

CONF-971031--4

PLAN AND PROCEDURES FOR RAPID INVENTORY TAKING  
AT THE RESEARCH INSTITUTE FOR ATOMIC REACTORS\*

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MAY 20 1997  
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A major element of a system for nuclear material protection, control, and accounting (MPC&A) is to take the physical inventory of the nuclear material periodically. Physical inventory taking (PIT) includes ensuring that all nuclear material on inventory is included in the facility records and that the measured content of items or containers (or at least a suitable random sample thereof) corresponds to the recorded values.

A preliminary step to the conduct of the PIT is application of rapid inventory procedures that serve to provide the benchmark for the inventory, e.g., by identifying if any items are missing and also, if any unrecorded items are present. Rapid Inventory Procedures by design can be carried out on short notice and at any time during the reporting period, while a full physical inventory is normally carried out at the end of the reporting period. The procedures make use of computerized inventory records, bar codes, and tamper indicating devices (TIDs), and involve the identification and accounting of nuclear material containers and items without quantitative measurements. On completion of the Rapid Inventory Procedures, there will be a corrected data base with a one-to-one correspondence established between every record in the accountability data base and every item in the selected area.

The objective of a rapid inventory plan is to define a set of activities that can be carried out to determine the status of the nuclear material at a given location (for example, an MBA or interim storage vault). Various levels of rapid inventory procedures are possible. In a homogeneous storage area, such as a spent fuel storage pond or a given process line, rapid inventory procedures may consist of an item count. For mixed item storage areas, rapid inventory procedures could include the verification of the item identification, location, and tamper indicating device. The extent of verification to be carried out will be determined on the basis of the material control objective (source of request and the assumed threat) and the technological tools available to the MPC&A staff.

The Rapid Inventory approach is being implemented by the Research Institute for Atomic Reactors (RIAR) in Dimitrovgrad, Russia, as one of the first steps in the program to enhance nuclear

\*This work was performed under the auspices of the U.S. Department of Energy  
under Contract No. DE-AC02-76CH00016.

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materials safeguards at the site. This effort as well as other projects, are being conducted under the US-Russian Cooperative Program on Nuclear Materials Protection, Control And Accounting (MPC&A), with assistance provided by specialists from U.S. Department of Energy National Laboratories.

The development of the rapid inventory capability involved a series of interrelated tasks starting with a site survey by the US Team and a documented assessment of the existing facilities and operations by RIAR staff. Following this assessment, the joint team identified MPC&A system upgrades, including hardware and software requirements and the associated training and workshop activities for both RIAR management and staff.

The focus of the rapid inventory task was on the Central Storage Facility at RIAR, which handles both bulk plutonium and uranium in containers, as well as completed fuel assemblies. The major technology items introduced were:

- Bar codes - Bar coding equipment was provided, and workshops were conducted on the use of bar codes for identification and tracking of items and storage locations, and more importantly, as the key to interrogating other facility data bases.
- Tamper-indicating devices(TIDs) - RIAR was introduced to a variety of TIDs currently in use and given an initial supply, with training regarding application, control and record keeping.
- Computerized inventory records - Computers were provided, as well as guidance and hands-on experience in structuring the data base. The use of flat files for accumulating various data elements e.g. shipping data, bar codes, passport data, etc. and their relation to the future network MC&A data base was developed.

Prior to implementing this program it was considered essential that the RIAR staff be introduced to the MC&A culture embodied in these new systems. This was accomplished by providing comprehensive MC&A workshops to RIAR management and staff based on the courses given in the US and to IAEA representatives. In addition, a two week working session conducted at Brookhaven National Laboratory in February 1997 for several RIAR staff addressed the issues associated with introducing of the rapid inventory elements into the existing system at the Central Storage Facility and developing the plan and schedule for implementation. The rapid inventory plan includes (a) input of hand recorded data into a computerized inventory record data base, (b) development and demonstration of rapid inventory procedures for the storage area, and (c) implementation of the procedures at other RIAR technological areas.

This paper summarizes the existing MC&A system at the RIAR Central Storage Facility, presents a means for achieving enhanced safeguards in nuclear material accounting, and discusses the process of introducing the technology and methodology into the plant operations at RIAR in Dimitrovgrad.

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