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TECHNOLOGY TRANSFER

Implementation of CRADAs at NIST, Army, and DOE

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Dear Madam Chairman:

We are pleased to be here today to discuss the preliminary results of our work on Cooperative Research and Development Agreements (CRADAs). As you know, CRADAs are one of several mechanisms that federal laboratories use to transfer technology to the private sector. Under a CRADA, federal laboratories and collaborators agree to share resources as they conduct research and development (R&D) efforts. The CRADA defines the terms and conditions for the collaboration including who will own, use and commercialize a technology. As agreed with your office, we compared the Department of Energy's (DOE) implementation of CRADAs with the approaches used by the Army and the Department of Commerce's National Institute of Standards and Technology (NIST).

In summary, the legislation establishing technology transfer objectives for federal agencies gave them considerable discretion and flexibility while implementing CRADAs, although it did require that agencies managing government-owned, contractor-operated laboratories (GOCOs) take some specific review steps not required of government-owned, government-operated laboratories (GOGOs). Army and NIST officials saw the CRADA process as an opportunity for their scientists and engineers at their GOGO laboratories to formalize their long-standing tradition of openness and cooperation with the entire R&D community. Army and NIST officials view a CRADA as a chance to solve common technical problems and exchange information for mutual benefit. As a result, NIST and Army laboratories quickly implement CRADAs with only limited headquarters oversight and few financial and administrative requirements.

In contrast, a number of institutional factors have led DOE policy makers to develop a tightly controlled, centralized CRADA implementation process that reduces DOE's ability to realize the full technology-transfer potential of its GOCO laboratories. These factors include the desire of some DOE officials to create a highly-visible, separately-funded CRADA program in order to justify continued support for the Department's weapons laboratories. In particular, separating CRADA funds from program R&D funds led to the need for an annual competitive selection and approval process within DOE's two largest program offices that select about 77 percent of DOE's CRADAs. This process slows down CRADA approvals and may limit the number of CRADAs the GOCO laboratories can implement.

DOE's centralized CRADA implementation policy is also linked to its desire to closely oversee the contractors that manage its laboratories and its traditional concern for security. Over the past few years, DOE has been heavily criticized for failing to adequately monitor the contractors that manage its laboratories. Furthermore, in contrast to the openness generally exhibited at the NIST and Army laboratories, DOE developed its CRADA implementation

process in an environment where the first priority had always been the protection of classified nuclear weapons technology.

Although some legal and cultural differences exist between the DOE and NIST and Army laboratories, the scope and range of many of the CRADA R&D activities are similar. Our preliminary analysis of the CRADA implementation process at DOE, NIST, and Army laboratories shows that it takes DOE about three to five times longer to implement a CRADA.

Despite the institutional factors that led to the lengthy implementation process, DOE officials cite some recent successes in developing collaborations with multiple partners such as the U.S.-based textile industry. However, we believe, based on our ongoing work, that opportunities exist to speed up DOE's CRADA approval process and allow more CRADAs at GOCO laboratories.

BACKGROUND

Since 1980 the Congress has enacted several laws designed to encourage technology transfer. The Federal Technology Transfer Act of 1986 and The National Competitiveness Technology Transfer Act of 1989 authorize GOGOs and GOCOs, respectively, to implement CRADAs for technology transfer purposes. In passing these laws, the Congress found that the federal laboratories and U.S.-based industry both benefit from collaborative research efforts and that the speed with which technology was transferred to the private sector could be a major factor affecting the competitiveness of the nation's industries. The legislation authorized the use of the laboratories' resources, such as staff and equipment, for CRADA projects, but specifically prohibited the transfer of federal funds to a CRADA collaborator and excluded CRADAs from the regulations that apply to federal procurement contracts, cooperative agreements, and grants.

The technology transfer legislation placed few limits on CRADAs but did require that R&D collaborations be consistent with the laboratory's mission. In addition, the 1986 law generally allows the directors of GOGOs--such as the NIST and Army laboratories and several of DOE's smaller laboratories--to approve CRADAs, subject to the review of a designated agency official who may disapprove or modify the agreement during a 30-day period which begins after submission by the laboratory director. However, the 1989 act directed GOCOs, such as DOE's Lawrence Livermore, Lawrence Berkeley, Sandia, and Los Alamos Laboratories, to submit two separate CRADA collaboration documents--the joint work statement (JWS) which describes the R&D, and the CRADA or contract for the agreement--to the agency for review and approval. The act allows the agency up to 90 days to approve the JWS and 30 days to approve a CRADA.

