

The logo for the Central California Asthma Collaborative (CCAC) features the letters 'CCAC' in a bold, blue, sans-serif font. The 'A' is a light blue color, while the 'C's and 'C' are a darker blue.

Central California
Asthma Collaborative

The background is a solid teal color. On the right side, there are several decorative elements: a large, semi-transparent pie chart with three segments, a smaller pie chart above it, and a bar chart at the bottom right with four vertical bars of increasing height. The text is centered in the lower half of the image.

**Because Everyone
Deserves A Safe Place
To Breathe**

HUD Healthy Homes and SUMMATION

Two studies assessing indoor air
quality in low-income communities
of Kern and Tulare County

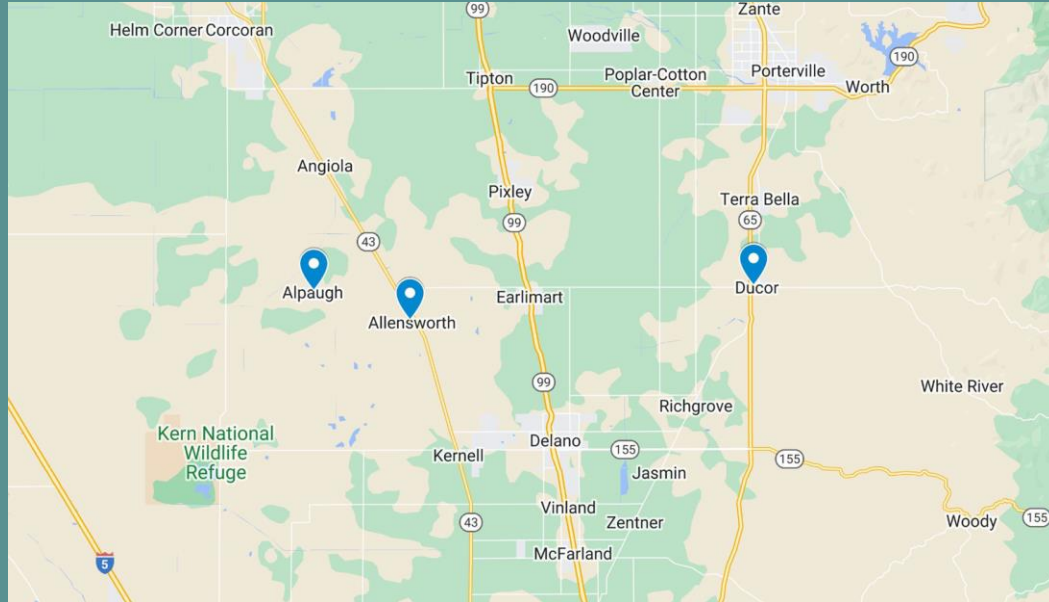
The HUD Healthy Homes project is being conducted by CCAC in partnership with the Berkeley Air Monitoring Group (not affiliated) and the Center for Race Poverty and the Environment (CRPE)

- Characterize changes in indoor air quality associated with home electrification (heating and cooking appliances) and smart air cleaner
- Includes three communities without natural gas infrastructure (Ducor, Alpaugh, Allensworth) that are part of the CPUC's SJV DAC Pilot (electrification) project

The primary study aims include:

- Compare average daily indoor concentrations of PM_{2.5}, NO₂, CO, CO₂, and BC in homes using electric cooking and heating appliances, with those using propane and/or biomass (wood)
- Evaluate impacts of a smart (PM_{2.5}-activated), low-cost air cleaner on indoor air quality (PM_{2.5} concentration), especially during wildfire smoke events

Study Area



Community Profiles

With 935 people, **Alpaugh** is the 1,084th most populated city in the state of California

The largest Alpaugh racial/ethnic groups are Hispanic (91.4%) followed by White (5.8%) and Two or More (1.6%)

In 2021, the median household income of Alpaugh households was \$25,313

Median age is 23

With 613 people, **Ducor** is the 1,176th most populated city in the state of California

The largest Ducor racial/ethnic groups are Hispanic (89.1%) followed by White (9.3%) and American Indian (1.6%)

In 2021, the median household income of Ducor households was \$39,000

Median age is 27

With 533 people, **Allensworth** is the 1,198th most populated city in the state of California

