



Project Summary

Follow-Up Radon Measurements In 14 Mitigated Schools

J-C Dehmel, P.L. McCloskey, and G. Mollyn

To determine the long-term performance of radon mitigation systems installed in U.S. Environmental Protection Agency (EPA) research schools, radon measurements were conducted in 14 schools that had been mitigated between 1988 and 1991. The measurements were made between February and April 1992. A measurement protocol was developed based on current EPA guidelines, and measurements were made with alpha track detectors (ATDs) which were mailed to the schools along with placement and retrieval instructions.

The results from these follow-up ATD measurements indicate that, overall, active soil depressurization (ASD) systems have been very effective in maintaining low long-term radon levels in the 14 schools. Of the 409 locations measured in these schools, only 17 (4%) of the measurements in mitigated areas exceeded 4 pCi/L. Eight of the 17 measurements were in the one basement school that was measured, one was in a room where the ASD fan had been turned off, and another was in a room with building pressurization that is only operated while the building is occupied. If these 10 measurements are dropped from the set, the rooms above 4 pCi/L drop to less than 2%.

The results of the quality assurance audits and ATD spiking measurements indicated that the project data quality objectives were generally met. However, some schools were not able to expose the ATDs for the specified 3-month period because of operational and administrative reasons. In addition, a

number of the duplicate ATDs were not co-located within the room, contributing to the variation between duplicates.

This Project Summary was developed by EPA's Air and Energy Engineering Research Laboratory, Research Triangle Park, NC, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Introduction

The U.S. Environmental Protection Agency's (EPA's) Air and Energy Engineering Research Laboratory (AEERL) has conducted radon mitigation research in nearly 50 public schools since 1987. Active soil depressurization (ASD) systems have been installed in many of these schools. After system installation, radon levels were measured to determine the effectiveness of the mitigation system. If the post-mitigation measurement indicated that radon levels were still above the EPA action level of 4 pCi/L, the mitigation system was modified and radon levels were remeasured.

To determine the long-term performance of these mitigation systems, radon measurements were conducted in 14 of the schools that were mitigated between 1988 and 1991. These follow-up measurements were made between February and April 1992. The measurements were made with alpha track detectors (ATDs) which were mailed to the schools along with placement and retrieval instructions. Quality Assurance (QA)/Quality Control (QC) requirements are applicable to this project. The work was performed under the re-



quirements of AEERL's QA Plan Category III, and data are supported by QA/QC documentation as required by the U.S. EPA policy.

Measurement Methods and Procedures

Telephone contacts were made with each of the eight school systems to verify their participation in the measurement study and arrangements were made to ship the ATDs and instructions to designated contacts. The ATD packages were mailed between January 31 and February 7, 1992. The packages included:

- 1) instructions and data sheets,
- 2) a completed sample data sheet,
- 3) a marked-up floor plan showing the proposed ATD deployment locations in the school, including those for duplicates,
- 4) ATDs, including control and duplicates, as separate packages,

- 5) ATD gold seals, and
- 6) a self-addressed return label and shipping form.

During the survey, each school was contacted by phone to establish placement and retrieval dates. It was requested that all ATDs and related documentation be returned by April 20, 1992.

Radtrak ATDs, supplied by Tech/Ops Landauer, Glenwood, IL, were used for the measurements. Upon receipt, 102 ATDs were set aside for exposure, as spikes, with the EPA's National Air and Radiation Environmental Laboratory (NAREL) test facility located in Montgomery, AL.

Once the exposed ATDs and supporting documentation were returned, all ATDs were counted, checked for proper identification, and forwarded to Tech/Ops Landauer for processing. Upon receipt of the measurement results, the data were sorted by school, and maximum, minimum, average, and standard deviation of the radon levels were determined.

Results and Conclusions

The results from the follow-up ATD measurements indicate that, overall, ASD systems have been very effective in maintaining low radon levels in the long-term in the 14 schools that were measured for this study. Of the 409 locations measured in these schools, only 17 (4%) of the measurements in mitigated areas exceeded 4 pCi/L. Eight of the 17 measurements were in the one basement school that was measured, one was in a room where the ASD fan had been turned off, and another was in a room with building pressurization that is only operated while the building is occupied. If these 10 measurements are dropped from the set, the rooms above 4 pCi/L drop to less than 2%.

The results of the QA audits and ATD spiking measurements indicate that the project data quality objectives were generally met. However, some schools were not able to expose the ATDs for the specified 3-month period because of operational and administrative reasons. In addition, a number of the duplicate ATDs were not co-located within the room, contributing to the variation between duplicates.

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The complete report, entitled "Follow-up Radon Measurements in 14 Mitigated Schools," (Order No. PB94-114798AS; Cost: \$19.50; subject to change) will be available only from:

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Telephone: 703-487-4650*

*The EPA Project Officer can be contacted at:
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