AB 617 Biomonitoring Update

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Presentation at the Scientific Guidance Panel Meeting

July 16, 2021

Overview of presentation

➢ Background

➢ Update on activities since November 2020 SGP meeting

➢ Current plan for AB 617 targeted biomonitoring study

  ▪ Community and study site

  ▪ Objectives

  ▪ Study design

  ▪ Next steps

  ▪ Challenges

Assembly Bill 617 (AB 617)

AB 617:

➤ Aims to reduce exposures in communities disproportionately impacted by air pollution.

➤ Requires engagement with communities to develop and implement air monitoring plans and exposure reduction strategies.

The California Air Resources Board (CARB) established the Community Air Protection Program to help implement AB 617.

Sacramento
South Sacramento-Florin
Richmond-San Pablo
Bay Area
Stockton
West Oakland
South Central Fresno
San Joaquin Valley
Shafter
South East Los Angeles
San Bernardino, Muscoy
East Los Angeles, Boyle Heights, West Commerce
South Coast
Eastern Coachella Valley
Wilmington, Carson, West Long Beach
San Diego
Imperial
Portside Environmental Justice Neighborhoods
El Centro, Heber, Calexico

AB 617 communities
(as of December 2020)

OEHHA's role under AB 617

Photo credit: pxfuel.com

Photo credit: snappygoat.com

➢ Activities include providing support to CARB, local air districts, and communities by:

- Evaluating and interpreting potential health effects from community air exposures and health benefits from reducing those exposures

- Identifying and tracking community air pollution concerns

- Designing and implementing targeted biomonitoring studies in AB 617 communities

➢ Goals of targeted biomonitoring studies are to:

- Increase understanding of air pollution exposures faced by community members

- Evaluate specific emission/exposure reduction measures

Activities since November 2020 SGP meeting

➤ Engaged with community groups to identify possible study sites

➤ Developed study protocol and draft study materials (e.g., recruitment script and flyer; questionnaires)

➤ Obtained deferred approval from the California CPHS[*], pending minor revisions submitted on 6/28/21

➤ Currently seeking school district approval to conduct the study at a public elementary school in Stockton

*Committee for the Protection of Human Subjects

Stockton: Disproportionately burdened

Air pollution[a]

PM$_{2.5}$: 94th percentile

Diesel particulate: 61st percentile

Ozone: 53rd percentile

Health[b]

Asthma: $\geq$ 95th percentile
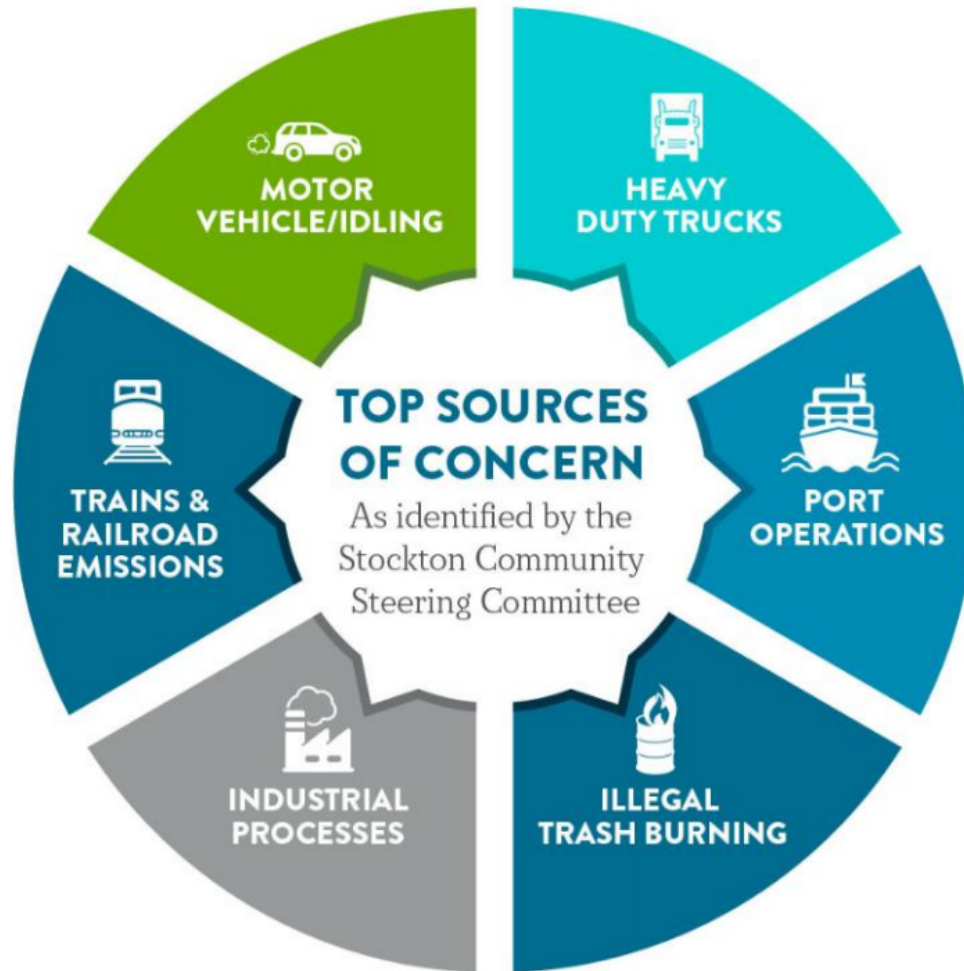
Cardiovascular disease: $\geq$ 95th percentile

