

USDOE Laboratory Views on U.S.-Russian Partnership for Nuclear Security*

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Abstract

This paper summarizes an analysis of the U.S.-Russian Nuclear Material Protection, Control and Accounting (MPC&A) Program, developed on the basis of extensive discussions with U.S. laboratory participants as well as personal experience. Results of the discussions have been organized into three main areas: Technical/MPC&A Progress; Programmatic and Administrative Issues; and Professional Aspects. Implications for MPC&A effectiveness, for MPC&A sustainability, and for future relations and collaboration are derived. Suggested next steps are given.

Background and Introduction

The U.S.-Russian Nuclear Material Protection, Control and Accounting Program is in its fifth year. Parallel to extensive political, economic, social and cultural changes in Russia have been, on a more focussed and detailed level, the initiation and building of relationships between Russian scientists, managers, governmental officials and leaders involved in or responsible for fissile materials production and use and their counterparts in the United States. Of course, at the same time, many other countries and international organizations have been interacting with the Russian nuclear community. The abrupt change in the nature of the safeguards threat present in Russia, which came about through the dissolution of the Soviet Union and its corresponding historical controls, is being followed by an evolving appreciation of the need for a different, and in many cases more intrusive and extensive, application of safeguards measures to meet the threat.

Certainly at the beginning of this program many of the participants from both sides found it difficult to believe just what they were undertaking. The effort initially seemed to run counter to over forty years of experience in maintaining distance and secrecy about exactly those nuclear materials the security of which became the focus of our extensive cooperation. The nature of that cooperation has evolved from early distrust, uncertainty, and skepticism through the building of "business-like" procedures under which contracting with compensation for performance is the rule, to the present and future which hold, at least in part, encouraging signs of sincere and fruitful collaboration and mutual trust.

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It is helpful to review progress and develop a perspective of activities in the MPC&A program which can foster continued success of those measures and approaches that have been successful, and also can lead to enhancements or improvements in those areas where work is needed or gaps have been identified. This paper represents an analysis of this program, developed on the basis of extensive discussions with U.S. laboratory participants as well as personal experience. Results of the discussions have been collected, digested, and organized into three main areas of interest: Technical/MPC&A Progress; Programmatic and Administrative Issues, and Professional Aspects. The implications of the points made in these areas are then presented with a focus on MPC&A effectiveness and sustainability, and for future relations and collaboration. Finally, some suggested next steps are given with priorities, methods, and mechanisms to achieve those steps.

Procedure

The "data" for this analysis were derived from a series of twenty-three structured conversations and interviews with MPC&A program participants from every national laboratory involved. Represented among these participants is a broad spectrum of safeguards experience and expertise, technical and managerial responsibility, length of time in the program, as well as the number and type of Russian facilities at which work has been on-going.

Each participant was asked a series of five questions, as follows: (1) how long have you been working on the MPC&A program? (2) at which sites have you worked? (3) in your professional opinion, what are the three highest-ranking positive results or aspects of the program? (4) in your professional opinion, what are the three highest-ranking negative results or aspects of the program? (5) what do you consider the major future challenges for the program?

In the process of discussing these questions, details about particular MPC&A projects at given sites were often used as examples of success or of problems. All participants were very forthcoming and had clearly given consideration to the underlying issues which have influenced and will influence this important work. During the interviews each participant was told that the purpose of the information gathering was to support a collation and analysis of a large sample of input and that no direct attribution would be made. Even though their names are not given here, their contributions and time are very much appreciated.

Results

Themes, concerns, issues, problems and positive features gathered in the interview process have been organized and grouped into three main areas: Technical MPC&A Progress; Programmatic and Administrative Issues; and Professional Aspects. In each area there were major themes, and within each theme specific points could be deduced. The charts which follow attempt to show the results in a coherent, concise manner. In the charts, reference is to Russian or other former-Soviet Republic sites or nuclear materials, unless otherwise indicated.

CHART I. TECHNICAL/MPC&A PROGRESS

Equipment/Technology

- equipment and technology used in U.S. domestic physical protection functions can and have improved the security of a number of buildings and sites
- significant improvements in nuclear material security have been made, although the progress is unevenly distributed
- to date, emphasis has been on physical security improvements; driving forces have been: (1) Russian priorities and limited acceptance of the reality of the insider threat; (2) evidence of physical security equipment and technologies upgrades is easily conveyed to the non-safeguards community, including U.S. Congress
- in the urgency to show U.S. goodwill and make improvements quickly, an equipment and technology "shopping list" approach was taken with the Russians; this can be misleading and counter-productive to conveying an understanding of true MPC&A as an effective system
- some U.S. technologies and tools have been very inappropriately and/or prematurely used in the program, to its detriment
- nuclear materials measurements have been focussed on quality control; measurement for accountability purposes is only slowly making progress, even though the Russians are fully capable of making good measurements
- surveillance equipment and technologies can be difficult for the work force to appreciate or use effectively, unless they are trained about MPC&A purposes and methods
- there is considerable U.S. concern about the functionality, operability, control, maintenance, and continued effective use of such equipment and technology installed under the program
- equipment certification issues have been and threaten to continue to hamper progress
- U.S. must correct the impression that MPC&A is about "new toys" and move forward with the Russians to mature application of MPC&A, integrated with safety and operations
- there are scattered, encouraging signs of developing in-country MPC&A support equipment and services; it is uncertain whether the Russian government is committed to allow this to survive and thrive

