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Report to the Chairman, Committee on Homeland Security, House of Representatives

December 2007

NUCLEAR NONPROLIFERATION

DOE's Program to Assist Weapons Scientists in Russia and Other Countries Needs to Be Reassessed

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GAO-08-189

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GAO Accountability · Integrity · Reliability

Highlights

Highlights of GAO-08-189, a report to the Chairman, Committee on Homeland Security, House of Representatives

Why GAO Did This Study

To address concerns about unemployed or underemployed Soviet-era weapons scientists in Russia and other countries, the Department of Energy (DOE) established the Initiatives for Proliferation Prevention (IPP) program in 1994 to engage former Soviet weapons scientists in nonmilitary work in the short term and create private sector jobs for these scientists in the long term. GAO assessed (1) DOE's reported accomplishments for the IPP program, (2) DOE's exit strategy for the program, and (3) the extent to which the program has experienced annual carryovers of unspent funds and the reasons for any such carryovers. To address these issues, GAO analyzed DOE policies, plans, and budgets and interviewed key program officials and representatives from 22 Russian and Ukrainian institutes.

What GAO Recommends

GAO recommends, among other things, that DOE assess the continuing need for the IPP program with input from other federal agencies, including State and the intelligence community. DOE and State generally agreed with GAO's recommendations, although DOE disagreed with the need to reassess the IPP program. However, the nature, scope, and volume of problems GAO identified during the course of its review necessitates such a reassessment to ensure that limited IPP program funds are directed to the scientists and institutes of highest proliferation risk.

To view the full product, including the scope and methodology, click on GAO-08-189. For more information, contact Gene Aloise at (202) 512-3841 or aloisee@gao.gov.

What GAO Found

DOE has overstated accomplishments for the 2 critical measures it uses to assess the IPP program's progress and performance—the number of scientists receiving DOE support and the number of long-term, private sector jobs created. First, although DOE claims to have engaged over 16,770 scientists in Russia and other countries, this total includes both scientists with and without weapons-related experience. GAO's analysis of 97 IPP projects involving about 6,450 scientists showed that more than half did not claim to possess any weapons-related experience. Furthermore, officials from 10 Russian and Ukrainian institutes told GAO that the IPP program helps them attract, recruit, and retain younger scientists who might otherwise emigrate to the United States or other western countries and contributes to the continued operation of their facilities. This is contrary to the original intent of the program, which was to reduce the proliferation risk posed by Soviet-era weapons scientists. Second, although DOE asserts that the IPP program helped create 2,790 long-term, private sector jobs for former weapons scientists, the credibility of this number is uncertain because DOE relies on "good-faith" reporting from U.S. industry partners and foreign institutes on the number of jobs created and does not independently verify the number of jobs reported to have been created.

DOE has not developed an exit strategy for the IPP program, even though officials from the Russian government, Russian and Ukrainian institutes, and U.S. companies raised questions about the continuing need for the program. Importantly, a senior Russian Atomic Energy Agency official told GAO that the IPP program is no longer relevant because Russia's economy is strong and its scientists no longer pose a proliferation risk. DOE has not developed criteria to determine when scientists, institutes, or countries should "graduate" from the program. In contrast, the Department of State (State), which supports a similar program to assist Soviet-era weapons scientists, has assessed participating institutes and developed a strategy to graduate certain institutes from its program. Instead of finding ways to phase out the IPP program, DOE has recently expanded the program to include new countries and areas. Specifically, in 2004, DOE began providing assistance to scientists in Iraq and Libya. In addition, the IPP program is working with DOE's Office of Nuclear Energy to develop projects that support the Global Nuclear Energy Partnership—a DOE-led international effort to expand the use of civilian nuclear power.

In every fiscal year since 1998, DOE carried over unspent funds in excess of the amount that the Congress provided for the program. For example, as of September 2007, DOE carried over about $30 million in unspent funds—$2 million more than the $28 million that the Congress had appropriated for the IPP program in fiscal year 2007. Two main factors have contributed to this recurring problem—lengthy review and approval processes for paying former Soviet weapons scientists and delays in implementing some IPP projects.

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Abbreviations

CRDF	U.S. Civilian Research and Development Foundation
DCAA	Defense Contract Audit Agency
DOE	Department of Energy
EXACT	Expertise Accountability Tool
GNEP	Global Nuclear Energy Partnership
ILAB	Inter-Laboratory Board
IPP	Initiatives for Proliferation Prevention
ISTC	International Science and Technology Center
NAS	National Academy of Sciences
NNSA	National Nuclear Security Administration
STCU	Science and Technology Center in Ukraine
USIC	United States Industry Coalition
WMD	weapons of mass destruction

GAO
Accountability * Integrity * Reliability

United States Government Accountability Office
Washington, DC 20548

December 12, 2007

The Honorable Bennie G. Thompson
Chairman
Committee on Homeland Security
House of Representatives

Dear Mr. Chairman:

During the decades before its dissolution, the Soviet Union produced a cadre of scientists and engineers whose knowledge and expertise would be invaluable to countries or terrorist groups trying to develop weapons of mass destruction (WMD). After the Soviet Union's collapse in 1991, many of these scientists suffered significant cuts in pay or lost their government-supported work. The United States and other countries were concerned that these scientists would sell their expertise to terrorists or countries of concern, such as Iran, Iraq, and North Korea. To address this potential proliferation concern, the Department of Energy (DOE) established the Initiatives for Proliferation Prevention (IPP) program in 1994.[1] The objectives of the IPP program, which is implemented by the National Nuclear Security Administration (NNSA),[2] are to (1) in the short term, engage weapons scientists and scientific research and development institutes located in Russia and other countries of the former Soviet Union in nonmilitary work by supplementing their existing salaries and (2) in the long term, create sustainable, private sector jobs for former weapons scientists. As of April 2007, DOE reported it had supplemented the salaries

[1]The IPP program was originally called the Industrial Partnering Program and was established under Pub. L. No. 103-87 § 575, 107 Stat. 972-773 (1993). In 1996, DOE changed the program's name to reflect a greater focus on and commitment to nonproliferation issues. In 2002, the IPP program and another similar DOE nonproliferation program, the Nuclear Cities Initiative, were placed under a common management organization within DOE and designated the Russian Transition Initiatives. In 2006, the Russian Transition Initiatives was renamed the Global Initiatives for Proliferation Prevention and adopted the mission of addressing the proliferation of WMD expertise globally. Since the program's inception, North Korea has successfully tested a nuclear weapon, and there are concerns that Iran has made progress in developing its own nuclear weapons program.

[2]NNSA is a separately organized agency within DOE that was created by the *National Defense Authorization Act for Fiscal Year 2000*, Pub. L. No. 106-65, 113 Stat. 953 (1999), with responsibility for the nation's nuclear weapons, nonproliferation, and naval reactors programs.

of over 16,770 scientists, engineers, and technicians and created 2,790 long-term, private sector jobs in Russia and other countries of the former Soviet Union.

Through October 1, 2007, there were 929 draft, active, inactive, and completed IPP projects involving personnel at about 200 nuclear, chemical, and biological institutes in Russia and other countries. Many IPP projects involve more than one institute, and sometimes a single project will involve institutes in more than one country. Over 80 percent of the projects are focused on institutes in Russia, and the majority of these projects involve scientists and institutes specializing in nuclear weapons-related work. Other countries that currently participate or have participated in the IPP program include Armenia, Belarus, Georgia, Kazakhstan, Ukraine, and Uzbekistan.

For each IPP project, DOE requires that at least 65 percent of the project's funding go to Russia and other countries as payments to individuals actually working on the project or to the participating institutes in payment for project-related supplies, equipment, and overhead. Because the IPP program is not administered through a government-to-government agreement, as are many other U.S. nonproliferation programs, DOE distributes funding for IPP projects through three tax-exempt entities to avoid paying foreign taxes: the International Science and Technology Center (ISTC) in Russia, the Science and Technology Center in Ukraine (STCU), and the U.S. Civilian Research and Development Foundation (CRDF). These organizations transfer IPP funds directly to the personal bank accounts of IPP project participants in Russia and other countries. To receive payment for work on IPP projects, project participants must submit paperwork to these organizations indicating, among other things, whether they possess WMD experience.

Project proposals under the IPP program are prepared and submitted to DOE by officials from the participating national laboratories,[3] although a project may also result from the initiative of a foreign institute or U.S.

[3]DOE manages the largest laboratory system of its kind in the world. Originally created to design and build atomic weapons, DOE's 22 laboratories have expanded their missions to conduct research in many disciplines—from high-energy physics to advanced computing. The 12 national laboratories that participate in the IPP program are the Argonne, Brookhaven, Idaho, Lawrence Berkeley, Lawrence Livermore, Los Alamos, Oak Ridge, National Renewable Energy, Pacific Northwest, Sandia, and Savannah River National Laboratories and the Kansas City Plant.

company. Each participating DOE national laboratory provides technical and financial oversight over a set of projects. Partnerships are formed by the national laboratories between U.S. companies—known as industry partners—and institutes in Russia and other countries. Industry partners are engaged in projects through Cooperative Research and Development Agreements with the participating DOE national laboratories, which require cost-sharing to develop technologies for commercial application. An Inter-Laboratory Board (ILAB) serves as the primary coordinating body for the national laboratories involved in the IPP program. The ILAB coordinates, reviews, and facilitates the activities of the participating national laboratories and makes recommendations to DOE on how to implement the program. Ultimate decision-making authority lies with the DOE headquarters IPP program office.

To improve the potential of IPP projects to create sustainable jobs in Russia and other countries, DOE requires that a U.S. industry partner be identified before it approves and funds a project. A consortium of U.S. industry partners—the United States Industry Coalition (USIC)—was established in 1994. To participate in the IPP program, a company must become a member of USIC and pay dues based on its size. USIC reviews IPP project proposals for commercial potential and requires that all project proposals have the basic outline of a business plan for commercializing the technology involved. In addition, USIC annually surveys its member companies to determine the commercial results of IPP projects, such as the number of long-term, private sector jobs created. DOE uses the results of USIC's surveys to report to the Congress on the number of jobs the IPP program created.

DOE's IPP program is one of several nonproliferation programs focused on reducing the potential proliferation risks posed by scientists from Russia and other countries. Other such programs include the Science Centers program funded by the U.S. government—under the auspices of the Department of State (State)—and other nations;[4] CRDF; and a variety of initiatives primarily focused on biological institutes and implemented by the Departments of Agriculture, Defense, Health and Human Services, and State. In addition, from 1998 through 2006, DOE administered the Nuclear

[4]The Science Centers, consisting of ISTC and STCU, are intergovernmental bodies with over 12 contributing member states. The centers were established to provide peaceful research opportunities to weapons scientists of the former Soviet Union. For additional information, see GAO, *Weapons of Mass Destruction: State Department Oversight of Science Centers Program*, GAO-01-582 (Washington, D.C.: May 10, 2001).

Cities Initiative, whose goal was to create sustainable jobs for weapons scientists in Russia's closed nuclear cities and to help Russia accelerate the downsizing of its nuclear weapons complex.[5] The government-to-government agreement between the United States and Russia governing this program expired and was not renewed, and, as a result, the program was terminated in September 2006.

In 1999, we reviewed the IPP program and made several recommendations to improve its management, including recommending that DOE (1) obtain more accurate data on the background and number of scientists participating in the program, (2) maximize the amount of funds going to former Soviet Union weapons institutes, and (3) eliminate projects that do not have commercial potential.[6] The Congress, among other things, subsequently prohibited DOE from using IPP program funding, available after fiscal year 1999, to supplement the income of scientists and engineers who (1) are currently engaged in activities directly related to the design, development, production, or testing of chemical or biological WMD or a missile system to deliver such weapons or (2) were not formerly engaged in activities directly related to the design, development, production, or testing of WMD or a missile delivery system for such weapons.[7] The Congress also prohibited DOE from funding any institute or scientist determined by the Secretary of Energy to have made a scientific or business contact about WMD with a representative of a "country of proliferation concern."[8]

[5]Ten closed nuclear cities formed the core of the former Soviet Union's nuclear weapons complex. Many of the cities are located in geographically remote locations and were so secret that they did not appear on any publicly-available maps until 1992. For additional information, see GAO, *Nuclear Nonproliferation: DOE's Efforts to Assist Scientists in Russia's Nuclear Cities Face Challenges*, GAO-01-429 (Washington, D.C.: May 3, 2001).

[6]See GAO, *Nuclear Nonproliferation: Concerns with DOE's Efforts to Reduce the Risks Posed by Russia's Unemployed Weapons Scientists*, GAO/RCED-99-54 (Washington, D.C.: Feb. 19, 1999). As a result of our 1999 review, DOE modified the IPP program by implementing requirements to (1) better categorize the weapons backgrounds of scientists participating in IPP projects; (2) review projects for potential dual-use technology; (3) limit funding for DOE national laboratories to no more than 35 percent for each IPP project; (4) eliminate basic research projects; (5) establish direct, tax-free payments to participating former Soviet scientists; and (6) institute audits conducted by the Defense Contract Audit Agency as a way of verifying proper transfer of IPP program funds and equipment.

[7]Pub. L. No. 106-65 § 3136(a)(2).

[8]Pub. L. No. 106-65 § 3136(a)(3). As defined by the section, a "country of proliferation concern" means any country designated as such by the Director of Central Intelligence for purposes of the IPP program.

In this context, you asked us to review the IPP program. As agreed with your office, we assessed (1) DOE's reported accomplishments for the IPP program, (2) DOE's exit strategy for the IPP program, and (3) the extent to which the IPP program has experienced annual carryover balances of unspent funds and the reasons for such carryover.

To address these objectives, we examined 207 of the 929 IPP projects. We selected this judgmental sample of draft, active, inactive, and completed projects on the basis of a variety of factors, such as geographic distribution, representation of all participating national laboratories, and project costs. Of the 207 projects in our sample, we received or were able to reconstruct information on payments to project participants for 97 projects. We interviewed key officials and analyzed documentation, such as program guidance, project proposals, and financial information, from DOE and its contractors at the Argonne, Brookhaven, Idaho, Lawrence Berkeley, Lawrence Livermore, Los Alamos, Oak Ridge, National Renewable Energy, Pacific Northwest, Sandia, and Savannah River National Laboratories; the Kansas City Plant; and Defense and State. We interviewed officials from 15 Russian and 7 Ukrainian institutes that participate in the IPP program. We also spoke with officials from the Federal Agency for Atomic Energy of the Russian Federation, which oversees institutes involved in Russia's nuclear weapons program. Furthermore, we interviewed officials from 14 U.S. companies that participate in the IPP program to better understand their perspective on the program's benefits and its implementation. In addition, we analyzed cost and budgetary information from DOE, DOE's national laboratories, CRDF, ISTC, and STCU. We interviewed knowledgeable officials on the reliability of these data, including issues such as data entry, access, quality control procedures, and the accuracy and completeness of the data. We determined that these data were sufficiently reliable for the purposes of this review. Appendix I provides more details on our scope and methodology, and appendix II provides more detailed information on the institutes that we visited in Russia and Ukraine. We conducted our review from October 2006 through December 2007 in accordance with generally accepted government auditing standards.

Results in Brief

DOE has overstated accomplishments for the 2 critical measures it uses to assess the IPP program's progress and performance—the number of WMD scientists receiving DOE support and the number of long-term, private sector jobs created. First, according to our analysis of 97 IPP projects involving about 6,450 scientists for whom we had complete payment information, more than half of the scientists paid by the program never

claimed to have WMD experience. Furthermore, instead of supporting Soviet-era WMD scientists as a way of minimizing proliferation risks, officials at 10 nuclear and biological institutes in Russia and Ukraine told us that IPP program funds help them attract, recruit, and retain younger scientists and contribute to the continued operation of their facilities. This is contrary to the original intent of the program, which was to reduce the proliferation risk posed by Soviet-era weapons scientists. For example, about 972 of the scientists paid for work on these 97 projects were born in 1970 or later, making them too young to have contributed to Soviet-era WMD efforts. Second, although DOE asserts that through April 2007, the IPP program had helped create 2,790 long-term, private sector jobs in Russia and other countries, we were unable to substantiate the existence of many of these jobs in our review of 48 of the 50 projects DOE considers to be commercial successes. For example, DOE reported that 350 jobs were created at one Russian institute, but officials from that institute told us that only 160 people had actually been employed, that most were on a part-time basis, and that they could not account for jobs that may have been created at other institutes previously involved in the projects. The validity of the number of jobs reported to have been created by the IPP program is in doubt because DOE relies on "good-faith" reporting from U.S. industry partners and institutes in Russia and other countries and does not independently verify employment data it receives. Finally, the metrics DOE uses to set IPP program goals and measure progress are outdated. DOE officials admitted that the IPP program targets—based on a 1991 assessment of the former Soviet WMD scientist population—are not sufficient to judge the IPP program's progress in reducing proliferation risks. However, DOE has not updated its metrics on the basis of more recent estimates of the WMD scientist population, and it has not set priorities for the program on the basis of a comprehensive country-by-country and institute-by-institute evaluation of proliferation risks. Due to the serious nature of these findings, we are recommending that DOE perform a comprehensive reassessment of the IPP program to help the Congress determine whether to continue to fund the program. We believe this reassessment should include, at a minimum, a thorough analysis of the proliferation risk posed by weapons scientists in Russia and other countries, a well-defined prioritization strategy to more effectively target the scientists and institutes of highest proliferation concern, and more accurate reporting of program accomplishments.

DOE has not developed an exit strategy for the IPP program in Russia and other countries, although officials from the Russian government, Russian and Ukrainian institutes, and U.S. companies raised questions about the continuing need for the IPP program, given economic improvements in

Russia and other countries where DOE provides assistance. Importantly, a senior Russian Atomic Energy Agency official told us that the IPP program is no longer relevant because Russia's economy is strong and its scientists no longer pose a proliferation risk. However, DOE has not developed criteria to determine when scientists, institutes, or countries should "graduate" from the IPP program. In contrast, State, which supports a similar program to assist weapons scientists in Russia and other countries, has assessed participating institutes and developed a strategy—using a range of factors, such as an institute's ability to pay salaries regularly and to attract funding from other sources—to graduate certain institutes from its program. Even so, we found that DOE is currently supporting 35 IPP projects at 17 Russian and Ukrainian institutes that State considers to already have graduated from its program and, therefore, no longer require U.S. assistance. Instead of finding ways to phase out the IPP program in the countries of the former Soviet Union, DOE has recently expanded the program to include new countries and areas as a way to maintain its relevance as a nonproliferation program. Specifically, DOE recently began providing assistance to scientists in Iraq and Libya. In addition, the IPP program is working with DOE's Office of Nuclear Energy to develop projects that support the Global Nuclear Energy Partnership—a DOE-led international effort to expand the use of civilian nuclear power. DOE has expanded the IPP program's efforts into these new areas without a clear mandate from the Congress and has suspended parts of its IPP program guidance for implementing projects in these new areas. For example, in its efforts in Libya, DOE is deviating from IPP program guidance and its standard practice of limiting the amount of IPP program funds spent at the national laboratories for project oversight to not exceed 35 percent of the total expenditures. We found that 97 percent of funds DOE spent on projects in Libya through May 2007 were spent at DOE's national laboratories for project management and oversight activities. We are recommending, among other things, that DOE (1) develop a clear exit strategy for the IPP program, including detailed criteria to determine when specific countries, institutes, and individuals are ready to graduate from participation in the IPP program, and (2) seek explicit congressional authorization to expand IPP efforts outside of the former Soviet Union.

