RADIOACTIVE MATERIALS PACKAGING (RAMPAC) DATABASE

K. L. Driscoll
Science Applications International Corporation
Oak Ridge, TN. 37830

ABSTRACT

The Radioactive Materials Packaging (RAMPAC) database is designed to store and retrieve information on all packages certified for the transport of radioactive materials within the boundaries of the United States. The information in RAMPAC is publicly available and the database has been designed so that individuals without programming experience can search for and retrieve information using a menu driven system.

RAMPAC currently contains information on over 650 radioactive material shipping packages. Information is gathered from the U.S. Department of Energy (DOE), the U.S. Department of Transportation (DOT) and the U.S. Nuclear Regulatory Commission (NRC). RAMPAC is the only tool which is available to radioactive material shippers which contains and reports packaging information from all three federal agencies. The DOT information includes package listings from Canada, France, Germany, Great Britain and Japan which have DOT certificates of competent authority and are authorized for use within the United States for import and export shipments only.

Originally developed in 1981 by DOE as a research and development tool RAMPAC has, in recent years, proven to be highly useful to operational personnel. As packages become obsolete or materials to be transported change, it is essential for shippers of radioactive materials to be able to determine if alternative packages exist prior to designing new packages. RAMPAC is designed to minimize the time required to make this determination, thus assisting the operational community in meeting their goals.

OVERVIEW

The Radioactive Materials Packaging (RAMPAC) database is designed to store and retrieve information on all packages authorized for the transport of radioactive materials (RAM) within the boundaries of the United States. RAMPAC is funded by the U.S. Department of Energy and is managed by Science Applications International Corporation (SAIC) in Oak Ridge, TN.

The U.S. Department of Energy (DOE), the U.S. Department of Transportation (DOT) and the U.S. Nuclear Regulatory Commission (NRC) review radioactive material package designs, to ensure that they meet the regulatory requirements. After it is determined that a package design meets these requirements, it is issued a certificate which approves the package for use. Information is gathered from these certificates and is stored in the RAMPAC database. Over 650 packages are represented in RAMPAC. In addition to packages made in the United States, the database stores information on packages from Canada, France, Germany, Great Britain and Japan which have DOT certificates of competent authority and are authorized for use within the United States for import and export shipments only.

RAMPAC is designed to allow individuals without programming experience to access and extract information from the database. Because RAMPAC is easy to use it has evolved from its original 1981 concept, that of a research tool, into a useful operational tool. Individuals with a continuing need for packaging information are assigned user identifications and are allowed to dial up and connect to the database directly. Individuals with only an occasional need for packaging information may find it more convenient to contact SAIC and have experienced staff members extract database information for them. Currently, access to RAMPAC is provided free except for possible long distant phone charges.

WHAT INFORMATION IS STORED IN RAMPAC

The following list outlines the data fields for which information may be collected and stored for each package. It is important to understand that each package is generally represented by a Certificate which is issued or endorsed by either the DOE, DOT or NRC. Each certificate may represent more than one package. Since it is unique, certificate information will appear only once for each package, but all other information stored concerning the package may appear multiple times. This relationship between the Certificate and other sections of the data may be thought of as a parent child relationship (i.e. One parent may have many children.)

Package Section

Field Name:	Brief Description:
Model Names	Identification other than the certificate number that a package may be known by. (N-55, Paducah Tiger, TRUPACT, etc.)
Fissile Type	Class of fissionable material the package can transport. (Y=yes, N=none, or combinations of 1, 2, 3)
Package Kind	General description of the package. (Box, Drum, Cylinder, etc.)
General Contents	General description of the overall authorized package contents. (Mixed Radionuclides, Source, Unirradiated Fuel, etc.)
Mode Use	Modes of travel the package authorized for. (A = air, S = Sea, H = Highway, R = Rail)
Gross Weight	The package gross weight fully loaded, in pounds.
Payload Weight	Maximum content weight, in pounds.
Empty Weight	Weight of the empty package, in pounds.
Cavity Volume	Cavity volume, in cubic inches.
Cavity Length	Length of cavity, in inches.
Cavity Height	Height of cavity, in inches.
Cavity Width	Width of cavity, in inches.
Exterior Length	Overall exterior length, in inches.
Exterior Height	Overall exterior height, in inches.
Exterior Width	Overall exterior width, in inches.

Agency Information Section

Field Name:	Brief Description:
General	Denotes approval for use under the general license provisions of 10 CFR 71.12. (Y=yes, N=no)
Agency	Agency which issued this certificate. (DOE, DOT, NRC, IAEA = for DOT certificates on other than US packages)
Issue Date	Date the paperwork was issued.
Expire Date	Date the paperwork will expire.
Reference	Reference for this set of paperwork. (Revision 10, DOE letter 01/12/87, etc.)

