Implementation of the Regulatory Authority Information System in Egypt

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ABSTRACT

As part of the implementation of a barcode-based system to track radioactive sealed sources (RSS) in Egypt, the Regulatory Authority Information System Personal Digital Assistant (RAIS PDA) Application was developed to extend the functionality of the International Atomic Energy Agency's (IAEA's) RAIS database by allowing users to download RSS data from the database to a portable PDA equipped with a barcode scanner. [1, 4] The system allows users in the field to verify radioactive sealed source data, gather radioactive sealed source audit information, and upload that data to the RAIS database. This paper describes the development of the RAIS PDA Application, its features, and how it will be implemented in Egypt.

INTRODUCTION

The Integrated Management Program for Radioactive Sealed Sources (IMPRSS) [2] is a joint effort among Sandia National Laboratories (SNL), The Egyptian Ministry of Health & Population (MOHP) Executive Office for Radiation Protection (EORP) and the Egyptian Atomic Energy Authority (EAEA) to protect human health and the environment in Egypt from

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mismanaged RSS through development of comprehensive RSS management capabilities. The program includes automating cradle-to-grave tracking of RSS in use and in storage through implementation of the IAEA's RAIS database. RAIS is a hierarchical inventory and tracking system for RSS developed through the IAEA to provide member states with a common software for tracking and controlling RSS. The RAIS structure is a top-down hierarchy, beginning with a country's regulatory infrastructure, and focusing down through regions, districts, facilities and departments to individual radiation generators and associated equipment. RAIS:

- Tracks authorization, licensing, import/export, use, and disposal of RSS.
- Manages activities such as inspections and audits.
- Provides a "template" for RSS management that can be customized to meet the needs and regulatory requirements of individual countries.
- Is available on the Internet at ftp://ftp.iaea.org/pub/RAISLANG/.

In order to completely automate RSS tracking in Egypt, 1) software had to be developed that would allow two-way communication between the RAIS database and a PDA, and 2) a barcode identification system was needed that would uniquely identify all RSS in the country.

RAIS PDA APPLICATION

The RAIS PDA Application is a software program that runs on a PalmOS PDA and Windows CE platforms. The software provides an easy-to-use PDA interface to a RAIS database that allows users to verify RSS inventory data in the field, perform audits, and upload the data to the parent RAIS database. Specifically, the Application allows users to:

- Display RSS in the RAIS database by making selections from lists of facilities and departments that have sealed sources.
- Review the following information for each RSS in the RAIS database:
    - Source identification number
    - Primary radionuclide(s)
    - Activity
    - Facility
    - Department
    - Source category
    - Physical form
    - Chemical formula
    - Expected location
    - Status (i.e., "in use", "inactive" or "in storage")
    - Status date
    - Responsible party
    - Responsible party phone number
- Provide audit data for selected RSS that includes:
    - Whether the source passed its leak test
    - Leak test date

- o Whether posting of the source is adequate
- o Whether the source is secure
- o Comments
- Select a sealed source by scanning its barcode.
- Move a sealed source from one facility and/or department to another by selecting the destination facility and department and scanning the barcode of the source.
- Log a discrepancy of a source barcode that is scanned but is not found in the RAIS database.

Hardware and Software Requirements
The following hardware and software are required for complete interoperability between the RAIS PDA Application and a RAIS database:

- Symbol model SPT 1800 PDA with cradle
- RAIS Database Creator, Version 3.0
- Palm Desktop Software
- JSync software for Palm Desktop
- Java/XML conduit, available from Digital Migration, Inc., Albuquerque, NM
- Desktop computer capable of running RAIS Database Creator 3.0 and Palm Desktop software.

Limitations of the RAIS PDA Application
In its current form, the RAIS PDA Application does not provide any mechanisms for adding a sealed source; sealed sources must be added to the system by using the RAIS database version 3.0 software. Because data consolidation in the RAIS 3.0 software can cause significant data changes, the RAIS PDA Application must be synchronized to its respective RAIS database immediately before and immediately following data consolidation to prevent data integrity problems.

