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Abstract

The Federal Nuclear Material Control and Accounting Information System (FIS) is the national information source on nuclear material accounting of the Russian Federation (RF). RF regulations mandated the creation of a national nuclear material accounting system to be managed by Federal Agency For Atomic Energy (Rosatom), and for the past decade, the FIS has been developed for all organizations required to report to Rosatom. The system represents a successful integration of U.S. financial support and consulting with Russian vision and technical expertise, creating a viable national nuclear material accounting system.

This paper discusses crucial elements to ensure Sustainability of the FIS. A long-term plan for operation and maintenance of the information system is critical to a sustainable national accounting system. Plans undertaken throughout the FIS Project lifecycle have supported the necessary elements to ensure success. Through the next two years, long-term planning will be re-evaluated and the successful elements and new initiatives will become part of an overall Operations Management Program. FIS resource needs will be managed through prioritization and ranking for each Program element, including: system operation; revising and implementing supporting regulations; establishing monitoring and control mechanisms to ensure validity of the data reported; maintaining and improving communication channels; and establishing regular FIS training. The results of a survey on improving FIS reporting, expected in June 2006, will be used in the prioritization and ranking process. Developing the Program and planning for long-term sustainability of the FIS will ensure a viable national nuclear material accounting system for the future.

Introduction

The Russian Federal Agency for Atomic Energy (Rosatom) is developing and operating the automated Federal Information System for State Nuclear Material Control and Accounting (FIS) as established in the primary set of documents governing the Russian State System for Nuclear Material Accounting and Control.

The Russian Federation began working on the FIS in 1996 with the assistance of Lawrence Livermore U.S. National Laboratory under the Russian and American intergovernmental agreement on cooperation in the area of nuclear material physical protection, control and accounting. The joint work has continued with support from the U.S. Department of Energy.

TsNIIATOMINFORM and the Rosatom Situation and Crisis Center (SCC) are the two organizations responsible for the operation and continuing development of the FIS:

- TsNIIATOMINFORM is the developer of the FIS. Its functions include the future development and expansion of the FIS, upgrading and supporting the current version of the system, as well as the support of its functions.
- The SCC operates the current version of the FIS and is the liaison with the organizations that report to the FIS.

The Joint Coordinating Committee (JCC) for the implementation of the above intergovernmental agreement stated that ensuring the long-term sustainability, advancement and expansion of the systems presently in development is the most important task of all the Russian and U.S. cooperative projects. This objective has become even more critical since it is expected that U.S. technical assistance will be gradually reduced starting in 2008 and end by 2013. During this period, Russian organizations must prepare to assume complete responsibility for the system

and its further development. In August 2005, the JCC again emphasized the importance of maintaining the long-term viability of the FIS.

Pursuant to the decisions of the JCC, Rosatom has begun developing a special comprehensive plan for the long-term sustainability of the FIS that includes:

- Continuous monitoring of the FIS;
- Regular system hardware and software upgrades;
- FIS developer support for system functions;
- New developments for the FIS;
- Maintaining the experience and knowledge of specialists who develop and operate the system, and training new personnel;
- Improving interaction between the FIS and organization information systems.

Monitoring the FIS

Rosatom and Rostekhnadzor monitor the FIS by supervising and checking activities related to the development and operation of the system.

The most comprehensive monitoring components are implemented through the ProFIS (FIS Validation), a series of procedures developed with Rosteknadzor. Appropriate training has been provided for specialists of the reporting organizations and Rostekhnadzor experts who perform the validation procedures.

The ProFIS validation procedure was developed with U.S. support and in conjunction with Lawrence Livermore National Laboratory and the Department of Energy. The ProFIS validates the FIS operating technology by confirming that the data in an organization's nuclear material accounting documents is consistent with the information contained in the FIS database.

The first validations have already been completed, showing the viability of the procedures developed, verifying that the FIS is being operated according to the established rules and regulations. This indicates the ProFIS procedure is a good model for the Russian Federation FIS monitoring regime.

FIS hardware and software upgrades

The sustainability plan for the FIS also includes updating the hardware and software for the system on a periodic basis. This consists of migrating to newer Oracle releases, mastering new software development tools, as well as upgrading equipment to ensure the uninterrupted operation of the system. The FIS hardware configuration includes:

- The development system;
- The test system;
- The pre-production
- The production system

Hardware should be upgraded periodically to ensure that hardware vendors have spare parts should a failure occur, and to ensure that operating system, database, and application software can run on the hardware platform. With the support of the U.S., FIS hardware has been upgraded every 4-5 years. The sustainability plan must include hardware upgrade plans that are both cost-effective and reduce the risk of hardware failure.

Operating system and database management software vendors release new versions of their software every 3 – 5 years. The FIS application operates on specific commercial software from vendors who stop providing support for older versions as the new versions become stable. Therefore, it is important to migrate to newer versions of the software in order for vendor assistance to be available in identifying and resolving software failures. Also, each release of the supporting software includes improvements in functional and operating capabilities, as well as important security upgrades. Upgrading software reduces the risk of serious failure of the FIS system.

