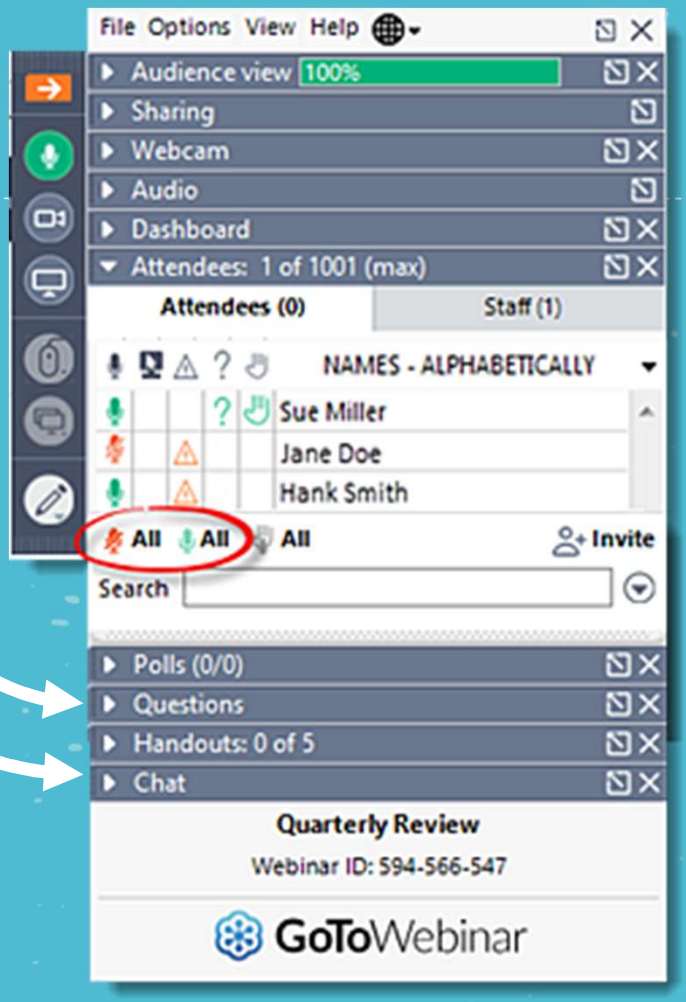
Low Cost Monitoring Project (LCMP)
Cohort 48: What are Good Numbers?

7:00 PM Monday July 19, 2021

10:30 AM Tuesday July 20, 2021

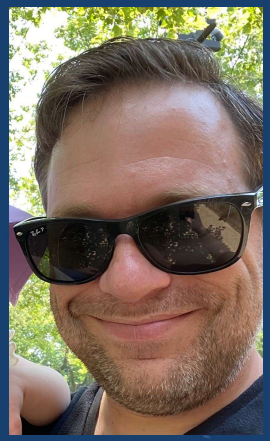
The Virtual Classroom

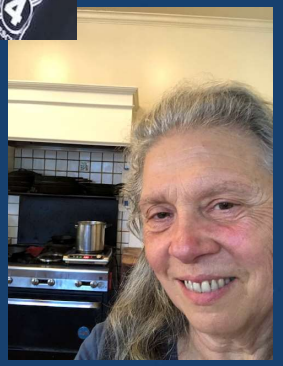
- Feel free to keep your mics on (mute if noisy)
- Use “Questions” tab in the control panel to ask questions, or raise hand
- All links will be placed in the “Chat” tab in the control panel. Comments can be added here as well.



This Meeting is Being Recorded

Cohort 48





Scott **Kate** **Alyssa's Family** **George** **Cathy's Family** **Nickie**

01

Introductions

Your Name & Who's with You

Your Location

How are You Feeling About the Cohort?

One question

LCMP Team

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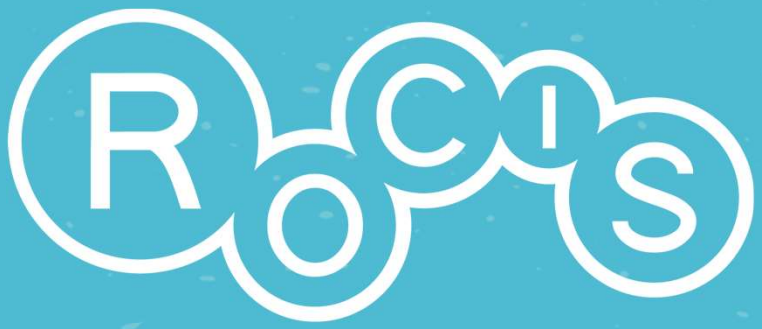
1. Understand how to interpret the data from the Excel Averager that Don provides
2. Identify typical range of monitor readings, as well as recommended exposure limits for CO, CO_2, radon, & particles
3. Discuss the limitations of "good numbers"