Regarding its management of IPP program funding, DOE has carried over unspent funds in excess of the amount that the Congress provided for the IPP program in every fiscal year since 1998. For example, as of September 2007, DOE had carried over about $30 million in unspent funds—$2 million more than the $28 million that the Congress had appropriated for the IPP program in fiscal year 2007. Two main factors have contributed to this recurring problem: (1) lengthy and multilayered review and approval

processes by DOE and its contractors for paying former Soviet weapons scientists for IPP-related work and (2) long delays in implementing some IPP projects. Regarding the first factor, payments to supplement the salaries of scientists in Russia and other countries are often delayed because they are reviewed by multiple offices within DOE; participating national laboratories; and the organizations, such as ISTC, that DOE uses to make tax-free payments to project participants' bank accounts. DOE officials acknowledged that the lag time between the allocation of funds, placement of contracts, and payment for deliverables is a problem for the IPP program. Russian and Ukrainian scientists we interviewed told us that they regularly experienced delays of 3 months to 1 year in receiving payments for completed work on IPP projects. In addition, some IPP projects we reviewed experienced long delays in implementation because of, among other things, administrative problems and turnover in key project participants. For example, in 2006, the Russian Customs Service rejected a testing device needed for one IPP project after it was improperly labeled when it was shipped from the United States to the participating Russian institute. As a result, DOE was unable to spend about $245,000 intended for this project for more than 1 year until the issue was resolved. DOE and national laboratory officials told us they are attempting to improve financial oversight over the IPP program, in part, to address concerns about unspent program funds. To that end, DOE is developing a program management system, which it expects to fully implement in 2008—14 years after the start of the program. We are recommending that DOE seek to reduce the large balances of unspent IPP program funds and streamline the process through which foreign scientists receive IPP funds by eliminating unnecessary layers of review.

We provided a draft of this report to DOE and State for comment. DOE agreed with 8 of our 11 recommendations to improve the overall management and oversight of the IPP program, noting that a number of changes were already under way. However, DOE disagreed with 2 recommendations and neither agreed nor disagreed with 1 recommendation. Specifically, DOE disagreed that it needs to reassess the IPP program, expressing the view that a reassessment has already taken place that justified the program's continued need. We are aware that DOE conducted internal assessments in 2004 and 2006 of its overall efforts to engage WMD scientists in the former Soviet Union and other countries. However, these assessments did not evaluate the IPP program exclusively and were conducted at a time when the IPP program was complemented by and coordinated with a similar DOE program focused on downsizing facilities and creating new jobs for personnel in Russia's nuclear cities. This complementary program—the Nuclear Cities Initiative—has since

been canceled. As a result, we believe these assessments are outdated because the IPP program operates under a significantly different set of circumstances today than when DOE conducted its previous internal assessments. Moreover, we believe that the nature, scope, and volume of problems we identified during the course of our review necessitates a reassessment of the IPP program to ensure that limited program funds are directed to the scientists and institutes of highest proliferation risk. DOE also disagreed with the need to ensure compliance with the statutory restriction on the percentage of IPP program funds spent on oversight activities at the DOE national laboratories to no more than 35 percent. However, we note in our report that DOE is deviating from its IPP program guidance and standard practices by placing no restrictions on the amount of IPP program funds that can be spent at DOE national laboratories for oversight of projects in Libya. In addition, State concurred with the 1 recommendation directed to both DOE and State. DOE and State also provided technical comments, which we incorporated in this report as appropriate.

Background

Historically, IPP projects were placed in one of three categories—Thrust 1, Thrust 2, and Thrust 3. DOE now only supports Thrust 2 projects. Specifically:

- *Thrust 1* projects were geared toward technology identification and verification and focused on "laboratory-to-laboratory" collaboration, or direct contact between DOE's national laboratories and weapons institutes and scientists in the former Soviet Union. These projects had no industry partner and, according to DOE, were entered into to quickly engage former Soviet weapons scientists and their institutes. DOE funded 447 Thrust 1 projects, 378 of which were completed. DOE no longer supports Thrust 1 projects.

- *Thrust 2* projects involve a U.S. industry partner that agrees to share in the costs of the project with DOE to further develop potential technologies. The U.S. industry partner is expected to match the funds DOE provides, either by providing in-kind support, such as employee time and equipment, or by providing cash. Through October 2007, there were 479 IPP projects in the Thrust 2 category.

- *Thrust 3* projects, with the exception of 1 project, did not receive any financial support from DOE and were intended to be self-sustaining business ventures. DOE no longer supports Thrust 3 projects. There were only three Thrust 3 projects and the last project was completed in 2001.

All proposed IPP projects are reviewed by DOE's national laboratories; the IPP program office; and other agencies, including Defense and State, before they are approved for funding. Initially, a national laboratory proposes a project for consideration. As the national laboratory prepares the proposal, the laboratory project manager, generally referred to as the "principal investigator," is responsible for including, among other things, a list of intended participants and for designating the WMD experience for each participant. The proposed participants are assigned to one of the following three categories:

- *Category I*—direct experience in WMD research, development, design, production, or testing;
- *Category II*—indirect WMD experience in the underlying technologies of potential use in WMD; or
- *Category III*—no WMD-relevant experience.

If the IPP project is approved, DOE transfers funding to the project participants using payment mechanisms at CRDF, ISTC, or STCU. To be paid by any of these entities, the project participants must self-declare whether they possess weapons experience and indicate a more specific category of WMD expertise, such as basic knowledge of nuclear weapons design, construction, and characteristics. The weapons category classifications these scientists declare are certified first by the foreign institute's director and then by the foreign government ministry overseeing the institute. See appendix III for a more detailed list of the WMD categories used by DOE, CRDF, ISTC, and STCU.

After the project passes an initial review within the proposing national laboratory, it is further analyzed by the ILAB and its technical committees, which then forward the project proposal to DOE headquarters for review. DOE, in turn, consults with State and other U.S. government agencies on policy, nonproliferation, and coordination considerations. The IPP program office at DOE headquarters is ultimately responsible for making final decisions, including funding, on all projects.

DOE Has Overstated the Progress Made on Key Performance Measures, Raising Doubts about the IPP Program's Nonproliferation Benefits

DOE has not accurately portrayed the IPP program's progress, according to our analysis of two key measures used to assess the program's performance—the number of WMD scientists receiving DOE support and the number of long-term, private sector jobs created. Many of the scientists in Russia and other countries that DOE has paid through its IPP program did not claim to have WMD experience. Furthermore, DOE's process for substantiating the weapons backgrounds of IPP project participants has several weaknesses, including limited information about the backgrounds of scientists proposed for an IPP project. In addition, DOE has overstated the rate at which weapons scientists have been employed in long-term, private sector jobs because it does not independently verify the data it receives on the number of jobs created, relies on estimates of job creation, and includes in its count a large number of part-time jobs that were created. Finally, DOE has not revised the IPP program's performance metrics, which are currently based on a 1991 assessment of the threat posed by former Soviet weapons scientists.

DOE Has Supplemented the Salaries of Many Scientists in Russia and Other Countries Who Did Not Claim Direct Experience with WMD

A major goal of the IPP program is to engage former Soviet weapons scientists, engineers, and technicians, and DOE claims to have supplemented the incomes of over 16,770 of these individuals since the program's inception. However, this number is misleading because DOE officials told us that this figure includes both personnel with WMD experience and those without any WMD experience. We reviewed the payment records of 97 IPP projects, for which information was available and complete, and found that 54 percent, or 3,472, of the 6,453 participants in these projects did not claim to possess any WMD experience in the declarations they made concerning their backgrounds. Moreover, project participants who did not claim any WMD experience received 40 percent, or approximately $10.1 million, of the $25.1 million paid to personnel on these projects. For example, in 1 project to develop a high-power accelerator that was funded for $1 million, 88 percent, or 66, of the 75 participants who have received payments did not claim any previous weapons-related experience.

On a project-by-project basis, we also found that DOE is not complying with a requirement of its own guidance for the IPP program—that is, each IPP project must have a minimum of 60 percent of the project's participants possessing WMD-relevant experience prior to 1991 (i.e., Soviet-era WMD experience). According to our analysis of the payment records of 97 projects for which information was available and complete, we found that 60 percent, or 58, of the 97 projects did not meet this requirement. A factor contributing to this outcome may be a poor

understanding of the IPP program guidance among the ILAB representatives of the 12 national laboratories participating in the program. During our interviews with national laboratory officials, we heard a range of opinions on the appropriate minimum percentage of WMD scientists on individual IPP projects. For example, ILAB representatives from 5 national laboratories indicated that they strive for a minimum of 50 percent of WMD scientists on each IPP project; the ILAB representative from the Pacific Northwest National Laboratory indicated a goal of 55 percent. The ILAB representative from the National Renewable Energy Laboratory indicated that he was not aware of any DOE policy establishing a minimum percentage of participants with WMD backgrounds on an IPP project.

Finally, many IPP project participants that DOE supports are too young to have supported the Soviet Union's WMD programs. Officials at 10 of the 22 Russian and Ukrainian institutes we interviewed said that IPP program funds have allowed their institutes to recruit, hire, and retain younger scientists. We found that 15 percent, or 972, of the 6,453 participants in the payment records of the 97 projects we reviewed were born in 1970 or later and, therefore, were unlikely to have contributed to Soviet-era WMD efforts. This group of younger participants received approximately 14 percent, or about $3.6 million, of $25.1 million paid to project participants in the 97 projects we reviewed.

While DOE guidance for the IPP program does not specifically prohibit participation of younger scientists in IPP projects, DOE has not clearly stated the proliferation risk posed by younger scientists and the extent to which they should be a focus of the IPP program. The absence of a clear policy on this matter has contributed to confusion and lack of consensus among national laboratory officials involved in the program about the extent to which younger scientists, rather than older, more experienced WMD experts, should be involved in IPP projects. For example, the ILAB representative at the Argonne National Laboratory told us that it would be appropriate to question the participation of personnel born in the mid-1960s or later since they most likely lacked weapons-related experience. A representative at the Los Alamos National Laboratory who has been involved with the IPP program for over a decade said that the program should engage "second-generation" scientists born in 1980 or later because doing so can help create opportunities for "third- and fourth-generation" scientists at facilities in Russia and other countries in the future. Senior officials at the Lawrence Livermore National Laboratory told us that scientists in Russia and other countries, regardless of their age or actual experience in weapons-related programs, should be included in

IPP projects because weapons expertise can be passed from one generation to the next.

DOE Lacks Necessary Information and a Rigorous, Formalized Review Process to Assess the WMD Credentials of IPP Project Participants

In 1999, we recommended that, to the extent possible, DOE should obtain more accurate data on the number and background of scientists participating in IPP program projects. DOE told us that it has made improvements in this area, including development of a classification system for WMD experts, hiring a full-time employee responsible for reviewing the WMD experience and backgrounds of IPP project participants, and conducting annual project reviews. DOE relies heavily on the statements of WMD experience that IPP project participants declare when they submit paperwork to receive payment for work on IPP projects. However, we found that DOE lacks an adequate and well-documented process for evaluating, verifying, and monitoring the number and WMD experience level of individuals participating in IPP projects.

According to DOE officials, all IPP projects are scrutinized carefully and subjected to at least 8, and in some cases 10, stages of review to assess and validate the WMD experience of the project participants. Responsibility for verifying the WMD experience and backgrounds of IPP project participants rests not only with DOE, but with the national laboratories, other federal agencies, and the entities responsible for transmitting funding to the scientists in Russia and other countries (CRDF, ISTC, or STCU). However, the ultimate responsibility for this assessment rests with DOE's IPP program office. Table 1 provides an overview of the different stages involved in DOE's assessment of IPP project participants' WMD backgrounds.

Table 1: Multistage Process for Assessing IPP Project Participants' WMD Backgrounds

Stage number	Review
1	Assessment by the national laboratory principal investigator
2	Assessment by ILAB representatives and ILAB technical committees
3	Review by ILAB Chairperson
4	Preliminary DOE review
5	U.S. interagency review
6	Approval and certification by DOE
7	Validation by project funding mechanism (CRDF, ISTC, or STCU)
8	Secondary review by DOE following project approval but prior to project implementation
9	End-of-year review by DOE prior to release of 2nd- or 3rd-year funding (for multiyear projects only)
10	Audits of selected projects by the Defense Contract Audit Agency

Source: GAO analysis of DOE data.

In reviewing project documentation and in our discussions with officials responsible for conducting these reviews, we found limitations throughout this multistage assessment process. Specifically:

- DOE has limited information to verify the WMD experience of personnel proposed for IPP projects because government officials in Russia and other countries are reluctant to provide information about their countries' scientists. For example, ISTC officials told us that the Russian government refuses to provide résumés for scientists involved in projects funded by the Science Centers program, including IPP projects that use the ISTC payment process; while CRDF officials indicated that both the Russian and Ukrainian governments have shown increasing resistance to the policy requiring the scientists to declare their WMD-related experience. Three national laboratory officials stated that it is illegal under Russian law to ask project participants about their backgrounds, and that instead they make judgments regarding the WMD experience of the project participants on the basis of their personal knowledge and anecdotal information.

- Some IPP project proposals may advance from the national laboratories for consideration by DOE with insufficient vetting or understanding of all personnel who are to be engaged on the project. Contrary to the process DOE laid out for the review of the WMD scientists' backgrounds, senior representatives at five national laboratories told us that they and their project managers do not have sufficient time or the means to verify the

credentials of the proposed project participants. Furthermore, they believe that DOE is primarily responsible for substantiating the weapons experience of the individuals who are to be engaged in the projects.

- DOE does not have a well-documented process for verifying the WMD experience of IPP project participants, and, as a result, it is unclear whether DOE has a reliable sense of the proliferation risk these individuals pose. DOE's review of the WMD credentials of proposed project participants relies heavily on the determinations of the IPP program office. We examined the proposal review files that the program maintains, and we were unable to find adequate documentation to substantiate the depth or effectiveness of the program office's review of the WMD experience of proposed IPP project participants. DOE officials noted that they do not usually check the weapons backgrounds of every individual listed in an IPP project proposal, but only the key project scientists and a few of the personnel working with them. Specifically, in none of the IPP project files that we reviewed did we find formal, written documentation analyzing and substantiating the WMD backgrounds and proliferation risks of the personnel to be engaged in those IPP projects. Each of these files did, however, contain a comprehensive formal assessment by DOE's Office of International Regimes and Agreements analyzing export control issues and compliance with U.S. nonproliferation laws.

- Officials at the three organizations DOE uses to make tax-free payments for IPP projects—CRDF, ISTC, and STCU—also downplayed their organizations' ability to validate the backgrounds of the scientists participating in IPP projects. CRDF officials stated that their organization has not independently validated any of the weapons backgrounds of the participating scientists, and they do not consider that a responsibility under CRDF's contract with DOE. Similarly, ISTC officials told us that their organization cannot verify the backgrounds of scientists in projects funded by the Science Centers program, including IPP projects that use the ISTC payment process, and instead relies on the foreign institute's certification of the project participants. Finally, STCU relies on the validation provided by the foreign institute's director, and verifies this information in annual project reviews during which a sample of project participants are interviewed to confirm their WMD experience.

- Because it can be a matter of months or longer between development of an IPP project proposal and project implementation, the list of personnel who are actually paid on a project can differ substantially from the proposed list of scientists. For several IPP projects we reviewed, we did not find documentation in DOE's project files indicating that the

department was notified of the change of staff or had assessed the WMD backgrounds of the new project participants. For example, 1 IPP project—to discover new bioactive compounds in Russia and explore their commercial application—originally proposed 27 personnel and was funded at $1 million. However, 152 personnel were eventually paid under this project, and we did not find an updated list of the project personnel or any indication of a subsequent review of the additional personnel by DOE in the IPP project files. In another project to develop straw-fired boilers in Ukraine funded at $936,100, DOE reviewed the backgrounds of 18 personnel who were part of the project proposal. However, CRDF payment records indicated that 24 personnel were subsequently paid on the project, only 5 of whom were listed in the original proposal DOE had reviewed and approved. As a result, it is unclear whether DOE conducts sufficient oversight on changes in the number or composition of the workforce involved in IPP projects. For its part, CRDF informed us that when an institute requests a change in project staff and that change is approved by the participating national laboratory, CRDF does not report these changes to DOE, but relies on the national laboratory to notify relevant DOE officials.

The limited information DOE obtains about IPP project participants and the weaknesses in DOE's review of the backgrounds of these individuals leave the IPP program vulnerable to potential misallocation of funds. In our review, we found several examples that call into question DOE's ability to adequately evaluate IPP project participants' backgrounds before the projects are approved and funded. For example:

- A National Renewable Energy Laboratory official told us he was confident that a Russian institute involved in a $250,000 IPP project he oversaw to monitor microorganisms under environmental stress was supporting Soviet-era biological weapons scientists. However, during our visit to the institute in July 2007, the Russian project leader told us that neither he nor his institute was ever involved in biological weapons research. As a result of this meeting, DOE canceled this project on July 31, 2007. DOE's cancellation letter stated that the information provided during our visit led to this action. It further stated, "it is well documented in statute and in the [IPP program's] General Program Guidance that our projects must engage Russians, and others, with relevant weapons of mass destruction or strategic delivery means backgrounds. Violation of this requirement is an extremely serious matter."

- In November 2006, DOE canceled a project in Ukraine intended to develop a new type of fuel combustion system, 18 months after approving the project and after spending about $76,000. DOE canceled this project when

it discovered an inadequate number of personnel with WMD backgrounds involved in the project and after a Defense Contract Audit Agency (DCAA) audit revealed other irregularities, including a conflict of interest between the primary Ukrainian institute and the U.S. partner company. During the interagency review of the project proposal, State officials questioned the primary Ukrainian institute's involvement in WMD. However, in our review of DOE's project files, we did not find evidence that these concerns triggered a more-intensive evaluation of this institute by DOE prior to the project's approval.

- A 2005 DCAA audit found that 90 percent of the participants on an IPP project administered by the Pacific Northwest National Laboratory lacked WMD experience. This project, which was designed to develop improved biological contamination detectors, was funded at $492,739. Officials at the national laboratory insisted that DCAA "was just plain wrong." DOE and national laboratory officials asserted that the project participants were under instruction not to discuss their weapons involvement and, on the basis of their personal knowledge of the Russian project leader and the institute, they believed the project participants constituted a proliferation risk. However, according to the payment records we reviewed, the Russian project leader and other scientists involved in the project were not prevented from declaring their WMD backgrounds to CRDF. Such conflicting accounts, the absence of clear information, and the judgments made by IPP program officials in assessing the proliferation risks posed by IPP project participants underscore the difficulties the program faces and the possibility that the program is funding personnel who do not constitute a proliferation risk.

