Area TA6 n.21.00 – Radiation Protection of the Public and the Environment

RADON SURVEY IN TWENTY SCHOOLS OF CAMPANIA REGION (SOUTH ITALY) CARRIED OUT FROM STUDENTS IN THE FRAME OF A PROJECT ON THE STUDY OF ENVIRONMENTAL RADIOACTIVITY: PRELIMINARY RESULTS

M. Pugliese ^, V. Roca ^*, C. Sabbarese ^°, G. Venoso ^*, L. Gialanella ^*

^Istituto Nazionale di Fisica Nucleare (INFN), Sezione di Napoli, Italy
**Università degli Studi di Napoli Federico II, Dipartimento di Scienze Fisiche, Italy*
°Seconda Università di Napoli, Dipartimento di Scienze Ambientali, Caserta, Italy

Abstract - School may be the second largest contributor to radon exposure of students, teachers and stuff,. About 500 measurements have been started in 20 schools located in Campania. Preliminary results showed that higher radon concentrations are in the scientific laboratory.

INTRODUCTION

Radon is a radioactive gas which is a product of the radioactive decay of uranium. It is the most important source of radiation exposure for the population, because disperses quickly in outdoor air but can accumulate in buildings

Because students represent a considerable objective to such a kind of exposure, in North Italy a lot of surveys in the schools have been carried out, while in South Italy there are not data about student's radon exposure.

To make up for this leak of information ENVIRAD, a project supported by Istituto Nazionale di Fisica Nucleare (INFN), planned a survey in twenty secondary schools of Campania region. Students and their teachers have been directly involved in the campaign also to study the basic elements of radioactivity and radiations, natural radioactivity and radon. Students, after a training period, were become part for the experimental, planning and carrying out the survey [1].

Preliminary results showed that higher radon concentrations are in the chemical, language and computer science laboratories. In particular the school located on Ischia island, shows values higher than all the others.

THE SURVEY

Radon measurements were carried out for two successive six-month periods to estimate the annual average value of indoor radon concentration.

The measurements were performed using passive detectors, each containing two alpha track detectors LR-115 films (Kodak, type II), enclosed in a plastic bag. After the exposure, detectors were processed according to the protocols used yet for the Italian national survey [2].

In sixteen of the twenty schools measurements are completed, while in the remaining schools that joined to ENVIRAD in 2005 detectors for the second semester are exposed. In the present paper results of annual radon concentrations in the sixteen schools are reported.

In each school detectors were exposed in classrooms, in secretary's and headmaster's office and in the scientific and language laboratory. The number of detectors (between 8 and 20) depends on the constructive features of the building and on its dimensions.

To evaluate the influence of the different parameters affecting the indoor radon concentration we collected on a specific form: building data, classroom data and detectors data.

The survey involved 20 schools located in 14 municipalities. In fig. 1 their localization in the regional territory is reported.

This is the first radon survey performed in schools of South Italy.

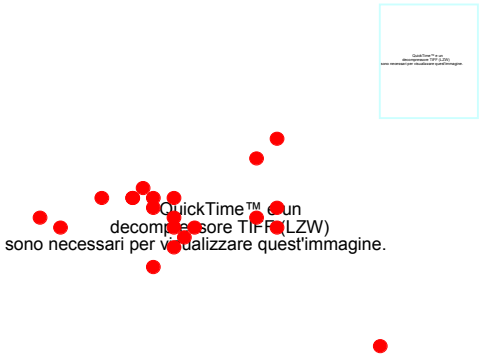

Fig. 1 – Localization of the schools involved in ENVIRAD project on Campania region

RESULTS AND DISCUSSION

The mean value of radon concentration calculated in the thirteen schools in which annual exposure was completed (254 rooms in all) is 130±12 Bq/m^3. The mean standard deviation is relatively high, and this may be due to the different geological features of the investigated municipalities. In Ischia island we found higher radon concentrations (up to 1060 Bq/m^3).

The distribution of radon concentration in classrooms (125 in the thirteen schools) is showed in figure 2. The mean value calculated is 102±10 Bq/m^3.

