

Recent Federal Counterterrorism Research Efforts: Agencies and Their Budgets

Summary

This appendix consists of a catalog of Federal agencies currently exploring new technologies applicable to the fight against terrorism. It begins with a review of the budgets devoted to these efforts in some recent fiscal years. A brief description of the direction each agency has taken in research efforts is also provided.

The largest expenditure of research funds (almost \$200 million per year) described is made by the Department of Defense (DoD). The Army has budgeted about \$165 million per year to support development of a wide array of technologies, from protection against chemical and biological assault, to explosives detection, to physical security and site protection. Nearly all of this effort is directed towards the support of battlefield objectives, including the area of low-intensity conflict. But some items may also be applicable to counterterrorism.

In the specific area of combating terrorism, the military services have budgeted some \$16 million in fiscal year 1990 for R&D. Further, the Defense Nuclear Agency bears primary responsibility for protecting the Nation's nuclear weapons stockpile and has been working on improving means to detect and deter intruders (about \$5 million per year). Another DoD agency, the Defense Advanced Research Projects Agency (DARPA), has just begun to direct its attention to the threats posed by terrorism and has budgeted about \$5 million this year for research into this field. Some other DoD components have smaller efforts.

Most other Federal agencies spend much less than DoD. The Federal Aviation Administration (FAA) runs second to Defense in yearly expenditures (among the agencies that gave OTA information). The FAA Technical Center in Atlantic City, NJ spent about \$13 million in fiscal year 1990 and is planning to spend about twice that much in fiscal year 1991 to develop enhanced security measures for commercial aviation. The Department of State, whose overseas facilities have frequently been the target of terrorist activities, is supporting research into a variety of security measures including explosives detection, site hardening and intrusion detection, and countermeasures. Over the last 4 years, State has invested about \$7 million in this effort. State also leads the Technical Support Working Group, a unique interagency effort to recognize and support promising research and development in counterterrorist measures not adequately supported by any other agency.

In fiscal year 1989, the Department of Energy spent about \$6 million researching new technologies, primarily in connection with their nuclear safeguards and security programs. Within the Treasury Department, the U.S. Customs Service has recently devoted about \$5 million per year to developing technologies applicable to counterterrorism, mostly focusing on one large project. The United States Secret Service, another Treasury agency, has a clear interest in developing defenses against terrorism, but its research budget is quite modest (a few hundred thousand dollars per year). It depends on adapting the research of others to their needs.

Surprisingly, the Federal Bureau of Investigation, which has been given primary responsibility for responding to most domestic terrorist incidents, has a very small counterterrorism research budget. Its needs are closely aligned with those of the Department of Defense, and it makes liberal use of developments pioneered there.

A number of agencies have not been mentioned in detail in this report. Access to some (in the intelligence community) has not been obtained.

The Federal Research Effort Into Counterterrorism Technologies

For several reasons it is difficult to categorize unambiguously given activities of the various Federal agencies as directed specifically towards research into counterterrorism. For many agencies it is difficult to distinguish research performed for the main agency mission from that performed specifically for counterterrorism because the two efforts are often closely aligned. Also, some law enforcement activities, such as drug interdiction, frequently involve work that parallels counterterrorism research, but usually is distinct from it. Moreover, the line between research and development on the one hand and implementation on the other is not sharp; one frequently blends imperceptibly into the other as experience in the field is used to perfect an idea.

Table E-1 presents a partial list of agencies that have performed at least some research and development directly in, or at least applicable to, the field of counterterrorism.

The sections below discuss the activities of some of these organizations and, where the information is available, the main lines of research and funding levels.

