

DOE/IG-0452

AUDIT REPORT

NUCLEAR MATERIAL PROTECTION, CONTROL, AND ACCOUNTING PROGRAM



SEPTEMBER 1999

U.S. DEPARTMENT OF ENERGY
OFFICE OF INSPECTOR GENERAL
OFFICE OF AUDIT SERVICES

September 16, 1999

MEMORANDUM FOR THE SECRETARY

FROM: Gregory H. Friedman (Signed)
Inspector General

SUBJECT: INFORMATION: Audit Report on "Nuclear Material Protection, Control, and Accounting Program"

BACKGROUND

Since 1994, the Department of Energy (Department) and its national laboratories have worked in the successor states of the Former Soviet Union (FSU) to improve nuclear material security and accountability. The goal of the Department's Nuclear Material Protection, Control, and Accounting (MPC&A) program is to reduce the threat of nuclear proliferation and nuclear terrorism by rapidly upgrading physical protection and material control and accounting systems at FSU facilities using modern technology and strict material control and accounting principles. The Department is attempting to achieve this goal by providing assistance in the form of expertise, funds, and equipment to facilities in the FSU that store, process, and/or transport plutonium or highly enriched uranium.

The Department has accomplished much towards achieving its goal of reducing the threat of nuclear proliferation and nuclear terrorism. It made significant progress in expanding the number of FSU sites participating in the program, from only 9 sites in Fiscal Year 1994 to 53 in Fiscal Year 1998. In addition, U.S. MPC&A project teams developed productive working relationships with FSU personnel and installed site-wide MPC&A systems, which reduced the threat of nuclear proliferation and nuclear terrorism at numerous FSU sites.

The objective of the audit was to assess whether the Department ensured that funds and equipment provided to the FSU under the MPC&A program were accounted for and used for their intended purposes.

RESULTS OF AUDIT

Although the Department accounted for funds and the purchase of equipment provided to the FSU under the MPC&A program, improvements are needed to ensure that funds and equipment are used for their intended purposes. We identified instances where low priority upgrades were planned and funded. In a number of locations, U.S. project teams lacked access to facilities which impaired their ability to establish priorities and to determine that upgrades were functioning as intended. Further, contractors did not always adhere to strategic plan guidelines, there was limited Federal oversight, and the Department lacked specific policy on the minimum acceptable level of access to facilities and information. The conditions resulted in: (i) the expenditure of approximately \$929,000 for which little reduction of risk to weapons-usable nuclear material was achieved; and, (ii) reduced assurance that certain MPC&A upgrades were justified, properly installed, used, and maintained.

An additional matter, taxes assessed on Russian Institutes for the value of MPC&A assistance received, is discussed in this report. It is unclear whether MPC&A funds were used to pay these taxes, and the institutes had not provided the Department with amounts paid and/or accrued. An MPC&A Task Force member familiar with the issue estimated the amounts to be significant. The Russian Federation has recently passed legislation that may resolve this issue. The Department is also attempting to address this issue in an agreement under negotiation with the Russian Ministry of Atomic Energy. Timely resolution is important, as the conditions the MPC&A program seeks to address are due, in part, to the financial crisis faced by the Russian Institutes. The financial burden created by these tax levies may further weaken economic conditions at the institutes, exacerbating the problem that the MPC&A program is attempting to mitigate.

MANAGEMENT REACTION

The Assistant Secretary for Nonproliferation and National Security concurred with the finding and recommendations, and indicated that the review and related recommendations will assist in strengthening the MPC&A program. Planned and implemented corrective actions outlined by the Assistant Secretary are responsive to our recommendations. In addition, the Assistant Secretary noted that the new Russian tax law will greatly help the program obtain tax exemptions.

Attachment

cc: Deputy Secretary
Under Secretary

Nuclear Material Protection, Control, And Accounting Program

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Overview

INTRODUCTION AND OBJECTIVE

During the Cold War, the United States and the Soviet Union amassed large stockpiles of plutonium and highly enriched uranium. These materials are essential to the production of nuclear weapons, and acquisition of even small quantities could enable a non-nuclear state or terrorist group to build a nuclear weapon. Acquisition of these materials is the most difficult step in the weapons manufacturing process because construction of the facilities needed to produce and refine plutonium and highly enriched uranium takes many years and requires capabilities well beyond those of non-state organizations. Thus, plutonium and highly enriched uranium in weapons-useable form are extremely attractive to non-nuclear states and terrorist organizations seeking to develop nuclear arms.