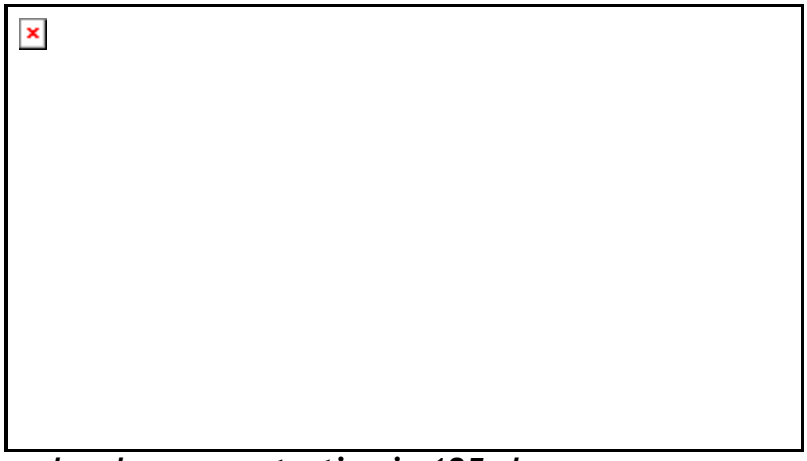

Fig. 2 – Annual radon concentration in 125 classrooms.

We observed higher radon concentration in chemical, language and computer science laboratories (Fig. 3). Exactly, the mean value of radon concentration is 152±34 Bq/m^3. This may be due to a reduced ventilation and a less frequent use of these rooms respect to classrooms.

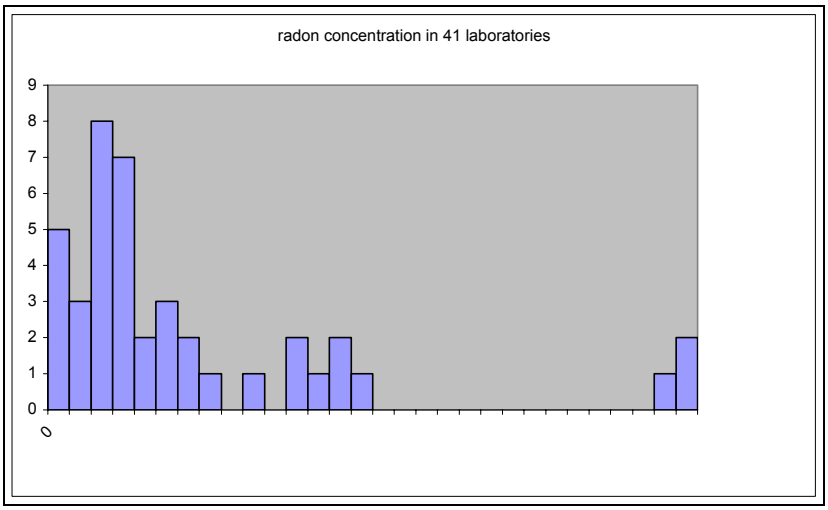

Fig. 3 – Radon concentration in laboratories

The dependence of indoor radon concentrations on the parameters that are generally considered (building typology, building materials, wall and floor linings) are confirmed by these preliminary results. In particular, we observed a seasonal variation of radon concentration, that is 80±9 Bq/m^3 during the warm semester and 161±15 Bq/m^3 during the cold semester.

Finally, the mean value in the classrooms is comparable with average radon concentration in dwellings in Campania, 95±3 Bq/m^3 [*3*].

CONCLUSION

The preliminary results show that geographical variation in the radon levels is correlated with the geology of the Campania region, evidencing that higher values are in Ischia Island.

It has been found that indoor radon concentration in the schools are influenced by a number of factor, in particular by ventilation rate.

The survey will be a basis for study on the health impact of radon in the workplaces that current regulations don't take in account.

REFERENCES

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[*3*] *F. Bochicchio et al., Annual average and seasonal variations of residential radon concentration for all the Italian Regions, Radiation Measurements 40, 686-694 (2005).*