Table E-I—Federal Agencies Engaged in Counterterrorism Research

Agency
Department of Defense
Department of Energy
EG&G (laboratories at Las Vegas and Santa Barbara)
Los Alamos National Laboratory (LANL)
Sandia National Laboratories (SNL)
Oak Ridge National Laboratory (ORNL)
Idaho National Engineering Laboratory (INEL)
Department of Justice
Federal Bureau of Investigation (FBI)
Immigration and Naturalization Service (INS)
National Institute of Justice
Department of State
Office of the Ambassador for Counterterrorism
Bureau of Diplomatic Security
Department of Transportation
Federal Aviation Administration (FAA)
Transportation Systems Center (TSC)
Department of the Treasury
Bureau of Alcohol, Tobacco, and Firearms (BATF)
U.S. Customs Service (USCS)
U.S. Secret Service (USSS)
Environmental Protection Agency (EPA)
Interagency Intelligence Committee on Terrorism--Community Counterterrorism Board

SOURCE: Office of Technology Assessment, 1991.

National Counterterrorism Research and Development Program

Early in the 1970s, it was recognized that some sort of coordination would be necessary to establish clear lines of responsibility and maintain adequate channels of communication among these players. To this end, various groups and committees were established by every administration, beginning with President Nixon's. A consistent theme has been the lead agency concept, whereby a particular agency is given responsibility for responding to certain types of incidents. The following current lead agency assignments were developed during the Reagan Administration¹:

- Department of State--incidents that take place outside U.S. territory,
- Department of Justice (FBI)--incidents that take place within U.S. territory, and
- Federal Aviation Administration (FAA)--incidents aboard aircraft in flight that take place within the special jurisdiction of the United States.

In addition, the tasks of coordination and communication still needed to be assigned. One organization charged with shouldering these duties is the Policy

Coordinating Committee on Terrorism (PCC/T), originally known as the Interagency Group on Terrorism (IGT) when it was created in 1982. The committee has two important functions: 1) to bring cohesion to the overall U.S. Government counterterrorism effort and 2) to coordinate the programs of the member agencies for combating terrorism. chaired by the State Department's Coordinator for Counterterrorism, Ambassador Morris Busby, committee members are drawn from about 25 U.S. Government organizations. Within the committee, various working groups have been established, for example, the Public Diplomacy Working Group, which is designed to generate greater global understanding of the threat of terrorism and the efforts to resist it; and the Maritime Security Working Group, which assesses port and shipping vulnerabilities to terrorism.²

One of the most important subcommittees of the PCC/T is the Technical Support Working Group (TSWG), which administers the National Counterterrorism Research and Development Program. Through this program, research into promising technologies is supported by "seed money" grants. The idea is that, after prototyping, successful efforts will be picked up and implemented by one or another Federal, State, or local agency. The unique contribution of this group is that it is specifically designed to support research into technologies that would otherwise go undeveloped, either because other agencies do not find a sufficiently direct linkage to their mission or because they are concentrating their priorities on other projects.

The TSWG is cochaired by representatives of the Departments of Energy and Defense. Its members are drawn from an interagency group of scientists and technical and terrorism specialists organized into seven general areas: Threat Assessment and Database Management; Intrusion Detection and Countermeasures; Conventional Incident Response; Nuclear Incident Response; Chemical and Biological Incident Response; Explosives Disposal; and Technology Transfer. Some of the agencies participating in the TSWG include the Food and Drug Administration, the Environmental Protection Agency, the Federal Aviation Administration, the Federal Bureau of Investigation, the Department of Energy, the Department of the Army, the Department of the Navy, the Department of the Air Force and the Defense Intelligence Agency. Contacts with other nations have also been made.

A list of candidate technologies to be considered for inclusion in the program is developed periodically. After interagency discussion among the TSWG members, candidate projects are ranked based on priority and feasibility, and the ranked list is then submitted to the PCC/T Chairman for approval. Funds for the projects

¹Public Report of the Vice President's Task Force on Combatting Terrorism, February 1986, P. 8.

²Ibid., p. 34.

come out of the budget of the State Department, but contracting and administrative support is provided at nominal expense (a few hundred thousand dollars per year) by the Department of Defense. One or more TSWG members supervise each project, with the research work actually being conducted either at the facilities of the member agencies or through subcontracting with various other laboratories and organizations both within and outside the Federal Government. Some of these are: Bendix Corp., Motorola Corp., the Illinois Institute of Technology, Los Alamos National Laboratory, the Naval Research Laboratory, and the Air Force Electronics System Division.

