Conference of Radiation Control Program Directors

Purpose

- To provide a common forum for the exchange of information among State and local radiation control programs.
- To provide a mechanism for States to communicate with the federal government on radiation protection issues.
- To encourage and support programs that will contribute to radiation control for all.
- To promote and foster uniformity of radiation control laws and regulations both nationally and internationally.

CRCPD Activities regarding Radon

- E-25 Committee on Radon
  - 30th National Radon Training Conference
    - November 2-4, 2020 Nashville, TN www.crcpd.org
- Radon Leaders Saving Lives
  - Web portal: http://radonleaders.org/
  - Outreach with other organizations at National Conference of State Legislatures
- International Collaboration with IAEA
  - Practical Arrangement since 2016

Radon Chamber

Kansas State University

Quality Assurance for Radon Measurements

Webinar – November 18, 2019

Bruce Snead

Director

Engineering Extension

Webinar Objectives

- The purpose of the primary and secondary chambers
- The tools for assuring quality in radon measurements
- Insights from a secondary chamber operator

KANSAS STATE UNIVERSITY

Radon Programs

- Radon Services History at KSU
  - Regional Radon Training Center – since 1988 serving KS, MO, NE and now 33 states
  - KS SIRG Services - KDHE Contract – since 1989
  - SIRG Services for NE, MO, TN and others
  - Replaced National Safety Council in 2009 providing national hotline response, poster contest, NCSL conference support, test kit sales, technical assistance, web site and outreach services
  - New Cooperative Agreement extends services to 2020

Radon Chamber

Kansas State University

- Radon Chamber Services Moved from Radon Measurements Laboratory (RML) in Colorado Springs to Kansas State University in April 2018
- Spiking, device performance testing, and device performance evaluations are conducted at Kansas State University (KSU) under the supervision of Engineering Extension Director Bruce Snead, and Kansas Radon Program Director Brian Hanson.

Radon Chamber

Kansas State University

- The KSU Radon Chamber will apply for all national and state certifications and will participate in all necessary inter-comparisons to achieve certified performance test chamber status.
- KSU Radon Chamber *DOES NOT PERFORM CALIBRATIONS*
- AARST-NRPP SC-1006
- IEMA Laboratory RNL2018202

Radon Chambers

- For the United States, a secondary radon chamber is one that meets the requirements of the National Radon Proficiency Program (NRPP) *Protocol and Guidance for Accreditation of Radon Chambers*,
- And, specifically inter-compares with a primary reference, such as the US EPA National Analytical Radiation Environmental Laboratory (NAREL) in Montgomery, Alabama.
- A secondary chamber can perform quality assurance exposures of devices including calibrations, spikes and proficiency tests.

Radon Chambers

- Quality assurance exposures include calibrations, spikes, proficiency tests and performance evaluations.
- Quality in these services is essential to the radon testing industry, because the radon chamber operators provide the reference upon which radon and radon decay product measurements are based.
- To achieve an adequate degree of quality, radon chambers must meet certain design and operating characteristics.

Chamber Protocols

- **Protocol and Guidance for NRPP Accreditation of Radon Chambers Rev. 06/05/14** https://nrpp.info/standards/chamber-protocols/
- This document is a set of guidelines that will be used to approve radon chambers wishing to become certified by NRPP as either:
- Radon Reference Chambers (secondary); or
- Tertiary Radon Chambers
- It is intended that the guidelines in this document set minimal standards, which are sufficient to ensure that chambers certified under its rubric will produce a product of high quality and have the confidence of the radon industry and related authorities.

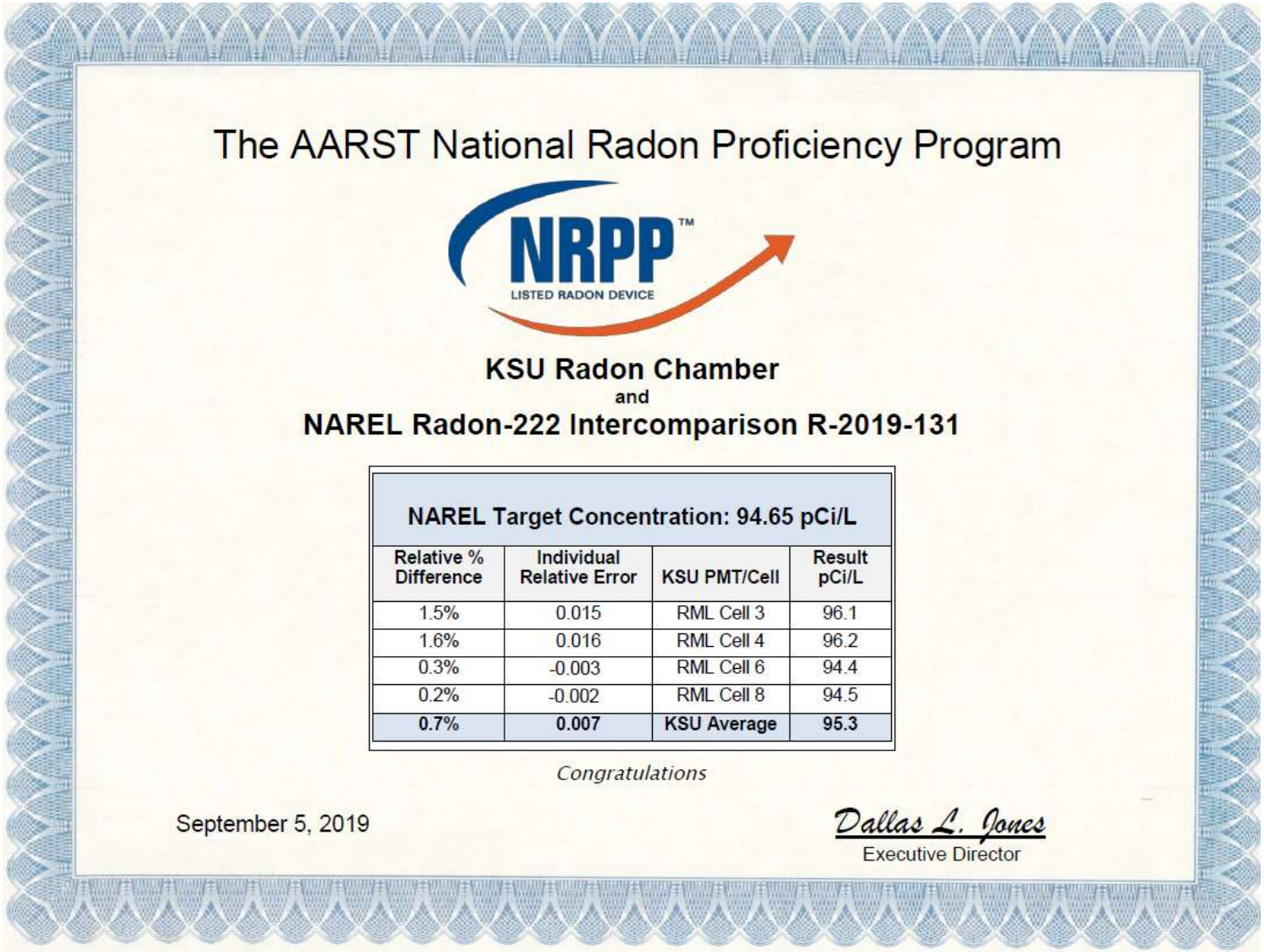
Chamber Licenses and Fees

- Chambers will need additional licenses from state radiation control or radon programs
- Kansas Dept of Health and Environment
- Illinois IEMA – Chamber
- Other states

