National Radon Safety Board

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AGREEMENT FOR DEVICE EVALUATION

The National Radon Safety Board ("NRSB") has been requested by the equipment manufacturer or its authorized agent, _____ to evaluate _____, for inclusion in the NRSB list of approved measurement devices.

Bowser Morner has agreed to cooperate with the NRSB in this device evaluation process. This letter of understanding details the responsibilities of _____ and those of the NRSB in this device evaluation process.

The following information is to be supplied to the NRSB Office, 14 Hayes Street, Elmsford, NY 10523 and a check payable to NRSB in the amount of $1000. The applicant will be responsible for any fees incurred for performance testing of new devices. It is general information that is required in the draft Instrument Evaluation Program Handbook that was prepared by SC&A for U.S. EPA September 6, 1995. This information will be used to help the NRSB work with the manufacturer to document the measurement system and place it in the context of other systems already evaluated.

Four (4) sets of the following information are to be provided in letter format from the manufacturer to the NRSB:

- The manufacturer name, location, and the identification of the line of detectors to be evaluated, and the name of a contact person to answer technical questions;
- References in published journals (including copies of reprints if available);
- Unpublished technical reports;
- A description of the device's history in terms of EPA or other proficiency program experience (e.g., whether the manufacturer has submitted a similar system for evaluation in the RMP Program or the Instrument Evaluation Program); and
- Information regarding the results of participation in any performance evaluations, such as those sponsored by other federal agencies or states.

<u>Technical Information</u>

- A complete description of the design of the system. For passive systems this includes the devices as well as the analysis equipment, and for active systems this includes components. Features particularly important to the operation of the system should be described, with schematics and the materials used.
- For passive systems, submit four (4) samples of test kits. For continuous radon monitor, submit one device or photos and pictures.

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- The procedures for using the measurement system to perform measurements, including any time requirements (e.g., deploying the instrument or device for the appropriate time period, starting and ending the measurement, and obtaining the measurement results).

- If a pump is used, the technical specifications for the pump operation, the procedures for verifying and adjusting pump flow rate and checking the filter(s), if applicable.

- The radon entry method, either pump or passive diffusion, and the method for eliminating the entry of radon decay products into the chamber, if appropriate.

- A complete description of the various options for performing measurements with the equipment (e.g., various measurement durations).

- A complete description of the calibration and recalibration process, including:
  - the procedure for obtaining and rechecking the background of the system (and components, if appropriate); and
  - the recommended frequency of the recalibration procedures.

- A general description of the technical basis for the calibration factors and background used, including:
  - the range of detector sensitivities and efficiencies;
  - the results of studies of background and the range of values generally found;
  - the results of studies on the effects of parameters that may affect the system's
  - efficiency, such as humidity, temperature, barometric pressure, etc. .

- The results of field studies on the ability to store measurement information during shipping.

- The effects of thoron and procedures for its discrimination.

- The routine equipment performance checks that are recommended with the system, including:
- the corrective action limits used for assessing the results of the checks; and
- the frequency and recommended documentation for the results.

- A description of other quality control procedures that are not already covered.

- Tamper-detection features and recommended procedures, including guidelines for recommending a retest.

- A general description of the system's ability to perform properly in a wide range of conditions, including:

  - A range of temperature, humidity, and barometric pressure (including field data (see the Performance Matrix);
  - the effects of shock (e.g., the results of drop tests);
  - the effects of vibration (e.g., operation in an industrial setting);
  - the effects due to external electromagnetic fields; and
  - the effects from other sources of ionizing radiation.

- The limitations of the measurement system in terms of the lower limit of detection, minimum and maximum exposure times, and the system's response time to changing concentrations.

- Complete test results for the various parameters described in the Performance Matrix (see Table 1), with the results of individual measurements, the type and location of the controlled environment (chamber) where the measurements were conducted, the type of instruments used to measure the various parameters, and references to or descriptions of their calibration schedules.

- A summary of the information described above in the general format of the Performance Matrix (see Table 1). Participants are required to provide a brief explanation for any areas where test results are not given. The explanation should present the physical principles of the device or components that prevent any effects from that particular parameter.