Funding for this effort was first authorized by Congress in 1986 (Public Law 99-349). The appropriation is not a line item, but is deeply embedded in the State Department's diplomatic security salaries and expenses account. The consequences of such fiscal anonymity are reflected in the consistently declining budget of the PCC/T. In its first year, 1986, riding a wave of public outrage over terrorist atrocities in the Middle East, the program was granted a budget of \$10 million. These funds were part of a late supplemental appropriation and carried the program through fiscal year 1987. In fiscal year 1988, enthusiasm was beginning to wane. Of the \$9 million requested, \$7 million was appropriated. The next year, fiscal year 1989, as other priorities strained the national budget, the program became embroiled in battle over where, bureaucratically, such a research effort should be centered. Six million dollars were requested but only half that amount was approved, a compromise between the full funding appropriated by the House of Representatives and zero funding ordered by the Senate. Funding levels for fiscal year 1990 headed downward again, this time to the \$2 million level. In fiscal year 1991, Congress agreed on an increase to \$3 million, but internal funding reductions at the State Department made necessary by the budget agreement between Congress and the executive branch in late 1990 brought the actual number back to \$2 million.

These cuts have resulted in termination or suspension of a number of projects because funding could not be assured. In an effort to keep the maximum number of programs alive, a "good faith" or "matching funds" concept was implemented by TSWG, in which agencies participating in a research project were required to find funds to make up the difference between the amount allotted and the amount needed to run the project. Typically, the other agency had not planned on any expenditure of this nature and the last minute budget scramble was not always easy or successful. Such stop-and-go financing, while intended as a cost contain-

ment measure, is actually frequently counterproductive: it winds up killing some projects and adding to the ultimate price of others.³

Another handicap of a restricted budget is the absence of funds available even for the purpose of properly documenting the research that is conducted. Essentially all available dollars go into the research itself and there is little or no money left over to spend on disseminating the results. While a shoestring operation can sometimes produce useful work, more often than not the shoestring breaks before it can accomplish its mission.

The PCC/T staff asserts that an assured annual budget of at least \$6 million would permit far more efficient operation.

PCC/T-TSWG Projects

In its short lifetime, the National Counterterrorism Research and Development Program has not had time or resources to complete many activities. Still, more than 50 projects have been proposed. Of these, almost 30 have been initiated and about 14 are at or near completion. A quick overview of several of these projects will show the breadth of the TSWG effort. Most items are reviewed in more detail in appendixes A through D.

The Transportable Emergency Response Monitoring Module

This project received \$611,000 in fiscal year 1988 and \$645,000 in fiscal year 1990. This unique, rapid response, transportable laboratory is designed for sustained operations in areas suspected of being contaminated by chemical or biological warfare agents. Instruments aboard the laboratory can detect, identify, quantify, and predict the spread of chemical and biological agents released by terrorists into water supplies and air. An interdisciplinary effort, the unit was designed and built by Engineering Computer Optecnomics, Inc. of Annapolis, MD using TSWG funds. The project manager came from the Environmental Protection Agency, and technical assistance was provided the U.S. Army's Chemical Research, Development, and Engineering Center (CRDEC). The unit will ultimately consist of two modules. Each unit will be about the size and shape of a semitrailer and is adapted for deployment by truck, helicopter, aircraft, railroad, ship, or barge. The analytical laboratory module, which has been constructed and can operate on its own, contains numerous pieces of modern laboratory equipment, all hardened to survive a not-too-gentle deployment. Air locks and decontamination showers are also provided. The living quarters module, construction of which has been delayed by lack of funds, will be attachable to the

³See, U.S. Congress, Office of Technology Assessment, "Introduction and Principal Findings," *The Defense Technology Base: Introduction and Overview—A Special Report*, OTA-ISC-374 (Washington, DC: U.S. Government Printing Office, March 1988), for a farther discussion of the problems associated with fluctuating research funding levels.

laboratory module and will provide completely self-contained operations for up to 7 days. This laboratory is uniquely capable of an on-the-spot response to a suspected chemical or biological attack. This effort has been successful despite a 1 year suspension in fiscal year 1989 due to lack of funds.