KSU Radon Chamber Application – Table of Contents

KSU Radon Chamber Application – Table of Contents

Intercomparison Certificate



The AARST National Radon Proficiency Program

NRPP™
LISTED RADON DEVICE

KSU Radon Chamber
and
NAREL Radon-222 Intercomparison R-2019-131

NAREL Target Concentration: 94.65 pCi/L			
Relative % Difference	**Individual Relative Error**	**KSU PMT/Cell**	**Result pCi/L**
1.5%	0.015	RML Cell 3	96.1
1.6%	0.016	RML Cell 4	96.2
0.3%	-0.003	RML Cell 6	94.4
0.2%	-0.002	RML Cell 8	94.5
0.7%	**0.007**	**KSU Average**	**95.3**

Congratulations

September 5, 2019

Dallas L. Jones
Executive Director

Quality Assurance Plan

Radon Chamber
Quality Assurance Program
For Use at KSU Radon Chamber
Prepared by Bruce Snead 3/15/2018

KSU Radon Chamber
2323 Anderson Ave. Suite 300
Manhattan, KS 66502
Contact Person: Bruce Snead
(785) -532-4992

Quality Assurance Program

Company Name: Engineering Extension - College of Engineering

Owner of the Company: Kansas State University

Radon Measurement Technician(s):