The database management software for the system is Oracle Designer 1.3.2 and Oracle 7.3.4 DBMS. This release is very much out-dated and plans were made in 2002 to migrate to Oracle 8.1.7 and Designer 6i. At the beginning of 2004, the migration was completed for the development system. The migration of the software to the production system is scheduled for 2006.

The planning process, including certification, is already underway in order to migrate the FIS to a newer version of the Windows operating system, and a newer release of the Oracle database. These software migrations will ensure that the FIS operates reliably into the future. In the sustainability plan, software migrations are scheduled every 3 – 5 years in order to ensure the FIS remains on a secure and supportable software platform.

FIS developer support for system functions

To ensure the uninterrupted operation of the current FIS release, operating personnel must continuously monitor the operation of the system module, and its developers must provide ongoing support, which includes eliminating probable system failures, correcting errors, analytical support and updating operating documentation. The sustainability plan envisions a series of steps for the implementation of all the above activities that conform to the IEEE 12207 standard for the operation and maintenance process of the software development life cycle.

New developments for the FIS

In tandem with the operation of the FIS, new procedures have been developed and implemented to provide a more flexible and reliable system. In addition to a trial operation phase in which MBA reports are received from pilot organizations, we have developed and implemented a summarized reporting method for all organizations in the Russian nuclear industry, and have been working on procedures for the receipt and processing of nuclear material movement reports.

Preparations are underway for the implementation of a control and accounting subsystem for foreign-owned nuclear material temporarily located in the Russian Federation.

An important phase in the operation and evolution of the FIS will be the planned transition to the universal reporting system. The fundamental concept of universal reporting is the establishment of reporting zones at the organizations that may consist of one or multiple MBAs or even an organization in its entirety. The merging of balance areas into reporting zones will facilitate the following:

- Obtaining optimally detailed information in the form most appropriate for system users;
- Maximizing the capabilities of FIS software and personnel skills.

The successful transition to the universal reporting method is essential to sustainability planning. Universal reporting will provide Rosatom with information of sufficient detail to be useful, thus the FIS will continue to receive Rosatom support and organizations will not be overburdened by reporting to the FIS and therefore will be able to provide accurate and timely information.

Maintaining expertise and training new FIS specialists

It is extremely important to provide ongoing training to the employees of organizations and initial training to young specialists. Also, we have contracted for the transfer of knowledge and expertise by the original FIS development team.

Cooperative efforts for the development of the FIS began 10 years ago. Our personnel management experience during this period has shown the need to organize regular training programs for personnel who:

- Participate in the development of the FIS;
- Support the operation of the FIS;

- Prepare the reports submitted to the FIS;
- Monitor the operation of the FIS.

The benefits of workshops for a wide range of FIS users – Rosatom, other government bodies, and organizations that report to and reconcile data with the FIS – have been noted on numerous occasions. The working groups for the FIS project and training project have already begun organizing regular courses and developing a standard approach and joint action plan. A quarterly newsletter, the FIS News, is also an important component of sharing knowledge and expertise. The FIS News is composed of articles submitted by organizations on a variety of topics related to reporting to the FIS. The FIS News, available in a limited number of hardcopies, is also accessible to all the organizations online.

Improving interaction between the FIS and organization information systems

An important area of activity that should facilitate the sustainability of the FIS is its interaction with the information systems of the organizations.

The local systems created by the organizations do not fully exploit their capabilities for interaction with the FIS and timely adaptation of new requirements. Because the FIS and the nuclear material control and accounting information systems of the organizations have been developed as independent projects, the systems are in some cases incompatible and require significant modifications. Substantial funds and resources have been invested in these systems; consequently, none of the entities involved, whether providing the funds or labor for the projects, are interested in redesigning them.

To support the long-term operation of the FIS and local MC&A information systems, Rosatom and the U.S. DOE must work together to more closely coordinate the upgrades to the organization information systems and their compatibility with the FIS. In particular, there must be a greater emphasis placed on the development of data collection, processing and transfer centers (workstations) to prepare electronic reports for the FIS based on standard software.

It is also important to maintain an effective feedback mechanism for input from the reporting organizations. Surveys of the organizations, their participation in the development of regulatory and technical documents, and the trial operation phase of the FIS subsystems are tools that enable us to analyze the current state of organization MC&A information systems, as well as troubleshoot and upgrade data collection, processing and transmission technologies. These tools will continue to be used to sustain the FIS.

Conclusion

The FIS is a key component of the Russian State System for Nuclear Material Accounting and Control, and its sustainability and effectiveness are paramount to the success of the national system.

Since the inception of the FIS, and throughout its development and operation, due consideration has been given to improvements and upgrades that ensure the long-term sustainability of the system. The current efforts of Rosatom, TsNIIATOMINFORM and the SCC within the framework of the sustainability plan will support the long-term viability of the FIS at the new qualitatively higher level, ensuring that the FIS continues to operate efficiently and without interruption, as well as provide the quality of information required by Rosatom to fulfill its nuclear material management, control and accounting objectives.

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