Concepts and Systems

- the transition from triage MPC&A upgrades to designed, planned, systematic MPC&A implementation requires continued attention if Russian sites are to have any hope for full or long-term effectiveness
- in many instances, the U.S. has tended to try a "spoon-feeding", "cookie cutter" approach, which has undermined opportunities for true Russian participation
- site-specific requirements must be addressed, from training through details of equipment and procedures
- national regulations have been very slow in coming; they must be put in place for far-reaching Russian commitment to be evidenced; many sites only do what is required to do, while others, to their credit, have cooperated with the U.S. to make MPC&A improvements on their own; however, all sites need the regulatory requirements to support continued commitment by management
- some projects have evolved very slowly because of security sensitivities; however, it appears in some cases that the time lag may have been well-spent in allowing a more systematic, integrated, design phase to occur, which may lead to fuller MPC&A implementation in the long run
- in general, material control and material accounting lag physical security upgrades; this may be due in part to a mistaken belief that "nuclear materials can be counted once they are protected" (quote of a Russian participant), which indicates either a lack of acceptance or purposeful avoidance of the insider threat

Implementation and Performance

- it is unclear how the human reliability issue is being addressed
- technical and operations staff and first-line managers are most likely to have an appreciation for MPC&A principles, the need for their application, and ideas of how to implement them; it is unclear how broadly this has spread either horizontally or vertically
- the continued concerns about salaries and personal/family security influence the prospects for long-term commitment to MPC&A
- there is scattered evidence of organizational and administrative actions which show development of cadres of knowledgeable staff with responsibilities and, it is hoped, authorities, to support MPC&A implementation, maintenance, and improvements

- it is hoped that long-sought, approved solutions to overcome significant stumbling blocks, such as access to sensitive areas or sites, can be applied broadly once successfully demonstrated
- concern exists that higher level interest in MPC&A is more financially-based than technical/requirements-based
- very broad (nearly unanimous among sample) U.S. concerns about "sustainability" of MPC&A systems already implemented, not to mention future projects; serious need for Russian strategic indications of MPC&A as part of nuclear-related plans

CHART II. PROGRAMMATIC AND ADMINISTRATIVE ISSUES

Strategy

- serious consolidation and streamlining of nuclear operations should be implemented; it is difficult for the U.S. to support active Russian nuclear materials processing when the U.S. itself is largely in "shut down" mode
- engagement at all levels, from facilities and sites through governmental entities is needed; the program's historical "on-the-ground" focus must broaden to include the bigger, long-term issues which now require strategic governmental involvement

Organization/Structure

- Russian sites, which vary by orders of magnitude in terms of size, complexity, nuclear materials quantities, etc. should receive corresponding attention and commitment on both sides
- it appears DOE/HQ leadership is instilling some method and order; concerns exist about the extent of detail and micro-management; juries are still out on future prospects; stability and guidance are needed
- much of the Russian organization and structure related to the approval, authority, and implementation of MPC&A remains mysterious to U.S. participants; there appears to be a very slow evolution from strict top-level authority to line accountability, which is necessary for effective MPC&A

Performance/Review

- evaluation of MPC&A effectiveness must be addressed at several levels: sites must take ownership and evaluate themselves; governmental entities must take responsibility and evaluate

sites and hold them accountable for performance; and outside, independent evaluation is needed to improve credibility and international acceptance

- more inclusion of U.S. project team input to program direction is needed; some feel it would be worth the burden of frequent meetings with DOE/HQ to overcome the "crisis mode"; many problems and crises would be defused quickly because answers reside in the project teams
- U.S. program reviews should be more inclusive so problems and solutions can be shared across project teams; consideration should be given to bilateral program/progress reviews

Tracking and Coordination

- better tracking and coordination are needed on both sides, but it has been particularly disappointing to see so little cross-sharing by many of the Russian parties; tracking and coordination will become more important as the program ages and lessons learned can be extensively shared
- a "newsletter" highlighting cross-cutting issues, problems solved, and successful approaches, would be useful for all participants

Resource Requirements

- travel paperwork, export licenses, taxes and other administrative items have cost the program and the participants much time and energy for very little return and, it appears, things are getting worse instead of better; blanket approvals and waivers should be developed to support the cost-effective continuation of the program
- nuclear safety issues are frequently brought up for attention, but are outside the scope of this program; Russian governmental authorities should focus on these issues and determine the best application of resources - safety issues can influence U.S. decisions about continued participation

Infrastructure

- concerns exist about the condition of facilities, personnel, procedural and administrative support to MPC&A, as well as about fiscal and business practices and accountability
- viable infrastructure to support MPC&A equipment and services in the long-term is not evident
- new U.S.-developed "infrastructure" projects (measurement and calibration standards, criteria development, certification, etc.) should focus on input to and implementation by project teams

with the exception of non-site specific areas, such as regulations, impacts of other programs, etc.