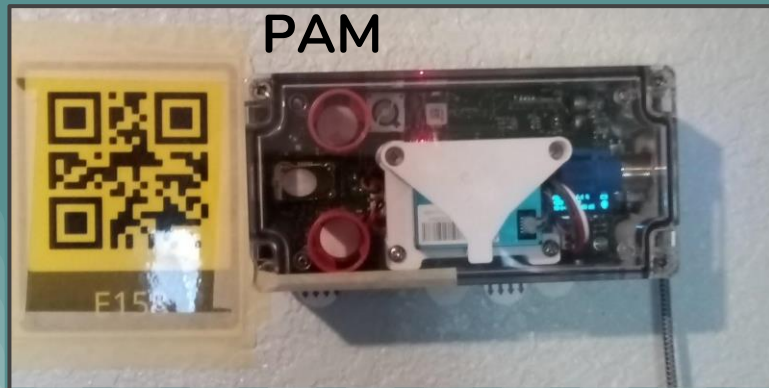
The largest Allensworth racial/ethnic groups are Hispanic (95.5%) followed by Black (3.8%) and Asian (0.8%)

In 2021, the median household income of Allensworth households was \$48,906

Median age is 23

The Model 405nm NO₂ monitor is designed to enable accurate measurements of atmospheric nitrogen dioxide (NO₂), nitric oxide (NO) and NO_x (NO + NO₂)

The PAM uses sensors to measure air pollutants (CO, CO₂, PM1.0, and PM2.5), indoor temperature, pressure, and relative humidity.



UPAS v2

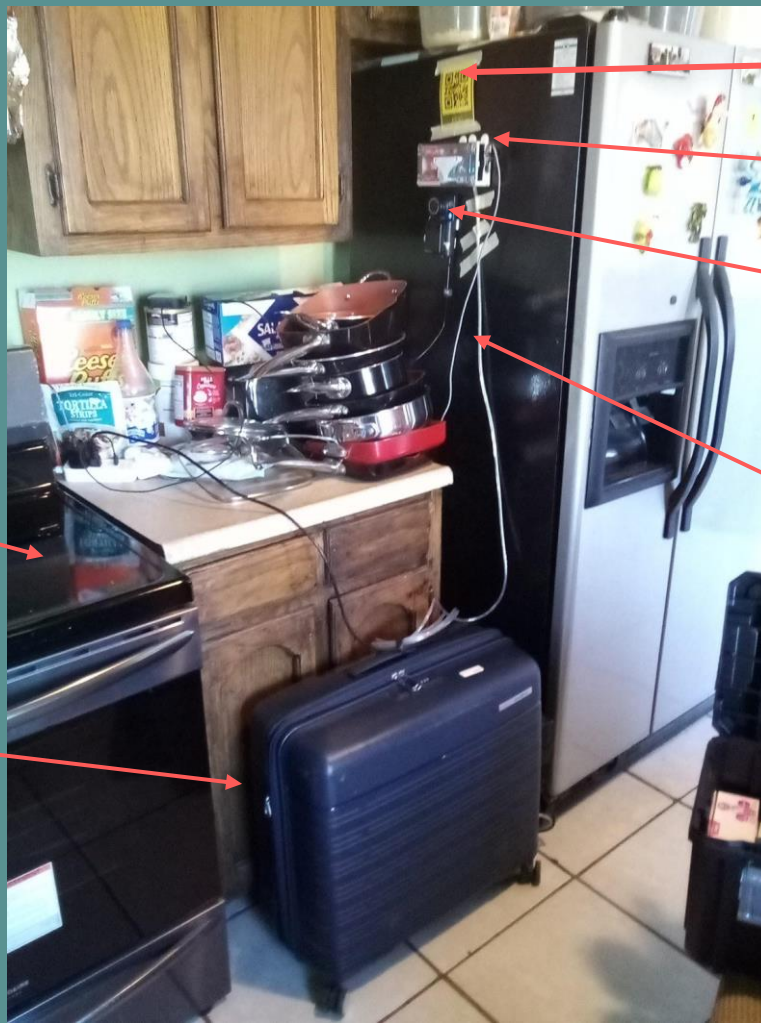
- The Ultrasonic Personal Air Sampler (UPAS) is a compact filter sampler built around ultrasonic pumping technology.
- The UPAS has interchangeable size-selective sample inlets and filter cartridges integrate directly with the pumping mechanism.
- The UPAS downloads sample data to your mobile device using Android or iOS applications.
- Reliable data: An active sample flow control system maintains the target volumetric flow rate even as environmental conditions change and the pressure drop across the sample filter increases. The UPAS automatically logs a comprehensive set of operational data to facilitate robust sample quality assurance.



A typical setup of monitors in a Ducor home

Induction Stove

405 Monitor in a protective case



Unique Identifier

PAM

UPAS Monitor

Sampling inlet that leads to the 405 Monitor

- 20X20 box fan.
- 3m MERV 13 filter.
- Filter Clips designed by CCAC and Root Access.
- PM 2.5 monitor.
- Blue tooth fan on/off switch.