NIST AND ARMY USE A DECENTRALIZED APPROACH TO IMPLEMENT CRADAs

At NIST and Army GOGO laboratories, a potential CRADA is evaluated on whether (1) the proposed collaboration will expand the knowledge that already resides in the laboratory, (2) the collaborator is committed to doing a substantial share of the work, (3) the laboratory has the resources and facilities to do the required work, and (4) the technical expertise and skills are present in the current group of scientists and engineers at the laboratory. The collaborator and the laboratory's technology transfer official and general counsel negotiate the CRADA's legal and nontechnical arrangements, and the laboratory's director approves the agreement, subject only to a 30-day agency review.

This approach results in a relatively short CRADA implementation time frame. Our preliminary analysis of the NIST laboratory and the U.S Army Research Laboratory at Fort Monmouth, New Jersey showed that it takes these two labs about 1.5 and 3 months, respectively, to implement a CRADA with one collaborator. NIST and Army officials credit the short time frame to (1) the small number of officials involved in the process, (2) the use of one model CRADA as a starting point for negotiations, and (3) the consolidation of the technical, administrative, and legal details of the CRADA into one document.

NIST and Army CRADA laboratory officials also take a relatively broad view, or what they call an "open-door" approach, to potential CRADA collaborators. The concept that the R&D work to be performed under a CRADA is both consistent with the laboratory's mission and dual use is embodied in criteria they use to evaluate the suitability of a CRADA for their laboratory.[1] In general, NIST and Army officials determine that a CRADA is consistent with the laboratory's mission when the science involved can be used to support the laboratories' objectives. For example, Army laboratory officials described a potential dual-use collaboration by using an example of R&D work on the chemistry that explains both the detonation of explosives for weapons use and the spontaneous combustion of gases within grain silos.

Ultimately, the number of CRADAs that each NIST and Army laboratory implements depends on the manager's determination of available resources. Several laboratory managers told us that they have no set objective for the number of CRADAs they will approve but rather allow a natural balance to occur. Other directors told us that CRADAs should be targeted at between 5 and 20 percent of the laboratory's resources. For fiscal years 1991 through 1992,

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[1]As a result of legislation authorizing defense R&D activities, support of "dual use" technology, that is, technology that can be used for military as well as commercial applications, also became an accepted objective for many CRADAs.

NIST implemented 142 CRADAs, or about 9 CRADAs for every 100 scientists and engineers. During the same period, Army laboratories implemented 164 CRADAs, or about 7 CRADAs for every 100 scientists and engineers.

NIST and Army laboratories fund the government's contribution to CRADA work directly from the agency's R&D appropriations. No separate budget item is directed to CRADAs; accordingly, no separate financial management system is used to track CRADAs. NIST and Army officials said that CRADA R&D work is not significantly different from R&D that is undertaken to meet the laboratories' missions; therefore, no tracking is needed. At the NIST and ARMY laboratories, the commitment or the contribution of both parties--the laboratory and the collaborator--was generally projected and measured in terms of the time spent by technical personnel, not in terms of dollar costs. However, if the CRADA called for expenses above those normally used to conduct the laboratory's mission, the collaborator would be expected to pay the additional cost. For example, a laboratory manager required a CRADA collaborator to pay the added expense incurred when a project examining electromagnets used high amounts of electricity.

DOE GOCO CRADAs ARE CONTROLLED BY HEADQUARTERS PROGRAM OFFICIALS

DOE GOCO laboratory personnel generally identify potential CRADAs in much the same way as NIST and Army laboratory personnel.[2] However, after the CRADA is identified, DOE initiates a selection process that is performed and/or controlled by the headquarters managers in DOE's program offices such as the Office of Defense Programs or the Office of Energy Research. In addition, the government's contribution to most GOCO CRADA activities is paid for through "set-aside" funds separated from the program budgets. This separate funding process, which DOE initiated, led to the need for a centralized competitive process that prolongs GOCO CRADA decision-making. Finally, the negotiation and approval of GOCO CRADA collaborations are further complicated by the requirement that a JWS and a CRADA be independently developed and separately approved by DOE officials.