Expedient Hood

Also under the technical direction of CRDEC, this project resulted in the development of a prototype of an inexpensive, compact protective hood that could provide the wearer with 10 to 30 minutes of emergency ocular and respiratory protection against chemical or biological agents. The hood is now ready for further refinement by suitable agencies. The TSWG invested about \$122,000 of its fiscal year 1989 funds in this project.

The Radiofrequency (RF) Quadruple Generator

The objective of this project was the development of a small, compact electronic neutron generating source for use in explosives detectors employed by airports. The unit was developed by ACCSYS Technology, located in Pleasanton, CA, and is designed to replace the radioactive neutron source currently used by explosives detectors based on thermal neutron analysis (see ch. 4 and app. A). A successful prototype has been produced. In fiscal year 1988 and fiscal year 1989 respectively, \$248,000 and \$125,000 of TSWG funds were allocated to this project.

Chemical Taggant for Plastic Explosives

In the spring of 1989, following the destruction of Pan Am Flight 103, two international groups held meetings to discuss what could be done to make small bombs carried aboard commercial aircraft easier to detect. Both groups determined that research should be conducted into suitable chemical taggants for the plastic explosives that constituted the main terrorist threat. Without the TSWG, there probably would not have been any U.S. contribution to this effort. On a minuscule budget of \$35,000 supplied by the TSWG, a chemist from the Army's Armament Development Command at Picatinny Arsenal, NJ, was able to test the various proposed compounds and supply the United States representatives to these organizations with what would prove to be their only technical support.⁴

Remote Detection Instrument

The objective of this effort is to develop an early warning system capable of detecting and identifying chemical agents at least 1 kilometer away using an infrared laser. In fiscal year 1988, this project received \$428,000 from the TSWG and \$405,000 in fiscal year 1990. The U.S. Army Chemical Research, Development

and Engineering Center in Maryland is working with the SRI Corp. of California in the development of this instrument.

This incomplete list gives at least a flavor for the depth and breadth of efforts that the TSWG has supported or sponsored.

Other Agencies

This section contains descriptions of some of the work performed by other agencies, including efforts to deter or prevent terrorist acts as well as preparations for coping with a terrorist incident once it develops.

Department of Defense

Agencies Within Department of Defense

Relevant budget: fiscal year 1990-about \$11 million

Several agencies are working on terrorism-related projects, covering fields such as explosives detection, threat prediction, and physical security. The latter field represents a major part of this group of efforts.

DoD has a budget of about \$40 million per year devoted to physical security. Of this, about \$5 million is allocated for exploratory development. Most of these projects involve development of novel means to detect and/or disable intruders. For example, one project includes a van or truck equipped with a combination of two infrared detectors capable of finding and tracking an intruder at a significant distance. Other detection strategies involve the use of various combinations of seismic, acoustic, infrared, and electrical sensors. Less esoteric undertakings are directed at improving physical barriers such as fences. Some agencies within DoD have been cooperating on joint ventures with other DoD agencies and with each other. For example, one agency has worked with the Department of State on strategies for hardening our embassies and other facilities overseas and two DoD agencies have worked on the development of an early warning threat detection system, having shared startup funds for this project.

Several programs under the aegis of these agencies within DoD have been transferred to the U.S. Navy. These include the acoustic lens sonar and the multifunctional sensor programs. Other Navy-specific programs include a Swimmer Identification System, which will provide an autonomous alarm system for detection of surface and subsurface swimmers; Waterside Lightweight Barriers, which will provide protection against high-speed, explosive laden boats; an Underwater Security Vehicle for positive identification of underwater intruders, and several other programs designed to meet the Navy's opera-

⁴However, from fiscal year 1989 through fiscal year 1991, a cumulative total of \$285,000 was provided by TSWG to the Armament Development Command for a tagging plastic explosives project.

tional requirements for Waterside and Shipboard Security Systems.