Bruce Snead, Director

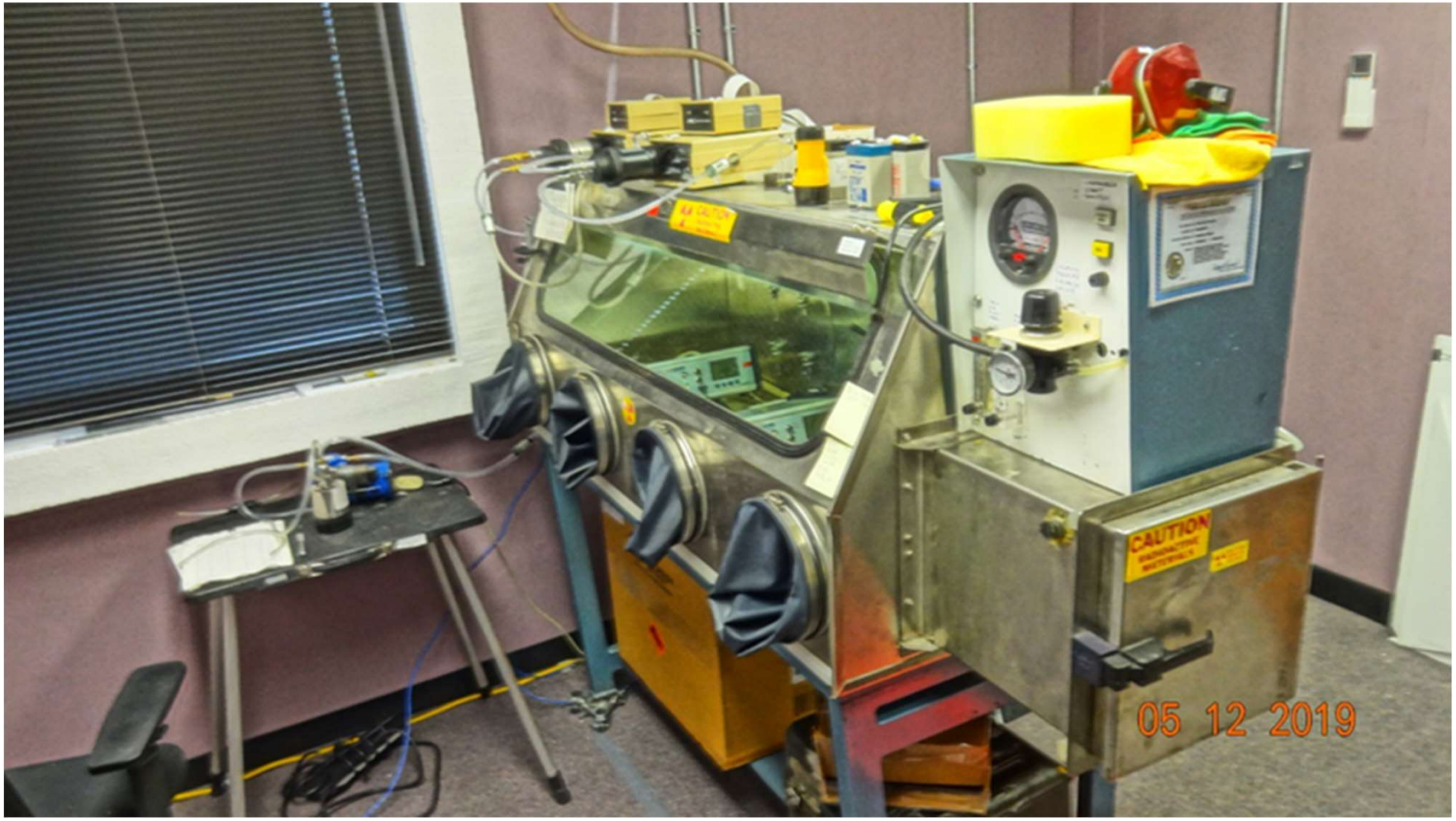
Brian Hanson, Coordinator

QAP Approval Date: _3/15/2018_____

Signature of Quality Assurance Manager:  ____

Chamber Space

Glove Box – Flow Through Type Chamber



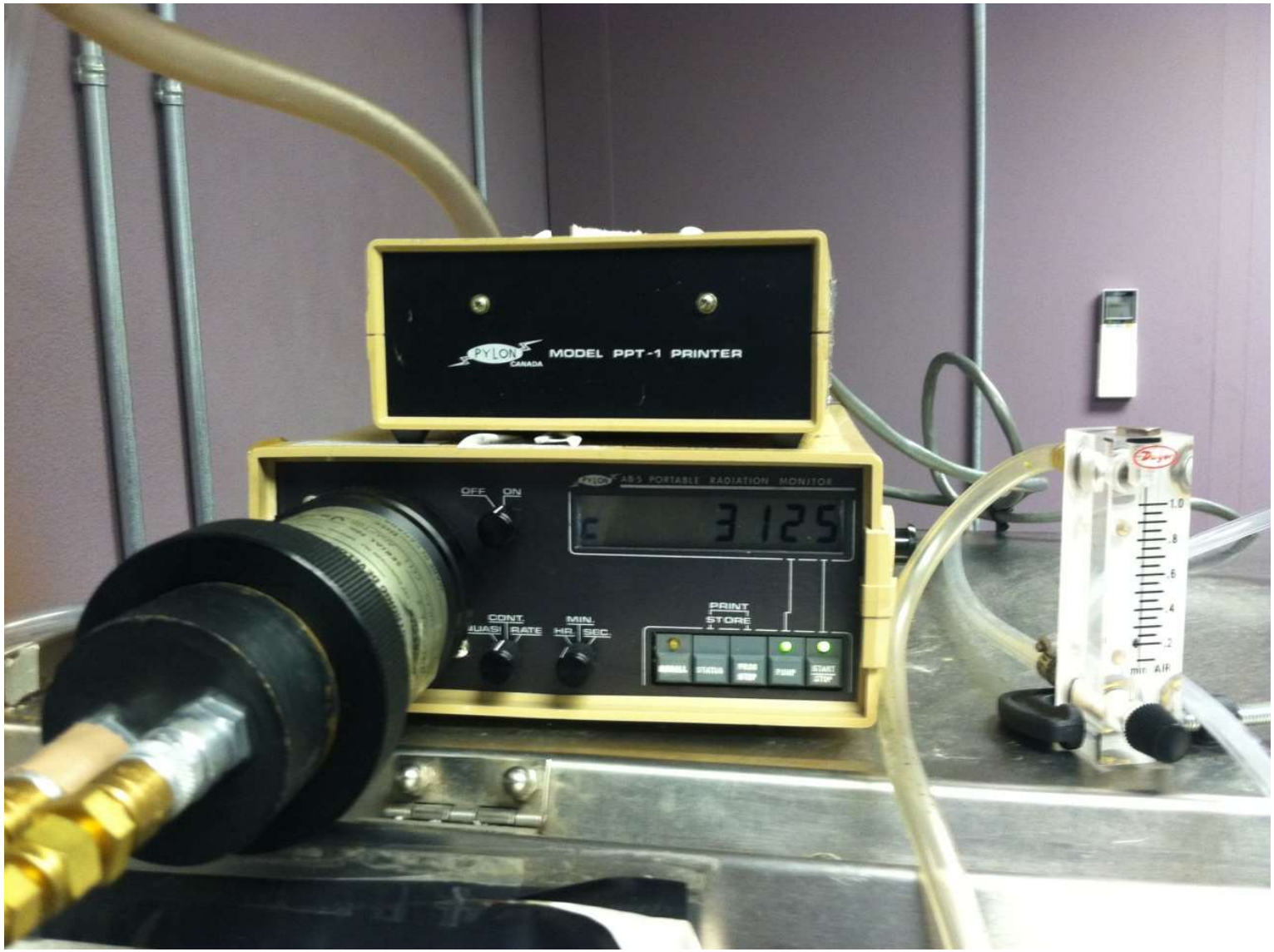
Compressed Room Air

Pressure Regulator and Device Airlock Door

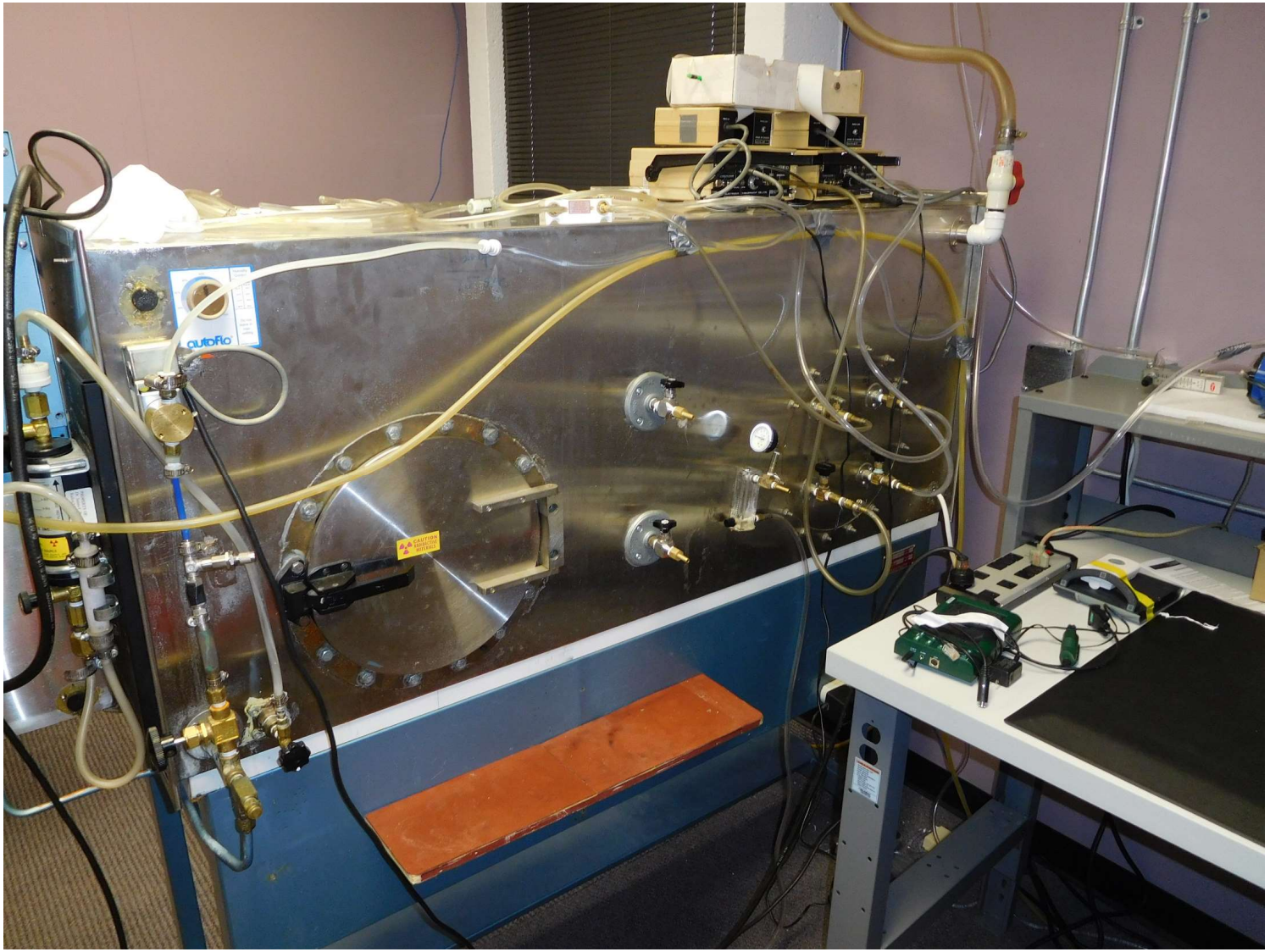
Radon Source-Flow Through Sealed Radium

Pylon Monitors

5 Hour Pylon Counts



Chamber Air, Humidity Controls, Access Ports and Grab Sample Ports

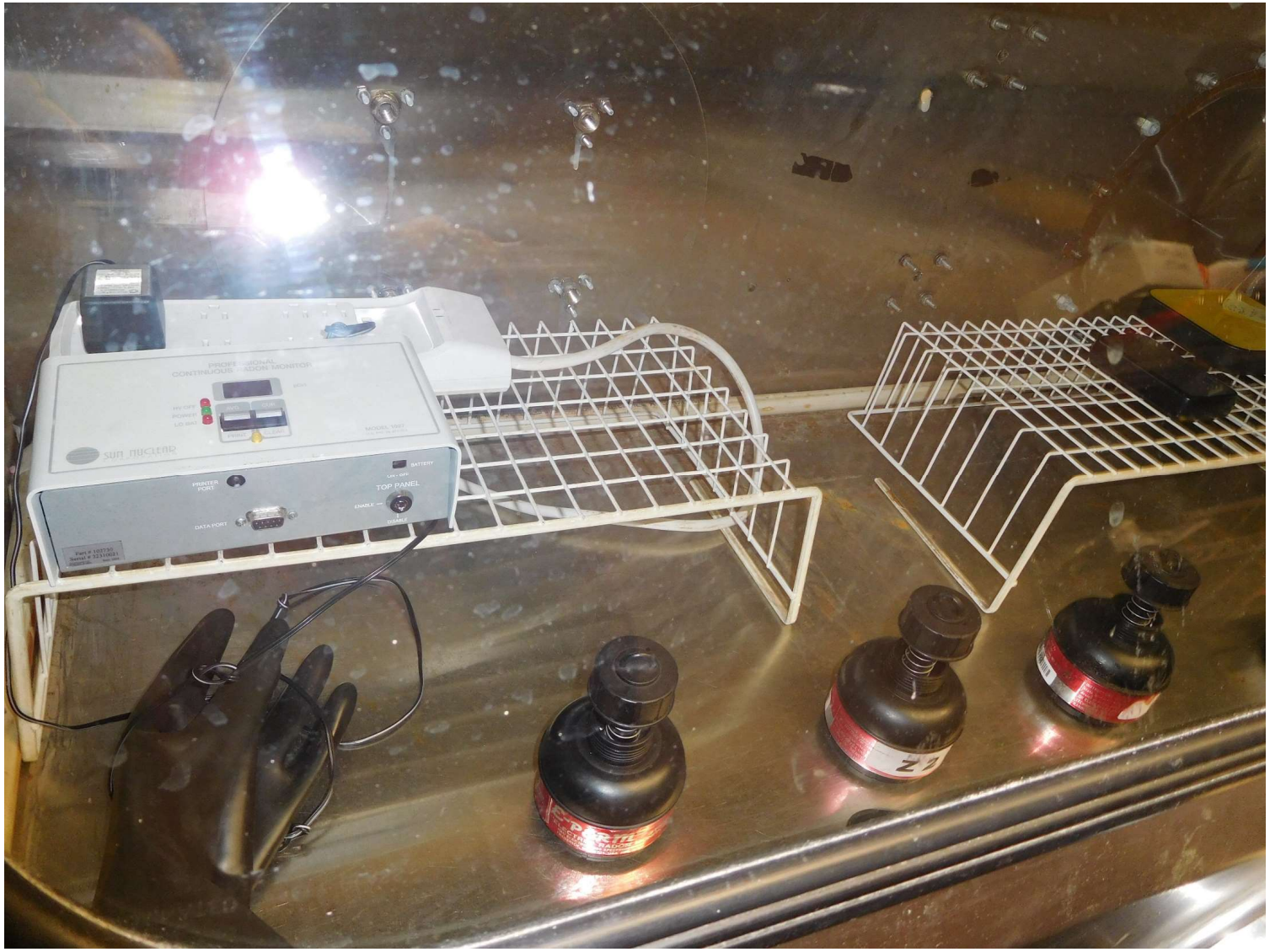


Vacuum and Flow Through Scintillation Cells

Vacuum and Flow Through Scintillation Cells

