THE CENTRE DE L'AUBE LOW-LEVEL WASTE DISPOSAL FACILITY

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ABSTRACT

Short-lived, low- and medium-level radioactive waste has been disposed of since 1969 at the Centre de la Manche Disposal Facility in Normandy, not far from Cherbourg and adjacent to the La Hague reprocessing plant operated by COGEMA. The facility's capacity of 535,000 m^3 on a site of 12 hectares will be exhausted in the 1994-1995 time frame. The Centre de la Manche currently receives 30,000 m^3 of waste per year. The experience from over 20 years of operations at the Centre de la Manche has been particularly useful in defining the strategy for radioactive waste management in France.

The Centre de la Manche facility will be replaced by the Centre de l'Aube Disposal Facility, which began receiving waste in early 1992. The Centre de l'Aube has a total capacity of 1,000,000 m^3 and a total surface area of 30 hectares, and will be operated for 30 years.

This paper will first present the radioactive waste management program in France, including the types and quantities of waste generated, and will then provide a detailed description of the design concept of the Centre de l'Aube.

LEGAL ASPECTS OF RADIOACTIVE WASTE MANAGEMENT IN FRANCE

ANDRA, the national waste management agency of France (Agence nationale pour la gestion des dechets radioactifs), is, as its name implies, responsible for long-term radioactive waste management in France. The agency was created in 1979 and charged with the following specific responsibilities:

- development of technical requirements for the protection of public health and safety and of the environment, and to comply with regulations issued by the Government, including the Ministry of Research and Industry, the Ministry of Health, and the Ministry of the Environment;
- submission of the technical requirements to the Government for approval; and
- enforcement of the technical requirements.

ANDRA establishes technical specifications that comply with the safety requirements and performance objectives applicable to radioactive waste transportation and disposal, and is responsible for their application by the waste generators, including EDF, COGEMA, CEA, defense contractors, hospitals, industry and the research sector. ANDRA is responsible for site characterization and selection for both near-surface and deep waste disposal sites, and is in charge of disposal facility construction and operation. ANDRA also plays an active role in research on waste treatment and solidification methods.

ANDRA activities are financed by the waste generators. The generators are members of ANDRA's Steering Committee [Comite de Gestion], which is similar to a Board of Directors, although ANDRA is, by law, a non-profit organization. ANDRA's charter will be changed to that of a Public Industrial and Commercial Establishment [Etablissement Public Industriel et Commercial], most likely in 1992, pursuant to the law passed in late 1991 relative to research on high-level radioactive waste management.

DESCRIPTION OF RADIOACTIVE WASTE IN FRANCE

Classification Criteria

Unlike most industrial waste, radioactive waste gradually and inevitably loses its radioactivity over time. Radioactive decay is characterized by the "half life" of the radionuclides. The radioactivity of a given radionuclide decreases:

- by a factor of 2 during one half life;
- by a factor of 1000 during 10 half lives; and
- by a factor of more than 106 during 20 half lives.

Waste loses its radioactivity as a function of the radionuclides it contains. The decay period is therefore the primary criterion in classifying waste, and determines how the waste will be managed.

Another criterion of importance is the initial radioactivity of the waste, which helps to determine how long it will take for the radioactivity to completely disappear. In the nuclear field, the convention is that:

- "low or medium level activity" is equal to 1 Ci/m^3, or 3.7 x 1010 Becquerels, i.e., disintegrations per second; and
- "high level activity" is equal to 10^6 Ci/m^3.

These two criteria--half life and activity--are used to divide waste into two main classes:

- short-lived waste with low- and medium-level activities, and
- long-lived waste.

Long-Lived Waste

Long-lived waste is discussed in other papers at this conference, and will therefore be addressed here only briefly. Long-lived waste is divided into two categories:

- "alpha" waste, or transuranic waste, called Category B waste in France, which is generally produced in fuel fabrication and reprocessing facilities;

- vitrified waste, called Category C waste in France, which is generated by spent fuel reprocessing activities.

Short-Lived, Low- and Medium-Level Waste

By definition, the main radionuclides contained in short-lived, low- and medium-level waste, called Category A waste in France, have half lives that are equal to or less than 30 years. After 10 half lives, or approximately 300 years, the beta-gamma activity of such waste is 1000 times lower and essentially negligible. The 300 years corresponds to the maximum length of the institutional control period specified in the regulations.

