

Study of Neighborhood Air near Petroleum Sources (SNAPS): Overview of Community Selection Methodology

California Air Resources Board (CARB) staff developed a systematic selection process to identify and prioritize communities for air monitoring in the Study of Neighborhood Air near Petroleum Sources (SNAPS). The selection process is composed of three stages: *identification*, *evaluation*, and *prioritization*. Additional considerations may be incorporated into the process over time and the mechanisms of these existing stages might be revised as more information becomes available.

In the *identification* stage, staff developed a list of candidate communities for potential study. This list was based on (1) a mapping analysis to determine areas with significant co-location of oil and gas production and populations, and (2) suggestions for additional specific communities made by the public and local air districts. The resulting candidate community list contains 56 communities from across the State, most of which were identified by the mapping analysis.

In the *evaluation* stage, staff gathered additional data for each community on the candidate community list. This data is intended to differentiate communities that may have a higher likelihood of being impacted by oil and gas production emissions. A threshold analysis of eight indicators (within four thematic categories) enables staff to advance communities that meet the thresholds for the highest number of indicators to the *prioritization* stage. This is intended to continue with additional communities being elevated for prioritization over time. The eight indicators are detailed below.

In the *prioritization* stage, communities are prioritized according to a more detailed analysis of the eight indicators and additional considerations primarily related to logistics of placing air monitoring equipment within a community. This effort is currently ongoing. Staff divided the State into two regions for this analysis: Central Valley/Northern and Central/South Coasts. Communities are only compared to others in the same region because of the differences between the regions in terms of population characteristics, well placement relative to communities, and existing air measurement data. When possible, staff plan to rotate air monitoring between the two regions, using the time while air monitoring is occurring in one region to prepare to monitor in the other region. The community selection approach is summarized in Figure 1.

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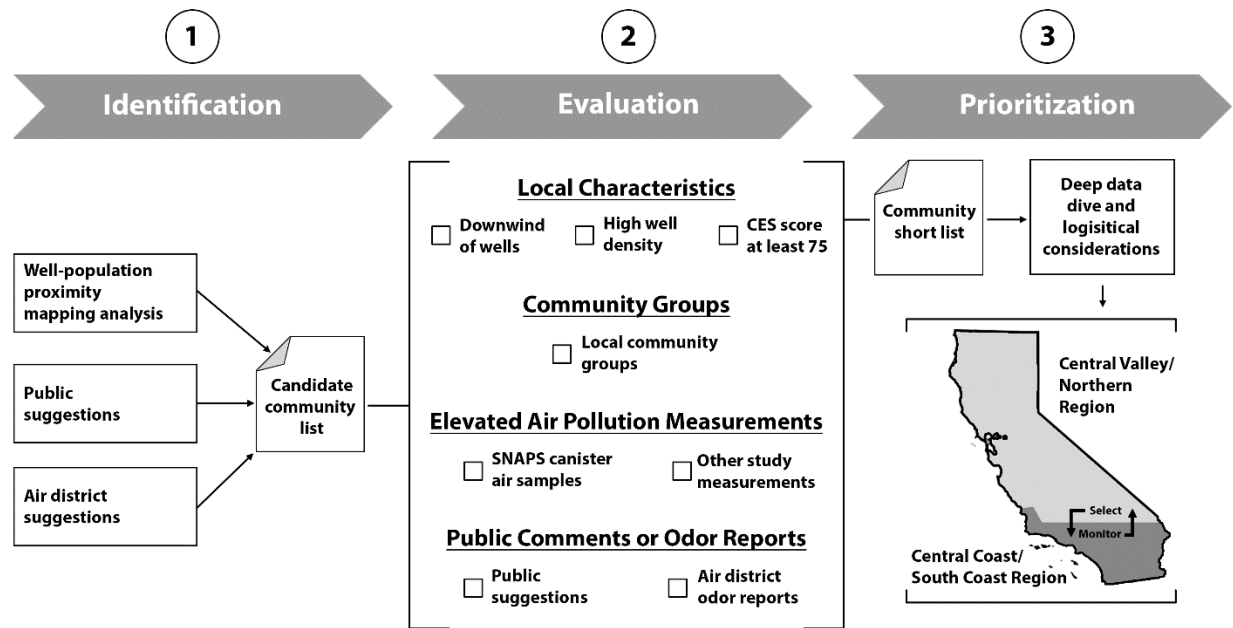


Figure 1 Community Selection Approach Overview

The eight indicators used in the *evaluation* and *prioritization* stages are explained below. The criteria listed are the minimum threshold for a candidate community to attain each indicator in the *evaluation* stage.