Scintillation Cell Counters

Device Deployment

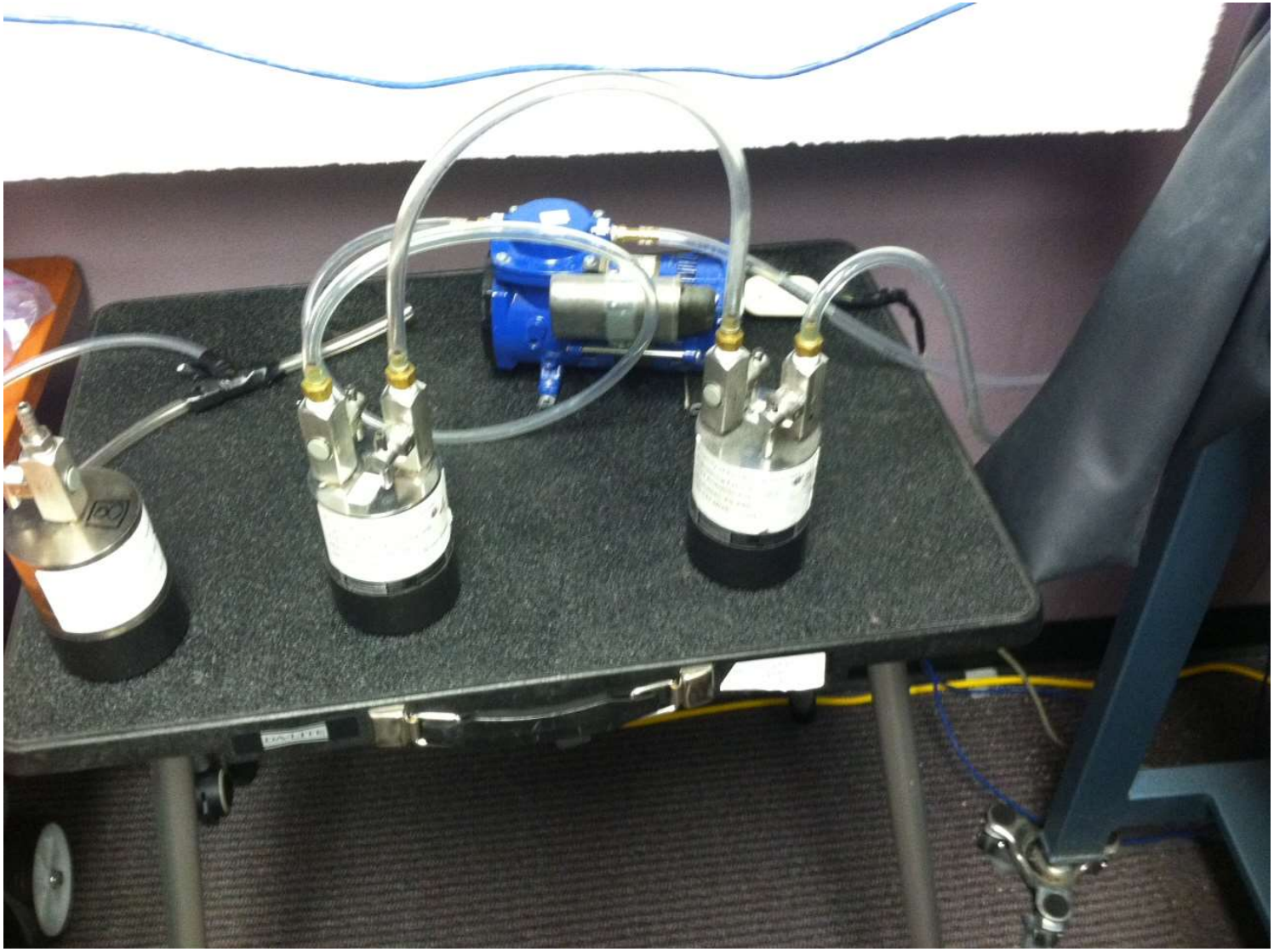


Device Deployment

Device Deployment

Discharge and Cell Flushing Ports

Cell Flushing Station



Chamber Discharge

Device Performance Test (DPT)

- A DPT is an exercise that proves you are proficient in using your chosen analytical device type. It requires that measurement device be exposed to a known amount of radon gas in an NRPP-approved radon chamber facility.
- *PLEASE NOTE:* For any certified professional utilizing an analytical device (Continuous Monitor or Electret with Reader), a performance test MUST be completed prior to your initial certification.