Category A waste is generated primarily in nuclear power plants and spent fuel reprocessing facilities, with smaller quantities coming from the operation and maintenance of facilities in the front end of the fuel cycle, from nuclear research centers, or from small generators such as universities or hospitals. Category A waste includes contaminated clothing, pieces of metal, tools, plastic sheets, failed equipment, ion exchange resins, and evaporator concentrates.

To be accepted for disposal in a near-surface disposal facility, Category A waste must be in solid form; must have good chemical, thermal and mechanical stability; must have good immobilization properties; must have a low leach rate; and may not contain toxic chemicals or flammable materials. The waste container must be grouted inside steel or concrete drums or boxes that can be handled and transported without risk to workers or the public.

Waste Inventory

The majority of radioactive waste is generated by the nuclear power industry. It is interesting to analyze waste generation statistics based on industrial versus domestic consumption. Per capita waste generation in France is 10,000 Kg of waste of all types, of which 1 Kg is radioactive waste. Included in this kilogram of radioactive waste is the waste itself, the solidification or grout material, and the container. The vast majority, or about 950 g of this kilogram of waste, is short- lived waste.

Waste Type	Annual Volume (cubic meters)	Cumulative Volume In Year 2000 (cubic meters)
Category A Short-Lived Waste	30,000	800,000
Category B Alpha Waste	3,000	88,000
Category C *Vitrified* Waste	100	2,090

While short-lived waste represents 90% of the total volume of radioactive waste generated in France, they contain only 1% of the total radioactivity. It should be noted that generators are making a substantial effort to reduce waste volumes.

It is interesting to examine the sources of Category A waste in France. In 1990, some 32,584 m^3 of waste were disposed of at the Centre de la Manche.

- 38.5% came from spent fuel reprocessing activities;
- 36.1% came from nuclear power plants;
- 13.6% came from large research centers;
- 5% came from non-nuclear industries;
- 4.8% came from facilities in the front end of the fuel cycle; and
- 1.9% came from small generators, such as hospitals and universities.

Approximately 100,000 waste containers are delivered to the Centre de la Manche annually, broken down as follows:

- metal drums represent 47% of the volume but 90% of the number of containers;
- metal boxes represent 27% of the volume and 1.5% of the number of containers; and
- concrete overpacks represent 25% of the volume and 5% of the number of containers.

DESIGN CONCEPT OF THE DISPOSAL FACILITY

General Requirements

The principal performance criterion for the design of the disposal facility is to protect the waste from human intrusion and from water infiltration until the radioactivity has decayed to an acceptable level.

The criterion is the same for both short-lived waste disposal and long-lived waste disposal. However, the French design concept for short-lived waste, chosen for the technical and economic advantages it offers, is defensible from a safety point of view only if the disposal period is short enough to be realistic on a human scale, yet long enough to provide security against human intrusion. The cut-off for radionuclide half lives of 30 years is intended to meet this requirement, because the radioactivity will have practically disappeared within 300 years, which is considered to be a reasonable period of time for institutional control. Radionuclides with longer half-lives may be excepted in very limited quantities based on site-specific safety requirements to be described later. Thus, there are three distinct periods in the life of a near-surface disposal facility:

- the operating period, during which waste is received and disposed of at the facility, and cumulative activity increases until it reaches its authorized ceiling at the end of the period;
- the institutional control or monitoring period, set at 300 years in France, during which the activity decays naturally, the integrity of the waste isolation system is monitored and the site is protected from human intrusion; and
- the free access period, when all restrictions concerning the use of the site are raised.

Multiple Barrier Disposal Concept

The multiple barrier disposal concept for radioactive waste was fashioned after the engineered barriers in nuclear power plants. There are three main barriers in the disposal system:

- the waste form, whose long-term integrity must be provided by appropriate mechanical (stability, compressive strength) and physico-chemical properties;

- the engineered disposal structures, designed to protect the waste from water; and
- the disposal site.

The multiple barrier design concept is the basis of the French regulation Regle Fondamentale de Surete, or Fundamental Safety Rule I.2, which sets forth the performance criteria and the design bases of the disposal system, and which specifies that the safety of the facility in normal operations must rely on the first two barriers alone, with the site acting as a barrier only in the event of an accident causing the failure of the first two barriers.

The Waste Form

The *waste form* is the primary barrier in the multiple barrier disposal system. The use of the waste form as a barrier is another way of saying that waste management at the disposal facility begins with the waste generator, well in advance of any waste deliveries to the site.

