

The Spanish Environmental Surveillance Radiological Network
(REVIRA)

J.L. Butragueño; J.P. García; E. Gil and M.J. Granada

Nuclear Safety Council
Justo Dorado 11
28040 Madrid
SPAIN

ABSTRACT

The Spanish Environmental Surveillance Radiological Network (REVIRA) has about 25 automatic stations and several associated laboratories (normally university labs) distributed over the state. The automatic network has been designed to measure dose rate and alpha, beta, radon and iodine air concentration. The measurement equipments consist of a ZnS(Ag) plastic scintillator, a NaI(Tl) crystal detector and a GM detector.

The automatic stations are connected with a Control Center sited in the Nuclear Safety Council headquarter in Madrid. The connection uses the National Telephonic Network and the central software is able to call from the Control Center to each local station, call from the stations if a setpoint is reached and call from the Control Center to set up the microprocesor governing the local stations.

INTRODUCTION

At first, the REVIRA project was an I+D General Program of the Nuclear Safety Council (CSN), but after Chernobyl's accident became a priority objective of CSN. The national surveillance radiological network has been designed to meet the following objectives:

- To know the radionuclide distribution and evolution in environment and the environmental radiation levels.
- To have experimental data for estimating the potential radiological risk to population due to a radioactive contamination, and to help the decision making process.
- To make periodic reports with these data.

REVIRA STRUCTURE

The REVIRA has two different stations:

- Automatic stations to measure air activity concentration and the dose rate.
- Stations in which a sample is taken and an analysis program is followed.

SAMPLE AND ANALYSIS STATIONS NETWORK

This network is constituted by a set of both, national research and university laboratories in all the national territory. These stations sample periodically: air, rain water and soils. The radioactivity contents is then analyzed in a lab. (total alpha and beta activity concentration and dose rate). A special interest is taken in iodine and strontium activity concentrations and the dose rate levels are measured with TLDs.

There are also taken samples of superficial water (continental and marine) foods (milk, vegetables, meat and fish) and its analysis are made.

AUTOMATIC STATIONS

The automatic stations measure the following variables in continuous form:

- Air activity concentration of total alpha aerosols.
- Air activity concentration of total beta aerosols.
- Air activity concentration of radioiodines.
- Air activity concentration of Radon.
- Dose rate.

The equipments have a particle aspiration and retention systems. The aspiration system has a constant flow pump of $0.0017 \text{ m}^3/\text{s}$. The retention system has filters for aerosols and for radioiodines. This system is constituted by the following devices:

- PLASTIC SCINTILLATOR DETECTOR
 - . Efficiencies

Cl-36	28% - 35%
Am-241	17% - 22%
 - . Alpha Background

	0.01 cps
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 - . Beta Background

	0.40 cps
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 - . L.I.D.

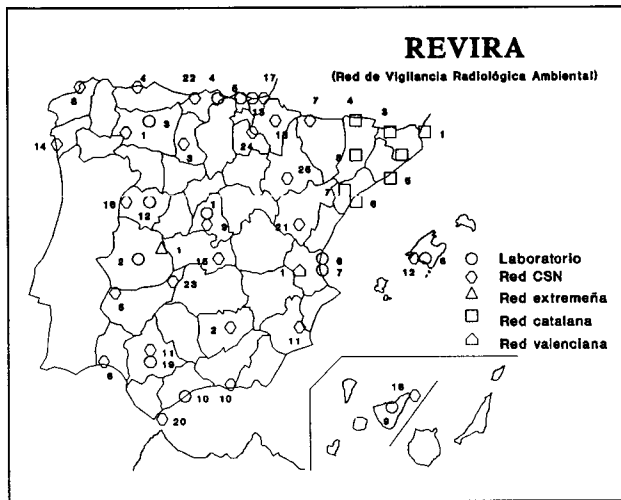
	$\leq 0.5 \text{ Bq/m}^3$
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- CRISTAL DETECTOR
 - . Efficiencies

Ba-133	$\geq 5\%$
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 - . Minimal concentration detectable

for I-131 (sample time 3600 sec)	$\leq 0.5 \text{ Bq/m}^3$
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- GEIGER-MÜLLER DETECTOR

	LOW DOSIS	HIGH DOSIS
Background (cps)	0.183	0.033
Energy response (MeV)	(0.05 - 1.5)	(0.05 - 1.5)
Accuracy Cs-137	$\pm 20\%$	$\pm 20\%$
Measure range (Gy/s)	$8.3 \cdot 10^{-13} - 5.5 \cdot 10^{-7}$	$5.5 \cdot 10^{-11} - 8.3 \cdot 10^{-4}$

A graphic representation of the automatic network is presented in the following figure.



These stations are located in the same places that some National Weather Institute automatic stations. So, the meteorological parameters (air temperature, relative humidity, wind direction and speed, rain intensity and air pressure) are also received.

TRANSMISSION DATA

The radiological and meteorological data, collected in the automatic stations, are transferred by the national telephonic network. A hardware device called DSIC (Selective and Inteligent Discriminator of Calls) is located in each station and stores each 10 min the radiological and meteorological parameters (having a maximum storage capability of 48 hours). The DSIC has an internal Modem connected to a telephone number and is called authomatically from Control Center.

THE CONTROL CENTER

The Control Center sited in the Nuclear Safety Council headquarter in Madrid, has three personal computer (Mod. 80386). These PCs are linked by a Local Area Network. Two of these three PCs takes charge of the comunication with the DSIC, and the other one makes the management of the data collected from the others PCs.

The PCs main functions are :

- To set alarms detections if a set point is reached for a parameters.

- To call manual and automatic to all the remote automatic stations (radiological and/or meteorological parameters).
- To request the parameters state from the radiological equipment (configuration of parameters, calibration factors, backgrounds, set points, etc)
- To display graphics and prints of time and spatial evolutions for all the parameters of automatics stations (daily and monthly evolutions, low and high value for each day and station, spatial values in all the National Territory, etc.).