Device Performance Test Checklist

- The participant must send or deliver to KSU Radon Chamber:
  - A completed “KSU Radon Chamber Application for NRPP Performance Test”
  - Name, phone number, and email address of your contact person and, if available your NRPP ID #

Device Performance Test Checklist

- The continuous radon monitor or passive devices to be exposed in the chamber
- Instructions on how to start the device and stop the device to make the measurement. These are the steps you follow to operate your device. We will follow your directions explicitly.
- A partially completed “KSU DPT Reporting Form,” which will be returned to you to fill out your results and return to us by email (to determine whether you passed or not)

Device Performance Test Checklist

- Pre-paid return shipping costs (and insurance, if desired) –
- Return shipping (mailing) address label -
- Confirmation of payment online (MasterCard, VISA or American Express) or check in the amount specified on the work agreement

Device Performance Test (DPT)

- The device performance test process is as follows:
- Ship the analytical device(s) (only one of each model you own/use) to an NRPP-approved test chamber.
- The test chamber exposes the device to a known radon concentration for at least 48 hours and ships it back to you; the average radon concentration in chamber will not be provided.

Device Performance Test (DPT)

- You analyze the data and report the result to the test chamber on their analysis reporting form.
- The test chamber compares your result to the actual average radon concentration to which your device was exposed and sends you a Performance Report detailing your accuracy.
- You must submit the Performance Report to NRPP as part of the initial certification process. Once certified by NRPP with your device(s), you can use your analytical device knowing you can provide accurate results to your customers.

Spiking Services

- KSU Radon Chamber spikes all radon devices in a controlled temperature, humidity and radon environment.
- Temperature is kept to room temperature (a nominal 72 degrees) and humidity is typically held constant but somewhere in the range of 20% to 50% RH.
- KSU Radon Chamber is at an elevation of 1020 feet, so devices which are sensitive to elevation may need correction according to manufacturer’s instructions.

Spiking Checklist

The participant must send or deliver to KSU Radon Chamber:

- Name, phone number, and email address of your contact person and NRPP ID # (if available).
- The monitor or passive devices to be exposed in the chamber,
- Directions for how you want us to expose your device(s). We will follow your directions explicitly.
- Pre-paid return shipping costs (and insurance, if desired) -
- Return shipping (mailing) address label (or label to analytical lab who will read the devices)
- A signed disclaimer (you will have received this form from us prior to, or along with, this “Instructions for Spiking” letter.)
- Confirmation of payment online or check in the amount specified on the work agreement

Spiking Services

1) When we receive your device (s), we will check to assure that the seven items in (a) through (g) above are included and that nothing we need to begin the spiking exposure is missing.

If something is incomplete, or we have questions, your device will be taken out of rotation until the missing items are taken care of. Your email address will be very important at this point in case we need to contact you.

2) All devices designed for 48-hour measurements will be exposed for 48 hours at a minimum radon concentration of 4 pCi/L, or higher.

Spiking Services

3) All devices designed for 3 days to 1 week will be exposed for their proper (advertised) exposure period at a minimum concentration of 4 pCi/L, or higher.

4) All long-term devices (91 days exposure, or longer) will be exposed for 14 days at a radon concentration of 30 pCi/L, or higher, to assure that a minimum exposure of 364 pCi/L days is achieved.

5) At the end of the exposure period, we will read continuous monitors that are not blind, using the instructions you supplied and then ship your monitor back to you. Or, if you wish, the monitor will be shipped back to you for your analysis and reading.

Spiking Services

6) At the end of the exposure period, all passive devices will be shipped back to you for your analysis using the shipping method you pre-paid for.

7) We will also include the temperature, barometric pressure and humidity information appropriate to your exposure period.

Evaluation of Spikes

- The client sends the spiked devices to their analytical laboratory for analysis with exposure time and date information.
- The client then compares the laboratory results with the radon chamber value for the device exposure.
- Are the results acceptable?
  Within +/- 25%?

NRPP Approved Measurement Devices

- Standard Measurement Devices (AC,AT,LS,BC) – 27 listings
- Electret Ion Chambers and Readers (EL,ES,ER) – 9 listings
- Continuous Radon Monitors – 32 listings

Device Evaluations

AARST - National Radon Proficiency Program

Device Evaluation Program

™

Procedures and Application for the Evaluation of Radon and Radon Decay Measurement Devices

June 6, 2014

American Association of Radon Scientists and Technologists, Inc. (AARST™)

National Radon Proficiency Program (NRPP™)

Device Evaluation

Device Evaluations

- Exposure of the devices (5) to a range of radon, humidity and temperature conditions to evaluate the performance of the devices.
- Results must be within +/- 25% of chamber value to pass and achieve a listed status

International Inter-comparison

COIRA intercomparison

Standard operating procedure

- The COIRA InterComparison Exercise, is an initiative organized by COIRA to compare and evaluate current reference atmospheres of primary and tertiary radon chambers internationally, with an intent to harmonize radon metrology and assist radon chambers with compliance of their regulatory demands.
- The InterComparison Exercise will help the international radon industry by improving traceability of radon gas standards used by radon device quality assurance programs, internationally.

International Inter-comparison

COIRA intercomparison

Standard operating procedure

- The outcome of the project should provide important information for all chambers, radon device manufacturers and radon professionals around the world on consistency of radon reference atmospheres and will help identify any irregularities.
- Although the information will be published with anonymity, each reference chamber will be able to identify their own information in comparison to the whole project outcomes.

Parties Involved

- The COIRA InterComparison Exercise is open to all chambers of participating countries. The devices used for the initial chamber InterComparison will be the Bertin's AlphaGuard continuous radon monitors. Radonova passive radon devices will also be included as part of the InterComparison Exercise.
- The COIRA InterComparison Exercise will be overseen by a the COIRA InterComparison committee which consists of Phil Jenkins (AARST), Jose Luis Gutierrez Villanueva (ERA), Melinda Ronca-Battista (AARST); Karl Nilsson (NGRA) and Pam Warkentin (CARST).
- Project Administrator: Pam Warkentin, CARST
- Principal Investigators: Jose Luis Gutierrez Villaneuva, ERA, Melinda Ronca-Battista and Phil Jenkins, AARST

Scope of Work

1. Dates for InterComparison scheduled with the Chamber.
2. Agreement signed and returned to Project Committee.
3. Questionnaire/survey completed by participating chamber.

Scope of Work

4. Process of InterComparison

a. Each chamber would receive the package of devices

b. Form completed at time of receiving the devices

c. Devices would be exposed in the chamber in accordance with the following:

i. Exposure Period: 2- 5 days; at least 48 hours after a four hour equilibration period at minimum

ii. Exposure Level: 1 k.Bq.m-3 to 6 k.Bq.m-3

iii. If Temperature or Relative Humidity can be controlled, exposures will be conducted in an environment of: 20 C (18-22 C) and 35 %RH (30-40 %RH), and measured at least hourly

iv. If Temperature or Humidity cannot be changed, they will be recorded, at hourly intervals, and kept as stable as possible

Scope of Work

d. At the end of the Exposure Period, hourly values for radon concentration, temperature, and relative humidity will be provided by the Chamber technical contact person, along with the AlphaGUARD output data provided to the project committee via email.

As described in the Project Equipment SOP, devices are then shipped to the next chamber in the list.

Scope of Work

5. Summarization of Data done by the project committee, with complete assurance of anonymity if the participating chamber requests that their results be published without facility identification.

Aside from chamber identification, results will be shared as quickly as the quality control review has been made, and all analyses will be conducted with the intent for transparency and mutual review of results presentations and analyses.

