

QA/QC for Radon Professionals



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Stakeholder Workshop

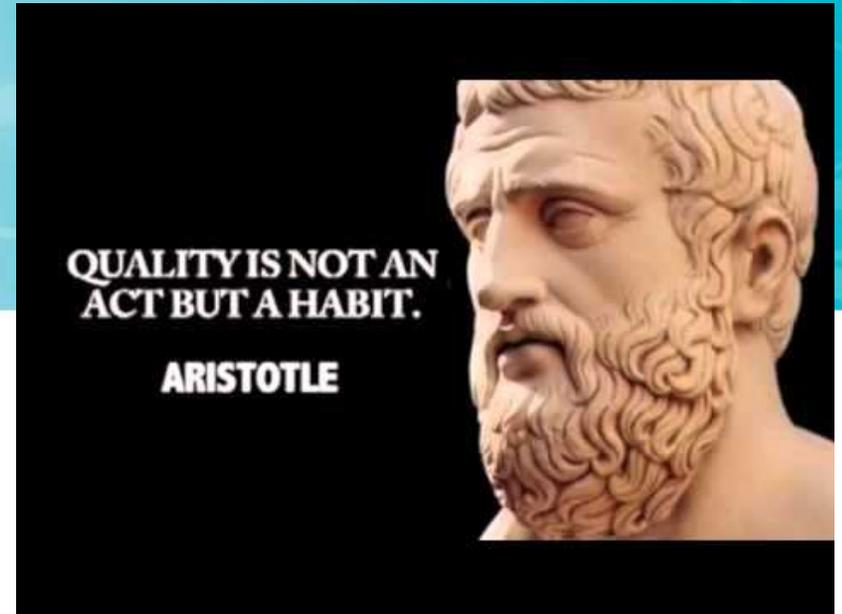
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Radon Quality Assurance

- Historically, Radon QA means blanks, spikes, duplicates, and control charts.
- These are certainly important, however:
- Radon protocols and training programs are behind the times.
- QA/QC expectations are evolving.



Radon Quality Assurance

- EPA closed RPP in 1998, ending their QA and protocol support for radon.
- Radon QA/QC stagnant for 20 years.
- ISO 9000 moved the bar, including:
 - ISO 9001 - Quality Management Systems
- **QA not just for measurement services any longer!**
- AARST, IL, OH, and KY are transitioning to ISO type of approach. Others will follow their lead.



What Constitutes Quality?

Quality System – *The organized structure, responsibilities, procedures, processes, and resources needed for implementing quality management.*

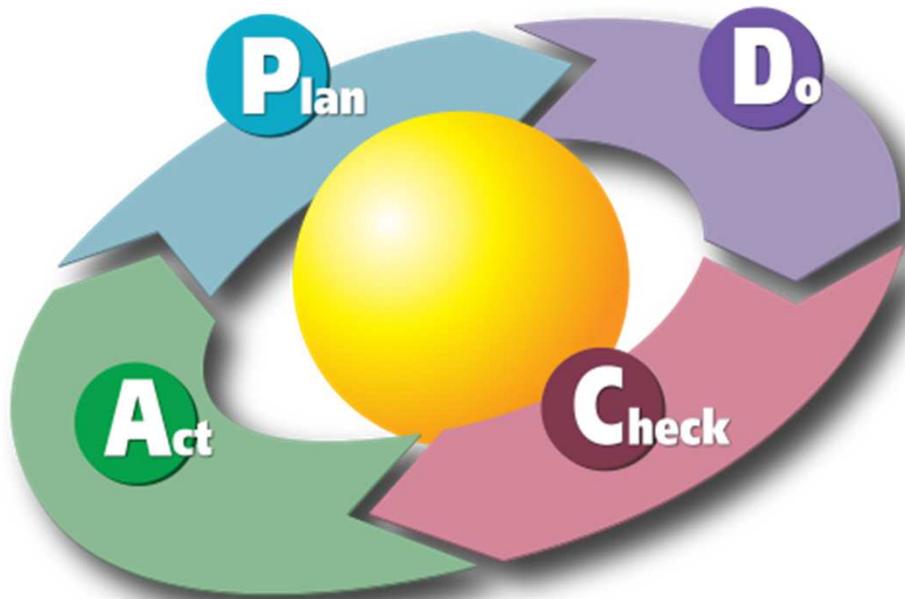


Quality Management

Activities and functions involved in determination of quality policy and its implementation through means such as quality planning, quality assurance, and quality control.