Using the Software
The RAIS PDA Application is launched by tapping on the RAIS icon in the applications window of the PDA with the stylus. Using the Application involves a few steps:

- Selecting a facility: Tap the arrow to the right of the facility drop-down list and select the desired facility from the list by tapping it with the stylus.
- Selecting a department: The above procedure is applied to the department drop-down list. When a new department is selected, the list of regulatory authority numbers for the sources in the department appears in the source regulatory authority number list (Fig. 1).
- Selecting a sealed source from the list or adding a sealed source from another facility or department: Tap the source regulatory authority number with the stylus. When the source is selected, it appears in the list with a darkened background. (Fig.1).
- Displaying the details for individual sources: Select the source and tap the Details button to display the RAIS data for the source (Fig. 1). Use the arrows or scroll bar to scroll the list. Tap on the Done button to return to the main menu.

- Providing audit data for selected sources: Select the source and tap the Audit button. This will display a window with controls for entering the following audit data (Fig. 2):

    o Data on whether the source passed its leak test
    o Leak test date
    o Whether posting of the source is adequate
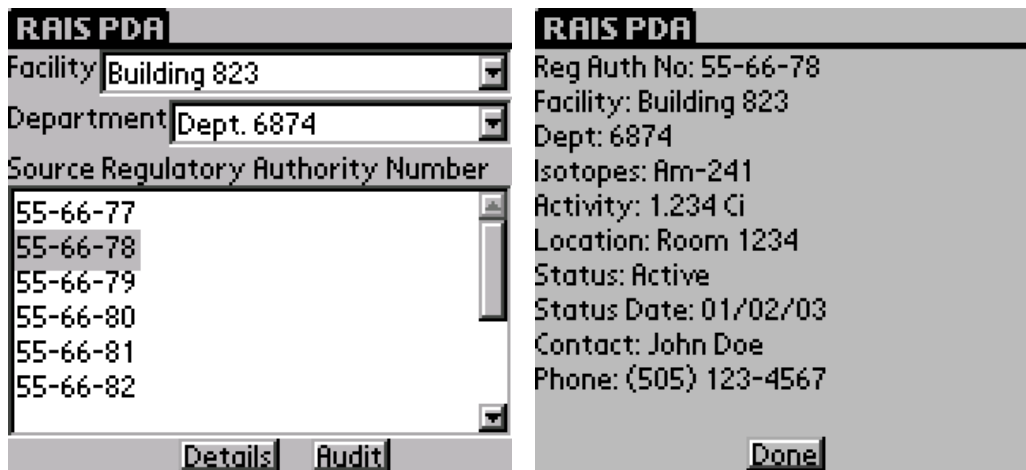   o Whether the source is secure
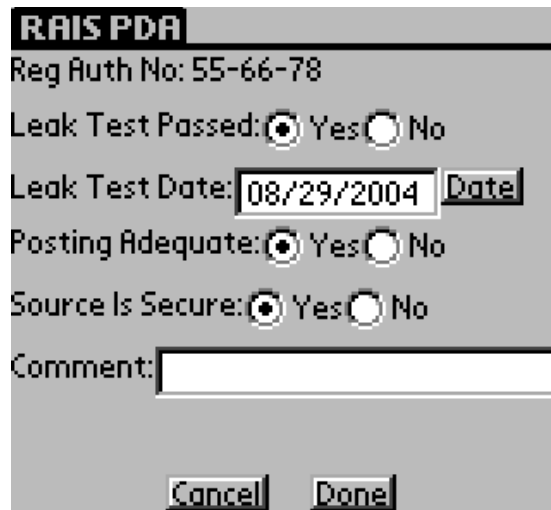   o Comments

Fig. 1. RAIS PDA Application source list (left) and source details (right).