The Soviet Union's Cold War era system of protecting its nuclear materials from theft or diversion focused primarily on countering external threats through the use of military guards and constant surveillance by state security forces. "Insider" threat scenarios were considered unlikely because workers within nuclear facilities enjoyed superior wages, social status, and other benefits. Until the end of the Cold War, the approach of "guards, guns, and gates" proved highly effective. However, the breakup of the Soviet Union in 1991 and current economic and political crises in the former states of the Soviet Union (commonly referred to as the FSU) substantially weakened the Soviet-era system of nuclear material protection, control, and accounting.

The recent economic and political changes in the FSU have left weapons-useable nuclear material vulnerable to theft and/or diversion. Budget cuts have decreased the number and effectiveness of guard force personnel, security system maintenance activities, and operational readiness. Efforts to reduce costs and retain key scientific personnel have taken priority over spending for nuclear material security systems. In addition, nuclear facility workers who once enjoyed a superior standard of living now face difficult circumstances. Workers have not received wages, and the quality of available food, housing, and medical care has declined. Combined, these factors increase the potential for both "outsider" and "insider" threat scenarios.

Since 1994, the Department and its national laboratories have worked in the FSU to improve nuclear material security and accountability at sites containing weapons-useable material. The goal of the Department's MPC&A program is to reduce the threat of nuclear proliferation and nuclear terrorism by rapidly upgrading physical protection and material

control and accounting systems at FSU facilities using modern technology and strict material control and accounting principles. The Department is attempting to achieve this goal by providing assistance in the form of expertise, funds, and equipment to facilities that store, process, and/or transport plutonium or highly enriched uranium, and assisting the FSU in the development of an MPC&A regulatory infrastructure.

Within the Department, responsibility for the MPC&A program resides with the Office of Nonproliferation and National Security's MPC&A Task Force. The Task Force is responsible for program planning, policy, guidance, and management. Planning, execution, and management of individual projects are accomplished through contractor personnel at the Department's national laboratories (Sandia, Los Alamos, Lawrence Livermore, Oak Ridge, Pacific Northwest National Laboratory, Argonne, and Brookhaven). For Fiscal Year (FY) 1998, the program consisted of 80 projects with a total budget of approximately \$132 million. For FY 1999, there were 77 projects with a total budget of approximately \$137 million.

The objective of the audit was to assess whether the Department ensured that funds and equipment provided to the Former Soviet Union under the Material Protection, Control, and Accounting program were accounted for and used for their intended purposes.

CONCLUSIONS AND OBSERVATIONS

The Department accounted for funds and the purchase of equipment provided to the FSU under the MPC&A program. However, programmatic improvements are needed to ensure that funds and equipment are used for their intended purposes. Specifically, the Department lacked assurance that resources were used to fund upgrades on a prioritized basis and that installed upgrades were functioning as intended. We identified instances where low priority upgrades were planned and funded at FSU facilities. In addition, upgrades were planned and funded where priorities and strategies could not be fully established and where the continued use and function of upgrades could not be fully ascertained. Low priority upgrades were planned and funded because contractors did not always adhere to strategic plan guidelines, and because of limited Federal oversight. Upgrades were planned and funded where upgrade priorities, strategies, and continued use could not be fully established because the Department had not developed specific policy on the minimum level of access to facilities

and information required to make these determinations. The low priority upgrades we identified cost \$929,000, an amount for which little actual reduction of risk to weapons-useable nuclear material was achieved. For facilities where the Department could not fully establish priorities and monitor upgrade status, it could not fully determine that related upgrades were justified, properly installed, used, and maintained.

The Government Performance and Results Act (GPRA) of 1993 was designed to improve Federal program effectiveness by promoting a new focus on program results and improving management of the Federal Government. As required by GPRA, the Department prepared a strategic plan that was issued in September 1997. In the plan, one of the strategies designed to achieve national security objectives is to work with the states of the FSU to minimize the risks of proliferation. In order to meet the intent of GPRA, as well as its own strategic plan objectives, the Department needs to enhance its system of controls to address the matters noted in this report. Management should also consider the issues discussed in this report when preparing the yearend assurance memorandum on internal controls.

