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"Odor Detection and Identification"

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County Sanitation Districts of Los Angeles County

The Sanitation Districts of Los Angeles County operate wastewater treatment plants and sanitary landfills within Los Angeles County. By their very nature, these facilities have the potential to generate significant malodors. To be a good neighbor and to comply with regulatory requirements, the Sanitation Districts have invested tens of millions of dollars in systems to capture and treat malodorous air and gas streams. In order to determine whether odor removal is functioning, it is necessary to have some system for measuring odor intensity. Such a system can also demonstrate to the community and to regulators that odors are controlled.

To monitor known odorants, a variety of instrumental systems can be employed as "electronic noses" of varying degrees of sophistication. However, to truly evaluate odor impact, the human nose is still the ultimate detector. The Sanitation Districts Laboratory currently employs two different olfactometry methods.

One method is triangular forced-choice dynamic dilution ascending concentration series olfactometry, with an odor panel of six to ten odor assessors. The odor assessors smell greatly-diluted gas samples, and the dilution ratio is gradually decreased until an odor is detected. This method is used for various projects, including semi-routine monitoring of air streams before and after treatment by odor-scrubbing facilities, to assure that they are performing properly.

For some projects, we employ gas chromatography/mass spectrometry-olfactometry. The exit stream from the gas chromatography column is split between the mass spectrometer and two sniffer ports. Analysts inhale at the sniffer ports and then use a signal generator to indicate the strength for each odor as a geometric progression. They also record a verbal characterization of each odor. By correlating the retention time for a detected odor to that of a corresponding mass chromatogram peak, it is possible to identify the odorant through mass spectral pattern matching. People vary greatly in their sensitivity to odors and individually perceived odor strengths are generally represented as a geometric progression. As a result, overall odor strength is most appropriately reported as a geometric mean of individual measurements.