-edge, easily integrated and maintained drug crime fighting technologies. The technologies available for transfer include information technology and analytical tools, communications intercept, tracking and surveillance, and drug detection devices. To ensure that Law Enforcement Agencies (LEAs) will realize the greatest benefit and that the technologies will be used properly, hands-on training and limited maintenance support are also provided to all recipients.

Support, Application Status, Operation, and the Organization of the Technology Transfer Program

The Program has support from active-duty, nationally recognized senior police chiefs and sheriffs who serve as regional law enforcement experts. These experts 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 technologies being offered. 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 interface directly with receiving agencies to ensure the smooth insertion of technology is achieved including follow up and evaluation of the deployed technologies. They receive and review every application. Figure E-1 lists the names and shows the locations of the ten regional experts. Table E-1 provides a summary of the funding appropriated for TTP.

Over the four-year period from 1998 to 2001, 3,115 agencies applied to the program for assistance, and deliveries of 3,255 items were made to 2,533 agencies. Applications are handled on a first-come, first-served basis. In FY 2000 and FY 2001, the program funding was exhausted before the TTP was able to meet the requests from 469 and 942 agencies, respectively. The 469 unmet FY 2000 requests were carried over and satisfied in FY 2001, and the 942 unmet FY 2001 requests are scheduled for deliveries in FY 2002. An additional 516 requests have been received from October 1 and December 31, 2001.

Figure E-2 shows the distribution of TTP deliveries by type agency and size jurisdiction served. For the period FY 1998 to FY

2001, 86 percent of requests and deliveries were for agencies serving populations of 500,000 or less. The predominant mix of technologies requested and provided to the police departments and sheriffs' offices in smaller jurisdictions was composed of thermal imagers, drugwipes, mini-buster kits, and body worn transmitters. Similarly, for the distribution of deliveries by agency type, 80 percent of the deliveries (and requests) were allocated to police departments and sheriffs' offices. Requests for the more complex systems (AG-SMS, AVTS, VoiceBox, data locator, video stabilization, and wireless interoperability) were received from task forces, police departments, and sheriffs' offices from larger jurisdictions serving populations of 500,000 or more.

The assumption is that Federal, state, and local law enforcement agencies (LEAs) all need advanced technologies to conduct their drug-related criminal investigations, but to a different scale and complexity. The Federal LEAs employ the technology to carry out complex, large-scale, drug-related criminal investigations while the state and local LEAs need the identical technologies but usually on a smaller scale for their drug-related criminal investigations and daily operations. Thirty percent of the deliveries have been to LEAs located within one of the 28 areas designated as a High Intensity Drug Trafficking Area (HIDTA).

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, outreach, and awareness efforts, including informative publications and establishment of an Internet web site to exe-

cute the program. A breakdown of the financial management accounts set up by EPG provides the following distribution of the \$57,261,850 received for FY 1998 - FY 2001:

- Purchase of technologies at 83 percent
- LEA training at seven percent
- administration at five percent
- outreach efforts at three percent; and
- evaluations at two percent.

Outreach

In support of the TTP, one-day workshops are held throughout the U.S. to promote an awareness of the program with state and local law enforcement agencies. One unique feature of the TTP is the hands-on training provided as part of the equipment delivery to each recipient by the vendors and prior law enforcement users of the equipment. In some cases, certification in the operation of the equipment (e.g., thermal imagers) is provided as well. Regional one-day workshops, leadership meetings, and centralized training sessions held in 2001 are summarized in Figure E-3.

National Deployment Strategy

The strategy for nationwide deployment of technology includes:

Support to the officer on the street by providing high technology equipment 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.