Tap on the Yes or No radio buttons with the stylus to provide data about the leak test, posting, and source security. By default, all radio buttons are set to "No" if no audit data are available for the source. If the leak test date is available, it will be shown in the textbox; otherwise, the current date will be shown. To change the leak test date, tap the Date button to display a calendar from which another date can be selected. If desired, a comment of up to 50 characters may be entered in the Comment field. To save the audit data, tap the Done button; otherwise, tap the Cancel button to return to the main window.
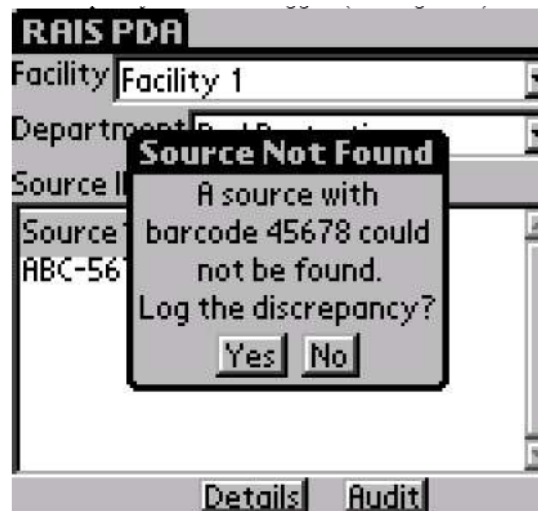
Fig. 2. Audit data window.

A source can also be selected by scanning the barcode of a source in the list. If a RSS with a regulatory authority number that corresponds to the scanned barcode is found in the list of sources for the selected facility and department, it is selected in the list and highlighted; if the source is found in the list for another facility and department, it is added to the list for the currently selected facility and department, highlighted, and deleted from the list for the other facility and department. If no source is found in the system that corresponds to the scanned barcode, a dialog box appears asking if a discrepancy should be logged (Fig. 3.)

Fig. 3. Discrepancy dialog.

Audit data may be provided for only those sealed sources that are associated with specific facilities and departments. When [Unassigned] is selected in the Department list, and a source

regulatory authority number is selected with the stylus, an error message will appear that says, "Source must be associated with a department before it can be audited."

To associate a sealed source with a department, select a facility and department and scan the barcode for the source. The source will be assigned to the selected facility and department and be highlighted in the list. Once the source is assigned to a department and selected, audit data may be provided for it.

THE RAIS BARCODE SYSTEM FOR EGYPT

Under the RAIS hierarchical structure, all regions, districts, facilities, equipment and sources have a unique regulatory authority number (RAN). The barcode identity system shown in Fig. 4 was developed for each step in the RAIS hierarchy as it relates to infrastructure organization in Egypt. Under this system,

- All regions (the 27 Egyptian governorates, or "states") have a 2-digit RAN.
- All districts (Egyptian cities and towns) have a 4-digit RAN (region + district).
- All facilities have an 8-digit RAN (region + district + facility).
- All generators have a 10-digit RAN (region + district+ facility + generator).
- All sources have a 12-digit RAN (region + district + facility + generator + source).

<div align="center">

01
RAIS "Region," one of the 27 Egyptian governorates
0101
RAIS "district," corresponds to an Egyptian city
01010001
Facility
0101000101
"Generator" or "Associated Equipment"
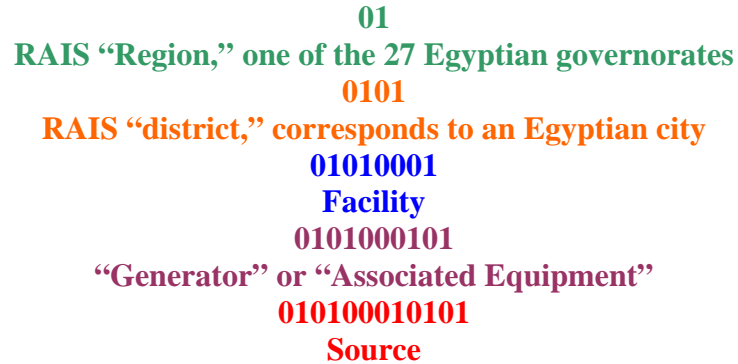**010100010101**
Source

</div>

Fig. 4. The RAIS barcode identification system for Egypt.