Shieldings Section

Field Name:	Brief Description:
Shielding Material	Shielding material(s) used. (Steel, Lead, Depleted Uranium, etc.)
Shielding Location	Location of Shielding material. (Side wall, Top, Bottom, etc.)
Shielding Thickness	Thickness of the shielding material(s), in inches.

Coolants Section

Field Name:	Brief Description:
Composition	Composition of the coolant. (Air, Liquid, Water, etc.)
Thermal Rate	Thermal decay rate of the coolant.

Contents Section

Field Name:	Brief Description:
Chemical Comp.	Specific authorized contents. (CO-60, Fiss Mat, Irr Mat, CS-137, etc.)
Physical Form	Physical form of the content. (Solid, Gas, Liquid, Fuel Elements, etc.)
Limit	Limit for each content. (Numeric)
Units	Units of measure for the limit above. (Curies, Watts, Weights, Number of Fuel Elements, etc.)
Remarks	Text field used to further describe the limits.

Contact Section

Field Name:	Brief Description:
Company Name	Name of company to contact.
Address	Their street or mailing address.
City	
State	
Zip	
Potential Contact	Name of individual at the company to contact.
Category	The category of the user of the package. (D=Designer, O=Owner, P=Primary user, S=Secondary user)

How Is Information Extracted From the Database

As the previous listing indicates there are potentially many pieces of data stored for each Certificate. These pieces of data are stored in individual fields. To locate potential packages for a particular job, the user simply needs to know which features are required for the shipment. For example, suppose we had a radioactive material which requires a package with 2 inches of lead shielding and a cavity size at least 50 inches long and 12 inches wide. Furthermore, the package must weigh less than 50,000 lbs when loaded. Knowing that these features are important, we can log into RAMPAC and "feed" it these requirements. RAMPAC will then identify, if any packages meet these requirements.

Using the example outlined above, the following steps would be performed. After logging into RAMPAC and selecting the ad-hoc reporting option the computer will display a screen listing all the "fields" in the database and each field will be given an index number. Next, we would enter the index numbers of the fields we want to use in screening the database. In this case we would enter the index numbers for Shielding Material, Shielding Thickness, Cavity Length, Cavity Width and Gross Weight. The computer then knows to ask us more questions about these fields.

The computer then presents us with some options. Since Shielding Material is an alphanumeric field, the computer will allow us to enter all possible text entries that might be in the field if the package is to meet our needs. In our example we would enter "PB" and "LEAD" since a package with either entry stored in the Shielding Material field might meet our needs.

The other fields are numeric in nature so the computer presents us with a range for each field (i.e. a minimum limit and a maximum limit.) Going back to the example, for Shielding Thickness we would enter 2 for the minimum and no maximum, for Cavity Length we would enter 50 for the minimum and no maximum and for Cavity Width we would enter a minimum of 12 and again leave the maximum blank. The preceding entries all create a greater than condition since the minimum limit was specified and the maximum limit was left blank. For the Gross Weight entry we would leave the minimum limit blank and enter 50,000 for the maximum limit. This *creates* a less than condition.

We have now told the computer to search the database and let us know which packages pass the following selection criteria:

- Must have "PB" or "Lead" recorded in the field Shielding Material

  and

- Must have 2 or greater recorded in the Shielding Thickness field and
- Must have 50 or greater recorded *in the* Cavity Length field

  and

- Must have 12 or greater recorded in the Cavity Width field

  and

- Must have 50,000 or less recorded in the Gross Weight field.

The system will screen the database and only packages which pass all of the above criteria will be selected for reporting. Note that selecting between fields creates an "AND" condition and selecting within fields creates an "OR" condition.

If packages are found that pass the selection criteria then we will be presented with a screen that again lists all the fields in the database only this time no index is assigned to the field. We choose which fields are to be reported on by assigning the field an index. The computer will then sort the fields in order of the indexes we entered and only those fields that were indexed will appear in the report.

If no packages are found, then no package exits in the database with the specified criteria. The user may look for alternate packages by substituting criteria. In our example we could run the search again this time using a different yet equally as effective shielding material.

CONCLUSIONS

RAMPAC's easy to use design allows operational personnel the opportunity to identify potential packages relatively quickly compared to searching through volumes of certification information. As regulatory requirements or materials to be transported change, it is essential that shippers of radioactive materials have a tool which allows them to determine if alternative packages exist. RAMPAC is such a tool, it is truly designed to minimize the research time required to make this determination.

To obtain more information about the RAMPAC database contact:

Kevin L. Driscoll
Science Applications International Corp.
P.O. Box 2501
Oak Ridge, TN. 37831
(615) 482 9031