Low birth weight: $\geq$ 95th percentile

Based on CalEnviroScreen, as cited in:
[a] Stockton Community Air Monitoring Plan, November 2020 draft
[b] Stockton Community Emissions Reduction Plan, Appendix G, March 21 draft

Stockton: Exposure concerns

TOP SOURCES OF CONCERN — As identified by the Stockton Community Steering Committee:
MOTOR VEHICLE/IDLING, HEAVY DUTY TRUCKS, PORT OPERATIONS, ILLEGAL TRASH BURNING, INDUSTRIAL PROCESSES, TRAINS & RAILROAD EMISSIONS

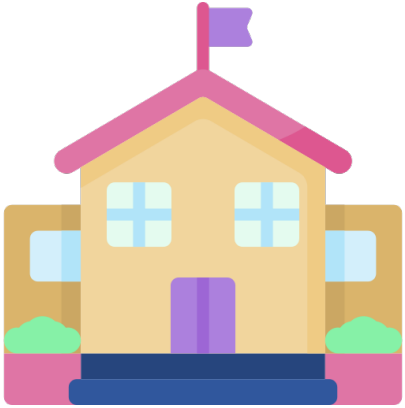Source: Stockton Community Emissions Reduction Plan (March 2021 draft)

Targeted biomonitoring study objectives

Learn more about air pollution exposures to children in a disproportionately impacted community