DOE Has Overstated the Number of Former Weapons Scientists Reemployed in Long-term, Private Sector Jobs

Although a senior DOE official described commercialization as the "flagship" of the IPP program, we found that the program's commercialization achievements have been overstated and are misleading, further eroding the perceived nonproliferation benefits of the program. In the most recent annual report for the IPP program available at the time of our review,[9] DOE indicated that 50 projects had evolved to support 32

[9]On September 5, 2007, DOE provided us with preliminary data that will be published in its fiscal year 2006 IPP program annual report. This report has not yet been issued. As a result, for purposes of this report, we used the most up-to-date published information available during our review, which was DOE's *Fiscal Year 2005 IPP Program Annual Report*.

commercially successful activities.[10] DOE reported that these 32 commercial successes had helped create or support 2,790 new private sector jobs for former weapon scientists in Russia and other countries.[11] In reviewing these projects, we identified several factors that raise concerns over the validity of the IPP program's reported commercial success and the numbers of scientists employed in private sector jobs. For example:

- The annual survey instrument that USIC distributes to collect information on job creation and other commercial successes of IPP projects relies on "good-faith" responses from U.S. industry partners and foreign institutes, which are not audited by DOE or USIC. In 9 of the 32 cases, we found that DOE based its job creation claims on estimates or other assumptions. For example, an official from a large U.S. company told us that the number of jobs it reported to have helped create was his own rough estimate. He told us he derived the job total by estimating the amount of money that the company was spending at Russian and Ukrainian institutes and dividing that total by the average salary for Russian engineers in the company's Moscow office.

- We could not substantiate many of the jobs reported to have been created in our interviews with the U.S. companies and officials at the Russian and Ukrainian institutes where these commercial activities were reportedly developed, due to conflicting information and accounts. For example, officials from 1 U.S. company we interviewed claimed that 250 jobs at 2 institutes in Russia had been created, on the basis of 2 separate IPP projects. However, during our visit to the Scientific Research Institute of Measuring Systems to discuss one of these projects, we were told that the project is still under way, manufacturing of the product has not started, and none of the scientists have been reemployed in commercial production of the technology. Similarly, during our site visit, officials at the Institute of Nuclear Research of the Russian Academy of Sciences could not confirm the creation of 350 jobs they had reported as a result of several IPP projects relating to the production of radioisotopes. They indicated that no more than 160 personnel were employed at their institute in commercial activities stemming from those IPP projects, that most of these jobs were only part time, and that they could not account for jobs

[10]In some cases, more than one IPP project was connected to a commercial success. See appendix IV for a complete list of the IPP projects reported by DOE as being commercially successful.

[11]We found that DOE made a mathematical error in totaling the number of new jobs created and in migrating data from the USIC survey to the *Fiscal Year 2005 IPP Program Annual Report*. As a result, the actual total of new jobs that DOE should have reported is 2,780.

that may have been created at other institutes previously involved in the projects.

Moreover, we found differing views among DOE and national laboratory officials on what constitutes a commercially successful IPP project. For example, an Oak Ridge National Laboratory official told us an IPP project could be considered a commercial success if the project participants become employed full time in a private business and are no longer employed by the WMD institute. A National Renewable Energy Laboratory official defined commercially successful IPP projects as those that lead to new products or new production capabilities in the former Soviet Union with significant sales in the marketplace. DOE guidance for the IPP program does not provide a standard definition or criteria to determine whether an IPP project should be judged commercially successful. However, in response to our request, DOE offered the following definition of a commercially successful IPP project:

"A product, process, or service is generating revenue from sales or other economic value added in the [former Soviet Union] or the U.S., based on an IPP project (either completed or ongoing); and/or there is a private contractual relationship between the U.S. industry partner and the [former Soviet Union] institute covering research and development work to be done by the institute for the U.S. industry partner growing out of an IPP project."

The lack of consensus among DOE and national laboratory officials involved in the IPP program on a common commercialization definition has created confusion and disagreement on which IPP projects should be considered commercially successful. For example, DOE counted as a commercial success one IPP project administered by the Pacific Northwest National Laboratory to facilitate biodegradation of oil spills. However, the national laboratory officials responsible for this project disagreed with DOE's characterization, in part because the project has not generated any commercial revenues.

Furthermore, DOE's broad-based definition of commercialization has allowed it to overstate its commercialization accomplishments to include part-time jobs created from and revenues derived from grants or contract research. Specifically:

- DOE counts part-time private sector jobs created, even if the scientists employed in these part-time jobs also continue to work at the former

Soviet weapons institute.[12] DOE policy does not require scientists employed in a private sector activity resulting from an IPP project to sever their relationship with their institute. In fact, in our review of the 2,790 jobs created, we found that 898, or nearly one third, of these jobs were part-time jobs, meaning that the scientists in some cases may still be affiliated with the institutes and involved in weapons-applicable research.

- The sources of revenue for some commercially successful IPP projects also call into question the long-term sustainability of some of the jobs created. DOE reported that $22.1 million in total revenue was generated by the foreign institutes or their spin-off companies as a result of commercial activities stemming from IPP projects. Of this total, approximately $4.5 million, or 20 percent, consisted of grants (including grants from the Russian government); contract research; and other sources of income that appear to be of limited duration, that are not based on commercial sales, and that may not offer a sustainable long-term source of revenue. For example, DOE reported that 510 jobs were created at the Kurchatov Institute and other Russian institutes as the result of an IPP project to develop thorium-based fuels for use in nuclear reactors.[13] However, we found that over 400 of those jobs were supported by a separate DOE contract to evaluate the use of thorium fuels for plutonium disposition. The Russian project participants told us that over 500 workers were supported while receiving funding from the 2 DOE sources, but the project is now completed, it has not been commercialized, and there are no more than 12 personnel currently involved in efforts related to the project.

DOE Has Not Revised the IPP Program's Performance Metrics to Reflect Updated Threat Information

The IPP program's long-term performance targets do not accurately reflect the size and nature of the threat the program is intended to address because DOE is basing the program's performance measures on outdated information. DOE has established 2 long-term performance targets for the IPP program—to engage 17,000 weapons scientists annually by 2015 in either IPP grants or in private sector jobs resulting from IPP projects, and to create private sector jobs for 11,000 weapons scientists by 2019. However, DOE bases these targets on a 16-year-old, 1991 National Academy of Sciences (NAS) assessment that had estimated approximately

[12]According to DOE, there is no IPP program requirement to exclude former weapons scientists employed on a part-time basis from the total number of jobs created as a result of IPP projects.

[13]Thorium is a naturally occurring radioactive metal, and it is considered an alternative nuclear fuel to uranium.

60,000 at-risk WMD experts in Russia and other countries in the former Soviet Union. DOE derived 17,000 scientists as its share of the total target population by subtracting from the NAS estimate the number of WMD scientists engaged by other U.S. government and international WMD scientist assistance programs (such as State's Science Centers program) and making assumptions about attrition rates in the former Soviet WMD workforce.

DOE officials acknowledged that the 1991 NAS study does not provide an accurate assessment of the current threat posed by WMD scientists in Russia and other countries. A 2005 DOE-commissioned study by the RAND Corporation estimated that the population of unemployed or underemployed weapons scientists in Russia and other former Soviet states had decreased significantly. The RAND study provided rough revised estimates of the number of WMD scientists in the former Soviet Union, and DOE acknowledged in 2006 that the target population of WMD experts in the former Soviet Union had dropped from the 1991 NAS estimate of 60,000 to approximately 35,000 individuals. However, DOE has not formally updated its performance metrics for the IPP program and, in its fiscal year 2008 budget justification, continued to base its long-term program targets on the 1991 NAS estimate.

Moreover, DOE's current metrics for the IPP program are not complete or meaningful indicators of the proliferation risk posed by weapons scientists in Russia and other countries and, therefore, do not provide sufficient information to the Congress on the program's progress in reducing the threat posed by former Soviet WMD scientists. The total number of scientists supported by IPP grants or employed in private sector jobs conveys a level of program accomplishment, but these figures are broad measures that do not describe progress in redirecting WMD expertise within specific countries or at institutes of highest proliferation concern. DOE has recognized this weakness in the IPP program metrics and recently initiated the program's first systematic analysis to understand the scope of the proliferation risk at individual institutes in the former Soviet Union. DOE believes that setting priorities for providing support to foreign institutes is necessary because (1) the economies in Russia and the other countries of the former Soviet Union have improved since the program's inception, (2) former "at-risk" institutes are now solvent, and (3) the threat of mass migration of former Soviet weapons scientists has subsided. However, DOE believes that a concern remains over the "targeted recruitment" of scientists and former WMD personnel. DOE officials briefed us on their efforts in September 2007, but told us that the analysis

is still under way, and that it would not be completed until 2008. As a result, we were unable to evaluate the results of DOE's assessment.

DOE Has Not Developed an Exit Strategy for the IPP Program, but Instead Has Expanded Efforts to Iraq and Libya and Is Using the Program to Support the Department's Global Nuclear Energy Partnership

Russian government officials, representatives of Russian and Ukrainian institutes, and individuals at U.S. companies raised questions about the continuing need for the IPP program, particularly in Russia, whose economy has improved in recent years. However, DOE has yet to develop criteria for phasing-out the IPP program in Russia and other countries of the former Soviet Union. Meanwhile, DOE is departing from the program's traditional focus on Russia and other former Soviet states to engage scientists in new countries, such as Iraq and Libya, and to fund projects that support a DOE-led initiative on nuclear energy, called the Global Nuclear Energy Partnership (GNEP).

Russian Government Officials, Russian and Ukrainian Scientists, and U.S. Industry Representatives Questioned the Continuing Need for the IPP Program

Officials from the Russian government, representatives of Russian and Ukrainian institutes, and individuals at U.S. companies who have been long-time program participants raised questions about the continuing need for the IPP program, given economic improvements in Russia and other countries of the former Soviet Union. Specifically:

- A senior Russian Atomic Energy Agency official told us in July 2007 that the IPP program is no longer relevant because Russia's economy is strong and its scientists no longer pose a proliferation risk. Additionally, in September 2006, the Deputy Head of the Russian Atomic Energy Agency stated that Russia is no longer in need of U.S. assistance, and that it is easier and more convenient for Russia to pay for its own domestic nuclear security projects.

- Officials from 10 of the 22 Russian and Ukrainian institutes we interviewed told us that they do not see themselves or scientists at their institutes as a proliferation risk. Russian and Ukrainian officials at 14 of the 22 institutes we visited told us that salaries are regularly being paid, funding from the government and other sources has increased, and there is little danger of scientists migrating to countries of concern. However, many of these officials said that they are concerned about scientists emigrating to the

United States and Western Europe, and that IPP program funds help them to retain key personnel. Furthermore, many of these officials noted that the program was particularly helpful during the difficult financial period in the late 1990s.

- Representatives of 5 of the 14 U.S. companies we interviewed told us that, due to Russia's increased economic prosperity, the IPP program is no longer relevant as a nonproliferation program in that country. Some of these company officials believe that the program should be reassessed to determine if it is still needed.

In economic terms, Russia has advanced significantly since the IPP program was created in 1994. Some of the measures of Russia's economic strength include the following:

- massive gold and currency reserves, including more than $113 billion in a stabilization fund;[14]

- a dramatic decrease in the amount of foreign debt—from about 96 percent of Russia's gross domestic product in 1999 to about 5 percent in April 2007; and

- rapid growth in gross domestic product—averaging about 6 percent per year from 1998 to 2006.

In addition, the president of Russia recently pledged to invest substantial government resources in key industry sectors, including nuclear energy, nanotechnology, and aerospace technologies and aircraft production. Many of the Russian institutes involved in the IPP program could benefit substantially under these planned economic development initiatives, undercutting the need for future IPP program support. In fact, officials at many of the Russian institutes with whom we spoke told us that they hope to receive increased government funding from these new presidential initiatives.

In another sign of economic improvement, many of the institutes we visited in Russia and Ukraine appeared to be in better physical condition

[14]Russia's Stabilization Fund was established by resolution of the Government of Russia on January 1, 2004, to serve as an important tool for absorbing excessive liquidity; reducing inflationary pressure; and insulating the economy of Russia from volatility of raw material export earnings, which was among the reasons of the Russian financial crisis in 1998.

and more financially stable, especially when compared with their condition during our previous review of the IPP program. In particular, at one institute in Russia—where during our 1998 visit we observed a deteriorated infrastructure and facilities—we toured a newly refurbished building that featured state-of-the-art equipment. Russian officials told us that the overall financial condition of the institute has improved markedly because of increased funding from the government as well as funds from DOE. In addition, one institute we visited in Ukraine had recently undergone a $500,000 renovation, complete with a marble foyer and a collection of fine art. Furthermore, we found that many institutes we visited have been able to develop commercial relationships with Russian, U.S., and other international companies on their own—outside of the IPP framework—leading to increased revenues and commercial opportunities. For example, officials at one Russian institute met with us immediately following their successful negotiation of a new contract for research and development activities with a large international energy company. However, DOE officials noted that the economic recovery throughout Russia has been uneven, and that DOE believes there are many facilities that remain vulnerable. Even so, DOE officials told us that their intent is to reorient the IPP program from assistance to cooperation, especially in Russia, given the recent improvements in that country's economy.

DOE Has Not Developed Criteria to Determine When Individuals or Institutes Should No Longer Receive IPP Funding

DOE has not developed an exit strategy for the IPP program, and it is unclear when the department expects that the program will have completed its mission. DOE officials told us in September 2007 that they do not believe that the program needs to develop an exit strategy at this time. However, DOE officials acknowledged that the IPP program's long-term goal of finding employment for 17,000 WMD scientists in Russia and other countries does not represent an exit strategy.

DOE has not developed criteria to determine when scientists, institutes, or countries should be "graduated" from the IPP program, and DOE officials believe that there is a continued need to engage Russian scientists. In contrast, State has already assessed participating institutes and developed a strategy—using a range of factors, such as the institute's ability to pay salaries regularly and to attract funding from other sources—to graduate certain institutes from its Science Centers program. State and DOE officials told us that the Science Centers and IPP programs are complementary and well-coordinated. However, we found that the programs appear to have different approaches regarding continued U.S. government support at certain institutes. Specifically, DOE is currently supporting 35 IPP projects at 17 Russian and Ukrainian institutes that

State considers to already be graduated from its Science Centers program and, therefore, no longer in need of U.S. assistance. For example, according to State documents, beginning in fiscal year 2003, State considered the Kurchatov Institute to be graduated from its Science Centers program and, according to the Deputy Executive Director of ISTC, the institute is financially well-off and no longer needs U.S. assistance. However, we found that since fiscal year 2003, DOE has funded 6 new IPP projects at the Kurchatov Institute and a related spin-off company. DOE officials acknowledged that coordination between State and DOE's scientist assistance programs could be improved.

Part of State's exit strategy involves enhancing commercial opportunities at some institutes through the Commercialization Support Program. This program, which began in October 2005, is administered by ISTC with funding from the United States, through State's Science Centers program. State aims to facilitate and strengthen long-term commercial self-sustainability efforts at institutes in Russia and other countries by providing training and equipment to help them bring commercially viable technologies to market through the Commercialization Support Program. According to ISTC officials, 17 commercialization initiatives at institutes in Russia have been supported through the program, 2 of which were completed as of July 2007. DOE, State, and ISTC officials told us the IPP program and the Commercialization Support Program have a similar goal of finding commercial opportunities for weapons scientists in Russia and other countries of the former Soviet Union. According to ISTC officials, a key difference in the programs is that the Commercialization Support Program can support infrastructure upgrades at foreign institutes, but, unlike the IPP program, it is not used to support research and development activities. DOE and State officials insisted that the programs are complementary, but acknowledged that they need to be better coordinated.

DOE Expanded IPP Efforts to Iraq and Libya and Is Working with Its Global Nuclear Energy Partnership to Maintain the IPP Program's Relevance

DOE recently expanded its scientist assistance efforts on two fronts: DOE began providing assistance to scientists in Iraq and Libya, and the IPP program is working with DOE's Office of Nuclear Energy to develop IPP projects that support GNEP—a DOE-led international effort to expand the use of civilian nuclear power. These new directions represent a significant departure from the IPP program's traditional focus on the former Soviet Union. According to a senior DOE official, the expansion of the program's scope was undertaken as a way to maintain its relevance as a nonproliferation program.

DOE has expanded the IPP program's efforts into these new areas without a clear mandate from the Congress and has suspended parts of its IPP program guidance for implementing projects in these new areas. Specifically:

- Although DOE briefed the Congress on its plans, DOE officials told us that they began efforts in Iraq and Libya without explicit congressional authorization to expand the program outside of the former Soviet Union. In contrast, other U.S. nonproliferation programs, such as Defense's Cooperative Threat Reduction program, sought and received explicit congressional authorization before expanding their activities to countries outside of the former Soviet Union. DOE officials told us they plan to ask the Congress to include such language in future legislation.

- In Libya, DOE is deviating from IPP program guidance and its standard practice of limiting the amount of IPP program funds spent at DOE's national laboratories for project oversight to not more than 35 percent of total expenditures.

- Regarding efforts to support GNEP, DOE has suspended part of the IPP program's guidance that requires a U.S. industry partner's participation, which is intended to ensure IPP projects' commercial potential.

Iraq

Since 2004, DOE has been working to identify, contact, and find employment for Iraqi scientists in peaceful joint research and development projects. DOE's efforts were undertaken at the request of State, which has overall responsibility for coordinating nonproliferation activities and scientist assistance efforts in Iraq. DOE and State coordinate their activities through regular meetings and correspondence, participation in weekly teleconferences, interagency proposal review meetings, and coordination on strategic planning and upcoming events. Through May 2007, DOE had spent about $2.7 million to support its activities in Iraq. DOE has approved 29 projects, the majority of which are administered by Sandia National Laboratories. These include projects on radon exposure, radionuclides in the Baghdad watershed, and the development of salt tolerant wheat strains. However, owing to the uncertain security situation in Iraq, DOE and national laboratory officials told us that these are short-term projects. Sandia National Laboratory officials acknowledged that most of the projects DOE is funding in Iraq have no commercialization potential.

Libya

Similarly, DOE expanded its efforts to Libya at the request of State.[15] DOE spent about $934,000 through May 2007 to support 5 projects in Libya, including projects involving water purification and desalination. However, DOE is deviating from its IPP program guidance and standard practices by placing no restrictions on the amount of IPP program funds that can be spent at DOE national laboratories for oversight of these projects. DOE limits spending at the national laboratories for IPP projects in all other countries to comply with section 3136(a)(1) of the *National Defense Authorization Act for Fiscal Year 2000*, which states the following: "Not more than 35 percent of funds available in any fiscal year after fiscal year 1999 for the IPP program may be obligated or expended by the DOE national laboratories to carry out or provide oversight of any activities under that program." DOE officials acknowledged that more than 35 percent of IPP program funds for projects in Libya have been and will continue to be spent at the national laboratories. We found that through May 2007, DOE spent about $910,000 (97 percent) at the national laboratories, while spending about $24,000 (3 percent) in Libya. In a written response to us on September 7, 2007, DOE noted that the IPP program "will continue to operate in Libya on this basis [i.e., spending more than 35 percent of funds at the DOE national laboratories], while working with our legislative office to eliminate any perceived ambiguities [in the law]." DOE informed us on October 24, 2007, that these efforts are currently under way.