02

Meeting Objectives

1. In email report from Don (check spam folder)
2. Features & navigation
3. Examples

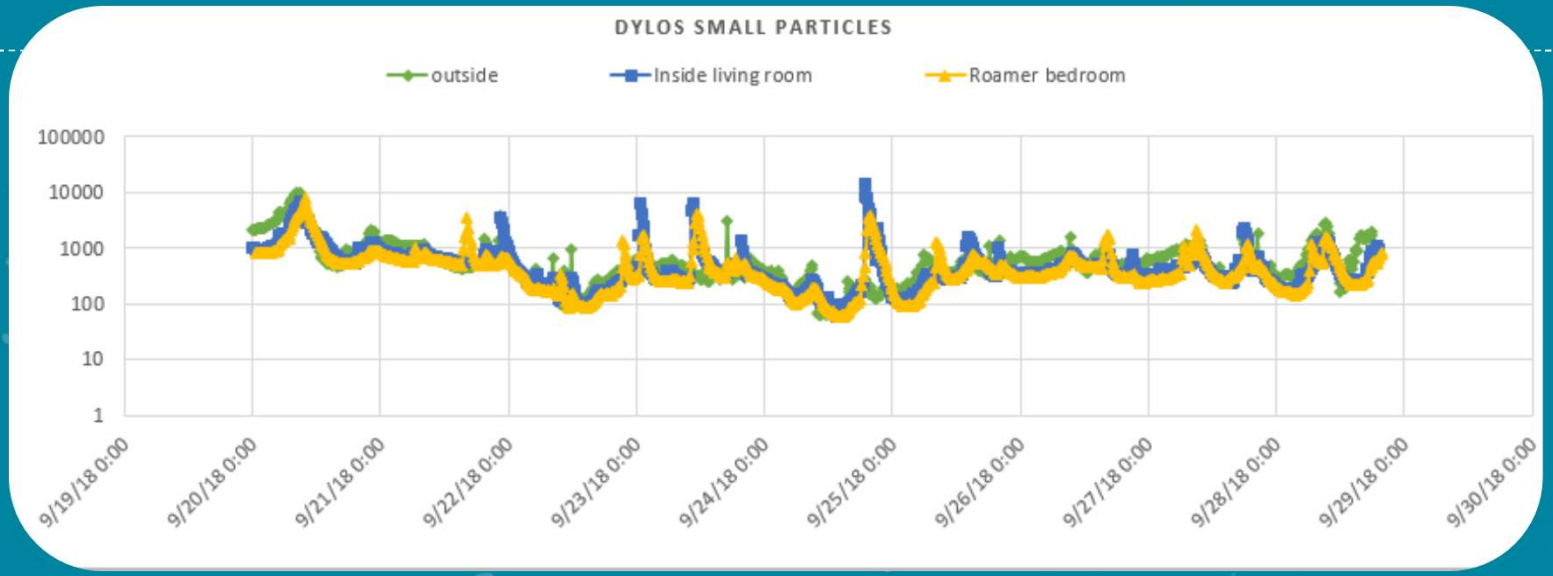
03



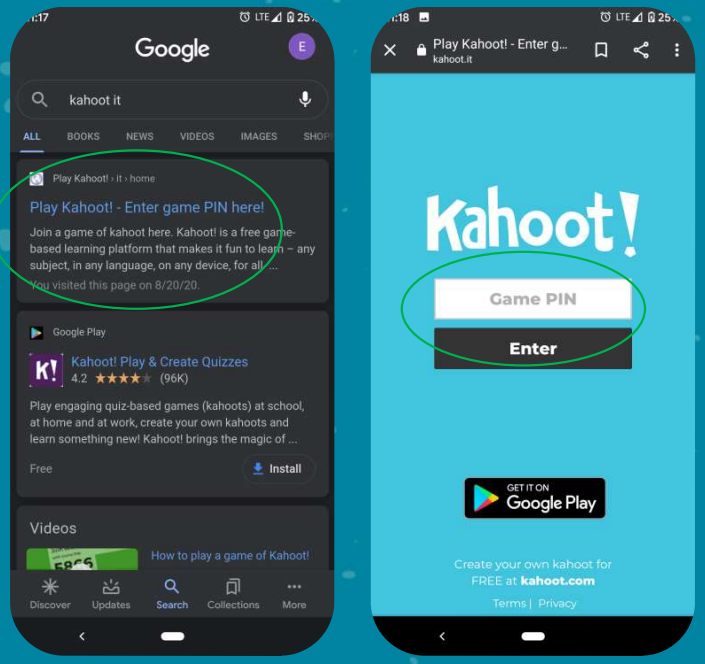
Excel Averager

ROCIS Excel Data Averager

http://rocis.org/rocis-averager



- Type of scale? → Static scale
- Period of data? → 1 week of data
- 3 units of data displayed? → I, O & R
- Complements weekly email summary from Don



QUIZ! ROCIS EXCEL AVERAGER

- Type kahoot.it in your browser
- We will give you the pin

Is there a safe level of radon exposure?

04

Good Numbers & Health Impacts

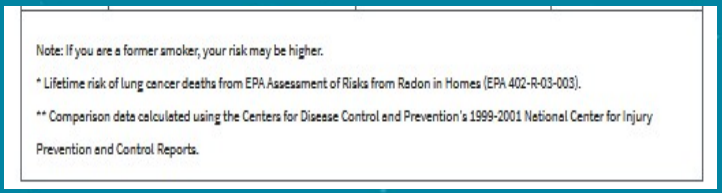
Radon Exposure & Health

- Greatest exposure occurs indoors
  - Tight and/or insufficiently ventilated structures are especially bad
- Increased risk of lung cancer; small-cell lung carcinoma
  - #1 cause of lung cancer in non-smokers
- 50% lung cancer risk increase at EPA level of 4pCi/L
- Synergistic risk effect in smokers
  - 2nd hand smokers risk sits in between

Radon Risk if You Have Never Smoked

Radon Level	If 1,000 people who never smoked were exposed to this level over a lifetime*...