Evaluate effectiveness of school air filtration at reducing children's air pollution exposures
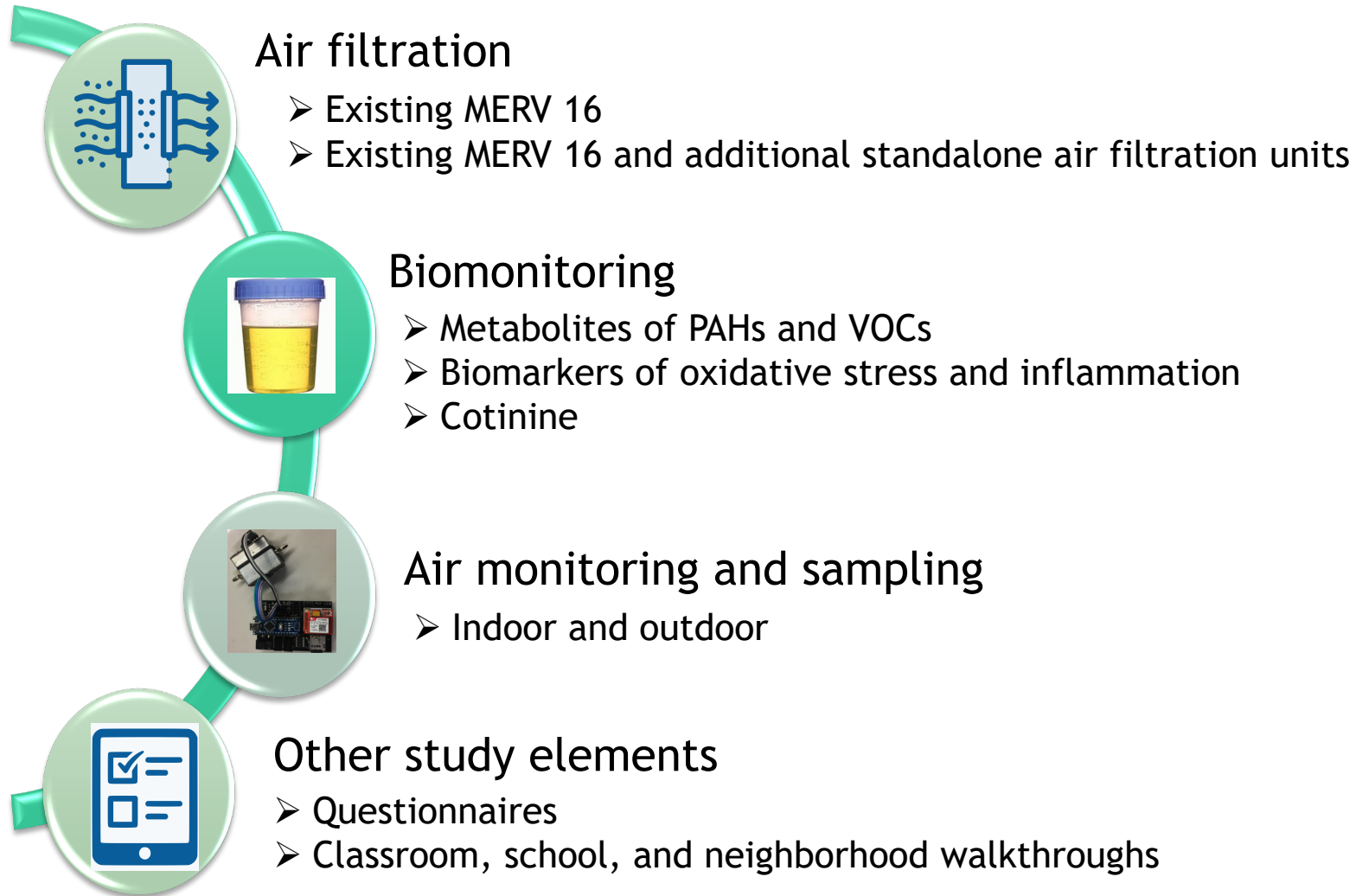
Study site