The CRADA Decision-Making Process for DOE GOCO Laboratories

Unlike NIST and Army CRADAs, DOE GOCO CRADAs cannot be implemented until funds are secured from a DOE program office. Officials within DOE's program offices employ various approaches for selecting which GOCO CRADAs will receive support. About three-quarters of all DOE GOCO CRADAs are funded by the Offices of

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[2]Of the 214 CRADAs implemented by DOE since 1990, 197 (92 percent) were originated at DOE's GOCO laboratories. (The rest were implemented at two small GOGO labs in much the same manner as the NIST and Army labs.)

Defense Programs and Energy Research, which select CRADAs through annual competitions--a process similar to the federal grant process that funds R&D for many nonfederal organizations. The remaining GOCO CRADAs are selected by individual managers in DOE's other program offices.

GOCO laboratories interested in doing a CRADA in the Energy Research or Defense Programs areas generally submit their proposals in response to an annual "call," or solicitation. Defense Programs CRADA proposals are reviewed and ranked by designated panels and boards, and the ultimate decision is made by the headquarters program official responsible for technology transfer activities. Proposals made to DOE's Office of Energy Research are reviewed and selected by panels composed of managers from other program offices at DOE headquarters.

Once the GOCO laboratory has received word that the headquarters' program office will support the CRADA, the laboratory, the collaborator, and field office personnel begin several rounds of negotiation and approval activities for both the JWS and CRADA. These activities often involve attorneys and program, budget, accounting, technology transfer, and contracting officials from DOE field offices and headquarters, as well as scientists, attorneys, and other officials from the laboratory's budget, accounting, and technology transfer office. Ultimately, the government-portion of the CRADA is approved by a DOE contracting officer from the field office and by the laboratory director for the GOCO contractor. We estimate from data provided by technology transfer officials at four of DOE's GOCO laboratories that the average time period between the date that the program office solicits proposals and the date that a CRADA can be implemented for a one-collaborator, one-laboratory CRADA is about 7.5 months, or about three to five times longer than Army or NIST. U.S. industry representatives say that delays frequently prove crucial as they compete in international markets.

DOE's Selection Criteria and Budget Process May Limit CRADAs

DOE headquarters' program managers create CRADA selection criteria by specifying the kind of CRADAs that DOE will fund for its GOCO laboratories. DOE officials explained that the CRADAs they select for funding must either (1) correspond to some predefined areas of technology chosen by program management, (2) be directed only to the stage of a technology's development just prior to commercialization that DOE refers to as a "spin-off", or (3) be confined to specific energy-related industries that generally have been part of the program's mission research in the past. DOE officials also strongly encourage the collaborator to match the dollar amount of the government's contribution to the CRADA. GOCO laboratory officials told us that the collaborator's failure to meet the match generally results in a lower rating for the CRADA in the funding competition. The effect of the selection criteria and

matching fund requirement may limit the number of potential CRADAs considered for implementation.

DOE may also limit the number of potential CRADAs by establishing separate funding limits for CRADAs independent of program R&D budgets. Most of the funds that DOE uses for CRADAs are separately defined in DOE's budget for Defense Programs and Energy Research--which, in turn, led program managers to decide to select CRADAs through a centralized competitive selection. Of the 282 GOCO CRADAs selected for funding in all of DOE's major programs over the past 3 years, 217, or 77 percent, receive support through set-aside funds separated from normal R&D program budgets. DOE officials said that although the separate budget item facilitates headquarters' management of CRADA money, the process was initiated to highlight the effort that DOE is making in federal technology transfer. However, the process may limit the number of CRADAs that can be approved. One headquarters official told us that he can afford to fund only about one out of nine proposals received from the laboratories.

The remaining 23 percent of DOE's GOCO CRADAs were implemented by DOE's other major programs, such as Fossil Energy, Energy Efficiency and Renewable Energy (formerly Conservation and Renewable Energy), Environmental Restoration and Waste Management, and Nuclear Energy. They draw the resources they contribute to CRADAs directly from their R&D accounts. Officials in these programs said technology transfer was and always had been an integral part of their R&D mission. They also said that their CRADA work did not require substantially different R&D, so they saw no need to devote separate accounts to CRADA activities.

Separate Approvals of JWS and CRADAs Further Lengthen the CRADA Approval Process

After the program offices have selected the CRADAs, the laboratories, as required by the 1989 act, separately prepare a JWS and a CRADA contract, negotiate both documents' terms and conditions, and submit them to the DOE field offices for approval. Each document contains similar information, such as work statements, schedules, and budgets. DOE field office and laboratory personnel said that the review of the three documents--the proposal, the JWS, and the CRADA--to record CRADA decision-making at GOCO laboratories contributes to the length of time needed to implement a CRADA.