20 pCi/L	About 36 people could get lung cancer
10 pCi/L	About 18 people could get lung cancer
8 pCi/L	About 15 people could get lung cancer
4 pCi/L	About 7 people could get lung cancer
2 pCi/L	About 4 person could get lung cancer
1.3 pCi/L	About 2 people could get lung cancer
0.4 pCi/L	

https://www.epa.gov/radon/health-risk-radon



Note: If you are a former smoker, your risk may be higher.

* Lifetime risk of lung cancer deaths from EPA Assessment of Risks from Radon in Homes (EPA 402-R-03-003).

** Comparison data calculated using the Centers for Disease Control and Prevention's 1999-2001 National Center for Injury Prevention and Control Reports.

https://www.epa.gov/radon/health-risk-radon

Where have heard about CO_2?

Is there a safe level of CO2 exposure?

What are the health effects at various levels?

04

Good Numbers & Health Impacts

Open Access

Vol. 120, No. 12 | Research

Is CO_2 an Indoor Pollutant? Direct Effects of Low-to-Moderate CO_2 Concentrations on Human Decision-Making Performance

Usha Satish, Mark J. Mendell, Krishnamurthy Shekhar, Toshifumi Hotchi, Douglas Sullivan, Siegfried Streufert, and William J. Fisk