An additional concern regarding MPC&A funds is taxes assessed on Russian Institutes for the value of assistance received. The Russian Federation had taxed Russian Institutes participating in the MPC&A program, as well as other U.S. cooperative programs. In the case of the MPC&A program, taxes were assessed based on the value of the assistance the institute received. Although it is unclear whether MPC&A funds were used to pay these taxes, and the institutes had not provided the Department with amounts paid and/or accrued, a Task Force member familiar with the issue estimated the amounts to be significant. Timely resolution of this issue is important, as the conditions the program seeks to address are due, in part, to the financial crisis faced by the Russian Institutes. The financial burden created by these tax levies may further weaken economic conditions at the institutes, exacerbating the problem that the MPC&A program is attempting to mitigate.

The Russian Federation recently ratified new legislation that may exempt MPC&A assistance from taxation, depending on how it is implemented. Implementation will be governed by subsequent legislation, that, according to a Task Force member, will take a minimum of 3 months to complete. The Department is also attempting to resolve this issue in a new agreement concerning MPC&A

cooperation with the Russian Ministry of Atomic Energy (Minatom). The agreement, currently in draft, contains language exempting MPC&A funds and equipment from all taxes, tariffs, customs duties, and levies of the Russian Federation. However, until the agreement is finalized, its impact on this issue is unknown.

Signed
Office of Inspector General

Prioritization And Function Of MPC&A Upgrades

The Department lacked assurance that MPC&A resources were used to fund upgrades on a prioritized basis and that installed upgrades were functioning as intended. Specifically, U.S. project teams planned and funded low-priority MPC&A upgrades. Furthermore, upgrades were planned and funded where priorities and strategies could not be fully established and where the use and function of upgrades could not be fully ascertained.

Low Priority Upgrades Included In MPC&A Projects

Low priority upgrades were included in projects planned and funded at FSU facilities. Specifically, three of the nine projects reviewed included upgrades that were designed to secure materials of little proliferation risk, equipment that was purchased despite uncertainty as to its need, and upgrades that were not clearly related to the protection of nuclear material. Specifically:

- A project managed by Lawrence Livermore National Laboratory (LLNL) included planned funding of \$878,000 for upgrades to a facility handling only Low Enriched Uranium. Low Enriched Uranium was not considered a significant proliferation risk. These upgrades were cited in an internal peer review as unnecessary and were subsequently reconsidered by the LLNL project team. However, the project team had already purchased equipment to support these upgrades at a cost of about \$358,000 prior to their termination.
- A Los Alamos National Laboratory (LANL) project team purchased a piece of equipment in support of an MPC&A project at a nuclear reactor facility. However, the need for this equipment was contingent upon conversion of the reactor core, and no firm agreement existed as to when or if core conversion would take place. The equipment cost approximately \$135,000 and, at the time of the audit, was stored at LANL.
- Another LANL-managed project included the installation of a fiber optic network backbone at an FSU nuclear site. The network backbone was designed to link six site facilities to a site administrative center. This activity was included in the project plan, even though the project team had not identified the MPC&A uses for the fiber optic backbone or how it would reduce proliferation risk. An internal peer review of the project recommended that completion of the backbone be suspended until it could be justified.

However, a substantial portion of the project had already been completed at a cost of about \$436,000.

Upgrade Priority, Strategy, And Use Could Not Be Fully Established

In addition, upgrades were planned and funded at facilities where U.S. project teams could not fully establish upgrade priorities and strategies and could not fully ascertain use and function of upgrades. Specifically, for six of the nine projects reviewed, U.S. project teams lacked facility access and/or nuclear material inventory information needed to establish upgrade priorities and strategies and determine that installed upgrades were functioning as intended. For example, at some facilities project teams were admitted to non-sensitive areas, but did not have access to areas where nuclear materials were stored or processed for purposes of verifying quantities, establishing upgrade priorities, and ensuring that upgrades were functioning as intended. Similarly, information restrictions included not disclosing specific quantities or locations of materials. Verifying quantities and locations of nuclear materials is essential for establishing proliferation risk and targeting MPC&A upgrades.

