

Radiation Monitoring System

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This project aims to measure the radiation that can be emitted to the area around nuclear facilities [3]. This system consists of a multichannel analyzer network connected to a supervisory computer. Each multichannel analyzer is designed to be part of a radiation monitoring network. All of them are connected by radio, within a radius of 10 kilometers, to a supervisor computer that collects data from the network of multichannel analyzers and numerically displays the latest radiation measurements or graphically shows the measurements over time for all multichannel analyzers, such as dose rate, spectra and operational status. Software also supports remote configuring operating parameters (such as the radiation alarm level) for each monitor independently.

The radiation monitoring system will consist of radiation monitors that will measure the intensity of the radiation rate and what specific radionuclide emanates from this radiation. These monitors have a NaI(Tl) scintillation probe, which captures radiation from a sodium iodide crystal and converts it into photons, which are then amplified in a photomultiplier unit [1] [2], to have high detection sensitivity in low radiation rate.

Each monitor will provide a full radiation rate in counts per second and the emanation of the energy spectrum. This spectrum contains the information about the energy which emanates from the radiation. These energies represent the radionuclides which are present in the environment, such as cesium, cobalt, americium, etc., so that the radiation protection staff identifies what type of radiation is released into the environment and the extent to which it can be potentially harmful to the population.

These monitors will be interconnected to a supervisory computer in a wireless network. The user can decide the distance within which the network will be adapted. Basically, the longest physical distance between a monitor and the supervisory computer will be 10 km. If, on the other hand, the distance requested exceeds 10 km, the network will have the ability to pass

data from one monitor to another, and then to the supervisory computer. This system will collect data from all the monitors, simultaneously, in a continuous period of time, and present it on the supervisory computer screen. It will also allow the transference of this data to any other computer connected to the internet.

This way, the movement and concentration of the intensity of the radiation plume may be displayed.

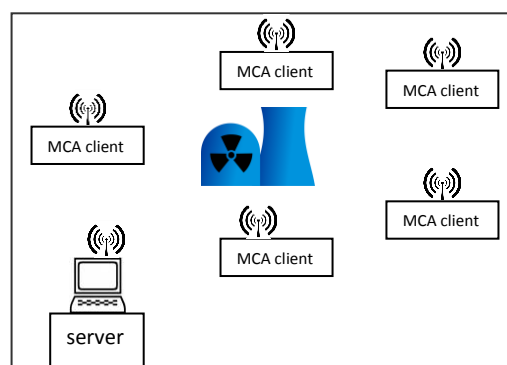


Figure 1. multichannel analyzer network connected by radio to a supervisory computer.

References

- [1] OLIVEIRA, M. V.; AGUINA, M. A. C.; SOARES, M. Sistema de monitoração de radiação 7027. In: ENCONTRO NACIONAL DE APLICACOES NUCLEARES , 4., aug. 1997, Poços de Caldas. **Proceedings...** Poços de Caldas: ENAN, 1997, p. 443-476.
- [2] TAUHATA, L. et al. **Radioproteção e dosimetria: fundamentos**. 5 rev. IRD, CNEN: 2003.
- [3] AGUINA, M. A. C. et al. Radiation monitoring system. In: INTERNATIONAL NUCLEAR ATLANTIC CONFERENCE, oct. 2015, São Paulo. **Proceedings...** São Paulo, 2015.