

DRAFT -- PROJECT OVERVIEW – Brief version, 2010-Feb-25

A Preliminary Investigation of the Potential for Ground-Level Ozone Formation Resulting from Biosolids Emissions

OBJECTIVE: To determine whether the types of Volatile Organic Compounds (VOCs) emitted from typical biosolids operations found around California's Central Valley during the May to October ozone "season" will react with oxides of nitrogen (NO_x) and form ozone.

OVERVIEW: The MOChA (Mobile Ozone Chamber Assay) provides an environment to mix whole gaseous emissions, in the field, from any source, with known quantities of oxides of nitrogen (NO_x) in order to measure actual ozone formation as might occur in the atmosphere. The MOChA was developed at UC Davis and has been used to profile emissions at dairies, for livestock and poultry operations, in orchards, at other animal agricultural sources, and at composting operations.

The sampling and subsequent analysis will result in a report which will be available to all stakeholders. After review by stakeholders, the report will be provided to regulators. The sampling and analysis may also be used by Dr. Green and his colleagues as the basis for an article published in a peer-reviewed scientific journal. This establishes the results in the literature and keeps them permanently available.

RATIONALE: Research demonstrates that all biological activities emit VOCs. Regulators assume that because VOCs are being emitted, ozone will be formed. However, VOCs vary greatly in their reactivity and in their propensity to contribute to ozone formation. Previous studies have concentrated on the total amount (pounds per day, for example) of emissions. The types of VOC emissions (the source profile, or 'fingerprint') coming off many sources have not been adequately determined. The assumption that a given source contributes to ozone formation should to be evaluated before regulators implement new rules which will raise operating costs. Moreover, there is no way to know the new rules will actually result in cleaner air: if a large amount of low reactivity VOCs is replaced by a smaller amount of sufficiently high reactivity VOCs, more ozone would actually be formed.

BACKGROUND: This project will provide a timely and low-cost appraisal of the potential for biosolids emissions to contribute to ozone formation. Ozone is beneficial in the stratosphere, but at ground level it harms human health, decreases crop yields, and is regulated as a "criteria pollutant" under the federal Clean Air Act. What makes ozone complicated is that it forms secondarily in the atmosphere from emissions of two precursor gases, plus sunlight. In hot, sunny regions, such as found in most of California, VOCs mix with oxides of nitrogen (NO_x)—mostly coming from engine exhaust—to form ozone. In ozone non-attainment regions, local air quality regulators are under pressure to regulate any industry which might emit precursors to ground-level ozone formation.

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