In one instance, the U.S. project team had not requested facility access. However, in most cases, access to facilities and/or information was denied or restricted based on FSU national security concerns. When access to facilities and information was denied or restricted, U.S. project teams relied on other sources of information to help determine upgrade priorities and strategies and monitor facility upgrades. Information sources used to help prioritize and design upgrades included facility descriptions, documents, schematics, and discussions with site personnel. U.S. project team members also made inferences on amounts and types of nuclear materials present at a given site based on their knowledge of the processes conducted at the site, and of operations at similar U.S. nuclear facilities. Information sources used to help monitor the status of facility upgrades included photographs and videotapes of installed equipment, written certification of site officials, and, in limited cases, operating data from installed equipment.

**Upgrade Strategy, Priority,
And Use Must Be
Determined**

MPC&A funds and equipment are intended to provide reduction of risk to direct-use nuclear materials on a prioritized basis. The MPC&A Program Strategic Plan indicated that program resources should be concentrated on the most attractive materials for nuclear weapons,

namely Highly Enriched Uranium (20 percent and greater) and Plutonium (excluding Plutonium in irradiated fuel). The plan also states that resources devoted to improving MPC&A should be commensurate with the risks presented to the nuclear material and with the level of proliferation risk that would result if the material were stolen or diverted. The importance of establishing upgrade priorities and strategies and determining the continued use and function of upgrades is further illustrated in program documents. The Department's guidelines for upgrades at FSU facilities indicate that upgrade strategies and priorities should be established prior to initiation of upgrades. The guidelines indicate that in order to establish priorities and strategies, U.S. project teams should have access to facilities and to a thorough categorization of nuclear material inventories. In addition, the Department's MPC&A Program Strategic Plan states that to ensure installed upgrades are functioning and operated according to established procedures, periodic reviews are necessary.

**Greater Oversight And
More Specific Guidance
Needed**

Low priority upgrades were planned and funded because U.S. project teams did not always adhere to the general guidelines outlined in the strategic plan and because of limited Federal oversight of MPC&A projects. Specifically, contractor project teams did not always follow strategic plan guidance to focus on the most attractive nuclear materials and ensure resources were commensurate with risk. In addition, the number of Federal personnel charged with program oversight had been intentionally limited to a level appropriate for a limited duration project. However, since its inception in 1994, the scope of the program has expanded dramatically. For example, the number of FSU sites participating in the program increased from 9 sites in FY 1994 to 53 in FY 1998. Furthermore, personnel assigned to the Task Force indicated that they lacked the resources to adequately monitor plans and activities associated with individual projects. For example, in FY 1998 only seven Federal personnel worked on the task force responsible for MPC&A program management, of whom four were responsible for project oversight. These individuals were responsible for monitoring the activities of 80 MPC&A projects.

The Department is currently reevaluating the number of Federal personnel assigned to the Task Force. In March of 1999, the Director of the Office of Nonproliferation and National Security characterized the workload of the average Task Force member as extreme. Furthermore, the Director indicated that because the scope of the tasks facing the

program is now understood to be much larger than anticipated, the task force is expected to become larger and longer range in its organizational outlook.

Two of the low priority upgrades we identified were also cited in internal peer review reports. Although the Department's MPC&A efforts had been underway since 1994, it had only recently begun to conduct formal peer reviews, but the process had not yet been institutionalized. In January 1999, the Department's MPC&A Task Force established a Technical Survey Team to conduct a number of project reviews. The survey team is a small group of technical specialists who review projects and provide technical advice to the Task Force. The survey team also helps U.S. project teams to plan and implement upgrades so that they are consistent with recent Departmental guidance regarding upgrades. This process is very valuable to the Department because it provides an evaluation of project priorities, strategies, and progress by technical personnel. It can also provide for the redirection of project priorities and strategies that are not aligned with program priorities and strategies.

MPC&A upgrades were planned and funded despite U.S. project teams' inability to fully determine upgrade priorities, strategies, and operation of upgrades because the Department had not developed specific policy on minimum level of access to facilities and information required to make these determinations. The MPC&A Program Strategic Plan articulated the need to evaluate proposed work to ensure that it was necessary, timely, cost-effective, and that all unnecessary activities and costs were eliminated. The plan also discussed the need to conduct periodic reviews to ensure that all elements of the MPC&A systems were functional and operated according to procedures. However, the plan does not speak to the minimum level of facility access and information needed to make these determinations.