➤ A public elementary school located in an AB 617 community

➤ Has advanced air filtration already installed in HVAC system

  ▪ Best option uses minimum efficiency reporting value (MERV) 16 panel filters

Study population

- 60 children to provide urine samples
  - Age 7 to 13 years in grades 2 to 6
  - One child per household
- One parent/guardian* for each child to assist with urine collection and complete questionnaires
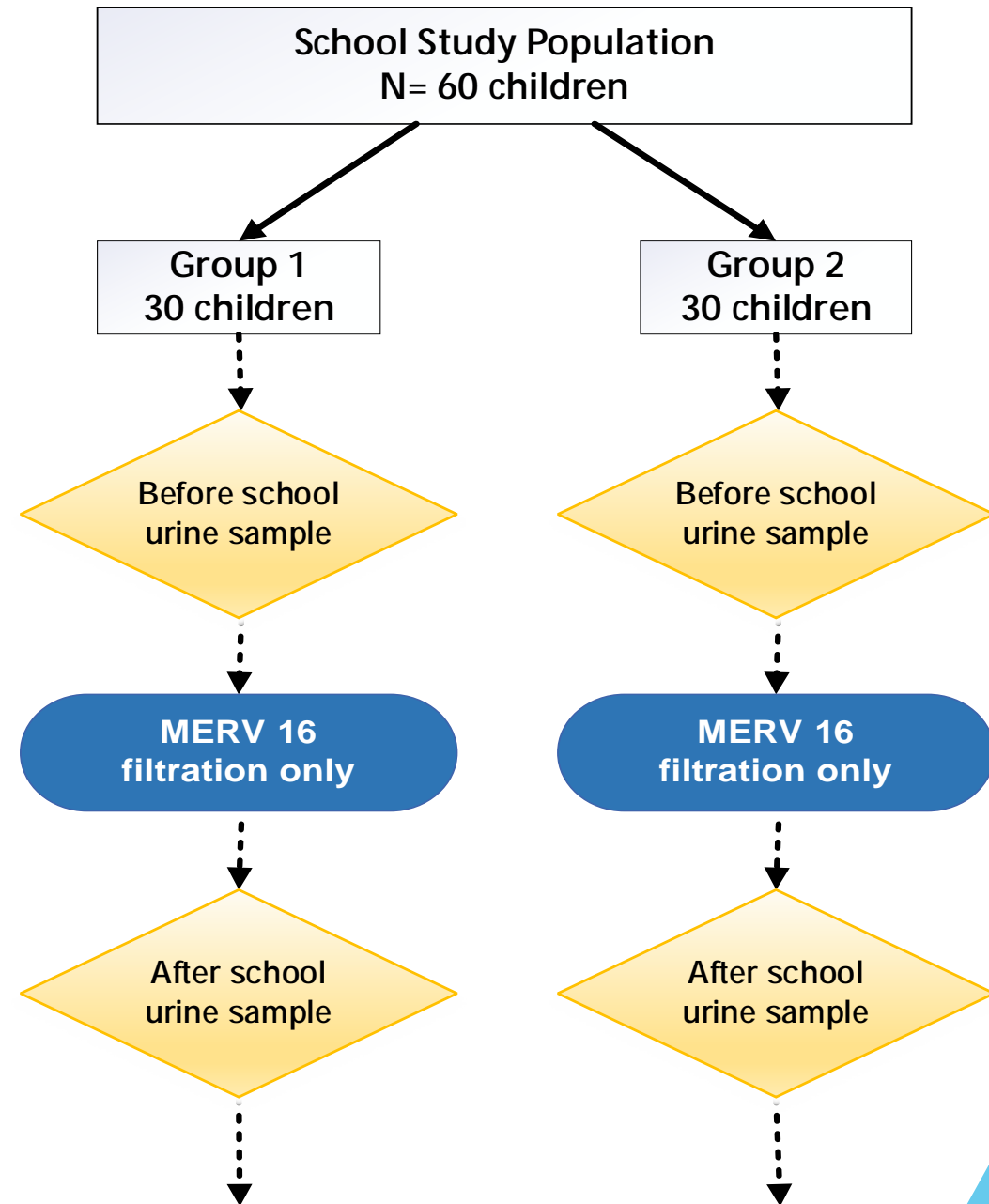- Child and parent speak English and/or Spanish

