

# **ENVIRONMENTAL MEASUREMENTS AROUND FRENCH NUCLEAR POWER PLANTS**

**A. LE CORRE, T. BOURCIER**

**Department of Safety, Radiation Protection and the Environment  
EDF/DEPT  
SAINT-DENIS (FRANCE)**

Electricité de France generates 75 % of its electricity in nuclear power plants with pressurized water reactors (PWR). These plants comprise 34 units of 900 MW and 20 units of 1300 MW, the first of which was connected to the grid in 1977, and the last in 1993. Three other units of 1400 MW are under construction.

The environmental measurements are performed in two complementary ways :

1. Routine regulatory monitoring carried out by the operator according to a programme and procedures drawn up by the Ionizing Radiation Protection Office (OPRI), which is the State monitoring authority in France. The OPRI checks the results against those obtained with its own samples.

Around each power plant, the following are monitored :

- Ambient  $\gamma$ -radiation (continuously) at 8 points around the site within a radius of 5 km ;
- Aerosols in the air (once per day) at 4 points within a radius of 1 km ;
- Rainwater and groundwater (monthly) ;
- Surface waters (whenever there is a liquid radioactive discharge) ;
- Milk and vegetables (monthly) at 2 points in the area close to the site.

The plant has an off-site laboratory, two specially-adapted vehicles and a team of three chemists.

These measurements are quite separate from those conducted on radioactive wastes.

2. Annual and ten-yearly radioecological measurement campaigns around the sites in order to improve scientific knowledge of the environmental impact of the plants.

A ten-yearly campaign consists of "radioecological photographs" which are compared with the "initial zero point". About 40 samples are taken and various analyses performed (total  $\beta$ ,  $\alpha$  and  $\gamma$  spectra, strontium, carbon-14, free and organic tritium). The choice of samples and the places where they are taken depend on the zero point and the special features of the region. Items sampled include drinking water, irrigation water, ground moss, vegetables, fruit, field crops, field soil, humic gley soil, meadow grass, milk, sewage sludge, wine, sediments, water or marine plants, fish or shellfish.

The annual campaigns around each site enable a picture to be built up of the radiation situation in time and space from  $\gamma$ -spectrometry measurements on 27 samples selected as being the most suitable indicators (sediments, bryophytes, fish, moss, fruit, drinking water, milk, wine, soil).

The programme involves around 600 samples and 800 measurements per year and is conducted, at our request, by the Institute for Radiation Protection and Nuclear Safety (IPSN) which has established the methodology for the sampling and measurements and has the capacity to ensure the continuity indispensable for this type of measurement..

The results of all these measurements are published and communicated to the public through the most appropriate media.