In March 1999, the Department issued additional instruction regarding upgrades at facilities in the FSU. It stated that a thorough categorization of nuclear materials inventories is required to properly identify and prioritize upgrades. The guidance also indicated that when developing a site description, it is desirable to have the U.S. project team onsite. If the site was unwilling or unable to provide adequate information on the site or its nuclear material assets, the guidance indicates that the project team should request assistance from

Departmental program managers to help resolve these problems. However, the guidance did not specify the degree of access to facilities and information required before upgrades could be initiated. Nor did the guidance speak to the level of access to facilities and information needed to determine that installed upgrades are functional, properly operated, and maintained.

FSU facilities have legitimate national security concerns regarding their nuclear facilities. Additionally, the supplemental information gathered by U.S. project teams may, to some degree, compensate for lack of access to facilities and information. However, to fully establish the nature of proliferation concerns; determine upgrade priorities and designs; and ensure that upgrades are properly installed, operated, and maintained, access to facilities and information is critical. The importance of access to facilities and information also was cited in the reviews conducted by the recently established Technical Survey Team. Specifically, the survey team indicated that sensitive information concerns of the FSU must be addressed, but not to the exclusion of the ability of the U.S. to determine that upgrades are justified, properly installed, used, and maintained.

Resources Should Achieve Maximum Risk Reduction

Because the Department lacked assurance that MPC&A resources were used to fund upgrades on a prioritized basis and that installed upgrades were functioning as intended, it could not ensure that programmatic resources were managed in a way that would achieve maximum reduction of risk to nuclear materials. The low priority upgrades identified in this report were budgeted for \$1,320,000. These funds represent an amount that could have been better targeted to higher priority projects or activities, thus maximizing threat reduction achieved for resources invested. Of the budgeted amount, approximately \$929,000 was actually spent. The actual amount expended for low priority upgrades represents program funds for which little actual threat reduction was achieved. For facilities where the Department could not fully establish priorities and monitor upgrade status, it could not fully determine that related upgrades were justified, installed properly, used, and maintained.

The ability of the Department to ensure that resources were used to fund upgrades on a prioritized basis and that installed upgrades were used and functioning as intended is particularly important, given the significant resources (\$137 million in FY 1999) currently dedicated to

the program. Moreover, the National Research Council's Committee on Upgrading Russian Capabilities for Controlling Highly Enriched Uranium and Plutonium recently recommended that the U.S. Government allocate \$725 million to the MPC&A program over the next 5 years and continue funding the program for at least a decade. The committee reported that reducing risks posed to nuclear materials will require years of steady work and should be a high priority for U.S. national security. Furthermore, the Director of the Office of Nonproliferation and National Security recently stated that the magnitude of the task facing the program is now understood to be much larger than when the program began in 1994, an indication that the program will likely require significant future resources.

RECOMMENDATIONS

We recommended that the Assistant Secretary for Nonproliferation and National Security:

1. Develop and implement a staffing plan that ensures adequate Federal resources are devoted to project oversight;
2. Institute an internal review process that ensures, prior to upgrade initiation, that planned facility upgrades are consistent with the MPC&A strategic plan and program guidelines;
3. Institutionalize periodic, independent peer reviews such as those conducted by the Technical Survey Team to help ensure that project priorities and strategies are consistent with the MPC&A strategic plan and program guidelines;
4. Develop and negotiate with appropriate Russian officials a policy on minimum levels of access to facilities and information required before upgrade initiation and for verification of upgrade use after installation; and
5. Fund only MPC&A upgrades for which the Department can fully establish related priority, strategy, and usage until policy regarding access to facilities and information is developed and implemented.