Military Services

Relevant budget: for fiscal year 1990, \$16 million directly for counterterrorist activities

For fiscal year 1990, the Army allocated about \$167 million to research activities that might be characterized as pertaining to the fight against terrorism. For fiscal year 1991, the Army expects to invest about an equivalent amount. This research includes literally dozens of projects aimed at developing materiel, munitions, equipment, and procedures for supporting special operations and dealing with low-intensity conflict. Many of these efforts are suitable in a counterterrorist context as well, although few are specifically designated as such.

The following groups contribute to Army R&D applicable to counterterrorism, roughly ranked by size of their effort:

- Chemical Research, Development, and Engineering Center;
- U.S. Army Medical Research Institute of Infectious Diseases;
- U.S. Army Medical Research Institute of Chemical Defense;
- Aviation Systems Command;
- Natick Research, Development, and Engineering Center;
- Communications-Electronics Command;
- Belvoir Research, Development, and Engineering Center;
- Army Research Office;
- Corps of Engineers; and
- Atmospheric Sciences Laboratory.

The Army is a member of the PCC/T (described above) and its Technical Support Working Group particularly in the areas of Threat Assessment, Intrusion Detection Countermeasures, and Chem/Bio Incident Response R&D. It also is involved with other interagency efforts.

The main line of investigation (about 85 percent of the research budget) is directed at defense against chemical or biological weapons, reflecting the Army's role as the DoD executive agent for chemical and biological defense research. This work can be broken down into four categories:

1. reconnaissance, detection, and identification;
2. protection;
3. decontamination; and
4. medical diagnosis and casualty care.

For example, at the Army Atmospheric Sciences Laboratory, research is being done into using computer modeling to predict the spread and dispersion of an aerosol agent. Also, work is being done to develop light weight overgarments that troops could wear to protect against toxic or biological threats. Further, a system for remotely monitoring the vital signs of a soldier is being developed. This would allow quick medical decisions to be made, even in a contaminated environment. Other lines of research include intrusion detection, physical security, explosives detection, and incident response.

While most of this activity is related to counterterrorism only as an off-shoot of the direct research mission, at least one Army program is specifically targeted towards research into counterterrorism technologies. Within the Chemical Research, Development, and Engineering Center lies the Chemical/Biological Antiterrorism program. This small unit (fiscal year 1989 budget = \$99,000 of Army funds, \$6.2 million customer (that is to say, non-Army) funds), is charged with development of protective gear, decontamination equipment, detection/identification equipment and less-than-lethal techniques specifically to cope with terrorist incidents. This group also provides technical support for other government agencies in the field of countering the threat of chemical/biological terrorism. In particular, the TSWG, the U.S. Secret Service, the National Institute of Justice, the Federal Bureau of Investigation, and other DoD agencies make use of the counter/antiterrorism⁵ expertise of this group.

In addition, the Army has allocated some \$10 million in fiscal year 1990 for R&D specifically aimed at developing technology for combatting terrorism in special operations contexts. Other services together have allocated an additional \$6 million to this end.

Department of Energy

Relevant budget: \$6 million for fiscal year 1989

Through its Special Technologies Program, the Department of Energy (DoE) is doing a considerable amount of work in areas useful to the fight against terrorism. Much of this effort, handled at DoE's Laboratories in Las Vegas and Santa Barbara, CA, is related to DoE's responsibilities under the Atomic Energy Act. A large, separate but related, budget is devoted to development and support of the Nuclear Emergency Support Teams (NEST), whose mission is to find and recover purloined nuclear material and provide technical support to other government agencies in responding to radiological threats. Additional funds are spent by the safeguards and security program, primarily in antiterrorism. There is a substantial amount of work in the area of remote detection of nuclear material

⁵"Antiterrorism" is the term used by the military to refer to passive defenses against terrorism. "Counterterrorism" refers to active responses to terrorist attacks. This report employs the latter term for both purposes, since it is generally understood as such by the public.

and nuclear weapons. In addition, a significant effort exists, in collaboration with the Naval Explosive Ordnance Disposal Technology Center, in developing means of detecting and countering alarm systems, especially those based on infrared or microwave, and acoustic technologies. However, several laboratories are involved in development of other counterterrorist techniques, many funded not out of the \$6 million referred to above, but out of laboratory funds for other programs, or out of reimbursable contracts from other Federal agencies.

