
Using Computer Technology to Identify the Appropriate Radioactive Materials Packaging

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The Radioactive Materials Packaging (RAMPAC) database is designed to store and retrieve information on all non-classified 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 available to radioactive material shippers that 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 revalidations for their certificates of competent authority and are authorized for use within the United States for import and export shipments only.

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

INTRODUCTION

The Radioactive Materials Packaging (RAMPAC) database is designed to store and retrieve information on all non-classified packagings 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 Analysas Corporation 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 packaging designs to ensure that they meet the regulatory requirements. After it is determined that a packaging design meets these requirements, it is issued a certificate that approves the packaging for use. Information is gathered from these certificates and is stored in the RAMPAC database. Over 650 packagings are represented in RAMPAC. In addition to packagings made in the United States, the database stores information on packagings from Canada, France, Germany, Great Britain, and Japan, which have DOT revalidations of certificates of competent authority and are authorized for use within the United States for import and export shipments only.

Information on packagings that once were in the database but that no longer have active certificates are retained in the database in order to facilitate research questions. This information can be accessed by the system manager only.

When it was conceived in 1981, RAMPAC was designed as a research tool. Since then, RAMPAC has evolved into an easy to use operational tool. RAMPAC is designed to allow individuals without programming experience to access and extract information from the database. 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 the Analysas Corporation, where experienced staff members can extract database information for them. Currently, access to RAMPAC is provided free of charge except for possible long distance phone charges.

WHAT INFORMATION IS STORED IN RAMPAC

Listed below are the data fields for which information may be collected and stored for each packaging. It is important to understand that each packaging is represented by a certificate, which is issued, endorsed, or revalidated by either the DOE, DOT, or NRC. Each certificate may represent more than one version of a packaging.

The certificate information is unique and will appear only once for each packaging, but all other information stored for the packaging(s) may appear several times. For example, one package may be authorized to carry many different radionuclides which are in many different physical forms. This relationship between the certificate and other sections of the data may be explained as a parent-child relationship (i.e., one parent may have many children).

CERTIFICATE INFORMATION SECTION

<u>Field Name:</u>	<u>Brief Description:</u>
Certificate	Certificate number assigned to packaging. (USA/9015/B ()F)
Package Class	Type of packaging. (A = type A, B = type B, S = Source/Special Form, X = Special DOT Issue Pkg)
Remarks	Additional information concerning the packaging or its use.

PACKAGE SECTION

<u>Field Name:</u>	<u>Brief Description:</u>
Model Names	Identification other than the certificate number that a packaging may be known by. (N-55, Paducah Tiger, TRUPACT, etc.)
Fissile Class	Class of fissionable material the packaging can transport. (Y = yes, N = None, or combinations of 1, 2, 3)
Package Kind	General description of the packaging. (box, drum, cylinder, etc.)

General Contents	General description of the overall authorized packaging contents. (mixed radionuclides, source, unirradiated fuel, etc.)
Mode Use	Modes of travel the packaging is authorized for. (A = air, S = sea, H = highway, R = rail)
Gross Weight	The packaging gross weight fully loaded, in pounds.
Payload Weight	Maximum content weight, in pounds.
Empty Weight	Weight of the empty packaging, in pounds.
Cavity Measurements	In inches, cavity width, height, length, and volume in cubic inches.
Exterior Measurements	In inches, exterior width, height and length.

AGENCY INFORMATION SECTION

<u>Field Name:</u>	<u>Brief Description:</u>
General	Denotes approval for use under the general license provisions of 10 CFR 71.12. (Y = yes, N = No)
Agency	Agency that issued certificate. (DOE, DOT, or NRC)
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.) and if foreign, will include foreign country and COCA.

SHIELDINGS SECTION

<u>Field Name:</u>	<u>Brief Description:</u>
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

<u>Field Name:</u>	<u>Brief Description:</u>
Composition	Composition of the coolant. (air, liquid, water, etc.)
Thermal Rate	Thermal decay rate of the coolant.

CONTENTS SECTION

<u>Field Name:</u>	<u>Brief Description</u>
Chemical Composition	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 describe the limits further.

CONTACT SECTION

<u>Field Name</u>	<u>Brief Description</u>
Company Name	Name of company to contact.
Address	Company's street or mailing address.
City	City
State	State
Zip	Zip Code
Potential Contact	Name of individual at the company to contact.
Category	The category of the user of the packaging. (D = designer, O = owner, P = primary user, S = secondary user)

HOW IS INFORMATION EXTRACTED FROM THE DATABASE

As the above list indicates, there is the potential to store many pieces of data for each certificate. These pieces of data are stored in individual fields. To locate potential packagings for a particular job, the user must know which features are required for the shipment, and therefore, which RAMPAC fields to access. For example, suppose we had a radioactive material that required a packaging with 2 inches of lead shielding and a cavity size at least 50 inches long and 12 inches wide. Furthermore, suppose the packaging had to weigh less than 50,000 pounds when loaded. Knowing that these features are important, we could log into RAMPAC and "feed" it these requirements. RAMPAC would then identify any packagings that met these requirements.

Using the example above, we would perform the following steps. After we log into RAMPAC and select the Ad-Hoc reporting option, the computer will display a screen listing all the "fields" in the database that can be used in the selection/search process. Each of these fields are displayed on the screen with a corresponding index number. Next, we enter the index numbers of the fields we want to use in screening the database. In this case, we 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 packaging is to meet our needs. In our example, we enter "PB" and "LEAD" since a packaging with either entry stored in the Shielding Material field might meet our needs.

Since the other fields are numeric, 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 enter 2 for the minimum and no maximum; for Cavity Length we enter 50 for the minimum and no maximum; and for Cavity Width we 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, but 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 instructed the computer to search the database and to let us know which packagings pass the following selection criteria:

- Must have "PB" or "LEAD" recorded in the Shielding Material field, 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 packagings that 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 packagings are found that pass the selection criteria, the screen will again list all the fields in the database. This time, however, no index number will be assigned to each

field. We choose which fields are to be reported by assigning the field an index number. 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 packagings are found, no packaging exists in the database with the specified criteria. The user may look for alternate packagings by substituting criteria. In our example, we can run the search again using a different, yet equally effective, shielding material.

CONCLUSION

RAMPAC's easy-to-use design allows operational personnel to identify potential packagings relatively quickly compared to searching through volumes of certification information. As regulatory requirements or material to be transported change, it is essential that shippers of radioactive materials have a tool that allows them to determine quickly if alternative packagings exists. 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:

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