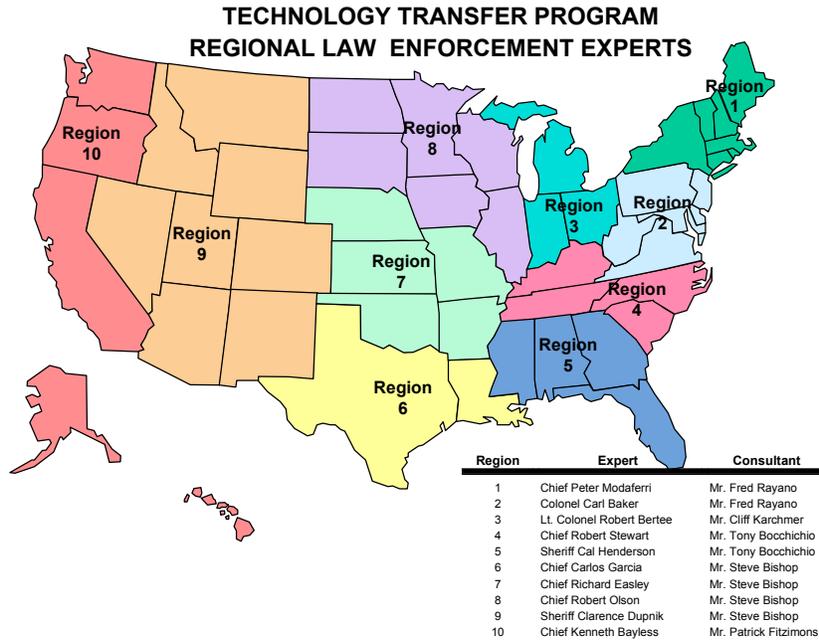


Figure E-1. TTP Regional LEA Experts

Table E-1. TTP Appropriations

| FY 1998 | FY 1999 | FY 2000 | FY 2001 | FY 2002 |
|---------|---------|-----------|-----------|-----------|
| \$13.0M | \$13.0M | \$13.052M | \$18.210M | \$22.236M |

APPENDIX E - TECHNOLOGY TRANSFER PROGRAM

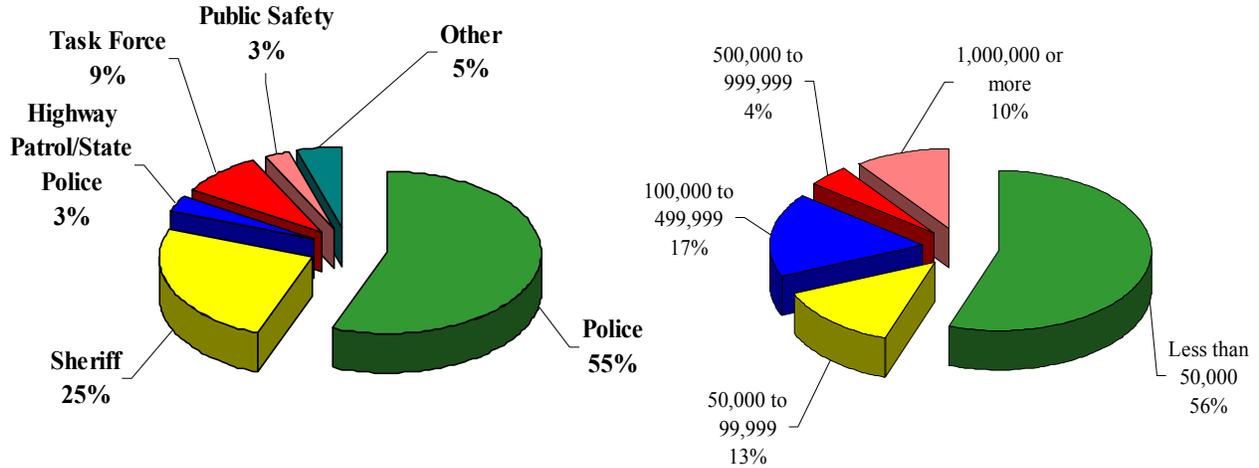


Figure E-2. Deliveries By Agency Type / Population Size - FY 1998 - 2001

| 2001 Training Sessions | | |
|------------------------|--------------------|-----------|
| Dates | Location | Attendees |
| April 8-13 | Phoenix, Arizona | 587 |
| May 28-31 | San Antonio, Texas | 393 |
| December 10-14 | Phoenix, Arizona | 307 |