6. Evaluation of Results and Draft of Research Paper, conducted by the project committee

Scope of Work

7. Complete reporting back to each participating organization; extensive communication with participating facilities will be made by the project committee, and participants will be kept apprised of progress using social media.

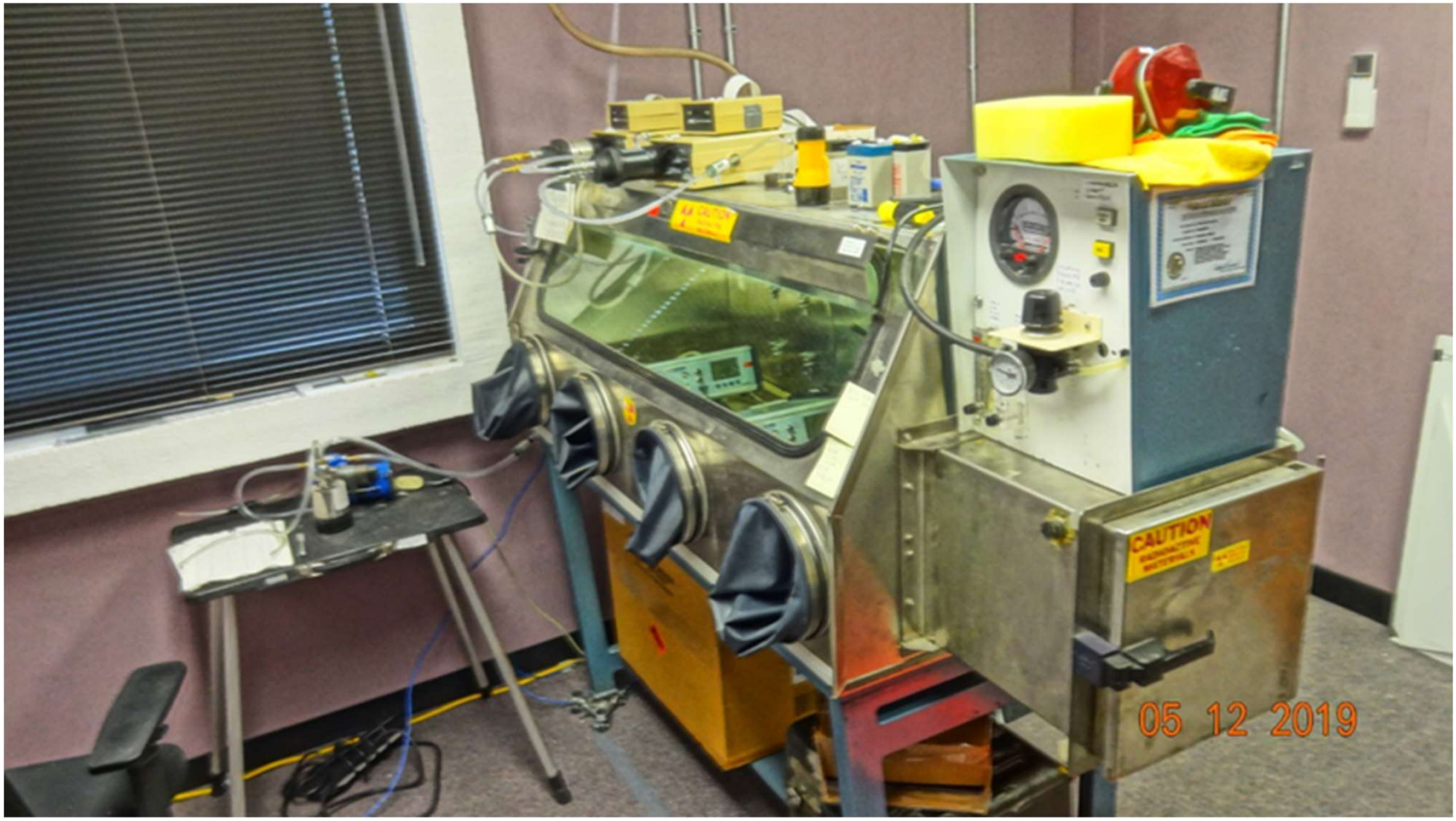
8. Submitting Research Paper to: Journal of Environmental Radioactivity, Nuclear Instruments and Methods in Physics Research B, Radiation Protection Dosimetry, Health Physics, and/or other relevant publication venues will be conducted by the project committee, in communication with chamber operators.

Standard Operating Procedures (SOP)

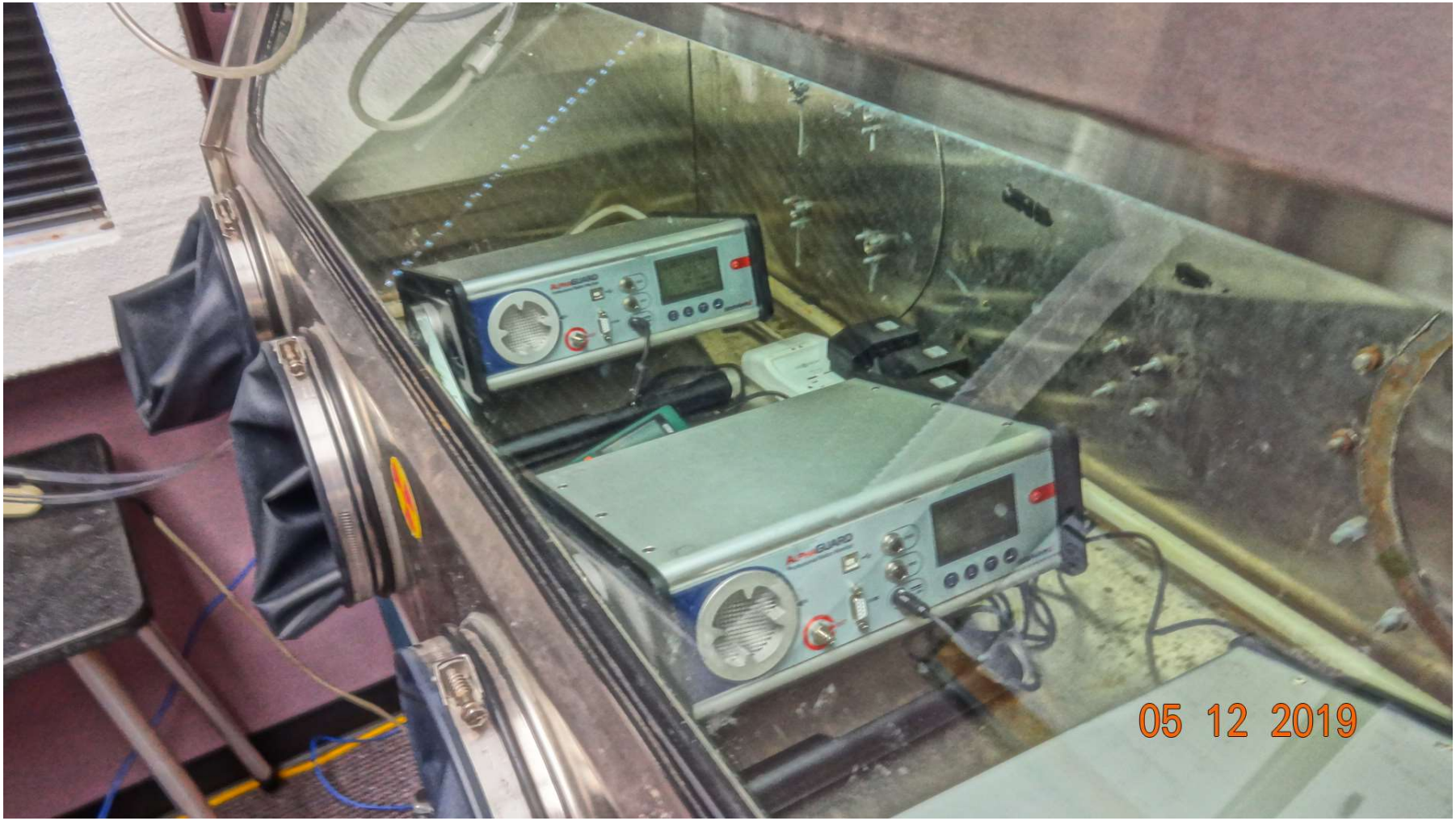
- After receiving the AlphaGUARDs and ATDs / before the measurements:
- 17 steps to prepare for measurements