Los Alamos National Laboratory (LANL)

A substantial amount of work related to counterterrorism is performed at LANL. One area of work is in diagnostics and disablement, which includes research aimed at bolstering defenses against nuclear terrorism. Another set of efforts is in a program of R&D in low intensity conflict, special operations, counterterrorism, and counternarcotics. This program spent about \$19 million in fiscal year 1989, of which perhaps \$9 million was devoted to counterterrorism. Most of the funding is in reimbursable projects from other government agencies and some is from the TSWG. Some typical fields of research include methods of early detection of chemical and biological agents, miniaturized radar for remote emplacement, and development of computer techniques for analyzing large quantities of real-time financial data to detect money laundering. Other divisions of LANL are involved in advanced technologies for explosives detection and laser means for remote detection of biological agents.

Sandia National Laboratories (SNL)

SNL is the lead laboratory within DoE for R&D into physical security, and as such is active in the development and evaluation of numerous devices applicable to counterterrorism. In particular, it conducts tests and evaluations of explosives detectors, intrusion detectors, and metal detectors. It has explored various schemes for access control, especially rapid identity verification, including voice print, hand profile, retina scan, finger prints, and signature dynamics. Research has also been carried out on barriers to intrusion such as smoke and foams.

In addition, for many years, SNL has had a program of evaluation and development in both explosives detection and weapons detection. There has been a significant transfer of experience and technology to the private sector in these areas.

Sandia Laboratories is being funded by the FAA's Technical Center to develop a systems approach to airport security, the "Enhanced Security Demonstration Proj-

ect' for BWI airport near Baltimore, MD, discussed in chapter 4. Low intensity conflict has been another area of research for Sandia that is of interest to counterterrorism. In this field, it is investigating remote sensors, portable satellite communication, and alarm and annunciator systems for noncombatants in a danger area.

Sandia has also been working with the FBI, Customs and the INS especially in the field of counter narcotics, having been designated a "center of excellence" for this purpose under Public Law 100-790. This work especially involves development of such items as night vision equipment and motion sensors.

Oak Ridge National Laboratory

About \$400,000 per year for the last 3 years has been invested by DoE at its Oak Ridge National Laboratory in Oak Ridge, TN for the development of a mass spectrometer capable of detecting and identifying tiny amounts of vapor emitted by plastic explosives. Additional fiscal year 1990 funds have been utilized to seed technologies that have counterterrorism applications.

Idaho National Engineering Laboratory

About \$400,000 per year has also been invested by DoE at its Idaho National Engineering Laboratory (INEL). Additional fiscal year 1990 funds have also been utilized here to seed technologies which have counterterrorism applications.

Department of Justice

Federal Bureau of Investigation

Relevant budget: small-exact figure not available at this time

The FBI's Hostage Rescue Team has responsibility for events, including terrorist incidents, that involve Federal or interstate jurisdiction. They do very little R&D, being mostly an operational unit. However, they have channeled some DoD funds (approximately \$1 to \$2 million per year) to outside contractors for relevant research.

The Special Operations Research Unit is working on less-than-lethal weapons and incapacitating agents; some of this work is sponsored by the National Institute of Justice. The Forensic Science Center performs work on evaluation of explosives detectors. In particular, in March of 1988, the Center performed a meticulous series of "real-world" tests on a group of explosives vapors detectors representative of then commercially available models.⁶ The total research budget of this center is \$300,000 for fiscal year 1990, half of that available in earlier years. Only part of this budget is devoted specifically to counterterrorist activity. The FBI also

⁶See *Explosives Detector Evaluation*, a limited distribution report produced by the FBI Laboratory, Forensic Science Research and Training Center, FBI Academy, Quantico, VA 22135, Mar. 21-24, 1988. Registered copies for official use are available by writing to the above address on letterhead.

supports the explosives detection community in two other ways. Every October, they sponsor and organize a symposium to discuss current R&D efforts. Also, the FBI Laboratory analyzes all samples of foreign explosives gathered by other law enforcement agencies.