Quality Assurance



The system of checks and balances used to establish confidence in work products and services.

- QA Plan

Quality Control



The series of measurements, and assessments made to determine whether the work product is reliable and client expectations are achieved.

- *Spikes*
- *Blanks*
- *Duplicates*

Why Have a QA Program?

- Regulations & Certification requirements
- Production of a consistent, accurate work product
- Training
- Be able to defend your work product
- Meet customer expectations
- Learn from customer feedback
- Look for areas of continued improvement



Who Defines Radon Quality?

- ISO
 - 9001: Quality Management Systems
 - 17025: Competence of Testing and Calibration Labs
- EPA Radon Protocols and QA Guidance Doc
- States: PA, OH, NY, NJ, IL, IA, NE, KS, KY,...
- AARST Standards (ANSI-Approved)
- Clients & Courts (Contracts and Expectations)



Starting a QA Program



- Quality doesn't happen automatically, nor by accident
- Quality Systems require a considerable amount of work, commitment, planning, & follow up
- Do fill in the blank approaches work?

So What is in a QA Program?

- Planning & Commitment
- Quality Assurance Plan
- Staff Qualifications
- Documents and Records
- Assessments and Review
- Corrective Actions
- Reporting and Auditing



Planning & Commitment

- Become familiar with requirements and expectations in your service areas
- Formulate a plan on how your company will abide by the rules
- Get buy-in from everyone in the company by explaining the repercussions that may happen if everyone isn't committed.
 - Possible loss of certifications, termination, etc.



QA Plan Guidance Documents

- EPA: National Radon Proficiency Program Quality Assurance Guidance (measurement) – available for download at www.nrpp.info
- AARST: Quality Management Systems for Mitigation Professionals - available in AARST member Toolkit CD / downloadable after log-in
- Some states have templates
- ISO 9001



Quality Assurance Plan

- Procedures for maintaining documents and records;
- Procedures for calibration and testing of instruments;
- Corrective action program;
- Standard operating procedures;
- Worker protection program.



Commitment & Management

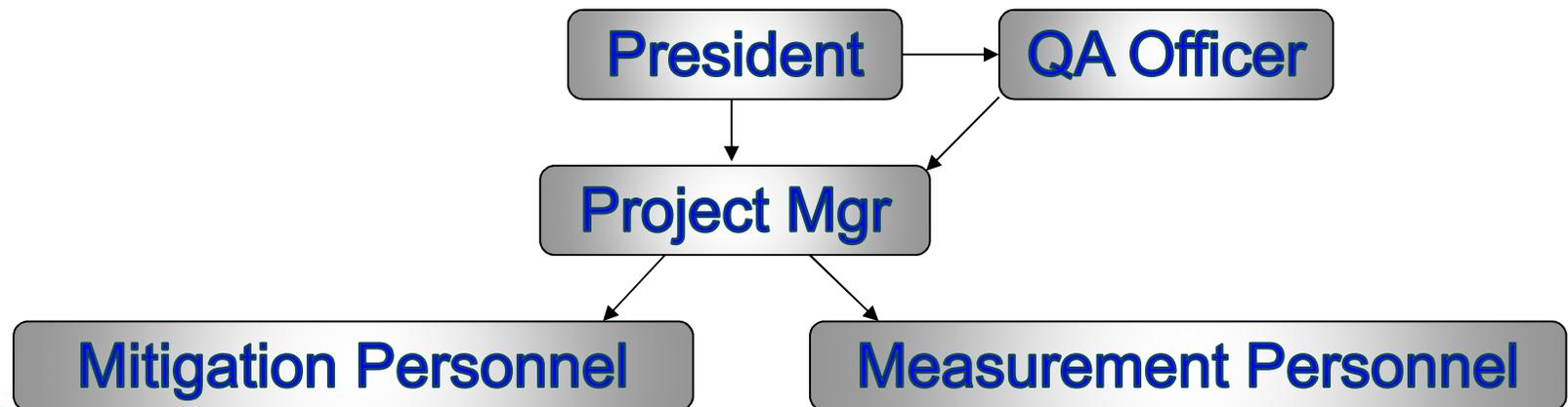
- Develop a commitment statement.
 - “Shawn Price Radon Services is committed to a strong quality control process whereby every radon measurement will be performed according to AARST/ANSI standards and in accordance with requirements of the Kentucky radon certification program.”
- Management must be truly dedicated to the statement and hold workers to your standards.