Examples of the implementation of this system using data for Egypt are shown in Table I.

Table I. Sample of Barcode RANs for In-Use Medical RSS in Egypt

Region	District (city)	Facility	Generator	Source
01 Alexandria	01 Samoha	0001 Alexandria International Hospital	01 Shirana	01 Co-60 02 Co-60 03 Cs-137
02 Asute	01 Asute	0001 Asute Oncology Center	01 C.G.R. 02 C.G.R.	01 Co-60 01 Co-60

		0002 Prof Amina Oncology Center 0003 South Egypt Oncology Center	01 Theratron 780 01 Blood irradiator	01 Co-60 01 Cs-137
03 Cairo	01 Abassia	0001 Ein Shams Oncology Center	01 C.G.R. 02 Nucletron	01 Co-60 01 Cs-137 02 Cs-137 03 Cs-137 04 Cs-137 05 Cs-137 06 Cs-137 07 Cs-137 08 Cs-137 09 Cs-137 10 Cs-137 11 Cs-137
			03 Blood irradiator	01 Cs-137

Using this system, the RAN for Alexandria is 01, the RAN for Samoha is 0101, the RAN for Alexandria International Hospital is 01010001, the RAN for the Shirana instrument is 0101000101, and the barcode RANs for the three sources associated with this instrument are 010100010101, 010100010102 and 010100010103.

DATA SHARING

RAIS will be implemented in Egypt at the MOHP/EORP and will contain data on both RSS that are in use and those that are in storage, either for possible future use or awaiting disposal. Different agencies will require various levels of access to RAIS to be able to effectively perform activities associated with RSS. The EORP is responsible for the update and maintenance of the database. The EAEA needs to be able to access data for "spent" RSS, i.e., those in storage for disposal, update specific RAIS data fields (source status and source location as sources change status from "in use" to "in storage") and input audit data when facility audits are conducted. The Egyptian Customs Authority needs "read only" access to be able to track RSS imports and exports.

Using the RAIS 3.0 Creator software module and the procedures outlined in the *RAIS 3.0 Administrator's Guide,* the EORP will create the RAIS user interfaces with the EAEA and customs (the RAIS 3.0 "front-end') and the database (RAIS 3.0 "back-end".) The EORP will then "freeze" the front-end so that it can only be modified by authorized MOHP staff.

The RAIS system in Egypt will be a three-site configuration, with the EORP being the primary site and the EAEA and customs being the user sites. As such, the EORP will provide the EAEA

and customs with the initial version of RAIS for Egypt. Both the EAEA and customs will be able to modify back-end data at their sites; however, it is anticipated that only the EAEA will make changes to source data as sources no longer in use are placed in storage. Using the Consolidator function in RAIS 3.0 Creator, the EAEA will then upload new back-end data to the MOHP on a regular basis; i.e., monthly. Using these data, the EORP will then create a new primary back-end, and re-distribute this to the two user sites.

SUMMARY

The IAEA has successfully developed and offered RAIS to over 50 countries. Using RAIS with the ability to automatically track barcoded sources via the RAIS PDA Application provides:

- Rapid assessment of a country's high-risk radioactive sources
- The ability to perform completely automated RSS audits
- Enhanced source security, leading to increased public health and safety.

The EORP now has approximately 1,900 RSS in RAIS in both English and Arabic. As the barcode-based RAIS is implemented in Egypt, the IMPRSS team will work with the IAEA to offer the RAIS PDA Application as an option for RSS tracking and inventory development in other countries.

REFERENCES

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