

**Region III Involvement in Quality
Control and Quality Assurance
of Radon Testing Methods**

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Abstract - Region III has set a goal of increasing the testing for radon by our residents. One approach to this goal, is to bolster the public's confidence in the testing laboratories. We believe that this can be done most effectively by assuring the quality of the measurements available to the public.

All Proficient Laboratories and Pennsylvania Certified Laboratories have submitted a quality assurance (QA) program. A QA audit checklist has been developed which will be finalized and made available to the states in our Region.

This QA audit procedure will deal with inspection, verification, and documentation of the various laboratories and their compliance with prudent measuring protocols and will address the following items:

- 1. Organization and Responsibilities**
- 2. Sampling Procedures**
- 3. Detector Chain of Custody**
- 4. Measurement Procedures, Quality Control Checks**
- 5. State Certification and RMP**
- 6. Data Reduction, Validation, and Reporting**
- 7. Quality Assurance Reports to Management**
- 8. Interview and Discussion of QA Audit with Responsible Officer**

INTRODUCTION

Region III has set a goal of increasing the testing for radon by our residents. One approach to this goal is to bolster the public's confidence in the testing laboratories. We believe that this can be done most effectively by assuring the quality of the measurements available to the public.

Figure 1, illustrates the percentage of radon readings above 4 pCi/l in Region III. At the time this graphic was made, Region III, which includes Delaware, Washington, D.C., Maryland, Pennsylvania, Virginia and West Virginia had approximately 190,000 measurements made by the laboratories listed in the slide. These laboratories were Key Technology, Teledyne, AirChek, Inc., and the Radon Project.

This paper describes the development of a Quality Assurance Audit Procedure by PADER and EPA. We have performed audits of radon measuring laboratories with a view to refine and implement an effective means of monitoring and establishing reliable laboratory services to the public.

When this audit procedure is finalized, it will be made available to the other states in our Region and also to the other Regions.

Discussion

The Radon Industry which involves testing, analyses or measurements, diagnostics, and remediation or mitigation is achieving maturity, like all enterprises of this type there is a continuing evolution from complete Laissez-Faire to a well regulated and responsible industry.

The route to the latter stage is usually achieved through a series of activities, such as development of quality control procedures, standardization of methods and procedures, proficiency testing, analysis of external and internal standards and blanks, replicate analyses, round robin testing, formation of technical or trade societies, such as AARST, holding of symposium and workshops and the free exchange of information between members with a common purpose of improvement. Eventually this may lead to certification of accreditation by some selected independent group.

Responsibility for producing a reliable measurement, starts and ends in the laboratory.

Institution of training programs for all personnel and adherence to meaningful and relevant quality assurance programs are a must. External and internal quality assurance audits are only a part of verification leading to the definition of, and production of data that are scientifically sound of known precision and accuracy.

There are many instances where failure to follow a good quality control procedure has led to a faulty end product. A pertinent example is found in the Swedish Marine Museum in Stockholm. Upon completion of a naval vessel, in those days, part of the quality control involved a test for stability which was done by the crew running from one side of the ship to the other and recording the amount of list. As the test indicated a tendency to overturn, it wasn't completed. On her first voyage, the Wasau developed a list and sank. A good quality assurance audit before the ship went to sea may have prevented this.

Most of you are aware that EPA has a National Radon Measurement Proficiency (RMP) Program. Also, Pennsylvania requires certification of all laboratories, testers, and mitigators and publishes a certified radon services directory. Successful participation in the (RMP) Program is a requirement for PA Certification. The Quality Assurance Program we are discussing does not replace the RMP Program. The fact is that the RMP Program is the foundation upon which the framework of measuring proficiency is built, our program augments and compliments the RMP.





The need for inspection, documentation and verification of adherence to quality control has led to the Quality Assurance Audit Checklist which we are to discuss. Many sources have been used to develop this list. Our appreciation and thanks to all the contributors to the Quality ethic is hereby extended. Figure 2, shows the items to be addressed. A more comprehensive tabulation follows which is designated as attachment 1.

