EDF's "DRA" SOFTWARE FOR
THE MANAGEMENT OF RADIOACTIVE WASTE

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I - FOREWORD:

In January 1991, the quantities of radioactive waste produced by EDF's nuclear power plants (nearly 13 000 containers per year sent for storage) led to develop a computerised management system for radioactive waste produced by the operation of nuclear units. The development of this computerised system met the restrictions laid down by the ANDRA (Agence National pour la gestion des Déchets RAdioactifs - National agency for the management of radioactive waste), which is responsible for the storage of such waste and which laid down a validation procedure for the characteristics of packages before they are dispatched to the storage centre.

II - OBJECTIVES:

The initial objective was to standardise management procedures throughout all nuclear sites by combining the framework of regulations for the transport and storage of waste with the need to integrate Quality Assurance rules into the software through the use of *"qualification"* which control access to the various functions and provide for an internal check (operator/inspector).

As later developments were included, the following additional objectives were reached:
- automation of radioactivity calculations,
- provision of a powerful statistical tool which provides for the making of comparisons between sites,
- transport planning aid, etc.

III - FUNCTIONS:

The following functions are provided:
- the management of empty containers (metal drums and vessels, concrete containers),
- the calculation of the radioactivity of containers through the use of mathematical tables, which associate:
    . the dose rate measured with the activity of each radionuclide detected,
    . the activities of the radionuclides which cannot be measured with the activity of the "key" radionuclides,
- the management of local storage areas,
- the determination of container characteristics (some of which are generated automatically by the application),
- the real time dialogue between EDF and ANDRA sites through the transmission of data files to ANDRA in order to obtain a "Valid" status for the container in return,
- the calculation of the criteria for the Transport of Dangerous Goods Regulations,
- the making up dispatch batches from the stock of "Valid" containers,

- the inspection of containers using bar codes (reception/dispatch),
- the printing of transport documents,
- the retrieval of data concerning radioactivity, stocks, etc.

Additional functions are also available:
- *for operators:*
  - calculation of radioactive decay to optimise transport resources and costs,
  - a library of reference documents for each site,
  - pre-formatted statistical printouts.

- *for central EDF departments:*
  - monitoring of volumes of products and stocks to establish performance indicators (WANO) and for the planning of transport,
  - adding reference documents to the library.

- *for the National Administrator:*
  - updating of tables,
  - specific transactions concerning data bases (change of status) and the interpretation of ANDRA return codes, etc.

IV - RESOURCES:

IV.1 HARDWARE/ARCHITECTURE

Users provided with local PC type workstations which are connected to a host computer (IBM 3090) via a special TRANSPAC 19200 baud links. The IBM 3090 host computer is connected to the ANDRA host computer via a TCP-IP link operating in a UNIX environment. This system provides for on-going communications between the EDF installation which produces the waste and ANDRA.
The software has a CRADLE type architecture combined with the COBOL programming language.
The various container production phases are managed by status.

IV.2 MODULES

The functions described above form part of 6 main modules:
- qualifications,
- radiological spectra,
- bar code readers,
- container characteristics,
- transmission,
- dispatch.

All these modules are specific to each user site which has its own data bases (access controlled by a "site user code"); the tables and operations in the data bases can be updated by the National Administrator in the event of the failure of the application.

The *"Qualification" module* is used to establish the access hierarchy for the various functions according to the authorisation criteria adopted for the user (Operator, Inspector).

The *"Bar Code reader" module* enables container identification numbers to be input using an optical bar code reader (reception and pre-dispatch inspections).

The *"Radiological spectra" module* provides for the input and storage of the radioactivity characteristics of the containers.

The *"Container characteristics" module* is used to establish the regulation statement for storage.

The *"Transmission" module* is used to transmit previous data to ANDRA in the form of computer files.

The *"Dispatch" module* is used for the preparation of the containers to be sent for storage, according to their shape and size and their level of radioactivity.

V - EXPERIENCE FEEDBACK:

By the end of 1995, the software will be used to manage more than 150 000 containers (under construction and dispatched).
Each container record comprising 80 fields, the disk space was approximately 250 Mb.
Availability of the tool is very satisfactory as is the reliability of the transmission system.
The initial objective has been achieved since the automation of the software has led to significant improvements to the following:
- the container descriptions required by ANDRA for the long term storage of data,
- the internal management within EDF.

The next version of the software will involve its modification for the new processing modes for certain types of radioactive waste (fusion, incineration) and require interfaces to be set up with other contractors.