| 2001 Workshops, Meetings, Conferences and Demos | | |
|---|--|--------------------|
| Dates | Event | Location |
| March 21-22 | CTAC Workshop | Seattle, WA |
| March 22 | Massachusetts Chiefs of Police | Boxborough, MA |
| April 17-20 | Law Enforcement Coordinating Committee (LECC) | Sandestin, FL |
| May 1-3 | Law Enforcement Coordinating Committee (LECC) | Gatlinburg, TN |
| May 24 | Senate Law Enforcement Technology Demo | Washington D.C. |
| June 13 | Consultant Meeting (Evaluations) | Orlando, FL |
| June 22-26 | National Sheriff's Association (NSA) | Ft. Lauderdale, FL |
| June 25-28 | ONDCP Symposium | San Diego, CA |
| July 17 | Consultant Meeting (Evaluations) | Tucson, AZ |
| August 2-4 | Badger State Sheriffs' Association | Racine, WI |
| August 20 | Colorado Wireless Demo | Denver, CO |
| August 21-23 | Program Review/Sources Sought | Denver, CO |
| August 27-31 | Interdiction Conference | St. Louis, MO |
| October 27-31 | International Association of Chiefs of Police (IACP) | Toronto, Canada |

Figure E-3. Promotion Efforts to State and Local Law Enforcement

- Support to specialized regional drug crime task forces and major city departments 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.
- Assurance that the proper 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 that can be replaced with next-generation technology.

Tactical Tools to Support the Officer. The TTP will continue to deliver hand-held devices and systems in response to requests from investigators working on individual cases. Support activities will include:

- continuing regional one-day workshops to maintain an awareness of the TTP, and
- continuing to introduce new hand-held devices and equipment as they become available to accommodate those agencies returning to the program for additional items.

Support to Task Forces and Major City Police Departments. Steps to introduce more of the complex case management tools into the mix include:

- beginning highly focused workshops concentrating on case management

tools to introduce these items to agencies who can use them but have not yet requested them, and

- fulfilling those requests for the more expensive case management tools (formerly withheld due solely to funding limitations).

Training and Workshops. The program will include more extensive training sessions for agency personnel when they first receive their new equipment. Certification for use of certain technologies (e.g., thermal imagers) has already been incorporated into the initial training to assure safe and proper use of the systems. Agencies in which the technologies already have been deployed assist with the training sessions and focused workshops so they may pass on their first-hand knowledge gained from operational use of the equipment. This will enable the program to leverage its prior investments to benefit new users.

A new series of regional workshops will begin focusing on the more complex case management systems. Attendance will be limited only to those departments capable of deploying systems of this complexity and those departments willing to devote internal resources necessary to install, train, and maintain the systems. An example of this concept was demonstrated at Lakewood Colorado in August 2001, where a communications interoperability system was installed at the Lakewood Police Department. The police department provided all of the facilities and resources to install, train, operate and maintain the system which now supports the communications connectivity for approximately 20 Federal, state, and local agencies and task forces within the neighboring jurisdictions.

Transitioning Technology from the Core Federal R&D Program. The technology testbeds within CTAC's core R&D program produce new capabilities and new "versions" or components to the overall system architecture. These enhancements can be provided as updates to those agencies that have received previous versions of the systems, such as Windows updates are provided by Microsoft for its products. Over the next year, two thrusts are being pursued: (1) advancing communications interoperability capabilities, and (2) providing a centerpiece for the case management tools.

- **Communication Interoperability:**
Interoperability systems capable of providing an interface between incompatible radios have been evaluated over the past year. Plans include adding two systems to the TTP: one for interfacing up to 20 agencies and another smaller system for interfacing five or fewer agencies.
- **Case Management Tool Architecture:**
A centerpiece is being developed to link criminal historical data with real-time

tracking and surveillance information to assist investigators in analyzing case information and in coordinating surveillance and apprehension operations.

TTP Technologies. Technologies currently offered by the program are listed in Tables E-2 and E-3. Items listed in Table E-2 are used for case building in long-term conspiracy investigations. These more complex technologies tend to require comprehensive training, infrastructure, and personnel resources for installation, operation, and maintenance.