Commitment

- U.S. participants feel they have worked long and hard enough to demonstrate their good faith; full Russian commitment is needed now, to include budgetary support
- Russian interactions with other countries in nuclear "sensitive" projects in some cases leave the U.S. uncertain about commitment to the U.S. effort
- although it is possible to come up with a rationale for why the Russian approach to many MPC&A issues is different from what the U.S. might expect or want, some middle ground is needed between the inertia of past authority structures and the current exacerbating social and economic conditions

CHART III. PROFESSIONAL ASPECTS

Travel/Workload

- excessive, difficult travel is involved for the U.S.; too much paperwork (clearances, visas, etc.) and logistics of getting to sites can be a drain; U.S. participants, in general, are tired and many have had health problems, some serious
- there is a need to expand U.S. participation to increase the participant pool with technical strengths; too many participants are not MPC&A experienced

Relationships

- interactions between U.S. and Russians are happening that were never expected to take place; they have been very interesting, challenging, and rewarding
- the U.S. participants have developed a real respect and appreciation for capabilities, both of the Russians and of each other across the national laboratories

Collaboration

- working relationships have been developed with the Russians on a technical level to address MPC&A issues; although it doesn't always go smoothly, it is like "arguing and disagreeing with a colleague on a professional level"

- in the process of working MPC&A improvements, the Russians have been learning about contracting and western business practices

Analysis

Among the MPC&A “effectiveness” and “sustainability” implications that can be drawn from this information is a serious one that existing MPC&A improvements and future planned improvements need to be evaluated, tested, corrected if necessary, and run through a filter of “sustainability”. Evaluation and testing are needed not only by U.S. experts, but also by U.S.-Russian teams, and by the Russians themselves. This has begun to happen under Gosatomnadzor. However, Minatom needs its own oversight, evaluation and testing function. By “run through a filter of ‘sustainability’” is meant: to include in negotiations and contracts, measures of Russian commitment to operation, maintenance, procedures, administrative and managerial responsibilities and authorities, training, and continued implementation.

On the very positive side is the fact that good working relationships have been established at the Russian sites and with several government organizations.

As we move on in the program and, given that serious evaluation and testing are incorporated, the U.S. needs to spend more time listening to Russian thinking on requirements and possibilities where MPC&A improvements make sense, etc. and ensure that system-based, requirements-driven work becomes the rule. In the process, weaning from the “toys” and “equipment/technology shopping list” approaches must take place. Russian commitment, in budgetary, regulatory, and organizational terms, needs to be evidenced to help convince the U.S. that the program is not a sink for U.S. funds.

The lack of material control and accounting improvements parallel to physical security improvements cannot continue. The insider threat is not being adequately addressed in too many cases. Further, a systematic, top-down and bottom-up review of the application and operation of all MPC&A equipment and technology should be undertaken (to include need, standards, calibration, validation, maintenance and testing).

The prognosis for future relations and collaboration is very good, given that progress and trust established to date (at great personal, professional, and financial expense) are not eroded. In the U.S. view, much of the work has become constructively collaborative, which contributes to quality in the long-run.

Suggested Next Steps

Equal priority should be given to: (1) increasing the systematic approach to MPC&A upgrades; (2) evaluating, testing, and correcting existing upgrades, as appropriate (and work has been initiated

by DOE/HQ along these lines, for some sites) as well as including effectiveness evaluation into future upgrades; (3) incorporating the “sustainability” question in all future efforts.

The first can be achieved by instituting DOE/HQ guidance to this effect and then folding system-based tasking into the project teams’ priorities.

The second will involve a larger effort, to include: development of assessment and testing plans; building and deploying assessment and testing “teams” (which can and should include project team members); and working with the Russians, at both the site and governmental levels to establish oversight and evaluation capabilities and official functions (with commitments to corresponding human and other resource needs).

The third is a more difficult problem, but it can begin to be addressed immediately by making the Russians aware of U.S. concerns in this regard, and (as mentioned above) injecting into task and contract negotiations measures of Russian commitment to operation, maintenance, procedures, administrative and managerial responsibilities and authorities, training, and continued implementation. Russian and U.S. support of in-country, commercial, competitive supply of MPC&A equipment and services is needed to support “sustainability”, as well.

Ensuring continued collaboration could be greatly facilitated by decreasing the amount of paperwork on both sides and by having the Russian government establish waivers or other mechanisms (blanket visas, blanket customs transit, blanket tax exemptions, waivers or discounts) in support of MPC&A cooperation. Periodic joint program reviews and a “newsletter” as an information forum could also contribute to the efficiency of the program. Russian indications of commitment are needed soon, as are plans for long-term incorporation of MPC&A into their existing and future fissile nuclear materials operations.