DOE officials estimate that about 200 scientists in Libya have WMD knowledge and pose a proliferation risk. However, in contrast with its activities in Russia and other countries, DOE's focus in Libya is not on engaging individual weapons scientists, but rather on converting former WMD manufacturing facilities, because, according to DOE, the Libyan government has made clear that it will continue to pay the salaries of its former WMD scientists and engineers. In collaboration with State, DOE is working to help scientists at Tajura, formerly the home of Libya's nuclear research center, set up and transition to research in seawater desalination and analytical water chemistry. DOE and State coordinate on strategic planning for and implementation of scientist engagement efforts in Libya. According to State, coordination mechanisms include regular e-mail correspondences, weekly interagency and laboratory teleconferences, and

[15]Launched in March 2004, State's Libya Scientist Engagement Program aims to reduce the risk of WMD expertise proliferation and, simultaneously, demonstrate Libya's return to the international community by supporting the transition of former Libyan weapons scientists to civilian careers that will enhance Libya's economic development.

quarterly meetings. DOE officials told us they plan to complete their efforts in Libya by 2009.

Global Nuclear Energy Partnership

In fiscal year 2007, DOE also expanded the efforts of the IPP program to provide support for GNEP—a DOE-led international effort to expand the use of civilian nuclear power.[16] In October 2006, a senior DOE official told us that the department planned to use IPP projects to support GNEP as a way to maintain the program's relevance as a nonproliferation program. On December 13, 2006, the IPP program office brought together national laboratory experts to propose new IPP projects that could support GNEP. Currently, six active or approved IPP projects are intended to support GNEP. According to IPP program officials, DOE's Office of Nuclear Energy and Office of Science will be providing some funding to three of these projects.[17] According to DOE officials, because these funds will come from other DOE offices and programs, they would not be subject to congressionally mandated limitations on the percentage of IPP program funds that can be spent at DOE national laboratories. As a result, DOE officials told us they plan to use funding provided by the Office of Nuclear Energy and the Office of Science to increase the amount spent at DOE national laboratories for technical review and oversight of GNEP-related IPP projects.

DOE has suspended some key IPP program guidelines, such as the requirement for a U.S. industry partner, for IPP projects intended to support GNEP. DOE officials told us that most GNEP-related IPP projects do not have immediate commercial potential, but could attract industry in the future. Furthermore, they said that GNEP-related IPP projects are essentially collaborative research and development efforts between Russian institutes and DOE national laboratories. DOE has yet to develop separate written guidance for GNEP-related IPP projects, but told us it is planning to do so. As a result, national laboratory officials we interviewed

[16]GNEP, which is managed by DOE's Office of Nuclear Energy, is part of the department's Advanced Energy Initiative and seeks to develop worldwide consensus on enabling expanded use of nuclear energy to meet growing electricity demand. GNEP would achieve its goal by having nations with secure, advanced nuclear capabilities provide fuel services—fresh fuel and recovery of used (spent) fuel—to other nations that agree to employ nuclear energy for power generation purposes only.

[17]Specifically, the Office of Nuclear Energy plans to provide $600,000 to two projects ($300,000 per project) dealing with spent fuel disposition, and the Office of Science plans to provide funds of an amount yet to be determined for one project dealing with the environmental consequences of spent fuel storage.

told us that implementing procedures for GNEP-related IPP projects has been piecemeal and informal, which has created some confusion about how these projects will be managed and funded.

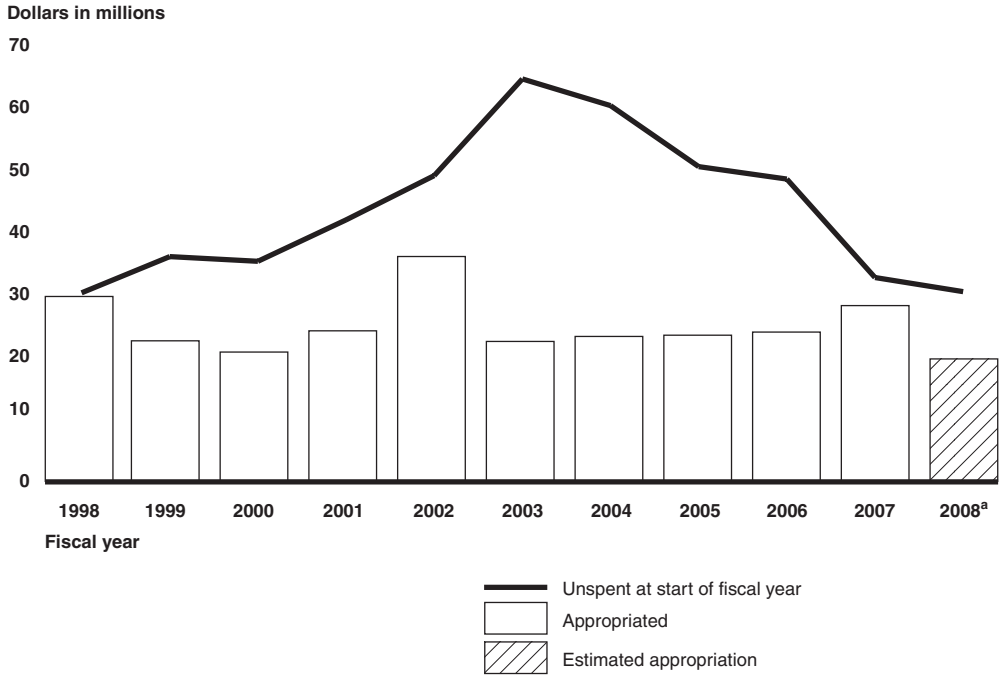
Multiple DOE and Contractor Reviews and Delays in Project Implementation Contribute to the IPP Program's Large Balances of Unspent Program Funds

In every fiscal year since 1998, DOE has carried over unspent funds in excess of the amount that the Congress provided for the IPP program, primarily because of DOE and its contractors' lengthy and multilayered review and approval processes for paying former Soviet weapons scientists for IPP-related work and long delays in implementing some IPP projects. DOE and national laboratory officials told us they are attempting to improve financial oversight over the IPP program, in part, to address concerns about unspent program funds. To that end, DOE is developing a new program management system, which it expects to fully implement in 2008—14 years after the start of the program.

DOE Has Carried Over Unspent Funds Greater Than the Amount the Congress Has Allocated to the IPP Program Each Fiscal Year since 1998

Since fiscal year 1994, DOE has spent about $309 million to implement the IPP program, but has annually carried over large balances of unspent program funds. DOE officials have recognized that unspent funds are a persistent and continuing problem with the IPP program. Specifically, in every fiscal year after 1998, DOE has carried over unspent funds in excess of the amount that the Congress provided for the program the following year. For example, as of September 2007, DOE had carried over about $30 million in unspent funds—$2 million more than the $28 million that the Congress had appropriated for the IPP program in fiscal year 2007. In fact, as figure 1 shows, for 3 fiscal years—2003 through 2005—the amount of unspent funds was more than double the amount that the Congress appropriated for the program in those fiscal years, although the total amount of unspent funds has been declining since its peak in 2003.

Figure 1: Appropriations and Unspent Balances for the IPP Program from Fiscal Years 1998 through 2008



Source: GAO analysis of DOE data.

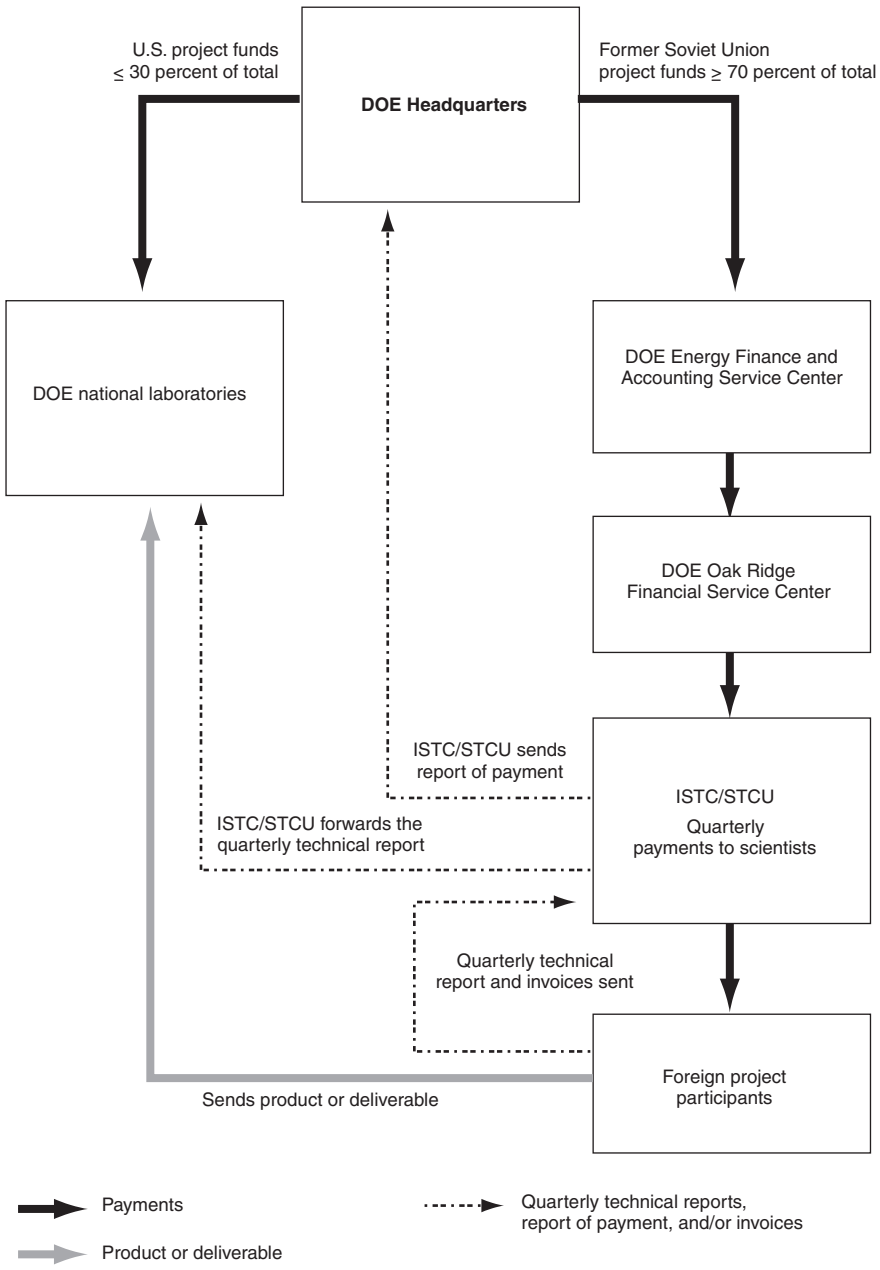
[a]As of November 30, 2007, DOE is operating under a continuing resolution. As a result, we used projected IPP program budget data, which DOE officials provided to us in May 2007, to estimate the fiscal year 2008 appropriation for the IPP program shown in this figure.

The IPP Program's Persistent Annual Unspent Balances Have Resulted Primarily from Multiple Layers of Review and Delays in Project Implementation

Two main factors have contributed to DOE's large and persistent carryover of unspent funds: the lengthy and multilayered review and approval processes DOE uses to pay IPP project participants for their work, and long delays in implementing some IPP projects. DOE identified three distinct payment processes that it uses to transfer funds to individual scientists' bank accounts in Russia and other countries—ISTC/STCU, CRDF subcontract, and CRDF master contract. These three processes involve up to seven internal DOE offices and external organizations that play a variety of roles, including reviewing project deliverables, approving funds, and processing invoices. DOE officials told us that these processes were originally introduced to ensure the program's fiscal integrity, but they agreed that it was time to streamline these procedures.

Regarding the first payment process, as figure 2 illustrates, before payment reaches project participants' bank accounts, it passes from DOE headquarters (which includes the IPP program office and NNSA's Budget Office), through DOE's Energy Finance and Accounting Service Center, which records the obligation of funds. DOE then transfers funding to the Oak Ridge Financial Service Center, which pays the invoice by transferring funds to ISTC or STCU. The funds arrive at ISTC or STCU, which disburses them in quarterly payments to IPP project participants, upon receipt of project invoices, quarterly technical reports, and documentation from the participating former Soviet Union institutes that deliverables were sent to the national laboratories. However, DOE and national laboratory officials told us that this payment process has limitations. Specifically, these officials told us that if there is a problem with a deliverable, it is usually too late for DOE or the participating national laboratory to request that ISTC or STCU stop the payment to the project participants for the current quarter.

Figure 2: ISTC/STCU Payment Process



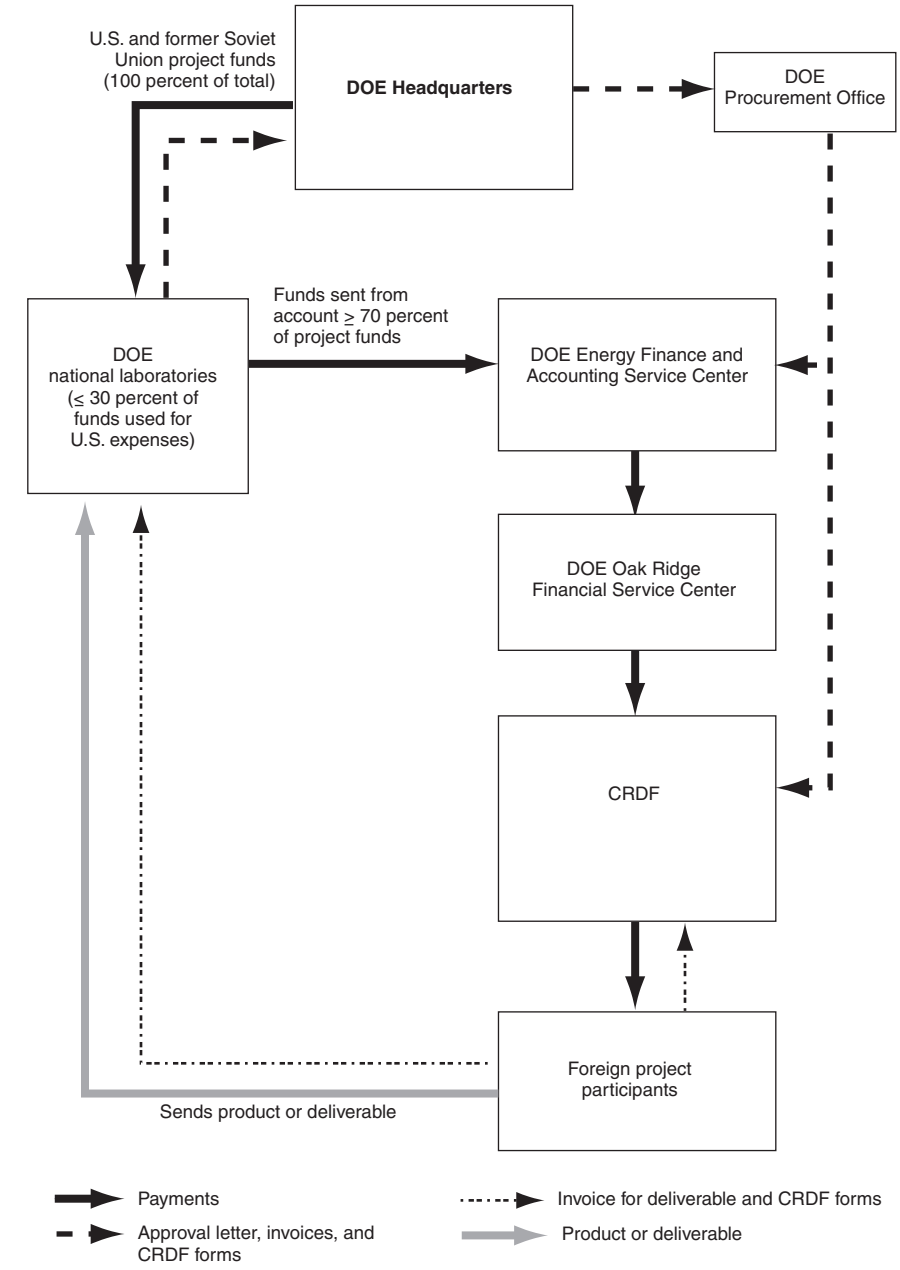
Source: GAO analysis of DOE data.

The other two processes that DOE uses to make payments to IPP project participants involve CRDF. In most cases, DOE administers the CRDF payment process through a subcontract with the participating national laboratory. In some rare cases, DOE contracts directly with foreign institutes through a CRDF "master contract."[18] For projects that use CRDF to process payments, the entire amount of project funding is first transferred to the participating national laboratory, where it is placed in two separate accounts. The first account consists of no more than 30 percent of project funding for oversight costs incurred by the national laboratory. The second account has all funding for the foreign project participants, which is at least 70 percent of project funding.

As figure 3 illustrates, before IPP project participants receive payment from CRDF, invoices and approvals of deliverables from the national laboratories, as well as CRDF forms, are sent to DOE headquarters for approval. DOE headquarters reviews the invoices against the contract and, if the amounts match, approves them and sends documentation to the DOE Procurement Office. DOE headquarters also notifies the participating national laboratory of its approval, and the laboratory sends the funds listed on the invoices to DOE's Energy Finance and Accounting Service Center. The DOE Procurement Office approves payment on project invoices and notifies CRDF and DOE's Energy Finance and Accounting Service Center that payments should be made. Funds are then transferred from the Energy Finance and Accounting Service Center to the Oak Ridge Financial Service Center and then to CRDF. Once CRDF has received the funds and the necessary approvals from DOE, it makes payments to the project participants' bank accounts.

[18]According to DOE officials, CRDF "master contracts" between DOE and foreign institutes were only used for 12 projects and are being phased out. The process is very similar to the CRDF subcontract process shown in figure 3.

Figure 3: CRDF Payment Process



Source: GAO analysis of DOE data.

DOE officials acknowledged the enormity of the problem that the lag time between the allocation of funds, placement of contracts, and payment for deliverables creates for the IPP program and told us they are taking steps to streamline their payment processes. In addition, Russian and Ukrainian scientists at 9 of the 22 institutes we interviewed told us that they experienced delays in payments ranging from 3 months to 1 year. Among the 207 projects we reviewed, we found several examples of payment delays. For example:

- In one project on the development and testing of a device to detect hidden explosives, the Lawrence Livermore National Laboratory official who heads the project told us that the U.S. industry partner had to pay Russian scientists' salaries until IPP funding could be released. Lawrence Livermore officials involved in this project noted that delays in payments to project participants slowed the project's completion.

- Officials at another Russian institute told us about two projects that experienced payment delays. On the project to develop nuclear material container security devices, they had shipped a deliverable to Sandia National Laboratories in October 2006, but it took more than 4 months for them to receive payment. On the project to produce a new computer modeling code for use in Russian nuclear reactor simulators, Russian institute officials told us payments were delayed 3 to 4 months. Officials said that when they asked Brookhaven National Laboratory officials about the delay, they were told it was due to DOE's complex payment processing systems.