Local Characteristics

- **Downwind of Wells:** Wind roses showing the distribution of wind speed and direction were plotted for each monitoring station that reports to the NOAA Local Climatological Data tool¹ near a candidate community and to the AQMIS² near some Kern County communities. Staff considered the relative location of wells to each community along with the nearest wind rose(s) to assess whether each community is primarily downwind or upwind based on the prevailing wind direction.
 - Criteria: Wells upwind of or within the community.
- **High Well Density:** Using GIS, a one-mile buffer was drawn around each community boundary and the density of wells within each buffer was calculated.
 - Criteria: The community has a well density of at least 17 wells per square mile³.

¹ NOAA (2018). *Data Tools: "Local Climatological Data."* <https://www.ncdc.noaa.gov/cdo-web/datatools/lcd>

² AQMIS (2018). *Air Quality and Meteorological Information System.* <https://www.arb.ca.gov/aqmis2/aqmis2.php>

³ The median well density of the 56 SNAPS candidate communities is 17 wells per square mile

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- **CalEnviroScreen 3.0 at least 75:** Area-weighted average CalEnviroScreen (CES) 3.0 percentile scores were calculated based on the area of each census tract within each community.
 - Criteria: The community has an average CES percentile score of 75 or above.

Community Groups

- **Local Community Groups:** Staff compiled a list of community groups working on environmental justice, public health, or oil/gas topics. Community groups are used as an indicator because of potential partnerships (for placing monitoring equipment and engaging with the community) and contribution of local knowledge. Groups were classified based on their coverage area. Those groups primarily working in a single or small set of communities were classified as local community groups and only these (local) groups were used in the *evaluation* stage. All groups are considered in the *prioritization* stage.
 - Criteria: Existence of active local community group within or near the community.

Elevated Air Pollution Measurements

- **SNAPS Canister Air Samples:** CARB staff deployed a mobile monitoring vehicle to each of the candidate communities. This vehicle was equipped with a gas chromatograph (GC) and summa canisters with which staff collected grab samples in some communities. Canister grab samples were taken mostly in communities that showed comparatively high readings on the GC or other onboard real-time equipment. Benzene concentration was used as the metric for the *evaluation* stage since it is known to be emitted from oil and gas operations and is also known to cause health impacts at relatively low concentrations.
 - Criteria: Benzene concentration exceeding background (0.23 ppb for Central Valley, and 0.29 ppb for South Coast⁴) in a canister sample within the community.
- **Other Study Measurements:** Two analyses of emissions from oil and gas infrastructure that were not part of the SNAPS program were considered:

⁴ Background assumed to be the 5-year (2013-2017) mean of the annual median benzene concentrations reported in the iADAM database (<https://www.arb.ca.gov/adam>) for Bakersfield and Los Angeles.

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FluxSense methane flux measurements in the South Coast⁵, and the NASA JPL California Methane Survey⁶ statewide.

- Criteria: The community is near a FluxSense benzene detection from oil/gas production equipment and/or a JPL California Methane Survey detection⁷ from oil/gas production equipment.

Public Comments or Odor Reports

- **Public Suggestions:** Members of the public, community groups, and local air districts provided suggestions for specific communities to monitor at public meetings, over email, or over the phone. Staff documented these suggestions.
 - Criteria: The community received a suggestion for SNAPS monitoring.
- **Air District Odor Reports:** Some of the local air districts collect reports from the public about air issues such as odors or health impacts. Some of the air districts provided records of recent odor reports.
 - Criteria: At least one odor report from an address or jurisdiction within one mile of the community.

For further questions on the community selection process, please contact Carolyn Lozo at clozo@arb.ca.gov or 916-445-1104.

⁵ Mellqvist, J., et al. (2017). "Using Solar Occultation Flux and other Optical Remote Sensing Methods to measure VOC emissions from a variety of stationary sources in the South Coast Air Basin." Prepared by FluxSense. http://www.aqmd.gov/docs/default-source/fenceline_monitoring/project_2/fluxsense_project2_2015_final_report.pdf?sfvrsn=6

⁶ Duren, R., Thorpe, A., and Sander, S. (2017). "California Baseline Methane Survey: Interim Phase 1 Report." Prepared for CARB and CEC by the Jet Propulsion Laboratory. <https://ww2.arb.ca.gov/our-work/programs/methane/ab1496-research>

⁷ Methane detection defined as "at least 10 kg CH₄/hr assuming a 3 meter/second wind" (Duren et al. 2017)