

RECENT DEVELOPMENTS IN THE FIELD OF
LOW AND INTERMEDIATE LEVEL WASTE DISPOSAL IN FRANCE

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ABSTRACT

The French government announced mid-1984 the decision to start a program for creating two new shallow land repositories and published a new "Fundamental Safety Rule" giving the framework of the safety requirements ANDRA has to cope with. A series of new actions have been started in the field of quality assurance to guarantee the safety of the whole management system including the operations carried out by the producers for treating and conditioning the waste. A comprehensive system has also been set up to calculate the detailed activity present in each of the 80.000 packages delivered each year. A computer allows to be permanently informed of the activity present in the repository and of the location of the packages. Several suitable zones have been nominated to start the site investigations. Two sites must be proposed to the government before the end of 1985. A series of studies have started to improve the design of the repository in the light of the experience gained at the Centre de la MANCHE.

GENERAL

1984 was a very important year for the management of radioactive waste in France, specially for the management of low level, short lived waste.

Taking into account 15 years of experience in the safe management of the shallow land repository at La Manche, the National Council for Nuclear Safety confirmed the suitability of this option and advised the government to start a program for constructing two new repositories to cope within the development of the nuclear program.

The State Secretary for Energy made on June 19 a public announcement describing the main decided actions :

- publication by the Safety Authorities of a Fundamental Safety Rule (FSR) for the shallow land repositories. It gives the frame of recommendations which have to be followed by ANDRA for :
 - . selecting sites for the new repositories
 - . designing the future disposal facilities
 - . implementing a quality assurance system for the whole waste management.

In addition, the FSR defines the limit of alpha nuclides concentration which can be accepted in a shallow-land repository. The maximum concentration in a single package must be lower than 100 nCi/g provided that the average concentration in all packages disposed of on the site must be lower than 10 nCi/g.

A special provision authorizes ANDRA, in very special cases, to accept packages up to 500 nCi/g with the written agreement of the Safety Authority.

- publication of a set of criteria for the selection of sites

- publication of the national program for waste management including low level waste but also high level waste
- guidelines for carrying out all the actions in good concertation with local authorities and with the public in the light of a full and clear information.

To cope with these decisions, ANDRA has had to start a series of new actions in the field of : quality assurance, waste inventory, site selection and investigations, design of a repository.

QUALITY ASSURANCE

ANDRA has to guarantee to the Safety Authorities that all the operations leading to the safe disposal of the packages are done with respect to the required quality, which includes in particular the treatment and conditioning of the waste.

The rule is the following :

- "...
- ANDRA will set up the specific conditions the waste must comply with.
- Only waste with a detailed data card matching that defined by ANDRA will be accepted on the disposal facility.
- The producer will certify the physical nature of the waste, physico-chemical form content in radionuclides and conformity with the approved package.
- ANDRA will particularly proceed to the control of the various stages in the fabrication of the waste packages by the waste producers.
..."

To reach these goals a special procedure has been set up and is already operational.

Starting from the evaluations carried out in the safety assessment report, ANDRA publishes a series of specifications for the different kinds of packages dealing with : the amount of activity accepted, the measurement of the activity, the process of embedding, its characteristics such as mechanical and thermal behavior, the leaching rate, the requirements for handling, the size, the weight, the outside maximum irradiation and contamination...

To have its conditioning process agreed, a producer has to submit to ANDRA a file describing the process, the different tests performed to verify the conformity to the specifications and the different controls carried out all along the process of the package fabrication.

The producers have also to prove that they are able to do the fabrication in the frame of their own quality assurance system.

If, after the examination of the file, ANDRA agrees the process, the fabrication can start and ANDRA's inspectors are going into the producers' facilities to check that all the requirements are fulfilled. In 1984, 60 of such controls were made, in 1985 they will probably be in the range of 120.

The final step of the control is done by ANDRA by selecting some packages already delivered at the repository making a series of destructive tests to check the actual characteristics of the waste and to make sure that the product is similar to that which was characterized and qualified.

If any variations or discrepancies are observed according to their importance, ANDRA advises the producer to improve the process or asks him to take back the waste for reconditioning.

A ten of controls by sampling have been carried out in 1984.

At the end of 1984, a hundred of different kinds of packages coming from the various producers have been agreed by ANDRA and are considered as standard waste.