Published: 1 December 2012 | https://doi.org/10.1289/ehp.1104789 | Cited by: 28

Sections PDF

Abstract

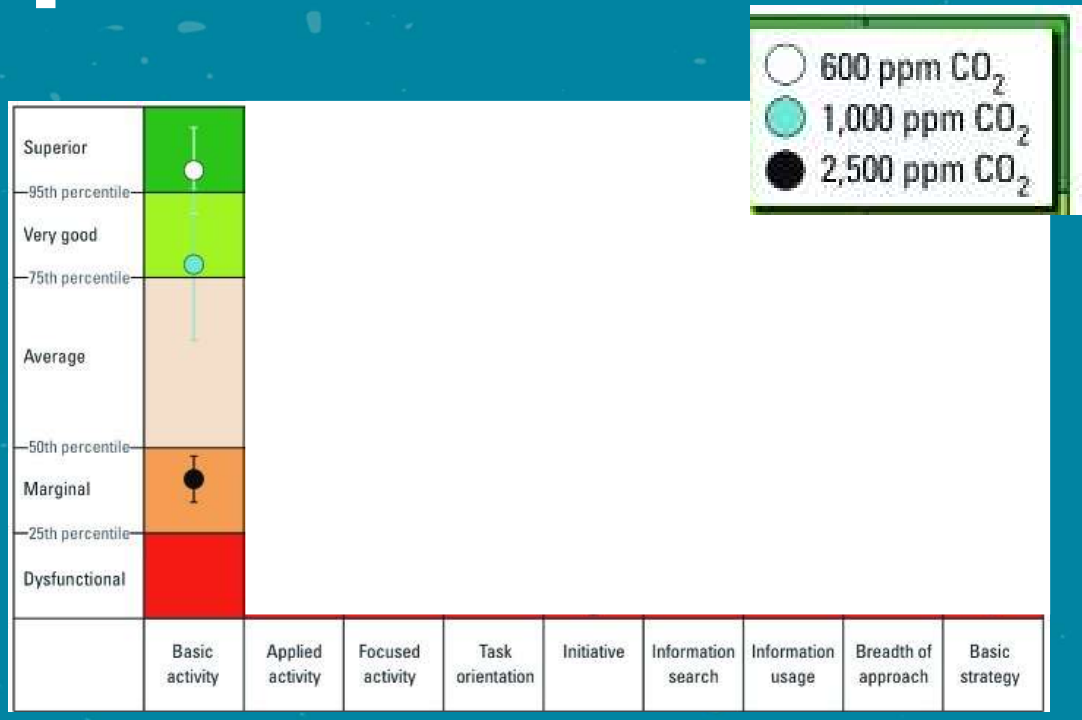
Background: Associations of higher indoor carbon dioxide (CO_2) concentrations with impaired work performance, increased and poorer perceived air quality have been attributed to correlation of indoor CO_2 with concentrations of other indoor air p also influenced by rates of outdoor-air ventilation.

Objectives: We assessed direct effects of increased CO_2, within the range of indoor concentrations, on decision making.

Methods: Twenty-two participants were exposed to CO_2 at 600, 1,000, and 2,500 ppm in an office-like chamber, in six groups. Each group was exposed to these conditions in three 2.5-hr sessions, all on 1 day, with exposure order balanced across groups. At 600 ppm, CO_2 came from outdoor air and participants' respiration. Higher concentrations were achieved by injecting ultrapure CO_2. Ventilation rate and temperature were constant. Under each condition, participants completed a computer-based test of decision-making performance as well as questionnaires on health symptoms and perceived air quality. Participants and the person administering the decision-making test were blinded to CO_2 level. Data were analyzed with analysis of variance models.

Impact of CO_2 on human decision-making performance

- Most decision-making variables showed a decline with higher concentrations of CO2, but measures of focused activity improved.
- High levels of focus under nonemergency conditions may indicate “overconcentration.” Prior research has shown repeatedly that individuals who experience difficulty in functioning, e.g. persons with mild-to-moderate head injuries, under the influence of alcohol tend to become highly focused on smaller details at the expense of the big picture.



Definitions of the nine primary factors and factor combinations that have predicted real-world success:

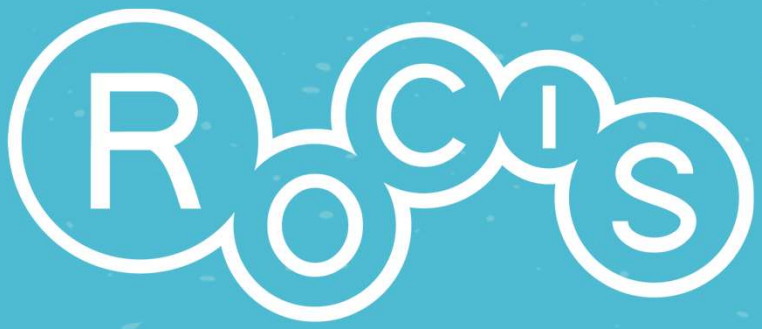
- basic activity level (number of actions taken)
- applied activity (opportunistic actions)
- focused activity (strategic actions in a narrow endeavor)
- task orientation (focus on concurrent task demands)
- initiative (development of new/creative activities)
- information search (openness to and search for information)
- information usage (ability to use information effectively)
- breadth of approach (flexibility in approach to the task)
- basic strategy (number of strategic actions).