MATRIX MUST BE FILLED IN COMPLETELY BEFORE APPLICATION CAN BE REVIEWED

Table 1. Performance Matrix

Parameter Name	Range	Optimal Testing Range	Actual Testing Conditions	Radon or RDP Conc.	N (# of meas.) in each testing set	Average (MV/RV) for each set	RSD (%) for set of meas.
Radon Conc. (Decay Product Concentration for WL measurement devices)	Low – High	LLD as stated by manufacturer 100 pCi/L or 0.5 WL					
Temperature	Low – High	10 C 30 C					
Relative Humidity (non condensing)	Low – High	15% rH 95% rH					
Atmospheric Pressure	Low – High	70 kPa 106 kPa					
Background ambient photon radiation (external gamma x-ray)	Low – High	<8 µR/h >8 µR/h					
Non-ionizing external electromagnetic field	Operate equipment in the vicinity of RF emitters						
Shock/vibration	Drop test from 0.1 m						
Atmospheric contaminants	Conduct testing as appropriate to type of equipment						
Air movement	Low – High	0 m/s 0.2 m/s					
Presence of thoron	Low – High						

LLD = lower limit of detection
MV = measured value as reported by participant's device
RV = reference value as measured by EPA chamber equipment
RSD = relative standard deviation; see Section II.B.

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Performance Data

After the NRSB has concluded its technical evaluation, the NRSB will ask the manufacturer to forward the devices to be evaluated.

Bowser Morner
4514 Taylorsville Road
Dayton OH 45401
Attn: Jill P. Newton

The Manufacturer must provide complete instructions for set up, deployment, starting, stopping and downloading (or printing) the test data, as appropriate.

Bowser Morner will expose these devices in their chamber according to each of the following exposure environment criteria based on the Instrument Evaluation Program Handbook written under contract by SC&A on September 6, 1995.

Parameters to be used during the Device Evaluation

1. Radon concentrations.
2. Ambient temperature.
3. Relative humidity.
4. Radon decay products (attached).

Exposure Environment

1.	Radon concentration target:	any one point between 4 to 10 pCi/L
	Duration:	48 hours or more
	Relative humidity:	15% to 25%
	Temperature:	12 to 17C
	radon decay product:	low
2.	Radon concentration target:	any one point between 4 to 10 pCi/L.
	Duration:	48 hours or more
	Relative humidity	70% to 80%
	Temperature:	22 to 27C
	radon decay product:	high
3.	Radon concentration target:	any three points between 4 to 20 pCi/L.
	Duration:	48 hours or more
	Relative humidity:	50%
	Temperature:	21C
	radon decay product:	low

After Bowser Morner has finished exposing the devices according to the above-referenced exposure environments (there are 5 distinct environments in the proposal), Bowser Morner will return the devices back to the manufacturer for read out and analysis of measured radon chamber levels. Bowser Morner shall be responsible for exposing the devices properly under the agreed to conditions and will notify the NRSB if any of the performance conditions were not met or were altered.

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Bowser Morner will forward to the NRSB office, 14 Hayes Street, Elmsford, NY 10523, all of Bowser Morner radon chamber data along with information about the chamber's operating characteristics.

The manufacturer will forward the measured radon values for each of the exposure periods directly to the NRSB office. The NRSB will evaluate the manufacture's measured values against Bowser Morner radon chamber target values under all exposure environments, according to the performance criteria stated below.

Performance Criteria

1. Individual relative error of each device must be less than or equal to 20.0% as calculated by:

   IRE = ABS VAL (MV - RV) / RV * 100

   where IRE is the individual relative error
   ABS VAL is the absolute value
   MV is the measured radon concentration of the device
   RV is the reference radon concentration

2. Precision error of all devices must be less than or equal to 20.0% as calculated by:

   RSD = (SD / AVG) * 100

   where RSD is the relative standard deviation
   SD is the standard deviation of a set of n simultaneous measurements in the same environment
   AVG is the mean on the n measurements in the same environment

The NRSB will be solely responsible for determining whether the device should be listed in the NRSB privatized certification program based upon successful demonstration of the above-referenced performance criteria, as well as review of other general and technical information that is requested of the manufacturer by the NRSB.

The NRSB assumes no liability with respect to the use of, or for damages resulting from the use of, any information, method, or process disclosed in this document or any other statutory or common law theory governing liability.

IN WITNESS HEREOF, the parties hereto have executed this Agreement by their duly authorized representatives as of the Effective Date set forth above.

Manufacturer	National Radon Safety Board
By:_____	By:_____
Signature	Signature
By:_____	By:_____
Print Name	Print Name
Title:_____	Title:_____
Date:_____	Date:_____
Telephone #:_____	Telephone #:_____