Delays in implementing some IPP projects also contribute to DOE's large and persistent carryover of unspent funds. According to officials from U.S. industry partners, national laboratories, and Russian and Ukrainian institutes, some IPP projects experience long implementation delays. As a result, project funds often remain as unspent balances until problems can be resolved. For example, the ILAB representative from the Argonne National Laboratory told us that, in his experience, IPP projects do not finish on schedule about 60 percent of the time owing to a variety of problems. These problems include implementation issues due to administrative problems, the withdrawal or bankruptcy of the U.S. industry partner, and turnover in key project participants. In our review of 207 IPP projects, we found several examples of projects that had experienced implementation delays. For example:

- One project to produce a low-cost artificial leg for use in developing countries had $245,000 in unspent funds as of April 2007—19 percent of

the $1.3 million DOE allocated for the project. Because a testing device needed for the project was not properly labeled when it was sent from the United States, the Russian Customs Service rejected the device. Sandia National Laboratory officials told us that this rejection had delayed project implementation for nearly 1 year.

- About 3 years into a project to create banks of chemical compounds linked with computer databases for industrial use, the project's U.S. industry partner was bought out by a larger company. The amount allocated for the project was nearly $1.4 million. The larger company lost interest in the project, and, according to the DOE project manager, the project sat idle for 3 or 4 years while DOE tried to get the company to take action. Ultimately, the project was finished 8 years after it began.

- Officials at one Russian institute we visited told us another IPP project to improve a material to help neutralize radioactive waste had experienced delays when the original U.S. industry partner went bankrupt, causing the project to be temporarily suspended. According to these officials, it took 2 years to find a new U.S. industry partner.

- Brookhaven National Laboratory officials described a delay of more than 6 months on a $740,000 project intended to develop new pattern recognition software. According to Brookhaven officials, these delays were caused by significant personnel turnover at the participating Russian institute, mostly through the loss of key personnel who found better, higher paying jobs outside of the institute.

DOE Is Implementing a New IPP Program Management System, in Part, to Address Problems with Large Balances of Unspent Funds

DOE is implementing a new system designed to better manage IPP projects' contracts and finances. DOE officials told us that this action was undertaken in response to a recommendation we made in 2005 to improve the management and internal controls at NNSA. Specifically, we recommended in our August 2005 report, among other things, that NNSA's program managers maintain quick access to key contract records, such as deliverables and invoices that relate to management controls, regardless of whether the records are located at a national laboratory or headquarters.[19] Following our 2005 report, in 2006, DOE initiated an extensive review of IPP financial and procurement procedures at participating national laboratories. DOE and national laboratory officials told us that

[19]GAO, *Nuclear Nonproliferation: Better Management Controls Needed for Some DOE Projects in Russia and Other Countries*, GAO-05-828 (Washington, D.C.: Aug. 29, 2005).

representatives from the IPP program office visited all of the participating national laboratories, except for the Kansas City Plant, and worked with each laboratory's financial department to find ways to reduce unspent funds.[20] DOE officials told us that, as a result, they were able to redirect about $15 million in unspent program funds for immediate use on existing IPP projects.

In addition, DOE officials said that they have imposed new management controls to address project delays and reduce balances of unspent funds. These controls include implementing a management reengineering plan and enforcing control mechanisms, called "sunset" provisions, which require national laboratory officials to justify continuing any IPP project that experiences an implementation delay of 6 to 8 months. DOE has also begun to implement its new Expertise Accountability Tool (EXACT), a project and information management system that it launched in October 2006. DOE expects to fully implement the EXACT system in 2008—14 years after the start of the IPP program. According to DOE officials, EXACT will allow instant sharing of IPP project data between DOE and the participating national laboratories. DOE officials believe that the EXACT system will allow the IPP program office to better monitor and oversee the progress of IPP projects at the national laboratories, including reviews of IPP project participants' WMD backgrounds and tracking unspent funds at the national laboratories.

Conclusions

In our view, the purpose and need for the IPP program must be reassessed. We believe that DOE has failed to clearly articulate the current threat posed by WMD scientists in Russia and other countries and has not adjusted the IPP program to account for the changed economic landscape in the region and improved conditions at many of the institutes involved in the program. Instead, DOE has continued to emphasize a broad strategy of engagement with foreign scientists and institutes, much as it did more than a decade ago, and it has not developed comprehensive plans for focusing on the most at-risk individuals and institutes or for developing an end-game for the program. We believe that DOE's inability to establish a clear exit strategy for the IPP program has contributed to a perception among foreign recipients that the program is essentially open-ended, represents an indefinite commitment of U.S. support, and serves as a useful

[20]According to DOE officials, the Kansas City Plant was not visited because it did not have any issues with unspent funds.

marketing tool to attract and retain young scientists who might otherwise emigrate to the United States or other western countries.

We believe that it is time for DOE to reassess the program to explain to the Congress how the program should continue to operate in the future or to discuss whether the program should continue to operate at all. Without a reassessment of the program's objectives, metrics, priorities, and exit strategy, the Congress cannot adequately determine at what level and for how long the program should continue to be supported. We believe that such a reassessment presents DOE with an opportunity to refocus the program on the most critical remaining tasks, with an eye toward reducing the program's scope, budget, and number of participating organizations.

Beyond reassessing the continuing need for the IPP program, a number of management problems are negatively affecting the program. Specifically:

- The fact that DOE has paid many scientists who claimed no WMD expertise is particularly troubling and, in our view, undermines the IPP program's credibility as a nonproliferation program. The lack of documentation of DOE's review of IPP project participants also raises concerns.

- DOE does not have reliable data on the commercialization results of IPP projects or a clear definition of what constitutes a commercially successful IPP project, preventing it from providing the Congress with a more accurate assessment of the program's results and purported benefits.

- Regarding its efforts to expand the IPP program, DOE's projects in Iraq and Libya represent a significant departure from the program's original focus on the countries of the former Soviet Union. While there may be sound national security reasons for expanding efforts to these countries, we are concerned that, unlike other federal agencies, DOE did not receive explicit authorization from the Congress before expanding its program outside of the former Soviet Union. Furthermore, in its efforts in Libya, DOE is not adhering to its own guidance restricting the percentage of IPP program funds that can be spent at DOE's national laboratories on oversight activities.

- The lack of clear, written guidance for IPP projects intended to support GNEP has led to confusion among national laboratory officials who implement the IPP program.

- Regarding the financial state of the IPP program, DOE's long-standing problem with large balances of unspent program funds raises serious

concerns about DOE's ability to spend program resources in a timely manner and about the method DOE uses to develop requests for future budgets. Reform of the complex payment system used by the IPP program to pay foreign scientists could help address some of these concerns.

- Because Russian scientists and institutes benefit from the IPP program, it seems appropriate that DOE should seek to take advantage of Russia's improved economic condition to ensure a greater commitment to jointly held nonproliferation objectives.

- The absence of a joint plan between DOE's IPP program and ISTC's Commercialization Support Program, which is funded by State, raises questions about the lack of coordination between these two U.S. government programs that share similar goals of finding peaceful commercial opportunities for foreign WMD scientists.

Recommendations for Executive Action

We recommend that the Secretary of Energy, working with the Administrator of the National Nuclear Security Administration, reassess the IPP program to justify to the Congress the continued need for the program. Such a reassessment should, at a minimum, include a thorough analysis of the proliferation risk posed by weapons scientists in Russia and other countries; a well-defined strategy to more effectively target the scientists and institutes of highest proliferation concern; more accurate reporting of program accomplishments; and a clear exit strategy for the IPP program, including specific criteria to determine when specific countries, institutes, and individuals are ready to graduate from participation in the IPP program. This reassessment should be done in concert with, and include input from, other federal agencies, such as State; the U.S. intelligence community; officials in host governments where IPP projects are being implemented; the U.S. business community; and independent U.S. nongovernmental organizations.

If DOE determines that the program is still needed, despite the increased economic prosperity in Russia and in light of the general trend toward cost-sharing in U.S. nonproliferation programs in that country, we recommend that the Secretary of Energy, working with the Administrator of the National Nuclear Security Administration, seek a commitment for cost-sharing from the Russian government for future IPP projects at Russian institutes.

To address a number of management issues that need to be resolved so that the IPP program operates more effectively, we recommend that the

Secretary of Energy, working with the Administrator of the National Nuclear Security Administration, immediately take the following eight actions:

- establish a more rigorous, objective, and well-documented process for verifying the WMD backgrounds and experiences of participating foreign scientists;
- develop more reliable data on the commercialization results of IPP projects, such as the number of jobs created;
- amend IPP program guidance to include a clear definition of what constitutes a commercially successful IPP project;
- seek explicit congressional authorization to expand IPP efforts outside of the former Soviet Union;
- for IPP efforts in Libya, ensure compliance with the statutory restriction on the percentage of IPP program funds spent on oversight activities at the DOE national laboratories to no more than 35 percent;
- develop clear and specific guidance for IPP projects that are intended to support GNEP;
- streamline the process through which foreign scientists receive IPP funds by eliminating unnecessary layers of review; and
- seek to reduce the large balances of unspent funds associated with the IPP program and adjust future budget requests accordingly.

Finally, we recommend that the Secretaries of Energy and State, working with the Administrator of the National Nuclear Security Administration, develop a joint plan to better coordinate the efforts of DOE's IPP program and ISTC's Commercialization Support Program, which is funded by State.

Agency Comments and Our Evaluation

DOE and State provided written comments on a draft of this report, which are presented in appendixes V and VI, respectively. DOE agreed with 8 of our 11 recommendations to improve the overall management and oversight of the IPP program, including augmenting the department's process for reviewing the WMD backgrounds of IPP project participants and developing more reliable data on the commercialization results of IPP projects. DOE disagreed with 2 of our recommendations and neither

agreed nor disagreed with 1 recommendation. In addition, State concurred with our recommendation to improve coordination between DOE's IPP program and ISTC's Commercialization Support Program, which is funded by State. DOE and State also provided technical comments, which we incorporated in this report as appropriate.

In its comments on our draft report, DOE raised concerns about our characterization of the IPP program's accomplishments, requirements, and goals. DOE stated that we did not acknowledge actions the department was undertaking during the course of our review and asserted that our report does not provide a balanced critique of the IPP program because we relied on an analysis of a judgmental sample of IPP projects to support our findings. DOE also disagreed with our general conclusion and recommendation that the IPP program needs to be reassessed. In addition, DOE did not concur with our recommendation that the department ensure compliance with the statutory restriction on the percentage of IPP program funds spent on oversight activities at the DOE national laboratories to no more than 35 percent. DOE neither agreed nor disagreed with our recommendation that the department seek a commitment for cost-sharing from the Russian government for future IPP projects at Russian institutes.

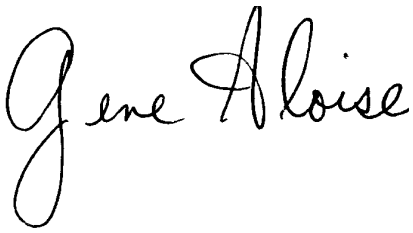
DOE is incorrect in its assertions that we failed to acknowledge actions it was undertaking during the course of our review, and that our report does not provide a balanced critique of the IPP program. Our report acknowledges actions DOE is taking to improve program management, such as the development of a new program and financial management system. Our review identified numerous problems and raised concerns about the IPP program's scope, implementation, and performance that we believe should be addressed by DOE as part of a reassessment of the IPP program. However, DOE disagreed with our recommendation that the IPP program needs to undergo such a reassessment and noted in its comments that the department believes it has already conducted such an assessment of the program. We were aware that such broad internal reviews took place in 2004 and 2006, but these assessments were conducted not of the IPP program exclusively, but rather of all DOE efforts to assist weapons scientists, including a complementary DOE program to assist workers in Russia's nuclear cities that has since been canceled. As a result, we believe these assessments are outdated because the IPP program operates under a significantly different set of circumstances today than when DOE conducted its previous internal assessments.

Finally, DOE disagreed with our recommendation that the department ensure compliance with the statutory restriction on the percentage of IPP program funds spent on oversight activities at the DOE national laboratories to no more than 35 percent. We believe DOE has misconstrued our recommendation concerning its funding of projects in Libya. We did not recommend, nor did we mean to imply, that DOE should allocate 65 percent of total project funds to Libya for projects in that country. Instead, our recommendation urges the department to ensure that it complies with existing statutory restrictions on the percentage of IPP funds that can be spent on oversight activities by DOE national laboratories. Specifically, as DOE notes, section 3136 of the *National Defense Authorization Act for Fiscal Year 2000* provides that not more than 35 percent of funds available in any fiscal year for the IPP program may be spent by DOE national laboratories to provide oversight of program activities. DOE's IPP guidance and its standard practice have been to implement this provision of law on a project-by-project basis, so that no more than 35 percent of the funds for each project are spent by national laboratories. However, with respect to projects in Libya, DOE is deviating from its IPP guidance by placing no restrictions on the amount of IPP program funds that can be spent at DOE national laboratories for oversight of projects in Libya. We found that 97 percent of funds DOE spent on projects in Libya through May 2007 were spent at DOE's national laboratories for project management and oversight. (See app. V for DOE's comments and our responses.)

As agreed with your office, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies of this report to interested congressional committees; the Secretaries of Energy and State; the Administrator, National Nuclear Security Administration; and the Director, Office of Management and Budget. We will also make copies available to others upon request. In addition, this report will be made available at no charge on the GAO Web site at http://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-3841 or aloisee@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Major contributors to this report are included in appendix VII.

Sincerely yours,



Gene Aloise
Director, Natural Resources and Environment

Appendix I: Scope and Methodology

To review the Initiatives for Proliferation Prevention (IPP) program, we interviewed key officials and analyzed documentation, such as program guidance, project proposals, and financial information from the Departments of Energy (DOE), Defense, and State (State). We also interviewed representatives from each of the 12 national laboratories—the Argonne, Brookhaven, Idaho, Lawrence Berkeley, Lawrence Livermore, Los Alamos, National Renewable Energy, Oak Ridge, Pacific Northwest, Sandia, and Savannah River National Laboratories and the Kansas City Plant—that participate in the IPP program. Our interviews focused on general program plans, strategies, and policies as well as issues associated with specific IPP projects. We also interviewed and reviewed documentation provided by the U.S. Civilian Research and Development Foundation (CRDF) in Arlington, Virginia; the International Science and Technology Center (ISTC) in Moscow, Russia; and the Science and Technology Center in Ukraine (STCU) in Kyiv, Ukraine. We analyzed cost and budgetary information from DOE, DOE's national laboratories, CRDF, ISTC, and STCU. Furthermore, we interviewed knowledgeable officials on the reliability of these data, including issues such as data entry, access, quality control procedures, and the accuracy and completeness of the data. We determined that these data were sufficiently reliable for the purposes of this review.

We visited Russia and Ukraine to discuss the implementation of the IPP program with officials and personnel involved in IPP projects. While in Russia and Ukraine, we interviewed officials from 15 Russian and 7 Ukrainian institutes that participate in the IPP program. We met with officials from the Federal Agency for Atomic Energy of the Russian Federation, which oversees institutes involved in Russia's nuclear weapons program. We also spoke with officials from the U.S. embassies in Moscow and Kyiv.

Furthermore, we interviewed officials from 14 U.S. companies that participate in the IPP program to better understand their perspectives on the program's goals, benefits, and challenges, and the results of specific projects for which they have served as industry partners. We interviewed the principal staff of the U.S. Industry Coalition, which represents companies that participate in the IPP program. We also met with 5 nongovernmental experts who have followed developments in the IPP and related nonproliferation programs to get their views on the program.

To assess the reported accomplishments of the IPP program, we judgmentally selected for in-depth review 207 IPP projects, including draft, active, inactive, and completed projects, in the Thrust 1, Thrust 2, and

Thrust 3 categories. These 207 projects represented over 22 percent of the 929 total IPP projects through September 2007. Of the projects that we reviewed, 180 were with Russia, 21 were with Ukraine, 3 were with Kazakhstan, and 3 were with Armenia.[1] Because these projects were a judgmental sample, the findings associated with them cannot be applied generally to the IPP program as a whole.

We used the IPP information system to identify and select IPP projects. This database, also referred to by DOE as the "Lotus Notes" system, was developed and maintained by the Los Alamos National Laboratory and is considered the program's project proposal management system. The system contains data on all IPP projects, from draft proposals to completed projects, and includes such information as the project description, statement of work, information on participating scientists in the former Soviet Union and the U.S. industry partner, and financial expenditures. DOE notified us that it was developing a new IPP project management database, known as the Expertise Accountability Tool (EXACT), and that some IPP project information contained in Lotus Notes—especially pertaining to project expenditures and the number of scientists supported—might not be current, accurate, or complete. However, DOE officials told us that the EXACT system was not available during our project selection phase, and that it would not contain information on completed IPP projects. As a result, we used the Lotus Notes database to make our project selection.

We selected projects on the basis of a number of criteria, such as project status, project funding, the type of institute involved in the project, geographic distribution, national laboratory representation, and the claimed commercial success of the project. We also received and used recommendations from DOE on criteria to consider in selecting projects for review.

The status and dollar size of IPP projects were significant considerations in our project selection. For example, we focused primarily on active projects—that is, Thrust 2 projects that were approved, funded, or under way—regardless of their dollar value. We also considered draft and inactive Thrust 2 projects where proposed funding was over $800,000, as

[1]Some projects involved multiple collaborating institutes and, in some cases, involved institutes in more than one country. We categorized projects by country according to the host country where the lead institute was located.

well as completed Thrust 1 and Thrust 2 projects that spent over $250,000. We also selected projects for review across a variety of institutes in the former Soviet Union, including facilities with backgrounds in nuclear, chemical, biological, and missile research and development.

The foreign countries and institutes where we planned to conduct fieldwork also played a significant role in our project selection. Time and cost constraints, as well as Russian government restrictions on access to some facilities, limited the number and types of sites we were able to visit. We concentrated on projects at institutes in Russia and Ukraine because over 90 percent of all IPP projects are in these two countries. We focused on IPP projects at institutes in the Russian cities of Moscow, Nizhny Novgorod, and Sarov because these cities ranked high in our analysis of several variables, including the total number of IPP projects, the number of projects supporting commercial activities, and the total amount of funding proposed in IPP projects in those locations.[2] We also focused on projects in the Ukrainian cities of Kyiv, because over 54 percent of IPP projects in Ukraine are there, and Kharkiv, because of its relative proximity to Kyiv and the number of projects there. We selected institutes in the Russian and Ukrainian cities for site visits on the basis of several criteria, including the total number of projects, the number of active projects, the type of institute, and the number of projects commercialized at each location.

We also selected projects administered by each of the national laboratories and the Kansas City Plant that participate in the program as well as projects managed by DOE headquarters. The selected projects included 18 projects at Argonne, 22 at Brookhaven, 8 at Idaho, 18 at Lawrence Berkeley, 33 at Lawrence Livermore, 14 at Los Alamos, 11 at National Renewable Energy, 12 at Oak Ridge, 41 at Pacific Northwest, 15 at Sandia, and 2 at Savannah River; 9 projects at the Kansas City Plant; as well as 4 projects managed by DOE headquarters.

The commercial success of an IPP project also played an important role in its selection. For example, we selected for review all 50 projects that DOE indicated as having led to commercially successful ventures identified in its *Fiscal Year 2005 IPP Program Annual Report*. We were able to review

[2]Because Sarov is a closed Russian nuclear city to which DOE officials told us we were not likely to be granted access by the Russian government, relevant IPP project managers traveled from Sarov to meet with us in Nizhny Novgorod.