Items listed in Table E-3 are tactical, portable, hand-held items designed to support the individual officer on the scene. These items, which require minimal training, can be distributed in large numbers and are especially appropriate for smaller jurisdictions because they do not require installation or sophisticated infrastructures for their operation. Compared to the complex systems, simple devices typically have a lower life-cycle cost and no requirement for organizational support other than operation and maintenance.

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

| TECHNOLOGY | DESCRIPTION |
|---|--|
| AG-SMS - Air-Ground Surveillance Management System | Enables officers to covertly locate and track both friendly "assets" and suspects. Graphically displays target position and archives this data on a moving map displayed either on a laptop or at the base station. Includes a database application to manage information relating to the units being tracked. |
| AIRNET32 | Intercepts, time-stamps, and records messages, either numeric or alphanumeric, sent to suspects' digital pagers. In specific cases, the messages are relayed to the case officer's own pager. Can intercept up to eight separate channels of pager traffic. |
| AVTS - Advanced Vehicle Tracking System | Using GPS-enabled "tags" attached to suspects' cars and trucks, lets officers map real-time vehicle position. Includes a user-friendly mapping software package operating on a PC base station. Multiple vehicles can be tracked simultaneously. |

APPENDIX E - TECHNOLOGY TRANSFER PROGRAM

| TECHNOLOGY | DESCRIPTION |
|---|---|
| Borderline (Voice-Box) System | Allows live, LAN-connected monitoring and collection of telephone, Internet, room-probe, fax, and video transmissions using a built-in dialed number recorder (DNR). Includes a networked printer, CD workstation, courtroom playback workstation, and high-level data backup. |
| CBSS – Cellular-Based Surveillance System | Covert transmitter and receiver system monitors and records evidence audio through the cellular network and VHF bands simultaneously. Components may be used separately and will integrate with existing VHF audio surveillance systems. |
| Data Locator / Direct Access System | Provides secure sharing of E-mail database access to existing or custom-built databases, and police intelligence analysis of information over a standard Internet connection. |
| Local Intercept Network Collection – Online Network (LINCOLN) Wiretap System | Title III telephone intercept system permits CALEA-compliant switch-based intercepts with several wireless carriers including Nextel, VoiceStream, and AT&T Wireless. Ranges from single-line to multi-line networked wiretap system. Package comes with LINCOLN server hardware, workstations, Pen-Link analysis software, and CALEA interface hardware. |
| Pen-Link Analysis Software | Telephone surveillance software provides complete, end-to-end data collection, distribution, and analysis systems. Helps build and integrate call, subscriber, event, seizure, and case files; stores complete case data; and provides instant network access to images, audio, and video. |
| SPIN - Suspect Pointer Index Network | Provides automated entry, retention, and analysis of multimedia investigative data (images and text). Users at nodes throughout a given jurisdiction can enter suspect and case data, including mug shots, on this networked, wireless system that provides complete data search capability. |
| R3000 Navigator Telephone Surveillance System | Expandable digital telephone-intercept system for Title III investigations that allows interception and decoding of CALEA-compliant digital messages. System provides LEAs a logical path of migration from traditional analog intercepts to digital switch-based telephone surveillance. |
| Video Stabilization | A PC-based video enhancement system that eliminates jitter and camera motion from real-time or previously recorded video of license plates or suspects. Provides video editing capability, zoom mode, and image digitization and storage for superior evidence processing. |
| Wireless Interoperability | Using computer-aided switching technology, connects multiple LEAs on disparate systems to a central radio system. Vastly improves real-time interagency communications during counternarcotic investigations. Permits each agency to assign its circuit to an agent or patrol vehicle and lets the two agents communicate directly in the field: no dispatchers needed. |

