Triumf - The Swedish data base system for radioactive waste in SFR

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ABSTRACT

All short lived LLW/ILW from the operation and maintenance of all Swedish Nuclear Power Plants are disposed in SFR, the Swedish final repository for radioactive operational waste. It is important to save all the information about radioactive waste that is needed now and in the future. To be secure that, we have developed a database system in Sweden called Triumf, consisting information about all the waste packages that are disposed in SFR. The waste producers register data concerning individual waste package during production. Before transport to SFR a data file with all information about the individual waste packages is transferred to Triumf. When transferred, the data are checked against accepted limitations before the waste can be loaded on the ship for transport to SFR. After disposal at SFR the deposition location in the repository is added to the database for each waste package.

1 Introduction

SKB (Swedish Nuclear Fuel and Waste Management Co) is owned by the Swedish Nuclear Power utilities and has been appointed as responsible for the management of Sweden's radioactive waste. The final repository for radioactive operational waste, SFR, has been in operation since 1988. All the short-lived waste; low-level waste (LLW) and intermediate-level waste (ILW) from the operation and maintenance of the nuclear power plants is disposed in SFR, along with radioactive waste from medical use, industry and research.

SFR has five different rock chambers for disposal of different kind of waste. The most active waste is disposed in a concrete silo surrounded by a clay buffer. The other four chambers consist of one cavern for LLW (BLA), two caverns for concrete tanks with dewatered ion exchange resins (BTF1 and BTF2), and one cavern for ILW (BMA). BMA and the silo are for intermediate-level waste and the three other caverns are for low-level waste. Today about 30 000 m^3 of Low- and intermediate level waste has been disposed in the rock chambers at SFR and the total capacity of the repository is 63 000 m^3.

For a waste management system it is important to be sure to save all relevant information about the radioactive waste that is disposed in the repository. To secure that all information needed now and in the future about the radioactive waste is stored, it is important to document as much as possible. It is also important that the information about the waste is kept in a safe way, not only now but also in the future. Because of this we have developed a database system in Sweden called Triumf. Triumf consists of information about all the waste packages that are disposed in SFR.

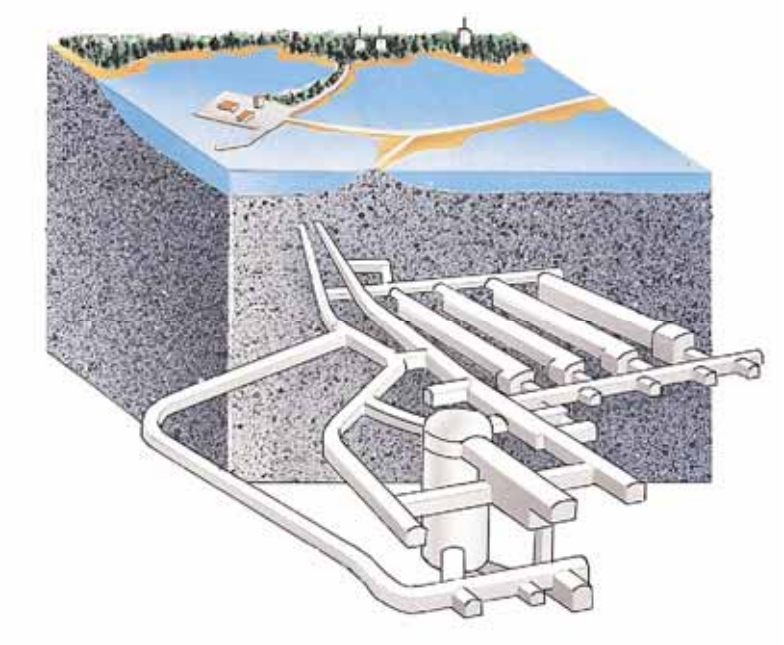

Fig 1. SFR

2 Radioactive waste management system

The Swedish waste system includes a lot of participants; waste producers, transport ship operators, final repository owners, repository operators and authorities.

In Sweden the waste is divided into waste types depending on what kind waste it is, how it is treated and who the producer is. Every waste type has its own designation and a document that describes the waste type. This document, called Waste type description, gives the criteria for the waste type. The waste type also gives information about for example the physical and chemical properties of the waste package

The waste type description has to have an approval from the authorities before the waste type can be transported to and disposed in SFR.

Handling of radioactive waste is strictly regulated and the system consist of different types of rules like waste acceptance criteria, transportation rules and deposition rules. To be sure that the rules are followed, they are checked by the staff and by the computer system. Triumf consists of all applicable rules and they are used as a first step to check incoming waste data.

The waste producers register data concerning individual waste packages during production and they are responsible to attend to that the information follows with the waste package to the final repository, where the information will be kept forever.

The Triumf system helps us to both store the information in a safe way for the future and to make sure that all the rules in the waste management process are fulfilled.

3 Information of the waste registered in Triumf

Before transport to SFR a data file with all information about the individual waste packages is transferred to Triumf.