WASTE INVENTORY AND RECORD

ANDRA must have and permanently update a detailed inventory of the activity present in each package and record its exact location on the disposal.

This is particularly important for the waste containing a certain quantity of alpha nuclides. In this case, ANDRA has to manage the repository under its own responsibility in order to keep the average concentration below 10 nCi/g for the packages as a whole, taking into account the fact that individual packages may reach a concentration of 100 nCi/g.

The yearly deliveries being in the range of 80 000 packages coming from tens of different nuclear installations, it has been necessary to set up a complete and industrial system to measure each package at the producer's facilities and to compute and record all the data in a central location.

The producers have to make at least one measure on each package and to fill in a data card which is sent to ANDRA with the package. When it is possible, this measure must give the break down of the total activity according to the different nuclides. Very often, it is possible to define for a family of

packages, a common radioactive composition which can be measured precisely on one single package of the family and which is adopted for all of them. Then, a very simple measure on each package, such as the outside irradiation rate allows to compute the actual activity.

This computer system, in operation since the beginning of 1985, provides the basis for the whole management of the repository including transport regulation and invoices treatment.

In the near future, the producers will be on line with the possibility to transfer directly to the computer all the information concerning the packages.

Another code serves to record the location of each package in the repository and to calculate the average activity in each disposal facility.

SITE SELECTION

After having chosen a model of site coping with the criterias set up by the Safety Authorities, a national inventory was carried out in 1982. Several tens of suitable zones were identified. Taking into account all the technical factors and socio-political aspects, three zones were nominated by ANDRA in September 1984 for field investigations in order to confirm their ability to receive a repository before the end of 1985. In addition, two local communities offer themselves as a candidate, being interested by the economical impact and the financial incentives (Fig. 1).

The preferred geology and hydrogeology model correspond to a site where it is possible to find a layer of tight material, to avoid the dispersion of a possible release of nuclides, far into the environment. But to avoid the burial of the waste in trenches where water can accumulate, it is better to have the tight layer covered by a layer of semi-porous material such as clayish sand.

After the selected zones were announced, ANDRA started a broad information operation for the local representatives, the public, the professional organizations, the journalists, etc... In every case, groups of ecologists tried to stop the project and created defense organizations. To try to convince people and to overcome all these difficulties, tens of meetings were held with local authorities or with the public. Among the five zones already defined, two are in the process of site investigations with geophysical methods and drillings. This means that the acceptability is not too bad. For the three other sites, talks and meetings are going on to try to obtain a minimal consensus before starting the investigations.

During all this phase, ANDRA has acquired a very good practical experience in the marketing of a repository for radioactive waste.

If the program can continue normally, two sites will be proposed to the government at the end of 1985.

DESIGN

The safety options chosen in France for shallow land disposal correspond to a "no release" facility during the survey period. This means that the radio-nuclides must be kept isolated from the biosphere until they have sufficiently decreased and the