48 of the 50 commercially successful projects with the sponsoring national laboratory, Russian or Ukrainian institute, or industry partner or some combination of these three entities. We also reviewed 11 IPP projects that had been identified as commercially successful in prior year annual reports, but that were not addressed in the fiscal year 2005 report.

To assess the nonproliferation impact of the IPP program, we requested and evaluated available information on the personnel at institutes in the countries of the former Soviet Union participating in the projects we selected for review. To determine the percentage of personnel without weapons of mass destruction (WMD) experience, we added the total number of project personnel who did not claim prior WMD experience—based on the WMD experience codes the project personnel self-declared to one of the three IPP payment systems—and divided this figure against the total number of project participants. We followed a similar process to calculate the percentage of older personnel versus younger personnel. We classified workers born in 1970 or later as younger workers because they were unlikely to have contributed to Soviet-era WMD programs. We also calculated the total amount of funds paid to these four different categories of participants—those claiming WMD experience, those who did not, older workers, and younger participants. In some cases, birth dates were not available for some participants in the documentation we received; in those instances, those individuals and the payments made to them were tracked in separate categories.

We collected this information by providing officials at each of the 12 participating national laboratories with a template, requesting that the laboratory project leader provide information on the personnel involved in each project in our sample, including each participant's full name, institute affiliation, date of birth, WMD experience, and amount paid under the project. In instances where we did not receive complete information from the laboratories, we used payment records and other information on IPP project participants maintained by the three payment mechanisms—CRDF, ISTC, and STCU—to complete data missing from the templates, or to reconstruct payment records for the project participants in cases where the national laboratory did not provide any information on the project participants. Because of potential data reliability concerns raised by CRDF on older IPP projects for which it processed payments, we consulted with CRDF representatives and received recommendations on specific projects that we should exclude from our analysis.

Among the 207 IPP projects we reviewed, no payments had yet been made on 42 projects and 14 projects were inactive. Of the remaining 151 IPP

projects in our sample, we determined that 54 projects were too old for evaluation, because DOE did not collect rosters of individual project participants before 2000, or that sufficient and reliable information on the project participants was not readily available. Thus, our review of the backgrounds of the participants was conducted on 97 of the 207 projects in our sample.

To assess the commercial results of IPP projects, we reviewed 48 of the 50 projects that contributed to the commercial successes presented in DOE's fiscal year 2005 annual report for the IPP program, which was the most recent report available at the time of our review. DOE provided us with the list of IPP projects associated with those commercial successes, and we reviewed and evaluated the raw data collected by the U.S. Industry Coalition for each of those projects in its 2005 commercial success survey, which DOE used as the basis for the commercial successes cited in its fiscal year 2005 IPP annual report. In addition, for the 48 commercially successful projects we reviewed, we interviewed representatives from the sponsoring national laboratory, Russian or Ukrainian institute, or industry partner or some combination of these three entities to understand the commercial activities and other details associated with these projects. Specifically, we (1) met or conducted telephone interviews with 12 companies involved in the commercially successful projects, (2) interviewed representatives at the national laboratories for 46 of the 50 projects reported to be commercially successful, and (3) visited 6 of the institutes in Russia and Ukraine where IPP projects were reported to have been commercialized.

To assess the IPP program's future, we interviewed DOE and national laboratory officials. We also assessed State's planned exit strategy for its Science Centers program. We discussed State's strategy with DOE, State, and ISTC officials. Regarding the IPP program's expansion, we met with officials and reviewed documentation from DOE, State, and the Lawrence Livermore, National Renewable Energy, and Sandia National Laboratories concerning the engagement of former weapons scientists in Iraq and Libya. Regarding the program's support to the Global Nuclear Energy Partnership, we reviewed documents and interviewed officials from the IPP program office, DOE national laboratories, and DOE's Office of Nuclear Energy.

To assess the extent to which the IPP program has had annual carryover balances of unspent funds and the reasons for such carryover, we obtained financial data from DOE's IPP program office, DOE's National Nuclear Security Administration's (NNSA) budget and finance office, and

the national laboratories participating in the program. We discussed and reviewed these data with budget and program analysts at the IPP program office and NNSA's budget and finance office. In addition, we interviewed knowledgeable officials on the reliability of these data, including issues such as data entry, access, quality control procedures, and the accuracy and completeness of the data. We determined that these data were sufficiently reliable for the purposes of this review.

We conducted our review from October 2006 through December 2007 in accordance with generally accepted government auditing standards.

Appendix II: Additional Information on the Russian and Ukrainian Institutes That We Included in Our Fieldwork

During our review of the DOE's IPP program, we interviewed officials from 15 institutes in Russia and 7 in Ukraine in July 2007.

Russian Institutes

In July 2007, we met with Russian scientists and officials from institutes in Moscow, Nizhny Novgorod, Pushchino, and Troitsk, Russia, to discuss draft, active, inactive, and completed IPP projects.

Center for Ecological Research and BioResources Development

The Center for Ecological Research and BioResources Development was established in 2000 through a $1.5 million grant from the IPP program. It focuses on the discovery of novel bioactive compounds, biodiversity collection and identification, and environmental bioremediation. The center comprises 9 research institutes and is connected with 30 laboratories, with about 300 scientists. The center's role is to coordinate the activities of the member institutes, organize workshops and visits, consult on the administration of IPP projects, provide report editing and translation, perform financial reporting and examinations, and export biomaterials to the United States and elsewhere. The center has shipped over 50,000 biological samples. We discussed 5 IPP projects, including 2 completed, 2 active, and 1 draft project. When we discussed IPP projects with the center, representatives from 2 partner institutes—the Institute of Biochemistry and Physiology of Microorganisms and the Scientific Center for Applied Microbiology and Biotechnology—were also present.

Gamaleya Scientific Research Institute of Epidemiology and Microbiology

The Gamaleya Scientific Research Institute of Epidemiology and Microbiology was founded in 1891 for research into infectious diseases in humans and manufactures more than 40 different pharmaceutical products, including a tuberculosis vaccine. Gamaleya officials told us that the institute employs 800 staff, including 120 scientists and 680 technicians and administrative personnel. We visited the institute during our first audit of the IPP program in 1999. We spoke with Gamaleya officials about 3 completed IPP projects. The institute is involved in marketing a veterinary drug and is just starting to market an antiparasite drug for honeybees. The third project is expected to produce a marketable product in 2 to 3 years.

Institute for Nuclear Research of the Russian Academy of Sciences

The Institute for Nuclear Research of the Russian Academy of Sciences, with branches in Moscow and Troitsk, was founded in 1970 to further development of fundamental research activities in the field of atomic, elementary particle, and cosmic ray physics and neutrino astrophysics.

The institute, with a staff of about 1,300 specialists, was formed from 3 nuclear laboratories of the P.N. Lebedev Institute of Physics of the former Soviet Union's National Academy of Sciences. About 600 people work in the Troitsk branch of the institute. We spoke with institute officials at this branch about 5 IPP projects—4 completed and 1 active. During the first audit of DOE IPP programs, in 1999, we visited the Moscow branch of this institute.

Institute of Applied Physics of the Russian Academy of Sciences

The Institute of Applied Physics of the Russian Academy of Sciences in Nizhny Novgorod became an independent research facility in 1977. During this time, its primary focus was working with transmitting and detecting waves through different matters; in practical terms, this included work for the Soviet military on radar tracking of missiles and supporting Russian missile defense, materials science applications in radioelectronic equipment, and submarine detection using radar. Institute officials told us that since the beginning of the 1990s, the institute has reduced its staff from about 2,000 employees, to roughly 1,100. However, it has retained a large number of top-level researchers despite the fact that defense orders plummeted to zero. Officials told us that the institute was in good shape today, has adapted to the changing environment, and has created several successful spin-off companies. We discussed 4 IPP projects with institute officials—1 completed, 1 active, and 2 draft.

Institute of Biochemistry and Physiology of Microorganisms

The Institute of Biochemistry and Physiology of Microorganisms is 1 of 4 research institutes that make up the Center for Ecological Research and BioResources Development. This institute is not a weapons institute and never had a role in the Soviet biological weapons program. However, institute officials noted that some scientists at the institute had come from other institutes that were involved in biological warfare research. The institute is home to the "All Russia Biological Culture Collection." We discussed 3 IPP projects—1 completed, 1 active, and 1 draft—with officials from the institute. These were 3 of the 4 IPP projects we discussed at the Center for Ecological Research and BioResources Development.

Institute of General Physics of the Russian Academy of Sciences

The Institute of General Physics of the Russian Academy of Sciences was founded in 1983 by Nobel Prize winner Academician A.M. Prokhorov, who headed it until 1998 and now serves as the institute's honorary director. The institute began as Division "A" of the Lebedev Physical Institute. It currently consists of 13 research departments and 5 research centers: (1)

natural sciences, (2) laser materials and technologies, (3) wave research, (4) fiber optics, and (5) physical instrumentation. The institute has a staff of 1,264, including 600 researchers. Its principal research areas encompass quantum electronics and optics, solid state physics, micro- and nanoelectronics, integral and fiber optics, plasma physics and photoelectronics, radio physics and acoustics, laser medicine, and ecology. We discussed 6 IPP projects with institute officials—4 completed and 2 active.

Krasnaya Zvezda (Red Star)

Krasnaya Zvezda was established in 1972 to combine other organizations that employed designers, developers, and manufacturers of space-based nuclear power systems. Krasnaya Zvezda officials told us that they continue to do some defense-related work. However, the institute now mostly focuses on the civilian sector and work on civilian nuclear energy projects, including radioactive waste management at civilian nuclear power plants. The financial situation has been relatively steady over the past years and officials anticipate that with the reorganization of the Federal Agency for Atomic Energy of the Russian Federation, Krasnaya Zvezda will be involved in many future civilian nuclear energy contracts. Krasnaya Zvezda maintains a close relationship with the Kurchatov Institute. We discussed 5 IPP projects—
3 completed and 2 draft—with Krasnaya Zvezda officials.

Kurchatov Institute

The Kurchatov Institute is one of Russia's leading nuclear research institutes. Through the mid-1950s, defense activities represented more than 80 percent of the institute's budget. By 1965, the defense portion had been reduced to about 50 percent, and, although Kurchatov has scientists who were involved with nuclear weapons programs in the past, today there are virtually no defense-related contracts. The institute conducts research on controlled thermonuclear fusion, plasma physics, solid state physics, and superconductivity. It designs nuclear reactors for the Russian Navy, the Russian icebreaker fleet, and space applications. Nuclear experts from the Kurchatov Institute have helped set up and operate Soviet-exported research reactors, including one at Libya's Tajura nuclear research center. In addition, the Kurchatov Institute is the subcontractor for DOE's Material Protection, Control, and Accounting program with the Russian Navy and icebreaker fleet. We discussed 10 IPP projects with Kurchatov officials—7 completed and 3 active. In 1999, we visited the Kurchatov Institute during our first audit of DOE's IPP program.

Moscow State University

One of the oldest Russian institutions of higher education, Moscow State University was established in 1755. According to DOE and national laboratory officials, Moscow State University departments of physics, chemistry, and biology were involved in research related to WMD. Specifically, according to DOE, when the Soviet Ministry of Defense needed certain expertise or research done, it called upon individuals at academic institutions, such as Moscow State University. We discussed 1 project DOE subsequently canceled and 1 draft IPP project with Moscow State University officials.

Radiophysical Research Institute

The Radiophysical Research Institute of the Ministry of Education and Science was founded in 1956 in Nizhny Novgorod. Since then outreach efforts have been directed toward (1) supporting research in the fields of natural sciences and astronomy and (2) expanding interest in research work in such areas as astronomy, solar physics, the relationship between the Sun and the Earth, and the associated geophysics. We spoke with an official from the Radiophysical Research Institute, who was present during our interview with officials from the Scientific Research Institute of Measuring Systems. We discussed 1 project that ended in 2002 with this official.

Scientific Research Institute of Measuring Systems

The Scientific Research Institute of Measuring Systems in Nizhny Novgorod, Russia, was established in 1966 to develop and produce electronics to support industry enterprises, including nuclear power plants as well as nuclear research and developments. Today, the institute researches, designs, and manufactures computer and semiconductor equipment, mostly for use in the Russian energy industry. The institute also develops and manufactures software and control systems for gas lines, and thermal and nuclear power stations. We discussed 3 IPP projects with officials—1 active and 2 completed projects.

Afrikantov Experimental Machine Building Design Bureau

The State Unitary Enterprise I.I. Afrikantov Experimental Machine Building Design Bureau was founded in 1947 as a component of the Gorky Machine Building Plant Design Bureau to create equipment for nuclear industry. Later, as the mission expanded to the creation of various nuclear reactors, the design bureau was separated from the Gorky Machine Building Plant. Currently, the Afrikantov Experimental Machine Building Design Bureau employs about 3,400 staff and is one of the lead design organizations in the industry, supporting a large scientific and production center for nuclear power engineering. Since the 1960s, the institute has

been the chief designer of ship-based reactor plants and fast neutron reactors. One of the institute's significant achievements is the creation of innovative integral reactors with natural and forced coolant circulation. The institute actively participates in the creation of nuclear power installations abroad and has scientific and technical cooperative arrangements with the International Atomic Energy Agency, and national laboratories and companies in China, France, India, Japan, South Korea, and the United States. We discussed 2 draft IPP projects with officials from the institute.

Soliton-NTT Research Center

Soliton is a private company that was spun off from the Kurchatov Institute in the early 1990s. Soliton was formed by scientists from the Kurchatov Institute to convert defense technologies to civil purposes and to commercialize these technologies. Before working for Soliton, many Soliton employees were involved in weapons-related activities at the Kurchatov Institute, and most still retain some ties to Kurchatov. Soliton has official permission to use scientists from other institutes as part of the effort to commercialize former weapons laboratories. Soliton was organized so that small-scale nonweapons projects could be undertaken using the talents of several weapons scientists from a variety of institutes. We discussed 6 IPP projects with Soliton officials—5 completed and 1 active.

Russian Federal Nuclear Center—All-Russian Scientific Research Institute of Experimental Physics

In 1946, the Soviet government established the All-Russian Scientific Research Institute of Experimental Physics in Sarov, where the first Soviet nuclear bomb was designed and assembled. In Soviet times, the institute's mission included the design of nuclear warheads and the development of experimental and prototype warheads. Today, the safety and reliability of the Russian nuclear stockpile are the institute's primary missions. According to information provided by the institute, since 1990, it has increasingly developed international collaboration in unclassified science and technology areas. The institute employs about 24,000 people, approximately half of whom are scientists or engineers, and is the largest research institution in Russia that successfully handles defense, science, and national economic problems. Under the current nuclear testing moratorium, nuclear weapons research and development activities are concentrated at computational and theoretical, design, and test divisions of the institute. During our earlier audit of DOE's IPP program, we interviewed officials from this institute in 1998. We discussed 10 IPP projects—5 active and 5 completed—with institute officials.

Zelinsky Institute of Organic Chemistry

The Zelinsky Institute of Organic Chemistry of the Russian Academy of Sciences, founded in 1934, is one of the world's largest scientific centers in the fields of organic chemistry, organic catalysis, and chemistry of biologically active compounds. It employs about 600 people, although it had over 1,300 at its peak in the 1980s. In addition, about 150 students are engaged in graduate studies at the institute. Officials told us that until the early 1990s, the institute was involved in some defense-related activities, but it has not been involved in any WMD-related work since the early 1990s. The institute mostly worked on research related to high explosives and solid rocket fuel (not chemical weapons). We discussed 3 IPP projects—2 completed and 1 canceled—with institute officials.

Ukrainian Institutes

While in Ukraine, we met with representatives from 7 institutes based in Dnipropetrovsk, Kharkiv, and Kyiv and discussed 18 IPP projects with scientists and institute officials.

E.O. Paton Electric Welding Institute

The E.O. Paton Electric Welding Institute was founded in 1934, and has become one of the largest research institutes in the world, with about 8,000 employees (3,000 at the headquarters in Kyiv). The institute is a multidisciplinary scientific and technical complex involved in fundamental and applied research in the field of welding and related technologies; development of technologies, materials, equipment, and control systems; rational welded structures and parts; and methods and means for diagnostics and nondestructive testing. The institute undertakes research in all phases of electric welding and certain specialized related processes, such as brazing, explosive forming, electrometallurgy, and friction welding. The institute's work covers welding of virtually all metals and alloys as well as ceramics in thicknesses varying from submicron to tens of centimeters. The institute also develops welding equipment, manufactures pilot plants, and develops welding consumables. We discussed 7 IPP projects—4 completed and 3 active—with E.O. Paton officials and Pratt and Whitney Kyiv employees at 3 Paton facilities in Kyiv.

International Center for Electron Beam Technology

The International Center for Electron Beam Technology is a spin-off institute from the E.O. Paton Welding Institute and is located nearby in Kyiv. The center derives more than half of its funding from IPP funds and was created in the early 1990s by Paton employees specifically to take on projects with international organizations. According to institute officials, they do not receive any funding for their activities from the Ukrainian

government. However, they also told us that financially, their situation is much better than 14 years ago, but that all of their research equipment is out of date. All of the IPP funds are used to pay scientists' salaries, and they do not have other funds for new equipment. We discussed 2 IPP projects—1 completed and 1 active—during the interview.

Institute for Metal Physics

The Institute for Metal Physics is part of the Ukrainian Academy of Sciences and employs about 600 staff—about half researchers and half support staff. The number of staff is down from a peak of 1,600 in Soviet times but has been stable for the past 5 to 6 years, according to institute officials. These officials told us that during the Soviet era, about 80 percent of the institute's work was related to missile delivery systems. The institute became completely divorced from weapons work in the mid 1980s. Today, virtually all work is commercial. During our visit, we discussed 1 active IPP project.

International Institute of Cell Biology

The International Institute of Cell Biology is a nonprofit entity founded in 1992 by the Ukrainian Academy of Sciences. The International Institute of Cell Biology employs about 150 people, about one third of whom have doctorates. It is closely affiliated with the Institute of Cell Biology and Genetic Engineering, founded in 1988, and the Institute of Microbiology and Virology founded in 1928. The Institute of Cell Biology and Genetic Engineering is one of the key laboratories involved with plant genetic engineering in the former Soviet Union and offers substantial expertise in tissue culture initiation, preservation and maintenance, and gene transfer and expression. The Institute of Microbiology and Virology, with about 300 scientists, hosts the second largest collection of microorganisms in the countries of the former Soviet Union. The official we interviewed told us that the Institute of Microbiology and Virology was involved in defense efforts involving biological agents during Soviet times. Researchers from both of these institutes were involved in the International Institute of Cell Biology's work with the IPP program. The deputy director told us that there has been a significant brain drain over the years. Over the last 15 years, 50 scientists left the institute and went to western-oriented countries, such as Germany and Australia. We discussed 1 completed IPP project. However, the deputy director told us that he is planning to apply for 2 more projects in the future.

Intertek, Ltd.

Registered as a private company in 2000, Intertek, Ltd., was founded by a man who was a professor of Aircraft Engines and Technology at the

National Aerospace University in Kharkiv until 2004. We discussed an IPP project, at the draft stage, with Intertek's director and a representative from a partner institute, the State Design Office Yuzhnoye. The director told us that Intertek currently employs about 15 people and would expand to 40 if the IPP project starts up. Most of the staff would be drawn from the National Aerospace University in Kharkiv.