What is NO2?

What are sources of $NO_{2?}$

How do we reduce indoor exposure?

04



Good Numbers & Health Impacts

What is NO_2?

- Gaseous air pollutant composed of nitrogen and oxygen
- One of a group of related gases called nitrogen oxides, or NOx.
- NO_2 forms when fossil fuels such as coal, oil, gas or diesel are burned at high temperatures.
- NO_2 and other nitrogen oxides in the outdoor air contribute to particle pollution and to the chemical reactions that make ozone.

NO_2 Indoor Control Measures

LMW39

- Properly install & maintain combustion appliances used for heating (e.g. gas & oil furnaces, wood stoves, gas water heaters), with venting outside.
- Use a higher fan setting when cooking on a gas stove, ensure that it vents outside, & use the back burners.
- Do not use gas-, propane-, or kerosene- based equipment in poorly-ventilated enclosed spaces.
- Do not idle cars or use combustion-powered equipment in attached garages.
- Barbeque outdoors & away from open doors & windows.

Use of these strategies will reduce exposure to NO_2 & other contaminants in combustion gases, including carbon monoxide, fine & ultrafine particulate matter, & volatile organic compounds. (from Health Canada)

Slide 20

LMW39 Don - Can you address health effects?
Linda Wigington, 4/19/2021

What are sources of formaldehyde?

How do we reduce exposure?

04

Good Numbers & Health Impacts

Indoor Sources of Formaldehyde LMW40

Combustion sources

- cigarettes & other tobacco products
- open fireplaces

Off-gassing sources

- wood products such as particle board & other building materials made with adhesives containing formaldehyde
- some varnishes, paints
- some carpeting, drapes & curtains

(from Health Canada)

Slide 22

LMW40 Don - Can you address health effects?
Linda Wigington, 4/19/2021

So what are good numbers?

04

ROCIS

Good Numbers & Health Impacts

Exposure Guidelines/Limits

Outdoor / Indoor Pollutant Exposure Guidelines/Limits						
Pollutant	CO	Radon	CO_2	$PM_{2.5}$	NO_2	VOCs
Low-end	6 ppm (WHO 24hr)	2.7 pCi/L (WHO)	800 ppm (tolerable)	10 µg/m³ (annual mean – WHO)	>1 ppb	.5 µg/m³ (acceptable)
High end	9 ppm (EPA 24hr)	4.0 pCi/L (EPA)	5000 ppm (OSHA 8h)	15 µg/m³	150 ppb	[illegible] µg/m³ (unhealthy)
Health Canada (indoor res.)	10 ppm (24hr)\ 35 ppm (1 hr)	200 Bq/m³ ~5-6 pCi/L Or "As low as practicable"		As low as possible	11 ppb (24 hours) 90 ppb (1 hr)	(formaldehyde) 50 ug/m³ (8 hrs) 123 ug/m³ (1 hr)

LMW38

Slide 24

LMW38 Are we sure the VOC numbers are correct? Why would ambient be lower than Health Canda indoors?
Linda Wigington, 4/19/2021

NAAQS Table

The Clean Air Act, which was last amended in 1990, requires EPA to set National Ambient Air Quality Standards (40 CFR part 50) for pollutants considered harmful to public health and the environment. The Clean Air Act identifies two types of national ambient air quality standards. ***Primary standards*** provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. ***Secondary standards*** provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

The EPA has set National Ambient Air Quality Standards for six principal pollutants, which are called "criteria" air pollutants. Periodically, the standards are reviewed and may be revised. The current standards are listed below. Units of measure for the standards are parts per million (ppm) by volume, parts per billion (ppb) by volume, and micrograms per cubic meter of air ($\mu g/m^3$).

Pollutant [links to historical tables of NAAQS reviews]		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)		primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead (Pb)		primary and secondary	Rolling 3 month average	0.15 $\mu g/m^3$ [1]	Not to be exceeded
Nitrogen Dioxide (NO_2)		primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 ppb [2]	Annual Mean
Ozone (O_3)		primary and secondary	8 hours	0.070 ppm [3]	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (PM)	$PM_{2.5}$	primary	1 year	12.0 $\mu g/m^3$	annual mean, averaged over 3 years
		secondary	1 year	15.0 $\mu g/m^3$	annual mean, averaged over 3 years
		primary and secondary	24 hours	35 $\mu g/m^3$	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24 hours	150 $\mu g/m^3$	Not to be exceeded more than once per year on average over 3 years

