

DEVELOPMENT OF THE RFID SYSTEM FOR NUCLEAR MATERIALS MANAGEMENT

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ABSTRACT

Radio frequency identification (RFID) is one of today's most rapidly growing technologies in the automatic data collection industry. Although commercial applications are already widespread, the use of this technology for managing nuclear materials is only in its infancy. Employing an RFID system has the potential to offer an immense payback: enhanced safety and security, reduced need for manned surveillance, real-time access to status and event history data, and overall cost-effectiveness. The Packaging Certification Program (PCP) in the U.S. Department of Energy's (DOE's) Office of Environmental Management (EM), Office of Packaging and Transportation (EM-63), is developing an RFID system for nuclear materials management. The system consists of battery-powered RFID tags with onboard sensors and memories, a reader network, application software, database and web pages. The tags monitor and record critical parameters, including the status of seals, movement of objects, and environmental conditions of the nuclear material packages in real time. They also provide instant warnings or alarms when preset thresholds for the sensors are exceeded. The information collected by the readers is transmitted to a dedicated central database server that can be accessed by authorized users across the DOE complex via a secured network. The onboard memory of the tags allows the materials manifest and event history data to reside with the packages throughout their life cycles in storage, transportation, and disposal. Data security is currently based on Advanced Encryption Standard-256. The software provides easy-to-use graphical interfaces that allow access to all vital information once the security and privilege requirements are met. An innovative scheme has been developed for managing batteries in service for more than 10 years without needing to be changed. A miniature onboard dosimeter is being developed for applications that require radiation surveillance. A field demonstration of the RFID system was recently conducted to assess its performance. The preliminary results of the demonstration are reported in this paper.