SOP

Chamber - Intercomparison



SOP



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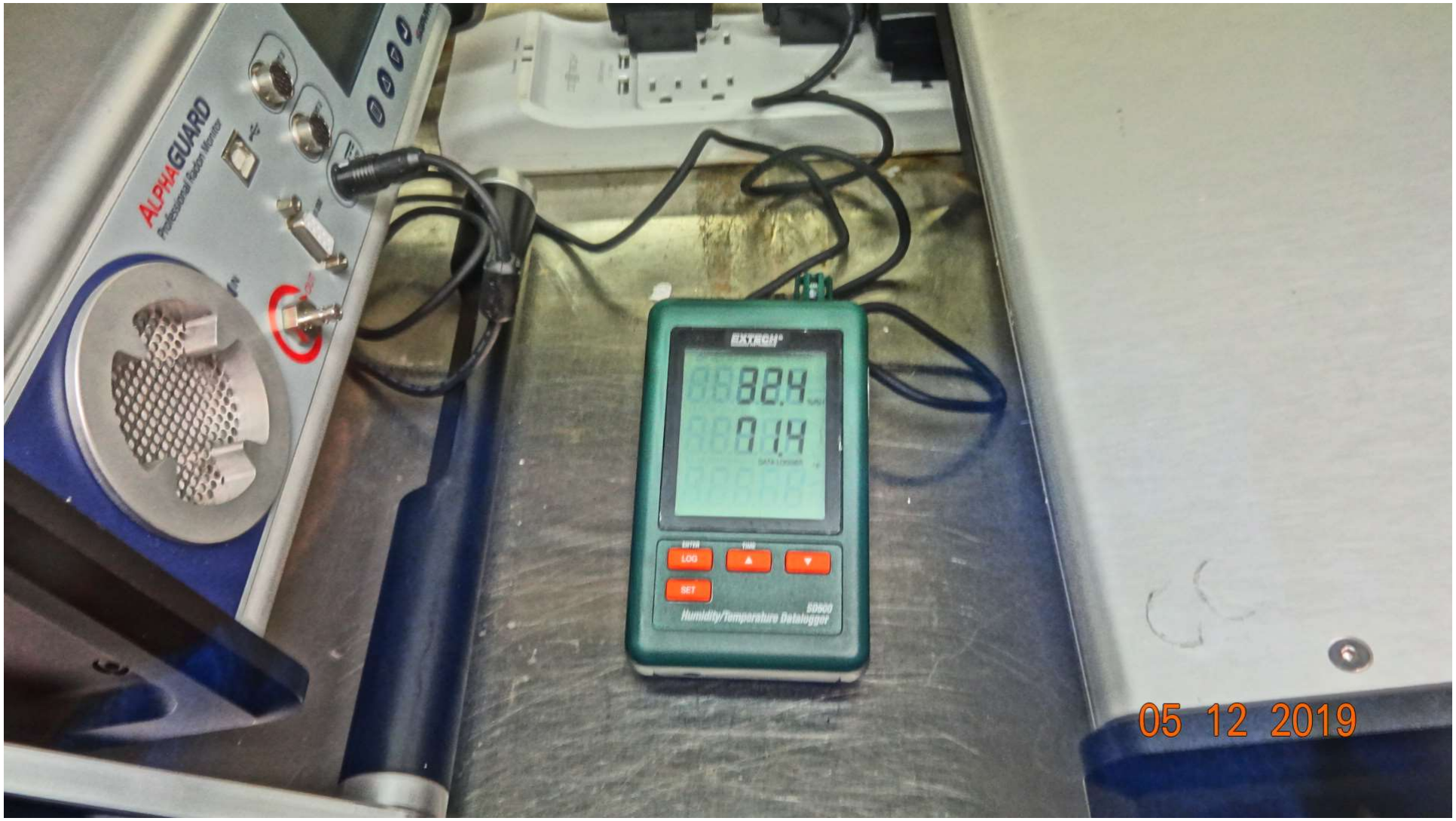
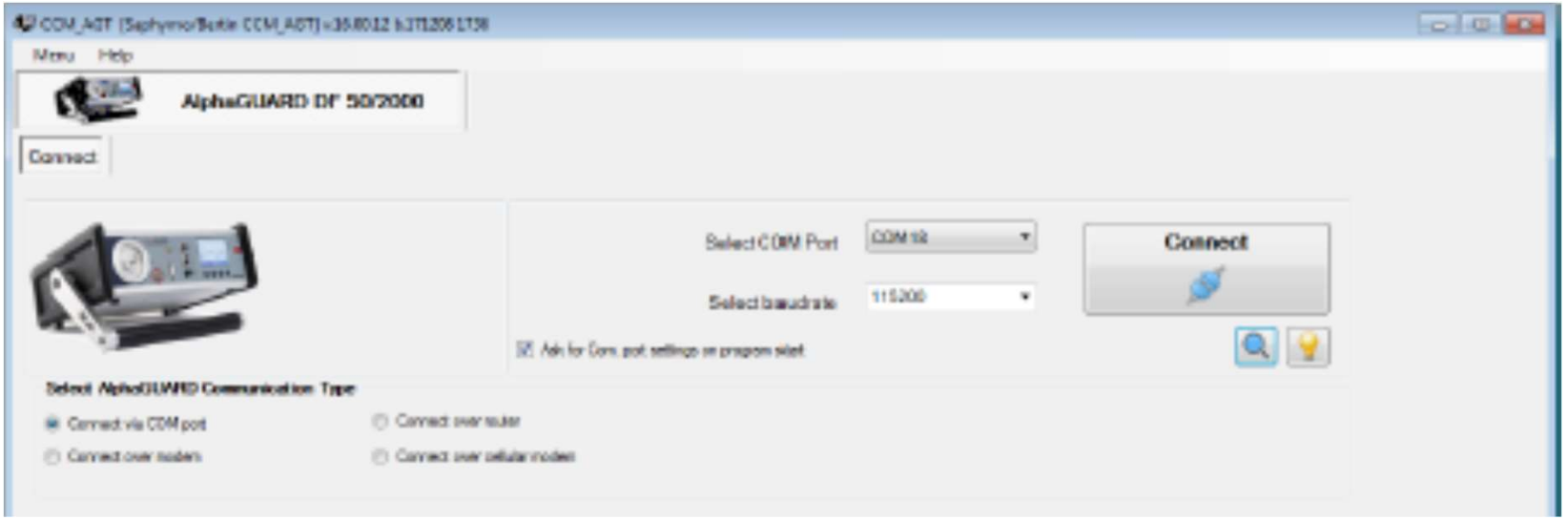
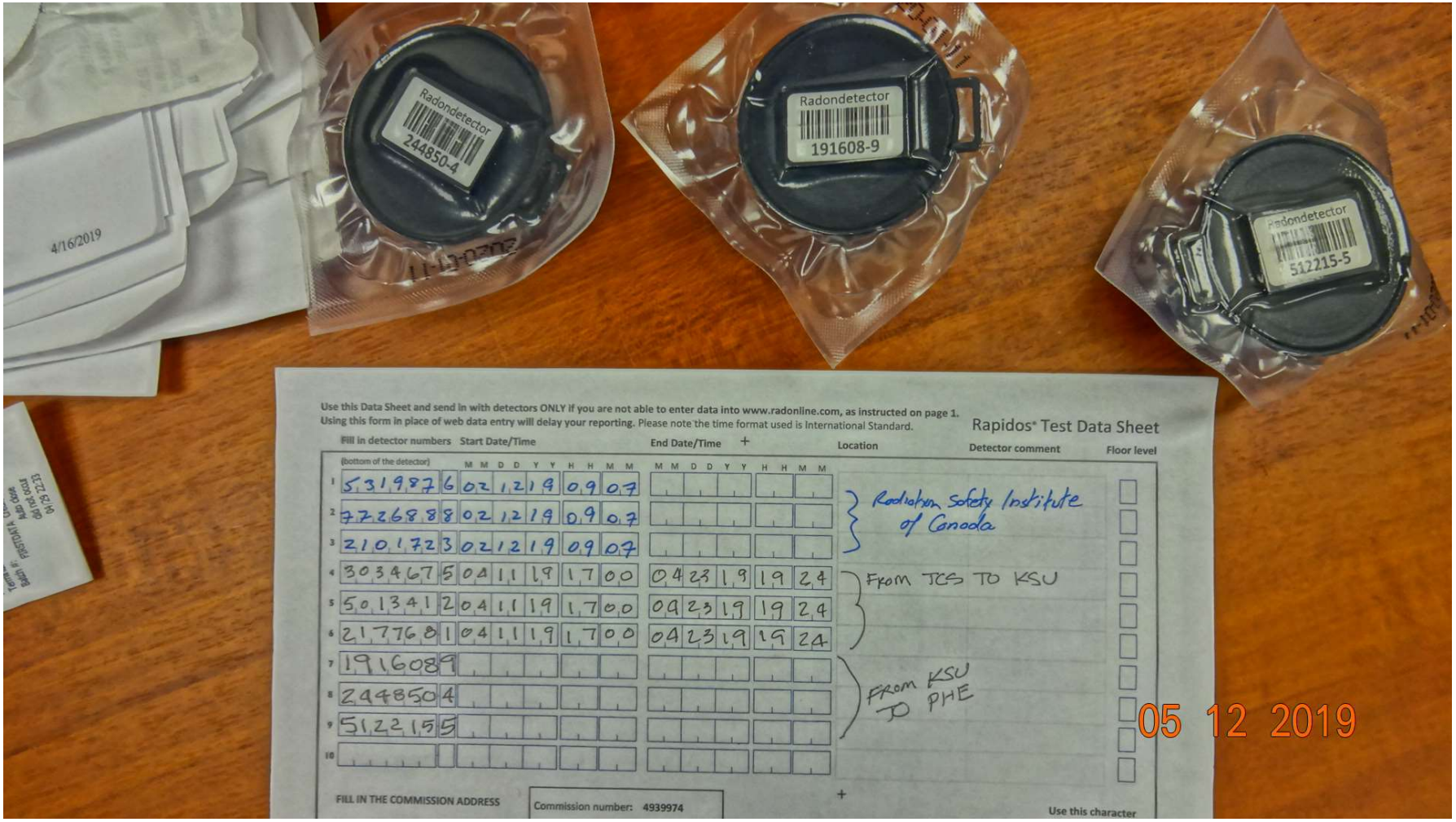