Waste immobilization has a dual purpose: 1) to confine the radioactivity in the waste and 2) to give the waste the required mechanical stability for the engineered disposal system. The safety requirements relative to waste immobilization are translated by ANDRA into technical specifications for different waste forms that must be complied with by the waste generators.

Waste acceptance is based on a thorough review of the technical documentation prepared by the generator on the following:

- a detailed description of the waste and of the waste immobilization process;
- a complete test report on the waste characterization test program;
- a Quality Assurance Program relative to each waste immobilization process; and
- a description of the quality control program, including waste sampling and analysis.

The technical documentation is presented to ANDRA as a Waste Acceptance File for review and approval. ANDRA's Quality Control Division performs both scheduled and unscheduled inspections and audits to ensure that the immobilization process is implemented according to plan, and reports on inspection and audit results to the French nuclear safety authorities.

The technical specifications for the waste include activity ceilings for the various radionuclides. There is an overall limit for alpha-emitter activity of 0.1 Ci, or 3,700 mega Becquerels, per metric ton for individual waste packages, and 0.01 Ci, or 370 mega Becquerels, per metric ton for the site as a whole.

In addition to the waste acceptance process, ANDRA developed a computerized waste tracking system that follows the waste from the moment it is generated to its final resting place in the disposal facility. The system links the waste generator, ANDRA headquarters in the Paris area, and the disposal facilities. The tracking system data base includes the identification number of the waste package, and all of the information needed to describe the package, including the type of waste, the type and activity of radionuclides contained in the waste, the type of container, etc. The information provided on the waste through the tracking system is compared to the Waste Acceptance File pertaining to that waste. In this manner, each container of waste is verified for compliance to specifications before the generator is allowed to ship it to the disposal facility.

The tracking system's data base is a useful tool in scheduling and tracking waste shipments, with the memorized location of the waste package being continuously updated from the time it leaves the generator's site to the time it reaches the disposal facility. The data base is also used to maintain a detailed and constantly updated inventory of radionuclides disposed of at the site.

The Engineered Disposal Structures

The secondary barrier in the multiple barrier disposal system is constituted by the *engineered disposal structures*. The disposal structures are designed to allow the integrity of the waste isolation system to be periodically verified. There are three main components to the disposal structures:

- the disposal module which receives the waste;
- the disposal cap which provides long-term protection to the module against rainwater infiltration; and
- the collection system for potential infiltration water.

The disposal system is protected from ground water infiltration by its placement in an unsaturated zone well above the highest historic level of the water table. The base of the disposal module consists of an impermeable concrete pad with an integral drain for any infiltrated water. Water is directed by gravity to the separative water collection system, which can be monitored for the presence and activity of water during the operating and institutional control periods.

The disposal cap will undergo several transformations before reaching its final form after the closure of the disposal facility. During the operating period, temporary mobile shelters, or moveable buildings, will be used to protect open disposal modules during loading operations. Once the modules are full, they will be backfilled, covered and coated with waterproof material that will serve as a temporary cover until the final cap is constructed.

The final cap will be designed to last for the duration of the institutional control period. The cap will be constructed of alternating layers of permeable and impermeable materials designed to limit water infiltration to no more than a few liters per square meter per year. Portions of the cap will be instrumented to periodically monitor its performance during the institutional control period. A full-scale instrumented section of the final disposal cap is already in place at the Centre de l'Aube disposal facility, and is being monitored to determine the efficacy of the cap design.

The Disposal Site

The tertiary barrier of the multiple barrier disposal system is the *disposal site* itself, which fulfills its role as a barrier only in the event of an accident that damages the first two barriers--the waste form and the engineered disposal structures-- during the operating and institutional control periods.

The site's true importance comes into play during the unrestricted site access period, when it is called upon to retain the remaining radionuclides at the site, or to slow their off-site migration. The site must therefore have the appropriate

hydrogeological and materials retention characteristics enabling it to fulfill this role.

With respect to hydrogeology, the preferred site is one that is easily modelled, meaning, for example, one with a permeable upper formation overlying an impermeable lower formation, and with easily identified and monitored water outlet. A site with these characteristics makes it easy to model water pathways and therefore to assess the potential environmental impacts of the disposal site using different scenarios.

Relatively stable sites, from a geotechnical point of view, and with historically low seismic activity are sought to guarantee the long-term stability of the disposal facility.