SUMMATION (Kern Project)

Super eMitters of Methane detection using Aircraft Towers, and Intensive Observational Network
LBNL study in partnership with CCAC, UC Riverside, Stanford, Univ of Az, JPL NASA and others

Stanford Home Appliance Methane Leakage sub-study

Natural Gas appliances

- Stoves and Ovens
- Water Heaters
- Furnaces

Home Appliance Sampling

- Bakersfield, Arvin, Lamont
- 37/50 homes sampled
- 3-4 hour sampling period



Region	Steady-State Off (mg CH ₄ / hour)	Steady-State On (mg CH ₄ / hour)		
Stove Methane Results		High Burner	Medium Burner	Low Burner
Bakersfield (n=12)	78	354	34	379
Bay Area (n=53)	58	246	193	473

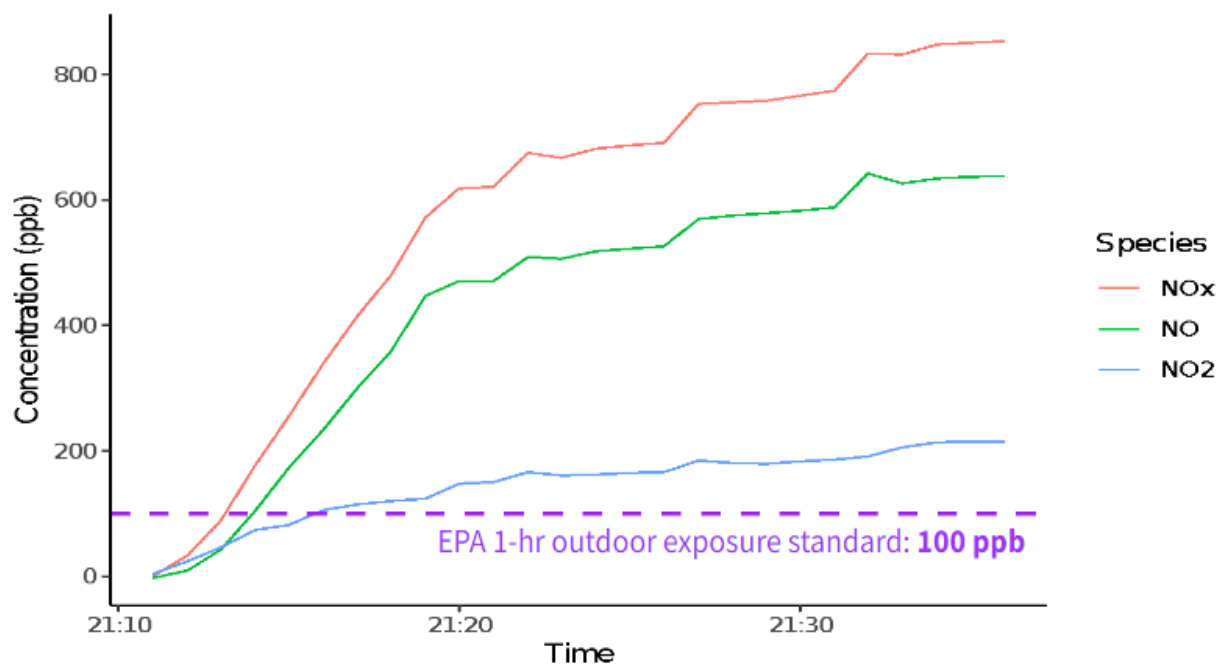


Stove Nitrogen Dioxide and Carbon Monoxide Results

Region	Steady-State On (mg NO ₂ / hour)	Steady-State On (mg CO / hour)
Bakersfield (n=7)	High: 149, Low: 20, Oven: 138	High: 799, Low: 392, Oven: 1197
Bay Area (n=32)	High: 99.5, Med: 40, Low: 18.4, Oven: 133	
Other studies	UCLA mean cooktop: 130, Oven: 150	UCLA mean cooktop: 670, Oven: 1700 CARB mean cooktop: 1194, Oven: 375

Respiratory health damaging air pollutants, such as NO₂, are formed as a byproduct of combustion.

NO₂ concentrations in a kitchen/living room that we measured without plastic exceeded 100 ppb just by running the oven



Lebel et al. Methane and NO_x Emissions from Natural Gas Stoves, Cooktops, and Ovens in Residential Homes, *Environmental Science and Technology*. 2022.

**Residents in low income communities
are being left behind in the zero net
energy, zero net carbon future**

**They need and deserve homes that are
healthy, safe places to breath**

Thank You.

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