Immigration and Naturalization Service (INS)

Relevant budget: \$400,000 for fiscal year 1990

This service has ongoing R&D efforts in the area of facial recognition and technologies related to document verification. The Service's Forensic Laboratory has no funds available for research and development.

National Institute of Justice

Relevant budget: \$500,000 for fiscal year 1989 (to CRDEC)

This money funded work on less-than-lethal agents. Similar work was channeled through the FBI to other contractors.

Department of State

Office of the Ambassador for Counterterrorism (Technical Support Working Group)

Relevant budget: fiscal year 1986-87--\$10 million
fiscal year 1988--\$7 million
fiscal year 1989--\$3 million
fiscal year 1990--\$2 million

See chapters 1 and 4 and above sections in this appendix for more information on this project.

Bureau of Diplomatic Security

Relevant budget: fiscal years 1986-9=6.5 million for explosives detection; the current budget includes \$300,000 to \$400,000 per year on other research.

This office is responsible for assuring the security of State Department property and personnel. The largest part of its research budget has been expended in supporting the development of an explosives "sniffer." See appendix C of this report for information on the Thermedics, Inc. explosive detector. A much smaller budget is devoted to research into alarms, locks, closed-circuit TV, blast hardening of buildings, and technical countermeasures to mask radio signals. Finally, some work is being conducted in cooperation with the intelligence community.

Department of Transportation

Federal Aviation Administration

Relevant budget: see table E-2

The FAA Technical Center, located in Atlantic City, NJ, manages a wide range of research programs aimed at developing systems and devices to prevent aviation

related hijacking and sabotage. These include efforts aimed at explosives detection, airport security, and security systems integration. Perhaps its best known field of investigation is the thermal neutron analysis (TNA) technique of explosives detection, discussed in detail in chapter 4 and appendix A. It has also heavily funded the development of the chemiluminescent-based explosives vapor detection equipment especially as a portal monitor for concourse security. Other technical approaches to explosives detection currently under investigation are:

- *vapor approaches* (which seek to detect molecules of explosives in the air or on external surfaces):
 - Advanced Ion Mobility
 - Surface Acoustic Wave
 - Modulated Infrared Absorption
 - Preconcentration
- *bulk approaches* (which use various types of penetrating radiation to interact with an explosive hidden inside a package, producing detectable secondary radiation):
 - Nuclear Resonance Absorption
 - Fast Neutron Scattering
 - Nuclear Magnetic Resonance
 - Expert Systems (not a detection technique in itself, but the use of computer software in support of bulk approaches)

The agency is working to expand this list. In an effort to attract numerous new strategies and approaches for explosives detection, the FAA has recently issued a Broad Agency Announcement. They are also sponsoring or attending numerous seminars and interagency and international symposia to improve research efforts in this area.

A large part of the FAA's research budget for the next several years (\$3 million for fiscal year 1990) will be devoted to the BWI Airport Demonstration project. This project has enlisted the technical expertise of DoE's Sandia National Laboratories to assist in the development of a complete systems approach to airport security including access control as well as explosives and weapons detection.

Funding for major programs for fiscal year 1990 are listed in table E-3.

Department of the Treasury

Bureau of Alcohol, Tobacco, and Firearms

This agency has some research activity of indirect relevance to counterterrorism. In the area of communications, it is participating in an interagency law enforcement effort to standardize communications for multiagency operations. This is mainly aimed at drug enforcement and is being coordinated by the Office of National Drug Control Policy. The agency is also looking at ways of tracking items (i.e., people, vehicles, contraband) by

Table E-2—Allocation of FAA Security R&D Resources

	Resources (\$ thousands)					
	Fiscal year 1990			Fiscal year 1991 (requested)		
	Contract	Manpower	Total	Contract	Manpower	Total
Explosives detection	7,000	850	7,850	22,018	597	22,615
Weapons detection	1,500	300	1,800	1,500	399	1,899
Airport and system integration. . .	3,513	207	3,720	1,500	348	1,848
Total	12,013	1,357	13,370	25,018	1,344	26,362

SOURCE: Federal Aviation Administration, 1990.