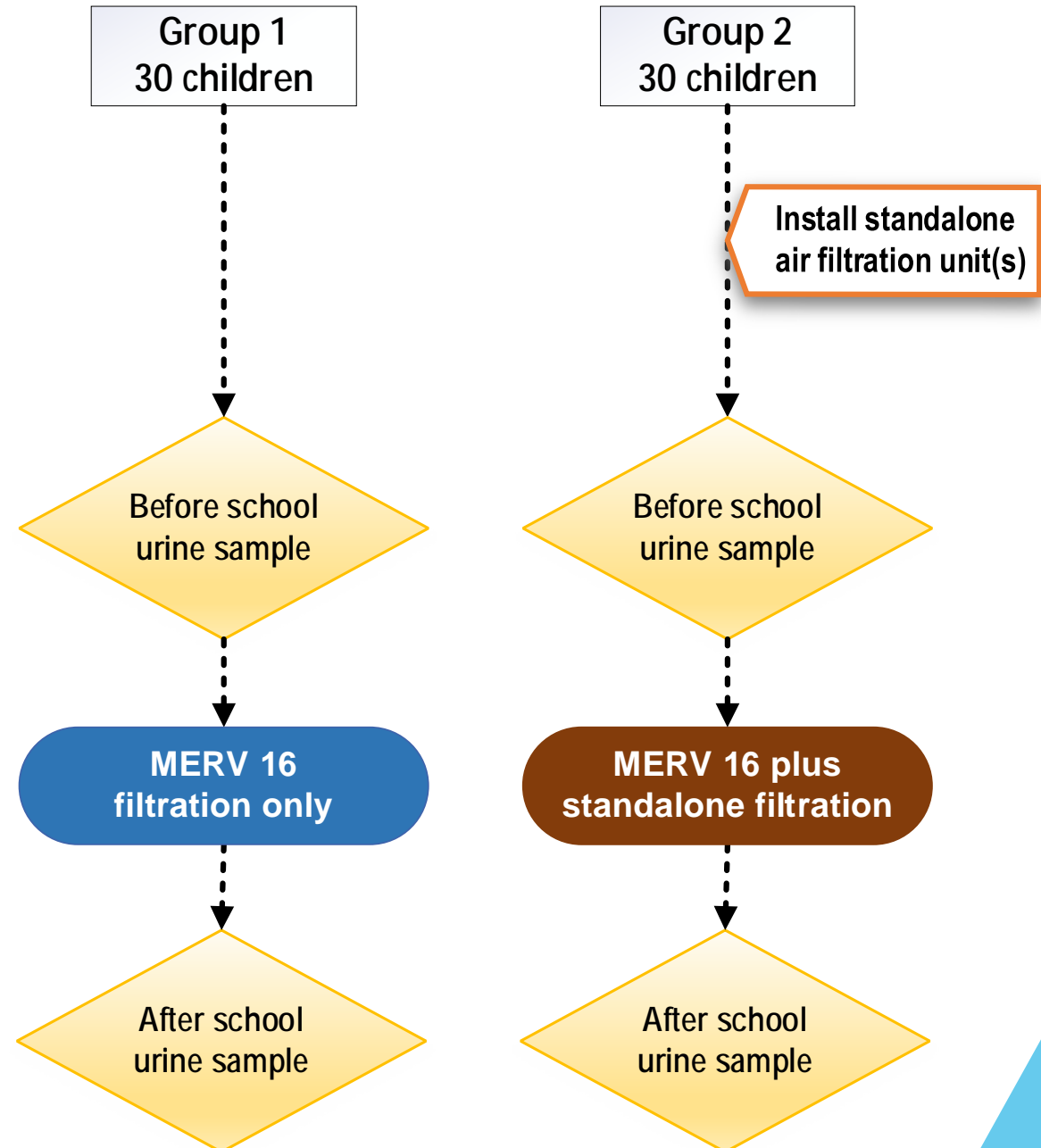*Hereafter referred to as "parent"

Overview of study elements

Air filtration
- Existing MERV 16
- Existing MERV 16 and additional standalone air filtration units

Biomonitoring
- Metabolites of PAHs and VOCs
- Biomarkers of oxidative stress and inflammation
- Cotinine

Air monitoring and sampling
- Indoor and outdoor

Other study elements
- Questionnaires
- Classroom, school, and neighborhood walkthroughs

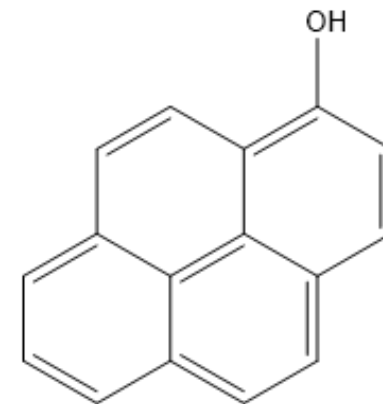# Urine sample collection - Week 1

Urine sample collection - Week 2

Biomarkers for specific air pollutants

➢ Hydroxy metabolites of PAHs:
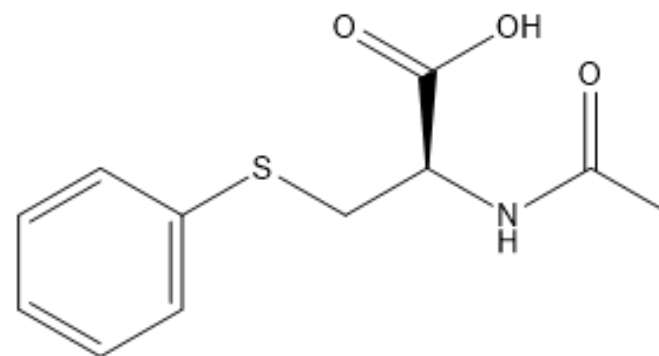 ▪ Naphthalene (NAP)
  ▪ Fluorene (FLU)
  ▪ Phenanthrene (PHE)
  ▪ Pyrene (PYR)