DOE's Lengthy GOCO CRADA Implementation Process Is a Product of Institutional Factors

DOE's centralized process for implementing CRADAs for its GOCO laboratories is a product of its long-standing security concerns for nuclear weapons research. Unlike NIST and the Army Research Laboratory, which have a traditional R&D culture of open

interaction and communication with nonfederal parties, DOE operated in an environment that concentrated its efforts on preventing, rather than facilitating technology transfer. The process is also the result of DOE's desire to maintain close oversight of the contractors operating its laboratories. Over the past few years, DOE has been heavily criticized by GAO and others for failing to adequately monitor the contractors that manage its laboratories.

DOE's CRADA policy was also affected by a desire to ensure the survival of its National Laboratories and their R&D budgets. Government officials said that part of DOE's strategy to demonstrate a high level of success with CRADAs led several DOE officials to request that technology transfer appear as a separate line in their budget request to the Congress and to attempt, when possible, to form large CRADA "deals" involving several of DOE's laboratories. Once the money for DOE CRADAs was separated from the program's R&D funds, the programs needed to ensure, with the addition of a centrally controlled selection step to the CRADA implementation process, that all laboratories and their potential collaborators had fair access to the CRADA funds.

PRELIMINARY OBSERVATIONS

Despite the strong motivation by DOE's headquarters to control the CRADA implementation process and to ensure the GOCO laboratories' survival, the centralized process of implementing a CRADA appears to have left the considerable technology-transfer potential of the technical resources at DOE's laboratories unrealized. GOCO laboratory directors and technology transfer officials said that the demand they are experiencing for CRADAs greatly exceeds what DOE has allowed them to implement. For example, DOE GOCO technology transfer officials estimate that they forward to headquarters only one out of every two to four CRADA proposals they receive, and as noted earlier, only a few of these are selected because of funding restrictions. Furthermore, our contacts with industry representatives indicate considerable frustration in their attempts to form CRADA collaborations with DOE's GOCO laboratories. For fiscal years 1991 and 1992 (fiscal year 1991 was the first year DOE GOCOs implemented CRADAs), Lawrence Livermore, Lawrence Berkeley, Los Alamos and Sandia implemented 95 CRADAs, or significantly less than one CRADA for every 100 scientists and engineers working at those laboratories.

DOE officials support the objectives of the technology transfer legislation. However, their strong desire to create a highly-visible CRADA program in order to justify continued support for the weapons laboratories, led to the development of a time-consuming, separately-funded CRADA approval process that limits the technology transfer potential of its laboratories.

GAO and others have historically been critical of the lack of DOE oversight and control of its contractors. However, the CRADA

implementation process may be an area where DOE could use more flexible procedures and build in adequate controls after the CRADA has been implemented.

As we continue our work we are considering several potential options that would speed up the CRADA approval process and may allow more CRADAs to be implemented at DOE GOCO laboratories. One possible step would be to eliminate the headquarters-controlled selection process. Rather than separating CRADA funds, the resources needed for CRADAs could be drawn directly through program R&D accounts. This would also allow CRADAs to be selected at the GOCO laboratories. This step would shorten the CRADA implementation process and may eliminate the barrier on the number of CRADAs created by separate budget accounts. It would also ensure that personnel who are knowledgeable about the technology, resources, and scientists and engineers who will do the CRADA work are the individuals actually selecting the best CRADA opportunities for their laboratories. However, because the directors of GOCO laboratories are not employees of the federal government, the final approval of the CRADA should remain with a designated DOE official at the field office. Furthermore, we recognize that DOE has legitimate concerns about providing proper contractor oversight. Like the NIST CRADA program, DOE could undertake periodic evaluations of the GOCO laboratory CRADAs after they are implemented rather than lengthening the CRADA approval process.

Another option, which might require a change in the existing legislation, may be to (1) consolidate the JWS and the CRADA into one document describing the technical and nontechnical terms and conditions much like what is done at NIST and Army laboratories and (2) reduce the time allotted to DOE to approve CRADAs.

We will continue to analyze the DOE processes and convey our findings to you in a report later this year.

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Madam Chairman, this concludes my prepared statement. I will be happy to answer any questions you or the members of the committee may have.

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