ALPHAGUARD
Professional Radon Monitor
EXTECH
82.4
71.4
LOG
SET
Humidity/Temperature Datalogger
05 12 2019

SOP

- After the measurements:
- 19 steps to download, transfer and ship to the next chamber



SOP


Radondetector
244850-4
Radondetector
191608-9
Radondetector
512215-5
4/16/2019
Use this Data Sheet and send in with detectors ONLY if you are not able to enter data into www.radonline.com, as instructed on page 1.
Using this form in place of web data entry will delay your reporting. Please note the time format used is International Standard.
Rapidos® Test Data Sheet
Fill in detector numbers (bottom of the detector)
Start Date/Time
End Date/Time
Location
Detector comment
Floor level
Radiation Safety Institute of Canada
From JCS TO KSU
From KSU TO PHE
FILL IN THE COMMISSION ADDRESS
Commission number: 4939974
Use this character
05 12 2019

KANSAS STATE UNIVERSITY

Radon Programs

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ENTRY level & CE courses

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KANSAS STATE UNIVERSITY

www.radoncoursesonline.org

Online Radon Training

Classroom Radon Training

kansasradonprogram.org/courses

National Technical Assistance

www.sosradon.org

State Program Support

Web Site Activity – www.sosradon.org - 10/1/2018 to 9/30/2019

We had 33,736 unique visitors this quarter and 218,860 visits for the PY. Average 423 total visitors per day for the program year

Midwest Universities Radon Consortium

Kansas State University

Super class! The information was fantastic. I got so much out of the slides and even more with the hands on demonstrations.

Radon 222 Courses

The class was perfect and encouraged involvement and made me want to contribute. Thank you all very much!!!

Classroom Courses

Online Courses

Contact Us:
Toll Free: (833) 723-6222
Phone: (785) 532-4995
radoncourse@ksu.edu

Radon Courses @ KSU
2323 Anderson Avenue
Suite 300
Manhattan, KS 66502

Radon Chamber

Kansas State University

- Order Form & Client Registration
- Device Performance Tests
- Spike Tests
- We Do NOT Perform Calibrations
- Shipping Checklists
- Location
- Home
- Contact Us

KSU Radon Chamber

2323 Anderson Ave., Suite 300

Manhattan, KS 66502

785-532-6026

radonchamber@ksu.edu

The Chamber will be closed November 25-29, 2019 & December 19, 2019 - January 6, 2020.

Engineering Extension at KSU operates 1 of 2 secondary radon chambers located within the US. We are certified to conduct spikes, device performance tests and new device performance evaluations within our custom built radon chamber.

Spikes

After the radon chamber exposures are completed, the devices are returned to the owners with an explanation of the radon chamber environment, including the pCi/L, temperature, relative humidity and length of exposure. For users of activated charcoal, liquid scintillation and alpha track detectors, spiking provides important information about the quality of the laboratory analysis since the devices are submitted to the lab without their knowledge that they were spiked.

Radon Chamber

Kansas State University

- Kansas State University Radon Chamber – Bruce Snead
- Telephone: 785-532-4992
- Email: radonchamber@ksu.edu or bsnead@ksu.edu

KANSAS STATE UNIVERSITY

Radon Programs

Kansas Radon Chamber

www.ksuradonchamber.org

National Radon Program Services

www.sosradon.org

Kansas Radon Program

www.kansasradonprogram.org

Radon Training Courses

Radoncourses.com