MANAGEMENT REACTION

The Assistant Secretary for Nonproliferation and National Security concurred with the finding and recommendations and indicated that the review and related recommendations will assist in strengthening the MPC&A program. In response to our recommendations, management agreed to:

- Review, update and implement the management plan section dealing with staffing;
- Implement Technical Survey Team reviews of all project work plans to ensure, prior to work being funded, that planned upgrades are consistent with MPC&A guidance;
- Institutionalize annual Technical Survey Team reviews of ongoing activities under each MPC&A project, updating these efforts continually throughout the life of the program;

-
- Develop a new policy to provide clear and consistent guidance to laboratory project managers on the appropriate level of access to buildings and information regarding sensitive nuclear materials in order to determine needed upgrades; and
 - Fund only MPC&A upgrades for which the Department can fully establish related priority, strategy, and usage. Specifically, the Deputy Director of the MPC&A Task Force stated that funding for work at a number of Russian facilities would be withheld until access issues are resolved.

**AUDITOR
COMMENTS**

Planned and implemented corrective actions outlined by management are responsive to our recommendations. These actions, if properly implemented and followed by management, will provide the Department with greater assurance that MPC&A upgrades are justified, properly designed, used, and maintained.

Appendix 1

SCOPE

Audit work was performed between December 1998 and July 1999 at Headquarters, and the Sandia, Los Alamos, and Lawrence Livermore National Laboratories.

METHODOLOGY

To accomplish the audit objective, we:

- Held discussions with personnel from the Office of Nonproliferation and National Security's MPC&A Task Force regarding efforts to help secure nuclear materials in the Former Soviet Union;
- Reviewed program documents, including the MPC&A Program Strategic Plan, Guidelines for MPC&A Upgrades at Russian Facilities, and the Department's MPC&A Program Assurance Procedures; and
- Held discussions with contractor project teams regarding project management and execution. For a judgmentally selected sample of 9 projects, we performed detailed reviews of project plans, contracts, deliverables, invoices, and other supporting documentation. In performing test work on the nine projects, we reviewed 32 task order contracts valued at approximately \$7.4 million. Budget information for the selected projects is as follows:

Project	Lead Laboratory	FY 1998 New Funding	FY 1999 New Funding
1	Sandia	\$3,361,000	\$9,000,000
2	Sandia	4,642,000	4,010,000
3	Sandia	1,389,000	7,700,000
4	Los Alamos	5,468,000	5,002,000
5	Los Alamos	5,311,000	6,195,000
6	Los Alamos	7,436,000	6,500,000
7	Lawrence Livermore	4,636,000	5,786,000
8	Lawrence Livermore	7,414,000	6,500,000
9	Lawrence Livermore	2,600,000	800,000
	Total	\$42,257,000	\$51,493,000

We also met with non-governmental organization officials who were familiar both with nonproliferation issues and the Department's MPC&A program. These discussions provided an "outsider" perspective on the Department's activities.

The audit was performed in accordance with generally accepted Government auditing standards for performance audits and included tests of internal controls and compliance with laws and regulations to the extent necessary to satisfy the audit objective. Because our review was limited, it would not necessarily have disclosed all internal control deficiencies that may have existed at the time of our audit. We did not rely on computer-processed data to accomplish our audit objective.

A formal exit conference was waived by the Office of Nonproliferation and National Security.

Appendix 2

PRIOR OFFICE OF INSPECTOR GENERAL AND GENERAL ACCOUNTING OFFICE REPORTS

This review concerned the Department's efforts to help the Former Soviet Union strengthen its nuclear material protection, control, and accounting regimes. Prior Office of Inspector General and General Accounting Office reviews related to nuclear nonproliferation include:

- *Audit of Internal Controls Over Special Nuclear Materials*, Report Number DOE/IG-0388, dated April 4, 1996. The responsible management and operating contractors had not performed all required physical inventories of special nuclear materials and at one site, and did not perform measurements of nuclear material shipments due to safety concerns and operational interruptions.
- *Nuclear Nonproliferation: Concerns with DOE's Efforts to Reduce the Risks Posed by Russia's Unemployed Weapons Scientists*, Report Number GAO/RCED-99-54, dated February 1999. The Department's Initiatives for Proliferation Prevention (IPP) program, established to engage former weapons scientists of the FSU in peaceful commercial activities, had not achieved its broader nonproliferation goal of long-term employment of weapons scientists through the commercialization of research and development projects. In addition, 63 percent of program funds was spent in the U.S., mostly by the Department's national laboratories in implementing and providing oversight of the program. Further, the amount that the Russian scientists received is unknown because the Russian Institutes' overhead charges, taxes, and other fees reduced the amount of funds available to pay the scientists.

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