THE CENTRE DE L'AUBE DISPOSAL FACILITY

Description of the Facility

Site screening activities were conducted in 1984 and 1985 in the administrative departments of Aube, Indre and Vienne, as well as near the town of Cholet in the Maine and Loire Department. The region near the town of Soulaines, in the Aube Department, was extensively characterized, both geologically and hydrologically. For example, nearly 500 relatively deep core drillings were taken to characterize the region.

The site chosen for the Centre de l'Aube disposal facility is on a low hill of sandy clay overlying a thick clay formation and bordered by the Noues d'Amance creek on one side, which corresponds precisely to the hydro-geological model described previously. The Soulaines site had all of the waste isolation qualities sought by ANDRA, especially with respect to site hydrology.

The Centre de l'Aube disposal facility occupies a 95 hectare site about 40 kilometers east of the city of Troyes and about 200 kilometers east of Paris. To compensate for the timber that had to be felled at the site for construction of the disposal facility, ANDRA purchased a 96 hectare portion of land and planted it with trees. The site is connected to the national highway system by a 4 kilometer road, covering approximately 17 hectares. Waste is delivered by rail to a special rail terminal at the Brienne-le-Chateau train station, approximately 15 kilometers from the site.

The Centre de l'Aube is divided into two zones: 1) the disposal area, covering 30 hectares, where 24 disposal modules are in operation and a total of 420 will have been constructed by the end of the operating period; and 2) the administrative area. A portion of the administrative area is inside the fence, in the controlled zone, and a portion is outside the controlled zone.

Controlled Zone

- the Waste Treatment Building, where boxed waste is grouted and drums are compacted and grouted inside overpacks;
- the Mechanical Building, which controls access to the controlled zone;
- the Auxiliary Services Building, including change rooms, environmental monitoring laboratory and infirmary;
- the Buffer Storage Building;
- the Administration Building;
- the Storm Basin;
- the Guard Post; and
- the Weather Station.

Uncontrolled Zone

The Public Information Building, where visitors can get information on nuclear waste management in general and on the Centre de l'Aube site in particular. The site itself may be visited by the public upon request.

Project Milestones

Numerous technical, administrative and licensing activities occurred between the time the decision was made, in June 1984, to construct a new near-surface disposal facility to the delivery of the first container of waste to the Centre de l'Aube at the beginning of 1992. The principal milestones are given below:

- October 1984 to June 1985: site screening and field investigations;
- July 1985 to July 1986: characterization and selection of the Aube site;
- February 1987: approval of the Preliminary Safety Analysis Report for the Aube site by the nuclear regulatory authorities;
- July 1987: following public hearings, signature of the Declaration of Public Utility by the Government, paving the way for acquisition of the site by ANDRA;
- August 1987: issuance of a site clearing permit by the Ministry of Agriculture, and ANDRA purchase of 96 hectares of land to plant trees equivalent to those felled at the site;
- October 1988: issuance of the construction permit for the disposal facility;
- January 1989: issuance of the construction permit for the rail terminal 15 kilometers from the site;
- September 1989: issuance of the Authorization for Creation of a Basic Nuclear Facility;
- July 1991: approval of the Interim Safety Analysis Report by the nuclear regulatory authorities;
- October 1991: approval to operate the facility by the Ministry of Industry and the Ministry of the Environment;
- December 24, 1991: issuance of the operating permit;
- January 13, 1992: first waste package is delivered to the Centre de l'Aube.

Description of Centre de l'Aube Operations

The operations conducted at the Centre de l'Aube relate primarily to either waste disposal or waste treatment. Both activities are described in the following sections.

WASTE DISPOSAL

The Centre de l'Aube disposal facility must perform three basic functions: 1) waste isolation, 2) verify waste acceptability, and 3) protect operating personnel from radiation exposure.

1. Waste Isolation

   The design of the disposal facility must isolate the waste from the environment and maintain the integrity

of the waste package by protecting the latter from water, which could damage the package and cause radionuclide migration. To this end, the first precaution to take is to construct the facility above the highest historic level of the water table. Protection from surface water is provided during the operating period by a moveable building that covers disposal vaults when they are being loaded with waste, and by a concrete roof impregnated with impermeable polyurethane after the vault is filled and the moveable building is removed. Ultimately, the disposal units are protected by a multiple layer disposal cap.