https://www.epa.gov/criteria-air-pollutants/naaqs-table

Challenge: Ambient vs. Indoor Air

Sources of Info of indoor air quality guidelines & standards

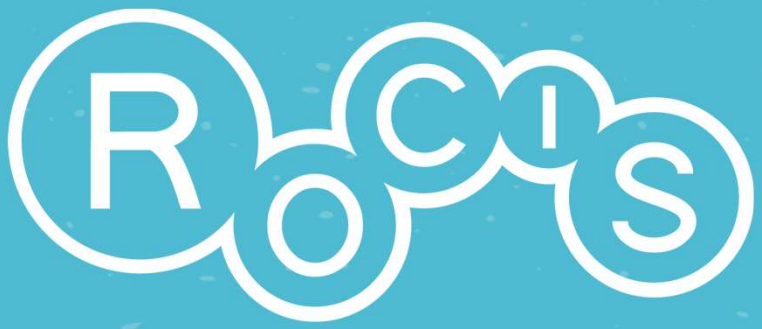
- Health Canada Guidelines (residential) https://www.canada.ca/en/health-canada/services/air-quality/residential-indoor-air-quality-guidelines.html
- RESET® Standard https://www.reset.build/
- WELL https://standard.wellcertified.com/air/air-quality-standards
- LEED https://www.usgbc.org/credits/new-construction-commercial-interiors-core-and-shell-schools-new-construction-retail-new-c-8

Challenge: Limitations of Knowledge

- Synergy between pollutants
- Synergy due to pre-existing conditions
- Impact on vulnerable populations (fetus)
- Time period (spike vs. median, short vs. long-term)
- Others?

Wrap-Up

05



Accessing Cohort 48 Resources

- Limited Access Website page*
  - Handouts
  - Forms
  - Slide decks from meetings
  - Links to recordings

http://rocis.org/rocis-lcmp-cohort-48

Schedule & Topics

75-minute Online Meetings
7 PM Mon. & Thurs., Repeated 10:30 AM Tues. & Fri.

Important Dates:

July 24	Dylos Downloads
July 31	- Upload with photos of
Aug 7	log & incident report
Aug 10	Kit Pick up

Meetings:

July 22 or 23	Online Resources
July 26 or 27	Behavioral Interventions
July 29 or 30	**ROCIS Filtration Interventions**
Aug 2 or 3	Health Impacts of Particles and YOUR questions Answered
Aug 5 or 6	**Wrap-up Meeting** – please consider contributing you experiences

Meetings in blue are required.

Cohort 48 Challenge

Step 1: Select a Dylos spike (with a known specific source) you have observed that ideally occurs several times a week

Step 2: Identify several ways you can reduce the intensity and/or duration of that spike

Step 3: Experiment to reduce that spike as much as possible

Step 4: At the Wrap-up meeting, let us know what you learned & what worked!

Slide 31

ED2 Not sure what is happening with the challenge?
Emily Dale, 4/16/2021

1. Understand how to interpret the data from the Excel Averager that Don provides
2. Identify typical range of monitor readings, as well as recommended exposure limits for CO, CO_2, radon & particles
3. Discuss the limitations of "good numbers"

06

Meeting Objectives Review

Need Help? Who to Contact

- **Coordination & Logistics:**
  - Emily Dale - text: 724-833-8223 or ke_dale@hotmail.com
- **Equipment issues:**
  - Rob Busher - text: 412-437-8454 or robb@rocis.org
  - Samantha Totoni - text: 217-390-1842 or skc35@pitt.edu
- **Interpretation of monitoring readings:**
  - Don Fugler - dfugler@gmail.com
  - Rob Busher - text: 412-437-8454 or robb@rocis.org
- **Social Media Postings:**
  - Jessie Kester - text: 814-937-7365 jessicalkester@gmail.com

Thanks!

Thanks to Phil Johnson & The Heinz Endowments for support of the ROCIS initiative (Reducing Outdoor Contaminants in Indoor Spaces) and our 385+ LCMP participants

QUESTIONS?

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CC someone else too

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Preview – Weebly Outdoor Graph for Cohort 47

Dylos small: http://lcmp-test.weebly.com/round-47-small.html

Dylos large: http://lcmp-test.weebly.com/round-47-large.html

Emily will send an email with links