When the information of the waste package has been transferred to Triumf, the system does a first check of the information to see that the data file comes from the right sender and that all the information is in the right format. Triumf also checks that the information of the packages is in the range of acceptance for that waste type.

After that a competent person at SKB does a last check of the incoming data and sends an approval to Triumf. Before this approval has been transferred to Triumf the overhead cranes in the cavern for ILW and the silo are locked for deposition of those waste packages. When the approval has been transferred to Triumf

the waste producer are allowed to load the waste containers on the ship and the overhead cranes at SFR can dispose the waste when it arrives to the repository.

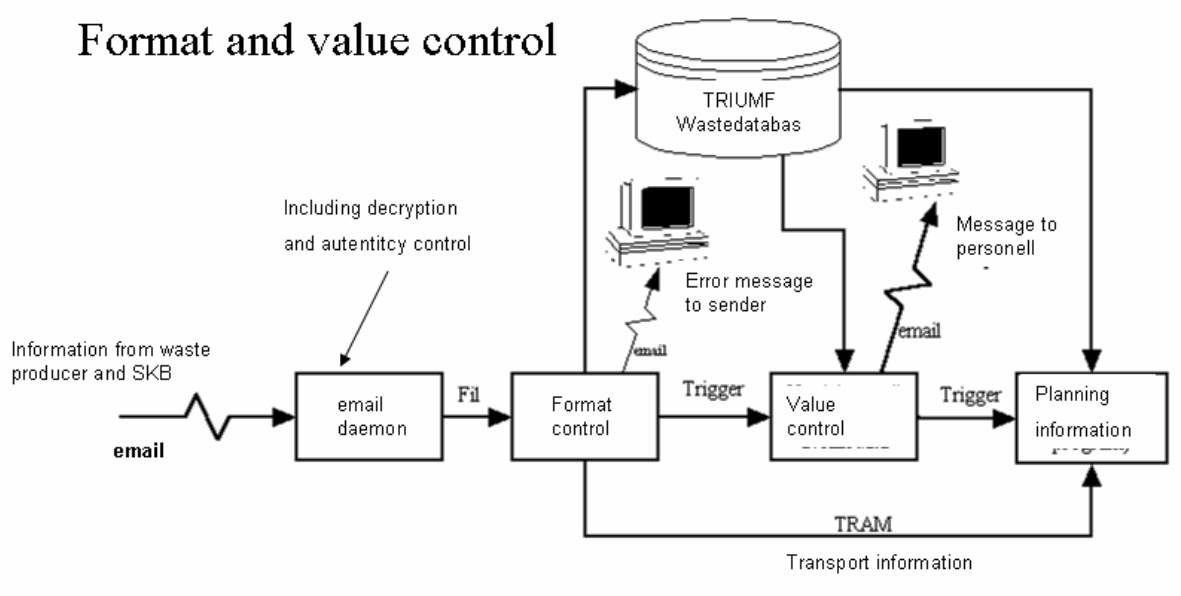

Fig 3 Format and value control in Triumf

The following information of each waste package is transferred to the Triumf database before transportation to SFR:

- *Waste package identification* - Each package has it's own unique identification number. Each package must have a permanent label with this identification number. This label is a link between the package and the record.

- *Waste type* - The information on which waste type the waste package belongs to is registered in Triumf. To have all information of the waste, you need the information both in Triumf and from the Waste type description.

- *Package type code, waste category code and conditioning method code* - A number system gives the information of the conditioning method of the waste, what package is used and which waste category the waste belong to.

- *Package weight* - The package weight is important information for the handling in SFR.

- *Date of production* – This information can for example give you information about the production process if it has changed in time.

- *Nuclide content and total activity* - The nuclide content is registered, both the nuclide specific and the total activity.

- *Surface doserate and doserate at 1 meter* – Is interesting under the different handling steps.

- *Measuring date* - The measuring date is necessary information for conversion of the activity of the waste package which is done automatically by the system. You just give a date for calculation and get the correct activity both nuclide specific and the total activity of the package.

After the waste package has been disposed in the rock chambers at SFR the information of the position and date of deposition of the waste are registered in Triumf. The control system for the overhead crane gives this information automatically to Triumf, the waste disposed in the caverns for LLW has to be registered manually buy the operator.

Fig 3. Unloading of a transport container in BMA

4 Reports from the Triumf system

From the Triumf system it is possible to search for the information you are interested in by using a data browser. You give your selection rules to the browser and get the information you want. For example this is useful for reports on how much waste has been disposed in different caverns and what the activity of a specific nuclide is at the moment in a cavern.

To the Triumf system a newly developed data program is coupled. This program called Prosit is used for short- and long rang forecasts to find out if it's enough space in SFR for the waste that is planned to be produced under the life cycle of the Swedish power plants. Also the radioactivity and different materials in the waste is important to forecast so the limit in the license for SFR don't get exceeded. To do these forecasts standardized referens waste packages for every waste type are registered in the system with average activity, material content and so on.

The program is also used for producing annual reports for the repository.