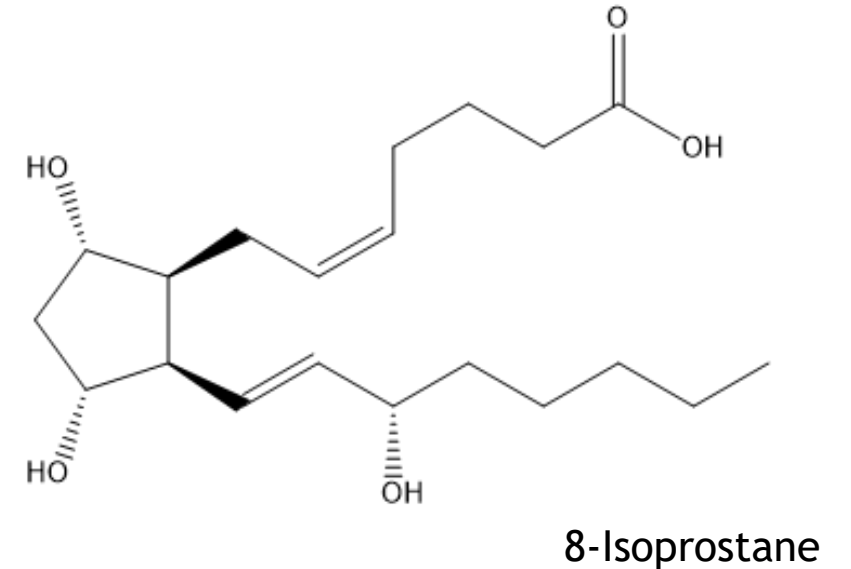1-Hydroxypyrene

➢ Stable metabolites of VOCs:
  ▪ Acrolein
  ▪ Acrylonitrile
  ▪ Benzene
  ▪ 1,3-Butadiene
  ▪ Ethylbenzene
  ▪ Xylene

Phenylmercapturic acid
(benzene metabolite)

Additional biomarkers

➢ Biomarkers of oxidative stress:

- 8-Isoprostane

- 8-Hydroxy-2′-deoxyguanosine (8-OHdG)

➢ Biomarkers of inflammation:

- Club cell secretory protein-16 (CC-16)

- Leukotriene E4

8-Isoprostane

Questionnaires

- Available as online link or paper copy
- Will be completed after return of urine samples on each sample collection day
- Possible topics include:
  - Demographics
  - Home characteristics and household activities
  - Child's diet, activities, health, and medication use
- Considerations for prioritizing topics:
  - Small sample size – include only most important factors for interpreting biomonitoring results
  - Minimize burden on participants
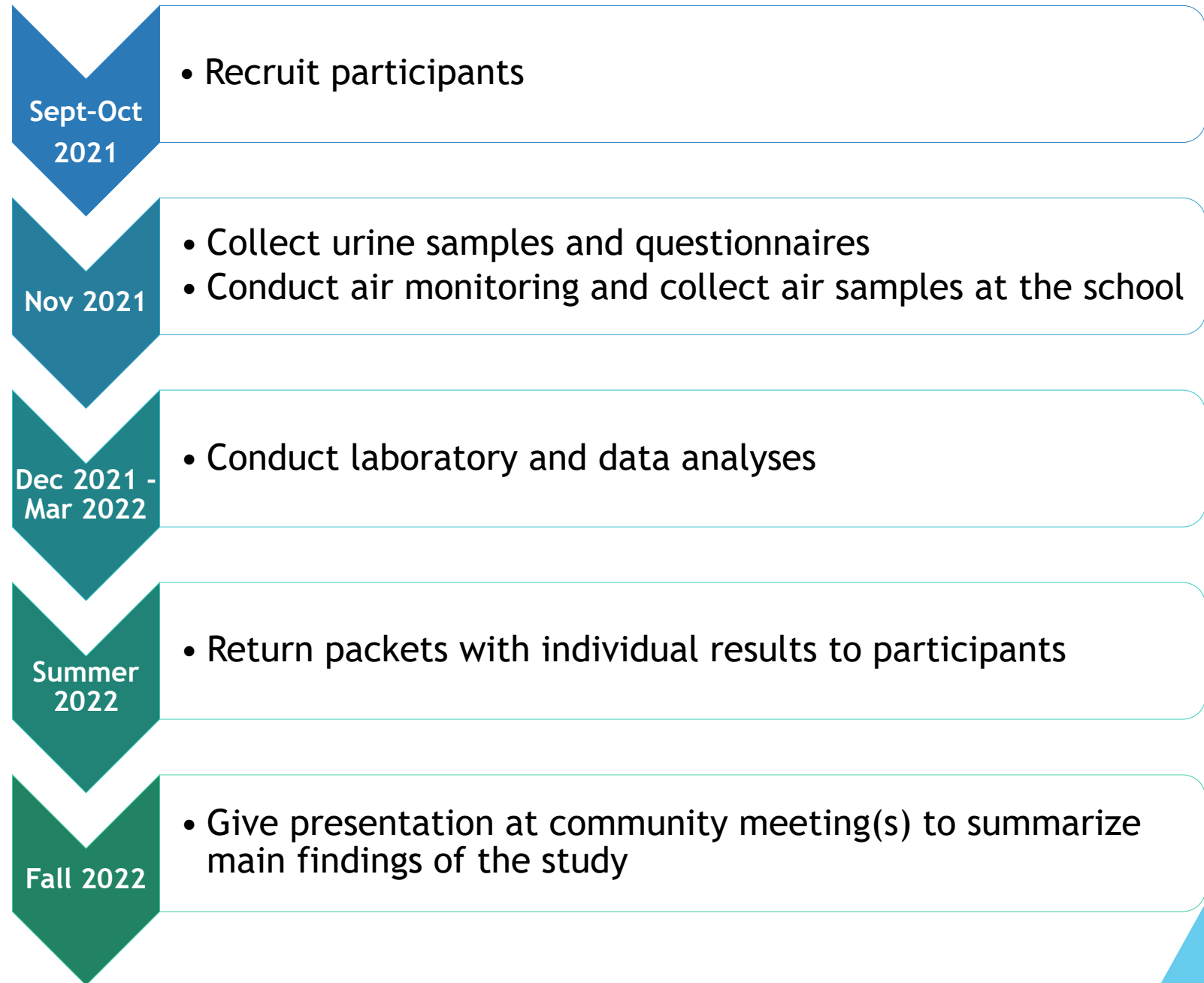
Biomonitoring results return