Kharkov Institute of Physics and Technology

Kharkov Institute of Physics and Technology, one of the oldest and largest centers for physical science in Ukraine, was created in 1928 to research nuclear and solid-state physics. The institute, located in Kharkiv, Ukraine, currently has 2,500 employees, down from about 6,500 employees before 1991. Many young specialists left during the difficult financial period of the late 1990s for Brazil, Canada, France, Germany, Israel, the Netherlands, Sweden, the United Kingdom, and the United States. Institute officials are not aware of any specialists who have either left Ukraine for a country of concern or provided any information to such a country. Since 2004, the institute has been under the Ukrainian Academy of Sciences and is Ukraine's lead organization on scientific programs for nuclear and radiation technologies. The institute's economic condition has significantly improved over the past 10 years. It is receiving more direct funding from the Ukrainian federal budget and also receives grants from U.S. and European programs. Assistance partners include STCU and IPP. IPP funding makes up no more than 2 percent of the total budget. We discussed 6 IPP projects—1 draft, 2 active, and 3 completed—with institute officials.

State Design Office Yuzhnoye

The State Design Office Yuzhnoye in Dnipropetrovsk was founded in 1954 for researching and engineering space and rocket technology. The institute has designed and manufactured many varieties of ballistic missile complexes, and designed and launched 70 types of spacecraft. Once Ukraine gained its independence in 1991, Yuzhnoye, the sole Soviet missile design facility located outside of the Russian Federation, discontinued its work on ballistic missiles. However, since 1994, Yuzhnoye personnel, under a contract with the Russian Strategic Rocket Forces, have continued to provide a wide range of services aimed at extending the service life of those missile complexes still in use. In addition, the institute has diversified its production to include agricultural machinery, such as combines; a line of food processing accessories; and trolleys. We met with an official from Yuzhnoye during our interview with Intertek, Ltd., and discussed 1 draft IPP project on which the 2 institutes are collaborating.

Appendix III: Classification Systems Used to Assess IPP Project Participants' Knowledge of Weapons of Mass Destruction

This appendix provides information on the classification systems DOE and the three entities that make IPP project payments to recipients in Russia and other countries use to classify the WMD expertise of the personnel participating in an IPP project.

DOE, for example, classifies personnel into one of three categories:

1. Direct experience in WMD design, production, or testing.

2. Experience in research and development of WMD underlying technology.

3. No WMD-relevant experience.

DOE also requires that a preponderance of staff working on its projects have had WMD-relevant experience before 1991 (i.e., fall in categories 1 or 2 above). According to DOE, "the meaning of 'preponderance' is taken to be 60 percent, as a bare minimum. Two thirds would be better, and anything above that better still."

There is no consistent approach to categorizing the proposed project personnel by the national laboratories in the lists they submit in the proposal to DOE for review. In some cases, the proposed personnel are categorized using the DOE classifications. But in other cases, the individuals in the project proposal are classified using weapons experience codes of the intended payment mechanism. Some IPP project proposals classify personnel using both the DOE categories and the payment system codes.

Each of the three payment entities have similar but slightly different lists of weapons experience codes that personnel on an IPP project use to designate their relevant WMD background. See table 2 for the weapons codes used by CRDF, ISTC, and STCU, by general type of weapons expertise.

Table 2: CRDF, ISTC, and STCU Weapons Expertise Classification Codes

General weapons expertise category	CRDF weapons expertise codes	ISTC weapons expertise codes	STCU weapons expertise codes
Biological	C1: Design and performance of missile warheads and rockets for delivery of biological weapons C2: Biopolymer production related to biological warhead capabilities C3: Dissemination of biological weapon agents C4: Basic knowledge of biological weapons design and their effect on the human system	3.1: Design and performance of missile warheads and rockets for delivery of biological weapons 3.2: Biopolymer production related to biological warhead capabilities 3.3: Dissemination of biological weapon agents 3.4: Basic knowledge of biological weapons design and their effect on the human system	1.3: Mass destruction weapon—bacteriological
Chemical	B1: Design and performance of missile warheads and rockets for delivery of chemical weapons B2: Materials, facilities, and performance processes needed for the production of chemical weapon agents and their key precursors B3: Dissemination of chemical weapon agents B4: Basic knowledge of chemical weapons design and their effect on the human system	2.1: Design and performance of missile warheads and rockets for delivery of chemical weapons 2.2: Materials, facilities, and performance processes needed for the production of chemical weapon agents and their key precursors 2.3: Dissemination of chemical weapon agents 2.4: Basic knowledge of chemical weapons design and their effect on the human system	1.2: Mass destruction weapon—chemical
Missile/Anti-Ballistic Missile Systems	A1: Design, construction, and performance of air, space, surface, and underwater-launched missiles. Materials and technologies for these missiles. Production of engines, fuels, composites, integrated elements, radioelectronic equipment, and different testing devices for missiles A2: Techniques for guidance and control of missiles from launching to impact. Includes optical guidance, television guidance, wire guidance, present and terminal guidance, internal guidance, command guidance, and homing guidance A3: Missile handling and launching, including transportation, storage, and preparation for launching; air, space, surface, and underwater launching and support equipment and technologies; checkout equipment and procedures; guided missile ranges A4: Techniques and systems for tracking missiles as defensive measures. Can be from surface installations or air and space-borne platforms	1.1: Design, construction, and performance of air, space, surface, and underwater-launched missiles. Materials and technologies for these missiles. Production of engines, fuels, composites, integrated elements, radioelectronic equipment, and different testing devices for missiles 1.2: Techniques for guidance and control of missiles from launching to impact. Includes optical guidance, television guidance, wire guidance, present and terminal guidance, internal guidance, command guidance, and homing guidance 1.3: Missile handling and launching, including transportation, storage, and preparation for launching; air, space, surface, and underwater launching and support equipment and technologies; checkout equipment and procedures; guided missile ranges 1.4: Techniques and systems for tracking missiles as defensive measures. Can be from surface installations or air and space-borne platforms	2.1: Delivery systems—missile technologies 2.2: Delivery systems—guiding systems 2.3: Delivery systems—others 3.1: Anti-Ballistic Missile systems—recognition systems 3.2: Anti-Ballistic Missile systems—guiding systems 3.3: Anti-Ballistic Missile systems—others

General weapons expertise category	CRDF weapons expertise codes	ISTC weapons expertise codes	STCU weapons expertise codes
Nuclear	D1: Basic knowledge of nuclear weapons design, construction, characteristics, and the effect on the human system	4.1: Basic knowledge of nuclear weapons design, construction, characteristics, and the effect on the human system	1.1: Mass destruction weapon—nuclear
	D2: Design, construction, and performance of missile warheads for delivery of nuclear weapons	4.2: Design, construction, and performance of missile warheads for delivery of nuclear weapons	
	D3: Design, construction, and performance of the equipment and components of Uranium and Plutonium separation	4.3: Design, construction, and performance of the equipment and components for Uranium and Plutonium separation	
	D4: Design, construction, and performance of the equipment connected with heavy water production	4.4: Design, construction, and performance of the equipment connected with heavy water production	
	D5: Design, construction, and performance of the equipment for development of detonators	4.5: Design, construction, and performance for development of detonators	
	D6: Design, construction, and performance of explosive substances and related equipment	4.6: Design, construction, and performance of explosive substances and related equipment	
	D7: Design, construction, and performance of the equipment and components for nuclear testing	4.7: Design, construction, and performance of the equipment and components for nuclear testing	
	D8: Design, construction, performance, and operation of production-type nuclear reactors for fissile and tritium-content materials production (breeding)	4.8: Design, construction, performance, and operation of production-type nuclear reactors for fissile and tritium-content materials production (breeding)	
	D9: Design, construction, and performance of nuclear reactors and units for submarine and for military space programs	4.9: Design, construction, and performance of nuclear reactors and units for submarine and for military space programs	
Other	E1: Design, construction, and performance of powerful laser facilities for military applications	5.1: Design, construction, and performance of powerful laser facilities for military applications	1.4: Mass destruction weapon—others
	E2: Design, construction, and performance of accelerator facilities for military applications in space programs	5.2: Design, construction, and performance of accelerator facilities for military applications in space programs	4: Other weapons
	E3: Other		
No Weapons Experience	No code for personnel not claiming weapons experience	No code for personnel not claiming weapons experience	0: Non-former weapon scientist

Sources: CRDF, ISTC, and STCU.

Appendix IV: IPP Projects DOE Reported to Be Commercially Successful

Table 3 provides information on the 50 IPP projects DOE indicated as contributing to commercial successes in its *Fiscal Year 2005 IPP Program Annual Report.*

Table 3: DOE Projects Listed as Contributing to Commercial Successes in DOE's *Fiscal Year 2005 IPP Program Annual Report*

Project title	Project number(s)	U.S. companies	Lead DOE national laboratory	Lead foreign institute(s)
Nanophase Powders	LANL-T2-0148-RU LANL-T2-0190-RU	Argonide Corporation	Los Alamos	Institute of Petroleum Chemistry and Institute of Strength Physics and Materials Science, Russia
Ceramic Nanofibers	NREL-T2-0200-RU NREL-T2-0200a-RU	Argonide Corporation	National Renewable Energy	Institute of Strength Physics and Materials Science, and State Research Center of Virology and Biotechnology, Russia
Positron Emission Tomography	LANL-T2-0164-RU LANL-T2-0193-RU LANL-T3-0400-RU	Technology Commercialization International	Los Alamos	Institute of Nuclear Research, Russia
Positron Emission Tomography	BNL-T2-0306-RU	Technology Commercialization International	Brookhaven	Institute of Nuclear Research, Russia
Molybdenum-99 from Solution Reactor	ANL-T2-0210A-RU	Technology Commercialization International	Argonne	Kurchatov Institute of Atomic Energy, Russia
Ferrolectric Phase Shifters for Cellular and Personal Communications Systems Phased Array Antenna	NREL-T2-0191-RU NREL-T2-0208-RU	Paratek Microwave	National Renewable Energy	St. Petersburg Electrotechnical University, Russia
Soil and Water Remediation at Contaminated Sites Using Humosorb	ORS-T2-0078-RU	Stable Earth Technology, Electro-Physical and Acoustic Technologies, Ltd.	Oak Ridge	Electro-Physical and Acoustic Technologies, Ltd., Russia
Land Mine Detectors	SNL-T2-0194-RU	Stolar Research Corporation	Sandia	Spektr-Konversia, Russia
Radar Mapping of Geologic Structures from Drills	KCP-T2-0225-RU	Stolar Research Corporation	Kansas City Plant	Measuring Systems Research Institute, Russia
Electron Beam Welding	LBNL-T1-0017-RU LBNL-T2-0110-RU LBNL-T2-0110A-RU	Phygen Corporation	Lawrence Berkeley	All-Russian Scientific Research Institute of Inorganic Materials—Siberia Branch, Institute of High Current Electronics, and Tomsk State University of Control Systems and Radioelectronics, Russia

Project title	Project number(s)	U.S. companies	Lead DOE national laboratory	Lead foreign institute(s)
Thorium Power Cycle	BNL-T2-0074-RU BNL-T2-0074a-RU BNL-T2-0074b-RU	Thorium Power Company	Brookhaven	Kurchatov Institute of Atomic Energy and Electrostal, Russia
Software Developer Training	LLNL-T2-0236-RU DOEH-T2-0003-RU	No Partner	Lawrence Livermore and DOE Headquarters	Kurchatov Institute of Atomic Energy, Russia
Copper-Beryllium Alloy	LANL-T2-0195-KZ	RWE Nukem, Inc. and Brush-Wellman	Los Alamos	Ulba Metallurgical Plant, Kazakhstan
Uranium Dioxide Powder	BNL-T2-0308-KZ	RWE Nukem, Inc. and Global Nuclear Fuels	Brookhaven	Ulba Metallurgical Plant, Kazakhstan
Needleless Injectors	KCP-T2-0221-RU	Felton International, Inc.	Kansas City Plant	Chemical Automatics Design Bureau, Russia
Turbine Airfoil Repair	ORS-T2-0204-UA	Pratt and Whitney/United Technologies Corporation	Oak Ridge	Paton Electric Welding Institute, Ukraine
Unique Russian Crusher Design for Metal Recycling	ORS-T2-0107-RU ORS-T2-0180-RU	Rustec, Inc.	Oak Ridge	Association of Centers for Engineering and Automation, Russia
Stable Isotopes Carbon-13 and Oxygen-18 for Medical Applications	LLNL-T2-0234-RU	Spectra Gases	Lawrence Livermore	Kurchatov Institute of Atomic Energy, Moscow, Russia
Electrochemical Process for Removal of Heavy Metals from Wastewater	BNL-T2-0307-RU	Fenix Technology International	Brookhaven	Ural Process Engineering, Ltd., and the All-Russian Scientific Research Institute of Technical Physics, Russia
Linear Ion Source	BNL-T1-0012-RU BNL-T1-0012a-RU	No Partner	Brookhaven	Institute of Electrophysics, Russia
Step-by-Step Deformation of Metal Alloys	SNL-T1-0084-RU	No Partner	Sandia	Chelyabinsk State University of Technology, Russia
Crop Protection Products	PNNL-T2-0194-UA PNNL-T2-0195-RU	Dupont	Pacific Northwest	Ukraine Institute of Organic Chemistry, Ukraine, and Experimental Plant for the Design and Manufacturing of Scientific Equipment, Russia
Crop Protection Products	LBNL-T2-0193-RU	Dupont	Lawrence Berkeley	State Research Center of Virology and Biotechnology, Russia
Explosives Detection and Other Proton Beam Based Applications	BNL-T2-0320-RU	Brookhaven Technology Group	Brookhaven	Budker Institute of Nuclear Problems, Russia
Biodegradation of Oil Spills	PNNL-T2-0202-RU	Dye Seed Ranch	Pacific Northwest	JSC BioKhimMash, Russia
Recombinant Luciferase for Photometric Detectors	PNNL-T2-0217-RU	New Horizons Diagnostics	Pacific Northwest	Gamaleya Institute of Epidemiology and Microbiology, and Moscow State University, Russia

Project title	Project number(s)	U.S. companies	Lead DOE national laboratory	Lead foreign institute(s)
Biosensors for Detection of Neurotoxins	PNNL-T2-0203-RU	New Horizons Diagnostics	Pacific Northwest	State Research Institute of Organic Chemistry and Technology, and Moscow State University, Russia
Laser Diode Spectroscopy	BNL-T2-0318-RU	Canberra Aquila	Brookhaven	General Physics Institute, Russia
Comprehensive Asset Tracking	BNL-T2-0131-RU BNL-T2-0131a-RU BNL-T2-0131b-RU BNL-T2-0314-RU	Canberra Aquila	Brookhaven	General Physics Institute, Russia
Chemical Kinetics Software for Reactor and Process Design	PNNL-T2-0246-RU	Freescale Semiconductor, Inc.	Pacific Northwest	Kintech Kinetic Technologies, Russia[a]
Proprietary Information	One project	Not Disclosed	Pacific Northwest	Not Disclosed
Proprietary Information	Three projects	Not Disclosed	Lawrence Livermore and Pacific Northwest	Not Disclosed

Source: GAO analysis of DOE and U.S. Industry Coalition data.

[a]Kintech Kinetic Technologies is a spin-off company of the Kurchatov Institute of Atomic Energy.

Appendix V: Comments from the Department of Energy

Note: GAO comments supplementing those in the report text appear at the end of this appendix.

Department of Energy
National Nuclear Security Administration
Washington, DC 20585

NOV 2 1 2007

Mr. Gene Aloise
Director
Natural Resources and Environment
U.S. Government Accountability Office
Washington, D.C. 20548

Dear Mr. Aloise:

The National Nuclear Security Administration (NNSA) appreciates the opportunity to review the Government Accountability Office's (GAO) draft report, GAO-08-189, "NUCLEAR NONPROLIFERATION: DOE's Program to Assist Weapons Scientists in Russia and Other Countries Needs to Be Reassessed." We understand that GAO conducted this audit at the request of the House's Committee on Homeland Security to determine generally the accomplishments for the audited program.

The NNSA disagrees with the general conclusion as stated by GAO that leads to a program reassessment and justification of the program. We agree with the perceived intent of GAO that it is always important to review the goals of a program to ensure relevance. In that regard, NNSA does agree with GAO and wants to make a special note that the Global Initiatives for Proliferation Prevention (GIPP) program went through a complete justification assessment at the request of the Administrator. The Administrator has determined that the program is justified and continues to support the program to Congress as evidenced in the annual budget planning and programming cycle. In that regard we consider that we have answered GAO's basic recommendation to reassess and justify the program. With regard to the other recommendations to:

See comment 1.

Establish a more rigorous, objective, and well-documented process for verifying the WMD backgrounds and experiences of participating foreign scientists

We agree that the review process needs better documentation. We will, however, continue to include the informed judgments of our Laboratory experts, particularly those who have, or had in the past, direct access to foreign institutes and personnel.

Develop more reliable data on the commercialization results of IPP projects, such as the number of jobs created

We agree with the benefit of improved data collection. As we explained to the auditors, the metric that was used is a metric that was developed for a since terminated program. We will establish and implement a more relevant metric.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Amend IPP program guidance to include a clear definition of what constitutes a commercially successful IPP project

We will include the definition in our guidance in the future.

Seek explicit congressional authorization to expand IPP efforts outside the former Soviet Union

We are already in the process of seeking congressional authorization to expand our efforts outside the Former Soviet Union. (Note: This could also be considered a validation of the program justification).

For IPP efforts in Libya, ensure compliance with the statutory restriction on the percentage of IPP program funds spent on oversight activities at the DOE national laboratories to no more than 35%.

NNSA does not concur with this recommendation. The reasons for our disagreement were explained previously to GAO management.

Develop clear and specific guidance for IPP projects that are intended to support GNEP

NNSA agrees that it is prudent to have clear guidance when the results of one program support the goals of another. Since GNEP is an evolving initiative, it is premature for us to develop IPP project guidance. However, once the GNEP initiative is mature enough, NNSA will consider any appropriate actions that may support the GNEP initiative.

Streamline the process through which foreign scientists receive IPP funds by eliminating unnecessary layers of review.

NNSA will certainly streamline appropriately the overall process for funding foreign scientists.

Seek to reduce large balances of unspent funds associated with the IPP program and adjust future budget requests accordingly

We have reduced our uncosted balances over the past two years, with ambitious targets for the future. The Department takes this problem seriously, as evidenced by the commitment to streamlining the GIPP payment process and establishing a more detailed financial and program tracking database.

NNSA also has general comments because we do not believe that the body of this report substantiates the critical claims and observations. For example,

See comment 2.

- The GAO questions the level and number of WMD experts engaged on GIPP projects. GAO bases its analysis on responses to questions posed to officials at Russian and Ukrainian institutes. National Laboratory experts explained to GAO teams that U.S. agencies place limited weight on WMD information obtained from direct questioning of institute personnel. In fact, DOE, the State Department and the Defense Contract Audit Agency (DCAA), which GIPP brought on board in 2003 to audit projects in Russia and the FSU, agreed in 2006 that WMD-related questions are counter-productive in the course of a financial audit.

See comment 3.