Management and Structure

Define the chain of authority within the company
Identify the individual(s) with authority to stop work when necessary.

An organizational chart is a really good idea.



Personnel, Qualifications, & Training

- List the names of staff and the positions they hold
- List current qualifications for each staff member
- Develop a list of qualification expectations for each position
- Describe minimum training requirements for each position.
- Maintain a list of completed training for each staff member



Describe Radon Services

- Measurement Services
- Describe each service type and reference corresponding standard and SOP
 - Single-family/Townhouse testing
 - Multifamily testing
 - Large Building and School testing
 - Radon in Water



Describe Radon Services

- Mitigation Services
- Describe each service types, techniques, reference corresponding standard and SOPs
 - ASD, Ventilation, and Pressurization techniques...
 - Single-family/Townhouse mitigation
 - Multifamily building mitigation
 - School and large building mitigation
 - New construction



Procurement of Items & Services

Create a list vital equipment & subcontractors

- Manufacturers, part numbers, suppliers, specs,
- Subcontracted services and their license requirements
- Assures reproducible supplies & product comparisons for vendor or part comparisons
- May also assist replacement of broken or stolen equipment



Documents and Records

- Create a library of all regularly used forms, letters, agreements.
- Use version numbering or dates to distinguish modification dates.
- Develop a process where these materials are reviewed and updated.
- Make sure all staff are involved in the review process and know where to find most recent copy



Documents and Records

- File copies of letters received from clients who offer suggestions and complaints.
- Respond to client letters and maintain a paper trail in case you are challenged in court.
- Ensure that files are maintained in orderly manner.
- Some records must be kept for 5 years or longer.
- Make routine backups. Computers Crash!!



Calibration Records

- Know manufacturer calibration recommendations, frequencies, and techniques
- Know Radon standards and state requirements
- Maintain list of every item needing calibration
 - Maintain serial number inventory
 - Maintain calibration certificates
 - Display calibration info on equipment or storage case if not practical to display on the equipment



Corrective Actions

- Problems occur, so expect them!
- Create processes such as inspections or audits to review work.
- Log complaints that led to company action
- Determine the proper fix and document what happened, how it was fixed, how procedures or staff were changed as a result, and explain how future occurrences will try to be avoided.



Corrective Actions

- Use past problems to shape behavior
 - Training current and future staff
 - Have a plan to identify and resolve problems
 - Consider hiring an outside consultant to come in and review problems and help provide resolutions if you are unsure yourself
- Everyone has problems. Saying that you never have them is a **red** flag.