➢ Children's individual results will be returned to parents who request them

  ▪ Results packets will be sent as password-protected PDFs or paper copies

➢ Packets will include fact sheets on the measured biomarkers and possible ways to reduce air pollution exposures

➢ Fact sheets under development for:

  ▪ VOCs

  ▪ Biomarkers of oxidative stress and inflammation

Air monitoring and sampling

➤ Air monitoring
- Particulate matter: PurpleAir sensors
- Black carbon: Aerosol Black Carbon Detectors (ABCDs)

➤ Air sampling
- PAHs: Micro-environmental monitoring systems (MEMSs)
- VOCs: Evacuated canisters

➤ Locations
- Participating classrooms
- Selected indoor common areas
- Selected outdoor locations on school grounds

Timeline

Sept-Oct 2021
- Recruit participants

Nov 2021
- Collect urine samples and questionnaires
- Conduct air monitoring and collect air samples at the school

Dec 2021 - Mar 2022
- Conduct laboratory and data analyses

Summer 2022
- Return packets with individual results to participants

Fall 2022
- Give presentation at community meeting(s) to summarize main findings of the study

Next steps

- Obtain school district approval to conduct the study
- Collect more information about school, including:
  - Type of HVAC system and air filtration
  - Classroom details – dimensions, layout, class size
  - Children's schedule
  - Details of meal program
- Continue to develop and refine:
  - Study protocol (e.g., timing of afternoon sample collection)
  - Recruitment strategy (e.g., identify events for outreach to families)
  - Questionnaires

Some challenges

- Limited ability to restrict diet
  - Potentially offer guidance on recommended foods
  - Obtain school menus in advance
- Possible pre-screening for:
  - Asthma
  - Smoking households
- Prioritizing questionnaire topics
- Interpreting and explaining biomarkers of oxidative stress and inflammation as indicators of exposure
- Contingency planning (e.g., delay in school approval; wildfires)

AB 617 Biomonitoring Study Team

- Susan Hurley (OEHHA)
- Stephanie Jarmul (OEHHA)
- Sara Hoover (OEHHA)

- Duyen Kauffman (CDPH)
- Josephine DeGuzman (CDPH)
- Alveen Kumar (CDPH)

- Rosemary Castorina (UC Berkeley)
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Questions and Discussion