- The GAO implies that DOE ignored State Department concerns about the lack of WMD expertise at a primary institute in Ukraine. As noted in the project documentation, the WMD scientist teams were drawn from other institutes involved in the project and not from the primary institute. We regret that GAO's draft report implies that State did not concur in this project, which was never the case.

See comment 4.

- The GAO states that only a minority of former Soviet project participants have WMD experience, based on review of a select number of project payment records. Financial information on all projects, obtained from GIPP's payment agents, indicates that a majority of project participants have WMD experience and have received the majority of grant payments.

See comment 5.

- The GAO describes a Russian institute that cited figures for jobs generated by a GIPP project that were much lower than GIPP numbers. Two DOE representatives present at the meeting observed GAO decline an offer by the institute to obtain further documentation, including jobs at partner institutions involved in the project. DOE has since confirmed the original GIPP numbers.

See comment 6.

- An anecdote about a lavish refurbishment of a Ukrainian institute – intended to demonstrate that GIPP is funding solvent institutes – omits that the funding was donated by a former institute scientist who became successful in the West. This information was conveyed to the GAO while the audit was taking place. We therefore find it unsettling that GAO uses this example to comment on the economic circumstances at the institute in question, or with respect to former Soviet institutes in general.

See comment 7.

- The GAO indicates that Russian and Ukrainian institute personnel state that GIPP is no longer needed. The GAO posed the question as whether institutes would prefer a scientist cooperation program that did not have a nonproliferation objective or the need to include WMD scientists. When asked this way, some institute personnel naturally stated a preference for the less restrictive alternative. However, other personnel also endorsed GIPP as a nonproliferation program. We regret that this and other endorsements of GIPP as a nonproliferation program were excluded from the draft report, and we believe that the report's objectivity suffers as a result.

The Department is also concerned with the GAO's inaccurate portrayal of GIPP requirements. For example:

See comment 8.

- The GAO notes that GIPP grant recipients have not cut ties with their home institutes. This is not a program requirement, and in fact the overwhelming majority of the former Soviet institutes in which GIPP is active are no longer connected with weapons work. Of the 27 institutes GAO visited in Russia and Ukraine, only one remains involved with weapons work.

See comment 9.

- The GAO criticizes the program statistics that account for part-time employment of former Soviet scientists. There is no program requirement to discount part-time employment. Whether employment is full or part time, the critical matter is whether the former WMD scientist is employed and tied to a civilian activity.

See comment 10.

- The GAO raises concerns that GIPP projects involve Russian and Ukrainian project participants too young to have had prior WMD expertise. There is no program restriction on engagement of younger scientists. They are sometimes needed to achieve a project's scientific and commercial objectives and to therefore attract the former WMD scientists.

With respect to strategic planning and management, we acknowledge the need to give greater consideration to developing an "exit strategy" in Russia and improving outdated metrics. However, in other areas, a fuller accounting would have provided a better basis and a more complete picture for reaching conclusions with respect to GIPP. For example:

See comment 11.

- The GAO notes in its draft report that "DOE is developing a program management system, which it expects to fully implement in 2008 – 14 years after the start of the program." In fact, despite GAO's implication that there is no IPP management system, a system has been in place for well over a decade. GAO analysts were briefed on these systems in detail, and in fact used the existing system extensively throughout this audit, as well as previous audits.

See comment 12.

- The GAO is critical of the program's fiscal management, noting historically high uncosted balances. It is important to note, however, that, notwithstanding multi-year projects and contract obligations that on average result in higher uncosted balances, GIPP uncosted balances have been reduced by over 50% in the past two fiscal years and continue to trend downward.

See comment 13.

- The GAO recommends that State and DOE better coordinate the implementation of their commercialization initiatives and respective exit strategies. The two Departments have briefed each other, commented on, influenced, and drawn from each others' reprioritization and drawdown efforts. Consistent with GAO's recommendation, the Department plans to raise with State colleagues the possibility of a "joint plan" for commercialization.

Concerning engagement with non-FSU partners, the GAO recommends that DOE allocate 65% of project funds to Libya for projects in that country. As the Department has noted, the FY2000 National Defense Authorization Act, which places a 35% limit on

See comment 14.

See comment 15.

expenses for DOE national laboratories, applies to the program as a whole, not to specific projects or countries. The 35% limit was enacted to ensure that a maximum of funds would reach former Soviet scientists in need of salary support. Such a requirement does not pertain to Libya, given that Libya funds its own scientists involved in cooperative projects. The wisdom of funneling 65% of program funds to Libya is also open to question. Congress has been briefed on the program's increasingly global mission, including activity in Iraq and Libya.

NNSA believes that the draft report contains useful recommendations and points out the fact that our own actions were underway during the course of the audit and were not acknowledged in the report. In addition, while the GAO notes that because the projects it reviewed "were a judgmental sample" and therefore "the findings associated with them cannot be applied generally to the IPP program as a whole," we regret that this standard does not appear to have been consistently adhered to, leading to an imbalanced critique of the program. Nevertheless, this report can be useful if it helps to spur the implementation of constructive program changes.

Should you have any questions about this response, please contact Richard Speidel, Director, Policy and Internal Controls Management.

Sincerely,

Michael C. Kane
Associate Administrator
for Management and Administration

cc: Will Toby, Deputy Administrator
for Defense Nuclear Nonproliferation
David Boyd, Senior Procurement Executive
Karen Boardman, Director, Service Center

The following are GAO's comments on the Department of Energy's letter dated November 21, 2007.

GAO Comments

1. We are aware that DOE conducted internal assessments in 2004 and 2006 of its overall efforts to engage WMD scientists in the former Soviet Union and other countries. However, these assessments did not evaluate the IPP program exclusively and were conducted at a time when the IPP program was complemented by and coordinated with a similar DOE program focused on downsizing facilities and creating new jobs for personnel in Russia's nuclear cities. This complementary program—the Nuclear Cities Initiative—has since been canceled. As a result, the IPP program operates under a significantly different set of circumstances today than when DOE conducted its previous internal assessments. Moreover, we note that some recommendations and action items from DOE's previous internal assessments, such as the development of an exit strategy, have not been implemented. Finally, during our review and as discussed in this report, we found numerous shortcomings and problems with the IPP program. We made a number of recommendations for improving the program, many of which DOE agreed with, including issues that should be addressed in the context of a program reassessment, such as the need to develop a program exit strategy. For these reasons, we are recommending that DOE undertake a fundamental reassessment of the IPP program, in concert with other agencies, to determine the continuing value of and need for the program.

2. DOE has incorrectly characterized how we collected information and conducted our analysis of the participants on IPP projects. Contrary to DOE's assertion, we did not base our analysis of this issue on responses to questions we posed directly to officials at Russian and Ukrainian institutes. We used data and statements provided directly by DOE program officials to determine the total number of former Soviet weapons scientists, engineers, and technicians the program has engaged since its inception. Regarding the level and number of WMD experts involved in individual IPP projects, as explained in the scope and methodology section of our draft report, we used a number of methods for assessing these totals, including analyzing data provided by project managers at the national laboratories; reviewing payment records provided by CRDF, ISTC, and STCU; and assessing the reliability of data we received.

3. DOE has incorrectly asserted that we implied that DOE and State did not concur on the project in question, and that DOE ignored State's

concerns regarding the primary Ukrainian institute's involvement in WMD. We used this case as an example of how DOE's limited ability to assess the proposed participants on an IPP project can lead to misallocation of funding. In our view, a more thorough evaluation of the entities involved in the project by DOE during its proposal review might have uncovered the conflict-of-interest issues between the primary Ukrainian institute and the industry partner discovered by the Defense Contract Audit Agency after the project was under way and funds had been spent.

4. Our finding was based on an in-depth review of the personnel involved in 97 IPP projects, representing over 6,450 individuals, or over 38 percent of the total personnel DOE has reported to have engaged through the IPP program. We have no way of assessing the accuracy, reliability, or validity of DOE's assertion that a majority of IPP project participants have WMD experience. However, we are skeptical that the department was able to conduct a thorough analysis of all IPP project payment records during the time it took to review and comment on our draft report.

5. During our visit to the Russian institute in question, institute officials told us that they were not the source for the reported job creation figure and could not substantiate the total number of jobs created as a result of the IPP projects we asked about. For this reason, we declined the institute official's offer to obtain further documentation regarding the number of jobs created at other institutes involved in these projects. Although DOE claims to have received additional information from this institute to corroborate the number of jobs reported to have been created, DOE did not provide this information to us. As a result, we cannot determine the reliability or accuracy of DOE's claim that the number of jobs it had reported as created is correct.

6. We have accurately described what we observed during our visit to the Ukrainian institute in question. Based on our observations, this institute clearly was not in dire financial straits or in poor physical condition like some of the institutes in the former Soviet Union we have visited in the past. The donation of funding to improve the physical condition of the institute has no material bearing on the facts that we presented in our draft report.

7. DOE has mischaracterized our findings and our process for evaluating the continued need for the program. As we pointed out in our draft report, officials at 10 of the 22 Russian and Ukrainian institutes we visited stated that they did not believe they or the other scientists at their institutes posed a proliferation risk, while officials at 14 of the 22

institutes also attested to the financial stability of their facilities. Moreover, a senior Russian Atomic Energy Agency official told us, in the presence of IPP program officials, in July 2007 that the program is no longer relevant. DOE asserted that we did not include endorsements of the program in our draft report. However, we do state that many officials at the Russian and Ukrainian institutes we visited noted that the program was especially helpful during the period of financial distress in the late 1990s.

8. DOE misstates the number of institutes that we included in our fieldwork in Russia and Ukraine. The correct number is 22. Regarding DOE's comment, our draft report clearly stated that DOE policy does not require IPP project participants reemployed in peaceful activities to cut ties to their home institute. However, more than one institute we visited stated that they are still involved in some weapons-related work, and many institutes remain involved in research and technology development that could be applied to WMD or delivery systems for WMD. We do not believe it is possible for DOE to verify the full extent and intended purpose of all activities at the institutes where the IPP program is engaged. Moreover, we believe that DOE misrepresents the IPP program's accomplishments by counting individuals who have been reemployed in private sector jobs but also are employed by their institutes and, therefore, may still be involved in weapons-related activities. In our view, the reemployment of former weapons scientists into new long-term, private sector jobs—one of the primary metrics DOE uses to measure progress of the IPP program—implies that these individuals have terminated their previous employment at the institutes and are dedicated solely to peaceful commercial activities outside of their institutes.

9. While there is no IPP program requirement to exclude former weapons scientists employed on a part-time basis from the total number of jobs created as a result of IPP projects, DOE's reported job creation total fails to delineate between part-time and full-time jobs. By not more clearly distinguishing the number of jobs created in each category, this metric is misleading and also misrepresents the program's accomplishments regarding the employment of weapons scientists in commercial activities. However, we have added information to our report that states that there is no IPP program requirement to exclude former weapons scientists employed on a part-time basis from the total number of jobs created as a result of IPP projects.

10. Our draft report stated that the IPP program does not prohibit participation of younger scientists in IPP projects. In our view,

however, DOE has a mistaken and naïve impression of how institutes in the former Soviet Union view the benefits of allowing younger scientists to participate in the IPP program. DOE believes that participation of some younger generation scientists on IPP projects must be permitted to successfully implement projects. This practice has the unintended consequence of allowing former Soviet Union institutes to use the IPP program as a long-term recruitment tool for younger scientists and, thereby, may perpetuate the proliferation risk posed by scientists at these institutes. As we stated in our draft report, officials at 10 of the 22 institutes we visited in Russia and Ukraine said that the IPP program has allowed their institutes to recruit, hire, and retain younger scientists. In our view, this is contrary to the original intent of the program, which was to reduce the proliferation risk posed by Soviet-era weapons scientists. That is why, among other reasons, we are recommending that DOE conduct a reassessment of the IPP program that includes a thorough analysis of the proliferation risk posed by weapons scientists in Russia and other countries, a well-defined strategy to more effectively target the scientists and institutes of highest proliferation concern, more accurate reporting of program accomplishments, and a clear exit strategy for the program.

11. DOE incorrectly characterized our description of its program management system. Specifically, we stated in the draft report "DOE and national laboratory officials told us they are attempting to improve financial oversight over the IPP program, in part, to address concerns about unspent program funds. To that end, DOE is developing a *new* program management system, which it expects to fully implement in 2008—14 years after the start of the program." Throughout our review, numerous DOE and national laboratory officials expressed concern about the existing systems that DOE used to manage IPP projects. Our description of DOE's planned implementation of its new program management system is accurate.

12. DOE officials concurred with our recommendation of reducing large balances of unspent funds and adjusting future budget requests accordingly. The data we present are based on DOE's own financial reporting and accurately reflect the state of the program's uncosted balances (unspent funds) over the last 10 years. We noted in our draft report that the program's uncosted balances are declining, but, as DOE officials acknowledge, uncosted balances remain a serious problem for the IPP program.

13. We are pleased that DOE concurs with our recommendation to improve coordination between the department's IPP program and

ISTC's Commercialization Support Program, which is funded by State. In its comments, State also concurred with this recommendation.

14. We believe DOE has misconstrued our recommendation concerning its funding of projects in Libya. We did not recommend, nor did we mean to imply, that DOE should allocate 65 percent of project funds to Libya for projects in that country. Instead, our recommendation urges the department to ensure that it complies with existing statutory restrictions on the percentage of IPP funds that can be spent on oversight activities by DOE national laboratories. Specifically, as DOE notes, section 3136 of the *National Defense Authorization Act for Fiscal Year 2000* provides that not more than 35 percent of funds available in any fiscal year for the IPP program may be spent by DOE national laboratories to provide oversight of program activities. As our report indicates, DOE's IPP guidance and its standard practice have been to implement this provision of law on a project-by-project basis, so that no more than 35 percent of the funds for each project are spent by national laboratories. Our point in our report and in our recommendation is that, with respect to projects in Libya, DOE has not followed its IPP guidance restricting national laboratory expenditures. Instead, we found that 97 percent of funds DOE spent on projects in Libya through May 2007 were spent at DOE's national laboratories for project management and oversight. In this regard, we note that DOE concurred with our recommendation that the department seek explicit congressional authorization to expand IPP efforts outside of the former Soviet Union. In seeking such authorization, DOE may wish to clarify the nature of other restrictions on the program, such as those set forth in section 3136 of the *National Defense Authorization Act for Fiscal Year 2000*.

15. DOE has mistakenly asserted that our selection of projects for review served as the sole basis for our conclusions and recommendations. As we explained in the draft report's scope and methodology section, the selection and evaluation of a sample of IPP projects was one of several analytical tools we employed during our review. We not only conducted an in-depth assessment of over 200 IPP projects, but also met multiple times with DOE officials; analyzed program plans, policies, and procedures; interviewed representatives at each of the 12 national laboratories involved in the program; interviewed staff of the U.S. Industry Coalition and 14 U.S. industry partner companies with long-standing participation in the program; and had discussions with numerous recipients of IPP program assistance at 22 institutes in Russia and Ukraine. We also met several times with State officials who are responsible for funding a similar program; interviewed and

assessed information provided by officials at CRDF, ISTC, and STCU; and met with nongovernmental experts familiar with the program. As further noted in our draft report, to develop our judgmental sample of 207 projects we used project selection criteria supplied by DOE and considered a variety of factors—such as project status, project funding, type and location of institutes where projects have been implemented, and a project's commercial success—to ensure we addressed a broad cross-section of IPP projects. This comprehensive approach, consistent with generally accepted government auditing standards, served as the foundation for our assessment which was fair, balanced, and objective. Our extensive review identified legitimate questions concerning the IPP program's scope, implementation, and performance that we believe should be addressed during the course of the fundamental reassessment of the program recommended in our draft report.

Appendix VI: Comments from the Department of State

United States Department of State

Assistant Secretary for Resource Management and Chief Financial Officer

Washington, D.C. 20520

NOV 19 2007

Ms. Jacquelyn Williams-Bridgers
Managing Director
International Affairs and Trade
Government Accountability Office
441 G Street, N.W.
Washington, D.C. 20548-0001

Dear Ms. Williams-Bridgers:

We appreciate the opportunity to review your draft report, "NUCLEAR NONPROLIFERATION: DOE's Program to Assist Weapons Scientists in Russia and Other Countries Needs to Be Reassessed," GAO Job Code 360770.

The enclosed Department of State comments are provided for incorporation with this letter as an appendix to the final report.

If you have any questions concerning this response, please contact Linda Bernstein, Science Centers Program Coordinator, Bureau of International Security and Nonproliferation, at (202) 736-7976.

Sincerely,

Bradford R. Higgins

cc: GAO – Glen Levis
ISN – Andrew Semmel
State/OIG – Mark Duda

Department of State Comment on GAO Draft Report

NUCLEAR NONPROLIFERATION: DOE's Program to Assist Weapons Scientists in Russia and Other Countries Needs to Be Reassessed
(GAO-08-189, Job Code 360770)

Thank you for allowing the Department of State the opportunity to provide comments on the recommendation in the draft report *Nuclear Nonproliferation: DOE's Program to Assist Weapons Scientists in Russia and Other Countries Needs to Be Reassessed.*

Regarding the recommendation (page 44) to work with the Administrator of the National Nuclear Security Administration, and the Secretary of Energy, to develop a joint plan to better coordinate the efforts of DOE's IPP Program and the ISTC's Commercialization Support Program:

The Department of State and the Department of Energy concur with the recommendation to more closely coordinate these program elements and will consult with DOE on implementing this recommendation.

Appendix VII: GAO Contact and Staff Acknowledgments

GAO Contact

Gene Aloise, (202) 512-3841 or aloisee@gao.gov

Staff Acknowledgments

In addition to the contact named above, Glen Levis (Assistant Director), R. Stockton Butler, David Fox, Preston Heard, and William Hoehn made key contributions to this report. Other technical assistance was provided by David Maurer; Carol Herrnstadt Shulman; Jay Smale, Jr.; and Paul Thompson.

Related GAO Products

Nuclear Nonproliferation: Better Management Controls Needed for Some DOE Projects in Russia and Other Countries. GAO-05-828. Washington, D.C.: August 29, 2005.

Weapons of Mass Destruction: Nonproliferation Programs Need Better Integration. GAO-05-157. Washington, D.C.: January 28, 2005.

Nuclear Nonproliferation: DOE's Effort to Close Russia's Plutonium Production Reactors Faces Challenges, and Final Shutdown Is Uncertain. GAO-04-662. Washington, D.C.: June 4, 2004.

Nuclear Nonproliferation: DOE's Efforts to Secure Nuclear Material and Employ Weapons Scientists in Russia. GAO-01-726T. Washington, D.C.: May 15, 2001.

Weapons of Mass Destruction: State Department Oversight of Science Centers Program. GAO-01-582. Washington, D.C.: May 10, 2001.

Nuclear Nonproliferation: DOE's Efforts to Assist Weapons Scientists in Russia's Nuclear Cities Face Challenges. GAO-01-429. Washington, D.C.: May 3, 2001.

Biological Weapons: Effort to Reduce Former Soviet Threat Offers Benefits, Poses New Risks. GAO/NSIAD-00-138. Washington, D.C.: April 28, 2000.

Nuclear Nonproliferation: Concerns with DOE's Efforts to Reduce the Risks Posed by Russia's Unemployed Weapons Scientists. GAO/RCED-99-54. Washington, D.C.: February 19, 1999.

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