Standard Operating Procedures

- SOPs are Recipes to produce consistent work
- SOPs should be developed and maintained for each measurement system and project type.
- SOPs include design and diagnostic measures utilized in the various mitigation projects.
- SOPs require periodic reviews and maintenance
- List Standard or Protocols required for use in each SOP as a reference source



Measurement Standards of Practice

Measurement Standards - currently

- AARST ANSI “Measurement in Homes” (MAH 2014)
- AARST ANSI “Multifamily Measurement” (MAMF 2012)
- AARST ANSI “Measurement in Schools and Large Buildings” (MALB 2014)
- EPA “Homes Protocol” (402-R-92-003)



Mitigation Standards of Practice

Mitigation Standards

- AARST-ANSI “Radon Mitigation Standards” (ASD-RMS)
- AARST-ANSI “Multifamily Mitigation Standards” (RMS-MF 2014)
- AARST-ANSI “School and Large Building Mitigation Standards (RMS-LB 2014)
- AARST-ANSI “RRNC of 1&2 Family Dwellings” (CCAH-2013)
- ASTM E2121, EPA RMS,



Company SOPs

- SOPs are vital to a successful quality system.
- Where are your forms located, where are your devices stored, which computer is used to maintain records...?
- SOPs direct staff when they are unsure of a procedure
- SOPs help to cross-train staff and new hires on proper procedures
- Create a consistent SOP look and feel that fit your needs, such as:



Example SOP Layout

- Introduction: concise statement of the procedure
- Summary: summarizes extent or areas where the procedure applies
- Definitions: unique words or terms
- Standards: the reference to the standard used to develop the procedure (e.g., AARST MAMF)
- Calibration: reference requirements for tools/devices used in the procedure



Example SOP Layout

- QC Requirements: identifies QC tests that are required under the standard (e.g., rate of duplicates, blanks, diagnostic tests)
- Equipment: identifies equipment and tools required to comply with the procedure
- Procedure: performers, actions, and controls to perform the intended, controlled process

Example SOP Layout

- Records: identify quality assurance records to be created and retained to document that the process was followed as designed
- References and Attachments:
 - Forms & checklists, manufacturer instructions, flowcharts, labels, floorplan templates
- Document Control: Display a procedure number, revision number, effective dates,...



Example SOP List

SOPs Table of Contents

<u>SOP#</u>	<u>Procedure Name</u>	<u>Revision Date</u>
1.	Document Control	Version 7/1/2014
2.	Suggestions and Complaints	Version 7/10/2014
3.	Corrective Action	Version 9/15/2014
4.	Detector Custody, Receipt and Storage	Version 7/1/2014
5.	Residential Measurement Procedures	Version 10/1/2014
6.	Data Validation and Reporting	Version 1/10/2015
7.	Internal Quality Control and Training	Version 8/15/2014



Worker Protection Plan

- Unsafe workplaces produce injuries, lawsuits, harm worker morale, and decrease productivity
- Monitoring worker exposure to radon/radon decay product is a must!
- Health and safety programs are important
 - Respirator fit/training, eye and hearing protections, lift and ladder safety, crawlspace and roof training
 - Local and online training available
 - clicksafety.com = OSHA10 and OSHA30
- OSHA regulates worker safety



Radiological Safety Plan

Guidance for developing a Rad Safety Plan

- A commitment to track occupational exposure
- A statement with regard to ALARA (As Low As Reasonable Achievable)
- A statement that describes the maximum exposure
 - i.e. 4 WLM per year (Working Level Months)
- An outline of the method used to determine exposure
 - WLM formula used, devices used to measure, frequency of calculations, worker names, how long will records be kept



Measurement Quality Control

- Understand your Test Devices!
- Duplicates
- Blanks
- Spikes
- Calibration
- Routine Instrument Checks
- Inventory Control



Understanding Test Devices

EVERY device has its strengths and weaknesses

- Optimum exposure times
- Optimum exposure conditions
- What happens while they sit in inventory
- What can go wrong?
 - When do they measure too high?
 - When do they measure too low?
- How will you know?



Know Your Devices!

- Measurement Methods
 - Activated Charcoal
 - Electret Ion Chambers
 - Alpha Track Monitors
 - Continuous Radon Monitors
- Become intimate with the manufacturer's instructions
- QC tests should look for any weaknesses that will differ from device to device and method to method.



What Impacts Quality?

