ARG-US RFID System for Management of High-Risk Materials

Now commercially available via Evigia Systems, Inc.

Model 9975 Drums in Storage

FEATURES

Security – The system can monitor thousands of drums 24/7 via secured RF/Ethernet links. The system can also track and monitor drums during transport. Any abnormal situation will trigger an alarm for immediate action. Alarm situations include seal tampering, unauthorized move, high temperature, humidity, shock, and radiation.

Drum information is stored in tags and archived in local and central servers.

Longevity – Tags resistant to radiation (≥ 30 kR); long battery life (≈ 10 yr)

Sensors – [Seal Integrity, Temperature, Humidity, Shock, Radiation (Gamma, Neutron), Battery Strength] provide instant alarms, environmental data, and event logs.

Versatility – Custom software modules (storage and transportation) are user-friendly and can be easily integrated into existing on-site databases.

Drum information can be retrieved remotely and shared with authorized off-site users via secured Internet.

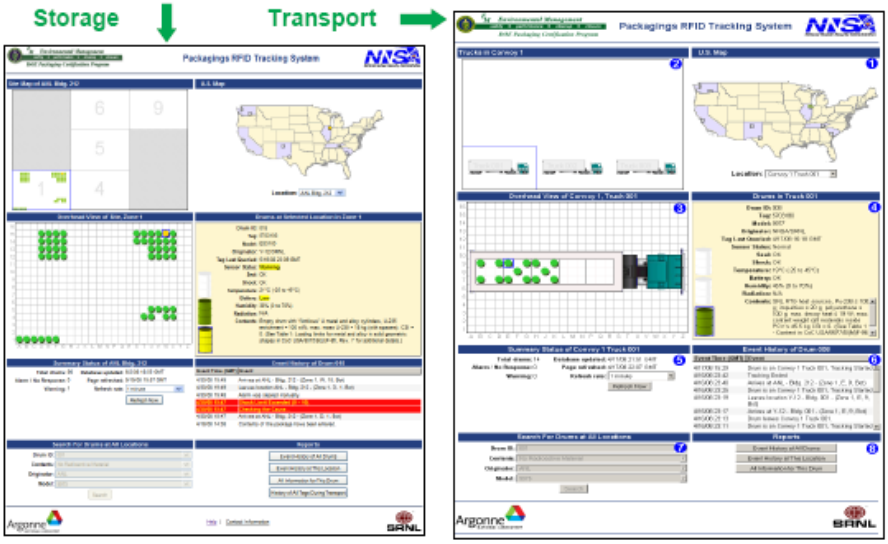
Availability – The technology has been licensed exclusively to the Evigia Systems, Inc. in the field of use of storage and transportation of nuclear and hazardous materials. Evigia Systems, Inc. is one of the leading manufacturers of ISO-18000 Part 7 RFID tags and readers for the U.S. Department of Defense.

The ARG-US system, developed by Argonne National Laboratory for the U.S. DOE Packaging Certification Program, is the result of extensive hardware and software development. The form factor of the radio frequency identification (RFID) tag has been designed to be broadly compatible with common material packagings and has undergone radiation endurance testing. The sensor suite includes seal integrity, radiation, temperature, humidity, and shock, and it can be expanded to accommodate additional sensors. Sophisticated battery life management and monitoring extends battery life to 10 years or more.

Two specialized software applications — ARG-US TransPort and ARG-US OnSite — have been developed, providing a powerful, customizable platform for full life-cycle materials management during transport, storage and disposition. The system incorporates secure communications, databases, and web services. Together, these features can significantly improve performance and reduce costs associated with nuclear material operations and aging management, while enhancing safety, security, safeguards and sustainability.

RFID tags mounted on Models 9975, 9977, 9978, ES-3100, and DOT 7A drums

The ARG-US RFID systems have been extensively tested under various operations environments at selected DOE sites and in multiple transportation campaigns since 2010. The overall performance of the system, from sensors to communication, has been proven robust and reliable, even as new sensors are being incorporated into the modular platform of the RFID tag. The system was featured in a case study in the U.S. for the World Institute for Nuclear Security and the World Nuclear Transport Institute Joint International Best Practice Guide on Electronic Tracking for the Transport of Nuclear and Other Radioactive Materials, Revision 1.0, February 2012.



Sample web pages for tracking packages in storage and transportation

Five DOE sites and national laboratories have acquired ARG-US RFID systems for ongoing field testing and applications in storage and transportation. At Argonne, a RFID Command Center was established in 2010 to support continuing device and system development and growing applications in civilian nuclear fuel cycles and other high-risk materials. In April 2013, ARG-US was chosen as the winner of the first annual Active Tagging Case Study contest conducted by the Association for Automatic Identification and Mobility (AIM) Expert Group (www.aimglobal.org). In April 2011, ARG-US was chosen by an industry panel to receive *RFID Journal's* prestigious "Most Innovative Use of RFID" Award. ARG-US was also selected as a finalist to present at the 2011 World's Best Technology Innovation Marketplace, a preeminent technology forum.

ARG-US RFID Tag & Reader Specifications

Physical	Width: Length: Thickness: Weight:	200 mm (7.9 in.) 150 mm (5.9 in.) 30 mm (1.2 in.) ≈1000g (2.2 lb)
Environmental	Temperature: Humidity: Vibration and Shock: EM Emissions:	-32° C to 70° C (-26° F to 158° F) 0% to 100% non-condensing MIL-STD-810E Method 514.4, Category 10 HERO-certified
UHF RF transceiver	Frequency: Range: Data rate: Protocol:	433.92 MHz 107 m (350 ft) line-of-sight 27.8 Kbps ISO/IEC 18000-7, with tag-initiated message protocol
Interface	Wireless:	RF read/write capable Sensor expansion board and serial read/write capable
Memory	User memory: Sensor memory:	256KB non-volatile (default) 256KB non-volatile (default)
Power	Battery type: Battery number: Battery life: Battery status:	3.6-V primary lithium (Li-$SOCl_2$), A-size 4 >10 years, depending on usage Reports present voltage
Sensor	Seal: tactile switch Shock: Temperature: Humidity: Radiation: gamma neutron	Tamper indication via loss of bolt tension Vibration indication and recording Temperature condition monitoring and recording Humidity condition monitoring and recording Dose and dose rate monitoring and recording Counts and count rate monitoring and recording
Readers	Fixed Handheld Portal	ISO/IEC 18000-7, with tag-initiated message protocol ISO/IEC 18000-7, with tag hibernation capability Short range 433 MHz & 134 kHz low frequency links

Web: http://rampac.energy.gov/reference/rfid/default.aspx

About the DOE Packaging Certification Program

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