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

| TECHNOLOGY | DESCRIPTION |
|----------------------------------|---|
| Audio Surveillance System | Covert body wire transmitter and receiver system includes a concealable body wire transmitter, repeater for extended range capability, and a receiver base station that can record transmissions on either audio cassette or professional mini-disk. Provides superior sound recording in the field. |
| Body Worn | Miniaturized, multi-channel transmitter with voice privacy and low probability of detection (VPLPD) capabilities. Can be worn inconspicuously and can defeat both detection and eavesdropping devices. |
| Drugwipe | Surface residue drug test kit that identifies trace amounts of cannabis, cocaine, opiates, and amphetamines. Officer wipes swab across surface such as dashboard or doorknob and inserts swab into vial. Color change indicates presence of narcotics. |
| Mini-Buster | Self-contained portable contraband detection kit that locates hidden compartments and bulkheads. Includes an ultrasonic range finder to detect false walls; a flexible fiber optic scope for remote viewing inside inaccessible spaces such as fuel tanks; and other assorted steel probes, extension mirrors with flashlights, and pocket pencil inspection probe. |
| Night Vision | Amplifies images in low light using military-strength night vision goggles with built-in infrared illuminator and a 50-millimeter (mm) lens; an interchangeable 70-300 mm lens with variable gain; a 3-power (3X) magnifier, and a very fast optic snap-on telescope. |
| Small Look | Miniature, solid-state electronic camera surveillance system with low power consumption for prolonged battery life. Captures, processes, and stores hundreds of digital picture images in nonvolatile memory. The system is an integrated package consisting of hardware, software, and product training. |
| Thermal Imager | Night vision device senses heat, not light, and generates real-time video in all lighting conditions including total darkness. Can be hand-held or mounted on a vehicle rooftop. Remote operation from inside vehicle permits 360-degree pan, 40-degree tilt using joystick. Can detect a human out to 1,500 feet. Designed to withstand harsh weather conditions. |

APPENDIX F - ACKNOWLEDGMENTS

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

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

Office of National Drug Control Policy

Mr. James A. Petrousky
Ms. Florence M. Williams
Ms. Kate D. Malliarakis
Mr. David J. Rivait
Ms. Michele C. Marx
Mr. David A. Shull
Mr. Kevin P. Cichetti
Ms. Rose M. MacKay
Mr. Kent W. Lunsford
Mr. Patrick W. Shier
Ms. Creigh Yarbrough
Mr. Michael D. Hoglund

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

Mr. James L. Cole
Mr. Rafael C. Anton
Ms. Laura J. Shnider
Mr. Charles B. Fahs

U.S. Navy, Space and Naval Warfare Systems Center, San Diego

Dr. Clifford Warner
Ms. Theresa Myers
Mr. Richard S. Mellor
Mr. Clark R. Hendrickson
Ms. Marian Regan

Technology Transfer Regional Experts

Region #1

Chief Peter Modafferri
Rockland County District Attorney's Office

Region #2

Colonel Carl R. Baker
Chesterfield County Police Department

Region #3

Lieutenant Colonel Robert J. Bertee
Michigan State Police

Region #4

Chief Robert M. Stewart
South Carolina Law Enforcement Division

Region #5

Sheriff Cal Henderson
Hillsborough County Sheriff's Office

Region #6

Chief Carlos Garcia
Brownsville Police Department

Region #7

Chief Richard D. Easley
Kansas City Police Department

Region #8

Chief Robert K. Olson
Minneapolis Police Department

Region #9

Sheriff Clarence W. Dupnik
Pima County Sheriff's Department

Region #10

Chief Kenneth Bayless
Los Angeles County Sheriff's Department

Federal Drug Control Agencies

Mr. John Saunders
National Program Leader, Alternative Crops
Agricultural Research Service
Department of Agriculture

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

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

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

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

Ms. Elizabeth D'Andrea
Program Executive
DoD Counterdrug Technology Development
Program Office
Department of Defense

Dr. Randall Murch
Deputy Assistant Director
Laboratory Division
Federal Bureau of Investigation

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

Special Agent John A. Cioffi
Federal Bureau of Investigation

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

CDR Bradley M. Jacobs
U.S. Coast Guard

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

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

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

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

National Institute on Drug Abuse

Dr. Alan I. Leshner
Former Director

Mr. Richard A. Millstein
Deputy Director

Dr. Barry J. Hoffer
Director
Intramural Research Program