Table E-3—Allocation of FAA Fiscal Year 1990 Contract Dollars for Major Program Priorities

Major program priorities	Contract allocations (\$ millions)
Thermal Neutron/Dual Sensor Support. . .	\$ 0.5
Vapor Portal Development	1.8
New Technology Explosives Detection . . .	4.5
New Technology Weapons Detection	1.2
Commercial Security Systems Evaluation. .	0.5
BWI Airport Demonstration	3.0
Other, efforts	<u>0.5</u>
Total	\$12.0

SOURCE: Federal Aviation Administration, 1990.

means of satellite systems. Other efforts more closely related to counterterrorism are the International Explosives Incident System, a repository for data related to international incidents involving explosives; and the international taggant study conducted under the auspices of the International Civil Aviation Organization (see ch. 4).

U.S. Customs Service

Relevant budget: approximately \$4.8 million per year for last 3 years.

This agency does not engage in much original research directly related to counter terrorism. However, Customs has supported considerable work in the area of drug detection and interdiction, some of which is of ancillary utility to the war on terrorism. The largest portion of the R&D money mentioned above (about \$3 million per year) has been devoted to development of a covert remote locating system (known as Geostar). Signals from a small device hidden on an object will be picked up by a pair of Earth satellites. By triangulation, the location of the object can be determined. This project is a cooperative effort with other agencies and groups, including the TSWG.

The remaining funds go primarily into contraband and drug detection equipment. As an example, Customs is sponsoring the development of an automatic letter mail

examiner for the detection of heroin, cocaine, and morphine by the use of Nuclear Magnetic Resonance. Laboratory and advanced prototyping efforts have shown this technology also to be amenable to explosives detection. In a current joint Customs-FAA project, single-sided imaging using gamma ray backscatter technology is being developed for contraband (including explosives) detection. The system is close to acceptance. Customs also funded and designed a mobile x-ray capability suitable for planeside examination of baggage and cargo. This agency also relies on other agencies, DoD or CIA for example, which share some specific R&D goals.

An interesting project being undertaken by Customs is an improvement of their Advanced Passenger Information System (APIS), which is an automated system for screening passengers. In cooperation with a number of agencies interested in monitoring travelers (INS and DEA for example), a large database is being assembled that contains information on known undesirables. Through a computer workstation, an inspector can access this database using a name, passport, or visa number. An enhancement that is being explored would make possible a computer comparison of a traveler's appearance with a stored image of suspects.

U.S. Secret Service

Relevant budget: fiscal year 1990—a few hundred thousand dollars

Secret Service participates in the TSWG and does not have a large research budget, since it is more of a user than developer. It has participated in several TSWG projects. Further, it has, on its own, worked on perfecting a software package that can estimate the effects of bombs on a building of given size and construction. Specifically, this package is designed to improve security by identifying the most vulnerable areas of a building or to provide forensic information on the probable size and location of an explosive from post-blast data. The output of the computer program will aid in planning inspections of structures before the arrival of key officials. Secret Service officials are anxious to maintain funding for this

project. If the risk from bomb blast could be accurately defined, they argue, searches and guard postings could be much more efficiently executed thereby saving time, effort, and money.

Environmental Protection Agency (EPA)

The EPA is managing the TSWG-funded project to develop the mobile laboratory to respond to chemical and biological terrorist attacks, described above in this appendix.

Interagency Intelligence Committee on Terrorism—Community Counterterrorism Board

This group is made up of representatives from various agencies involved with intelligence issues. It includes a Research and Development subcommittee that oversees research that would aid in data analysis as well as other areas of special interest to the intelligence community.