2. Waste Acceptability

Waste is tracked from the moment it is generated and throughout the waste management cycle. Waste solidification operations are largely automated and incorporate scanning of waste packages and transmission of relevant data to ANDRA's centralized computer tracking system. The computer accepts or rejects waste packages based on their conformance to pre- determined waste acceptance criteria before the waste even leaves the production site. The computerized waste tracking system is integrated into automated waste handling operations at the disposal site, and can interrupt handling operations of a specific package if it does not comply with the waste acceptance criteria.

3. Personnel Protection

The design basis dose rate for the Centre de l'Aube is one tenth of the dose rate authorized for personnel in nuclear facilities by French regulations, i.e., 5 mSv per year, which is the dose rate allowed by regulations for members of the public.

Engineered Disposal Structures

The disposal structures at the Centre de l'Aube consist of a concrete vault measuring 8 meters high and approximately 20 by 20 meters on each side. Overpacked waste packages may be piled on top of each other inside the vault, in which case the vault is backfilled with gravel. When waste is not overpacked, it is placed in the vault a layer at a time and stabilized by a concrete pour, which serves as the pad for the next layer of waste packages. Once the vault has been completely filled, it is sealed with a concrete slab and sprayed with polyurethane to waterproof the top and sides of the vault. The slab and polyurethane coating constitute a temporary cover for the disposal vault.

Handling operations are performed inside a 16 meter high moveable metal building which covers one and a half disposal vaults at a time: the disposal vault receiving waste is completely covered, and half of the next vault is covered to shelter waste delivery and unloading operations. The moveable building shelters waste from rain during handling operations, but also, and more importantly, prevents rainwater from entering the disposal structures.

The waste handling crane moves along rails that are integral to the moveable building. The cab for the operator is stationary at the top of the building when large quantities or higher activity waste are handled. The operator is protected from the radiation emanating from the disposed waste by the concrete walls of the disposal vaults, and by shielding windows in the cab.

Waste handling operations at the Centre de l'Aube are largely automated to better manage their transfer into their proper place in the disposal system. The identification codes of individual waste packages, and relevant data on each waste package, are entered into ANDRA's computerized tracking system prior to disposal. The packages are categorized according to waste form and the disposal method that corresponds to that waste form. When the waste is delivered to the disposal vault, the operator has only to lift the waste package up to a robotic device, which takes control of the remaining handling operations. The robot rotates the waste package in from of a bar code scanner, which transmits the data to the computerized tracking system. The computer compares the data from the waste package to the acceptance criteria for that particular package, and authorizes the robot to proceed with handling operations if the waste is in compliance. The waste package is automatically placed in its pre-determined location inside the disposal vault by the robot, which records the location in the central computer system.

Layout and Operation of the Disposal Facility

The decision to handle waste packages inside moveable buildings led to a grid-type site layout in which there are parallel rows of disposal vaults about 25 meters apart. The Centre de l'Aube can have as many as 420 disposal vaults with a combined capacity of one million cubic meters of waste packages.

Operations are conducted row by row, with waste filling operations beginning with the farthest disposal vault, and gradually working towards the end of the row closest to the central service corridor. One side of the disposal vaults is therefore left unfinished to allow passage of waste delivery trucks to the disposal vault in operation.

Once a row of vaults is full, the 270 metric ton moveable building is moved onto the central service corridor in order to change rows. This is accomplished by the adjustable wheel assemblies at the foot of the building.

Between 8 and 12 disposal vaults will be filled annually, which means that the Centre de l'Aube will always have disposal vaults under construction during the operating period.

Once an entire disposal area has been filled, construction will begin on the final disposal cap. The design of the disposal cap for the Centre de l'Aube will probably be similar to the one for the Centre de la Manche.

WASTE IMMOBILIZATION

The Centre de l'Aube has two waste solidification units in the Waste Treatment Building, a grout injection unit for waste arriving in metal boxes, and a compaction and grouting unit for drummed waste. The facility will replace similar units at the Centre de la Manche. The purpose of the solidification units is to reduce waste transportation costs, and to offer a service to waste generators not wishing to invest in the construction of similar units at their own production sites.

Box Grouting Unit

The grout injection station receives 5 and 10 m^3 metal boxes which contain large-size or odd-size waste, and injects them with grout. The unit includes:

- an unloading bay and drying station with a 350 kN handling crane;
- a cart to transfer the boxes into the grouting cell through a gate; and
- grout injection equipment.