Conclusion

We have learned from the previous discussion that the evolution of the radon measurements program is moving rapidly in the direction of reliability and integrity of analyses. Starting with a comprehensive quality assurance program, internal quality control, external and cooperative testing and the RMP program, all effort is directed to minimizing the bias, maximizing the precision and accuracy and thus insuring the integrity of the measurement. Our Quality Assurance Audit is another link in the system which inspects, verifies and documents these efforts.

PERCENTAGE OF RADON READINGS ABOVE 4 pCi/l IN REGION III

PERCENTAGE OF RADON READINGS ABOVE 4 pCi/l

-  Over 60%
-  40% to 60%
-  20% to 40%
-  0% to 20%

Insufficient Data
Less Than 15 Readings



Data:
 Recent data from USES
 1-2-88, 889 g/c Radon data
 from Ely Technology
 Service, Inc. and PA Radon
 Project.
Projection: 18
Produced by: 874 Region III - Philadelphia
 Information Resources Management
 Branch
Produced For: EPA Region III - Philadelphia
 Air Programs Branch



Figure 1

Quality Assurance Topics

1. Organization and Responsibilities
2. Sampling Procedures
3. Detector Chain of Custody
4. Measurement Procedures, Quality Control Checks
5. State Certification and RMP
6. Data Reduction, Validation, and Reporting
7. Quality Assurance Reports to Management
8. Interview and Discussion of QA Audit with Responsible Officer

Figure 2

(Attachment 1)

RADON LABORATORY

SUGGESTED QUALITY ASSURANCE AUDIT CHECKLIST

SECTION 1.0 Organization and Responsibilities

1.1 Organization: Name

Organization: Address

Organization: Phone No.

1.2 List of Personnel and Responsibilities

1.2.1 Name of QA contact who has authority to
suspend operation

1.3 Copy of QA/QC plan and relationship of listed
personnel

1.4 Training of personnel and documentation

1.5 Dosimetry records, if applicable including name,
date of birth, SS No., cumulative exposure

1.6 License or registration of radioactive sources,
if applicable

1.6.1 Wipe tests records, if applicable

1.6.2 Timely calibration of survey instruments

SECTION 2.0 Sampling Procedures

- 2.1 EPA Protocols, are they available?
used
- 2.2 Handling and shipment of detectors
- 2.3 Detector placement instruments.

SECTION 3.0 Detector Chain of Custody

- 3.1 Logging of Detector from Acquisition, Placement
Retrieval, measurement and disposition.
- 3.2 Examples of forms used for above,
- 3.3 Follow the route of several detectors through
chain of custody.

SECTION 4.0 Measurement Procedures

- 4.1 List of all equipment used,
- 4.2 Calibration and Frequency of Equipment
- 4.3 Internal QC Checks and Frequency
 - 4.3.1 Blanks, How many, results and frequency
 - 4.3.2 Blind samples, results and frequency, How
many?
 - 4.3.3 Standards and Traceability
- 4.4 Replicate Detectors, Results, Frequency,
How many?
- 4.5 Records of Internal Checks
- 4.6 Control and Trend Charts (Timely)
- 4.7 Corrective Action, examples, initiator,
responsible person

SECTION 5.0 State Certification and EPA Radon Measurement Proficiency (RMP)

- 5.1 Certification for whom and what measuring detector
- 5.2 RMP for what detectors and back up RMP data submitted for each type of detectors.
- 5.3 Availability and use of EPA protocols

SECTION 6.0 Data Reduction, Validation and Reporting

- 6.1 Equations, factors, parameters of interest, how used?
- 6.2 Responsible individual and reporting,
- 6.3 Treatment of anomalous data
- 6.4 Examples of reports and records of report files,

SECTION 7.0 Quality Assurance Reports to Management

- 7.1 Periodic internal audit of performance of measurements showing records of:
 - (a) Precision
 - (b) Accuracy (bias)
 - (c) Intercomparisons and calibrations
 - (d) Trend and Control Charts
 - (e) Use of above
- 7.2 Whether or not corrective action was undertaken, why and by whom?
- 7.3 List of significant problems and recommendations.

SECTION 8.0 Interview and Discussion of QA Audit with responsible officer.

- 8.1 Follow-up letter or report documenting findings