- Manufacturing
- Calibration
- Shipping
- Storage
- Test Environment
- Use (Protocols)
- Return Shipping
- Data Entry/Integrity
- Analysis
- Reports

Quality Control Measures

- Duplicates - Used to assess how two side-by-side measurements agree (*Precision*)
- Blanks - Used to determine whether the kits are contaminated and can assess storage conditions
- Spikes - Used to determine how well the lab can measure known amounts of radon (*Bias*)
- Routine Checks
- Calibration



Mitigation Quality – See AARST handout

- Initial Contact & Building Investigation
- Diagnostic Testing Procedures and Results
- Mitigation System Design
- Sealing and other passive procedures
- Operating, Maintenance and Monitoring (OM&M)
- Post mitigation inspections and retests
- Quality Control: e.g., oversight reviews & responses to failed systems



Mitigation Policies / Procedures

- Standard Contract Proposal guidelines
- Jobsite Quality Control Tracking Sheets
 - PFE procedures and worksheets
 - Obtaining or Creating jobsite diagrams
- Health & Safety Plan
- Labels and Notices
- Form Development & Maintenance



Initial Contact with Clients

- Contact name
- Property address
- Radon concentration present
 - Copy of report available?
 - Review report for clues or red flags
- Device Type, Dates, Laboratory Name,...
- Health risk info: Citizen's Guide, HB&SG, State?



Building Investigation

- Who performed onsite visual inspection
- Complete or verify the floor plan diagram
 - To Scale
 - PFE locations and readings
 - Structure type
 - Other notes relevant to building characterization or system design



Designed ASD Components

- Detail suction point specifics
 - Location, Conditions Found, Actions Taken
- ASD Piping
 - Slope/Drainage, Pipe Materials, Variances
 - Mechanical Fasteners confirmed & Methods
 - Code compliance, fire rated assemblies confirmed,...
 - ASD Pipe Sizing
 - Main stack, internal extensions, outdoors



ASD Exhaust Discharge

- Location and design details
- Compliance distance
 - Above grade, away from openings, away from intakes, people
 - Compliance with roof or eave locations
 - Compliant trajectory (not at building material, people, other buildings)
 - Mechanical fastening confirmed and methods



ASD Fan

- Model
- Location
- Electrical and Code Compliance
 - Initials of installer/supervisor
 - Location and method of disconnect
 - Location of accessed power
 - Wire gauge
 - Breaker size and amp



Sealing

- Sumps
 - Lid materials, sealing verification
 - Operational check of pump after sealing verification
 - Flex couplings installed verification
 - Physical access to pump verification
 - Visual access to pump verification

Sealing

- Cracks & Openings to soil
 - Materials (cracks)
 - Materials & Methods
 - Bath rough-ins, etc
 - Description of sealed and unsealed items
- Membranes
 - Materials: membranes, suction pipe seal, methods
 - Description of sealed and unsealed items



Sealing

- Drains
 - Materials & Methods
 - Sealed Assemblies
 - Sides, top, Bottom
 - Description of sealed and unsealed items

Operations, Maintenance, & Monitoring (OM&M)

- Fan Monitors (method, location)
- Location of main label and information packet
- Location of labels on each floor.
- Failure Indicators
- Service Plans



Post Mitigation Inspection

- Verification of visual for Standard compliance
- Log fan monitor pressure
- PFE Verification (Record pressure witnessed at each location)
- Backdraft observations, concerns, and actions
- Note compliance with Standards and Codes



Post Mitigation Retests

- Who performed retests
- Results
- Maintain copy of report



Health & Safety

- Exposure tracking
- Note safety deficiencies or injuries



Failed Quality

- Log all follow-up Actions
 - Record call backs
 - Check for form/checklist deficiencies
 - Elevated retest concentrations
 - Complete Field Investigation
 - Log Complaints, Feedback, suggestions...



Reporting

- Reports are the items that leave the lasting impression of your quality and thoroughness
- Detail, consistency, recommendations, references, and conclusions must be accurate
- AARST-ANSI standards list data requirements
- States have report content requirements too
- Cross reference each set of requirements because your forms and database must capture everything necessary for complete reporting



A quality program assures
consistent work products



Strive to make every client happy!