Drum Compaction Unit

Metal drums with 200 L capacity are compacted, and the pucks are placed inside 400 L drums. The compaction unit consists of:

- two truck unloading bays with handling cranes;
- roller conveyors that transfer the drums to a 450 drum storage magazine, where drums are automatically stored;
- a 1000 ton compactor for 200 L drums;
- grout injection equipment for the 400 L drum overpacks; and
- a curing station with a handling crane.

CENTRE DE L'AUBE PROJECT COSTS

Capital Costs

The total cost of the Centre de l'Aube project is 1.3 billion French francs, or approximately $250 million. This figure includes all project-related expenses from the beginning of the site selection program in 1983 to the start-up of the disposal vaults in January 1992, the start-up of the box grouting unit in mid 1992, and the start-up of the drum compaction unit in late 1992. These costs are broken down as follows:

- 8%: site screening, field investigations and characterization;
- 20%: project management, engineering and design studies;
- 43%: construction of the site, access road, and rail terminal;
- 13%: construction of the Waste Treatment Building; and
- 16%: licensing, including safety analysis reports; ANDRA overhead; public information; and taxes.

The facility was financed by the waste generators. Each generator's share of the financing was based on forecasts of waste volumes to be delivered to the site from its start-up to the end of the operating period.

Operating Costs

Based on annual waste deliveries of 30,000 m^3, operating costs of the Centre de l'Aube are estimated at approximately 200 million French francs, or $35 million per year.

If vault construction costs, operating costs and disposal cap construction costs were to be lumped together, the average disposal cost would be approximately 8,000 French francs per m^3 for a facility with a capacity of one million m^3.

ENVIRONMENTAL MONITORING

The fundamental principle behind near-surface disposal is to protect the environment from radionuclide migration. The environmental monitoring program, including the taking of samples on and around the disposal site, designed to verify the integrity of the waste isolation system, is an important part of ANDRA's responsibilities. The site monitoring program is itself monitored by the Central Department of Radiation Protection (Service Central de Protection contre les Rayonnements Ionisants- -SCPRI), which also performs its own monitoring activities on and near the site.

Initial site conditions were first measured to establish the reference site parameters. The reference site parameters and the results of sampling and analysis campaigns are available to the public and to the Local Information Commission.

The disposal facility is inspected throughout the operating and institutional control period by government inspectors from the Department of Nuclear Facility Safety, the Regional Departments of Industry, Research and the Environment, and the Central Department of Radiation Protection to verify compliance with safety regulations. Information is provided to the public concerning inspection activities and results.

Environmental monitoring is the most effective means of verifying that the facility is performing according to design. Samples of air, water, river sediment, vegetation, milk, etc., are taken at regular intervals--daily, weekly, monthly, quarterly or semi- annually--and analyzed as part of the environmental monitoring program. Some 1,500 samples were analyzed to establish the reference site parameters prior to the start-up of the Centre de l'Aube facility.

PUBLIC INFORMATION

Nuclear facility siting, especially a facility designed to dispose of radioactive waste, with all the negative connotations that it carries with it, isn't exactly received with enthusiasm by the public. Early on, a major public information program on radioactive waste aimed not only at the public, but at politicians, civil servants and professional associations was initiated early on and pursued during all phases of the creation of the Centre de l'Aube disposal facility. A policy of openness was adopted from the very beginning by ANDRA.

A Local Information Commission, made up of politicians, including Parliamentary representatives, mayors, and county administrators, of the media and of professional associations was established in July 1985. ANDRA's headquarters and regional staffs participated in over 200 public information meetings to open up the channels of communication and to respond to the concerns of the inhabitants of the entire region.

Radioactive waste management is a long-term commitment, and the Centre de l'Aube project was conducted in that vein. For example, instead of simply compensating local communities financially for the loss of forest land, ANDRA purchased land equivalent in surface area to the site and planted it with trees.

The Centre de l'Aube has become a veritable local attraction, with more than 6,000 visitors per year.

CONCLUSION

The first containers of low-level, short-lived waste were delivered to the Centre de l'Aube on January 13, 1992. This

event was, for ANDRA, the crowning achievement of seven years of hard work and constant communication with the licensing authorities and with the public, from site characterization through facility construction; seven years of getting to know and working with the local communities. It is a commitment that binds ANDRA to the community and to the environment for many years to come. For, above all, radioactive waste management is a commitment to protecting the environment and preserving it for posterity, and we have given our best to the Centre de l'Aube to make that a reality.