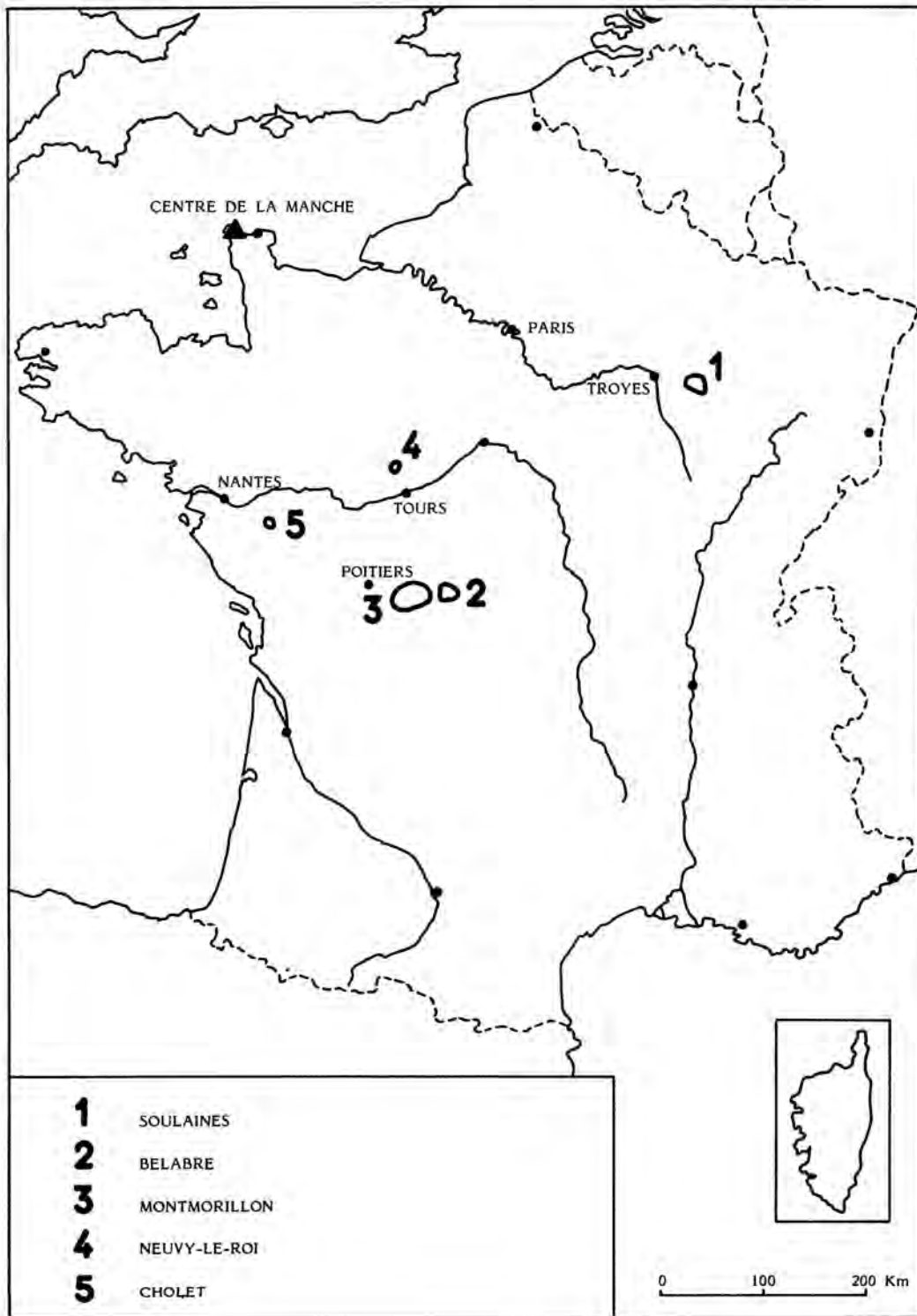


Fig. 1. Sites selected for investigation.

residual risk can be considered negligible whatever may occur.

To reach this goal, the first action is to prevent as far as possible a degradation of the packages and to avoid any infiltration of water in the repository. The protection against the rainfall will be given by a tight cover made of very stable natural materials able to keep their characteristics over several hundred years. The efficiency of the cover must be such that only one thousandth of the rain can reach the waste.

Studies have been carried out for designing the cover and tests are going on to evaluate the efficiency

of the different materials involved in the construction of the cover.

For the rest of the design, the experience acquired at the Centre de la Manche will serve to improve the conditions of operation and reduce the cost of operations.

The schedule of the total operation is given on Fig. 2.

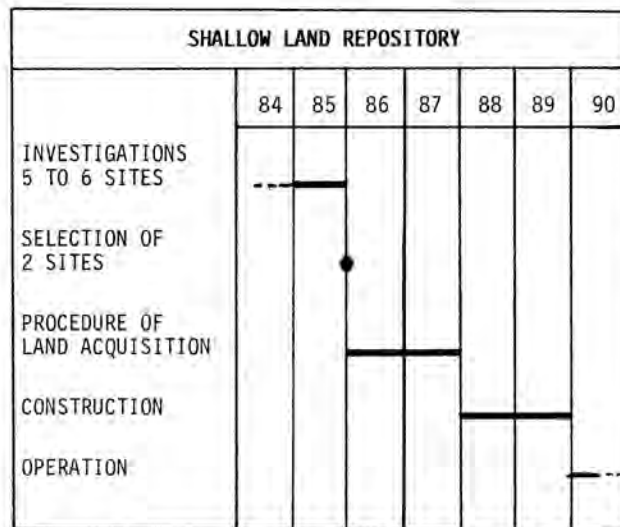


Fig. 2. Construction Program.