USING OLFACTOMETRY TO EVALUATE ODOR PERSISTENCY FROM SITES EMITTING ODOR

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*Supported by Bay Area Air Quality Management District of California, USA

Objectives

- An Energy Development Facility (dry anaerobic digestion) has been evaluated as an odor source to optimize the evaluation of odor persistency.

- Objectives:

    1) Identify the **odor characteristics** and **intensity** emitted.

    2) Determine the **relative contribution of the different odors** emitted**.**

90,000 tons per year of “wet” organic waste material.

produces clean, green renewable energy and a feedstock for composting.

Objectives and Methods

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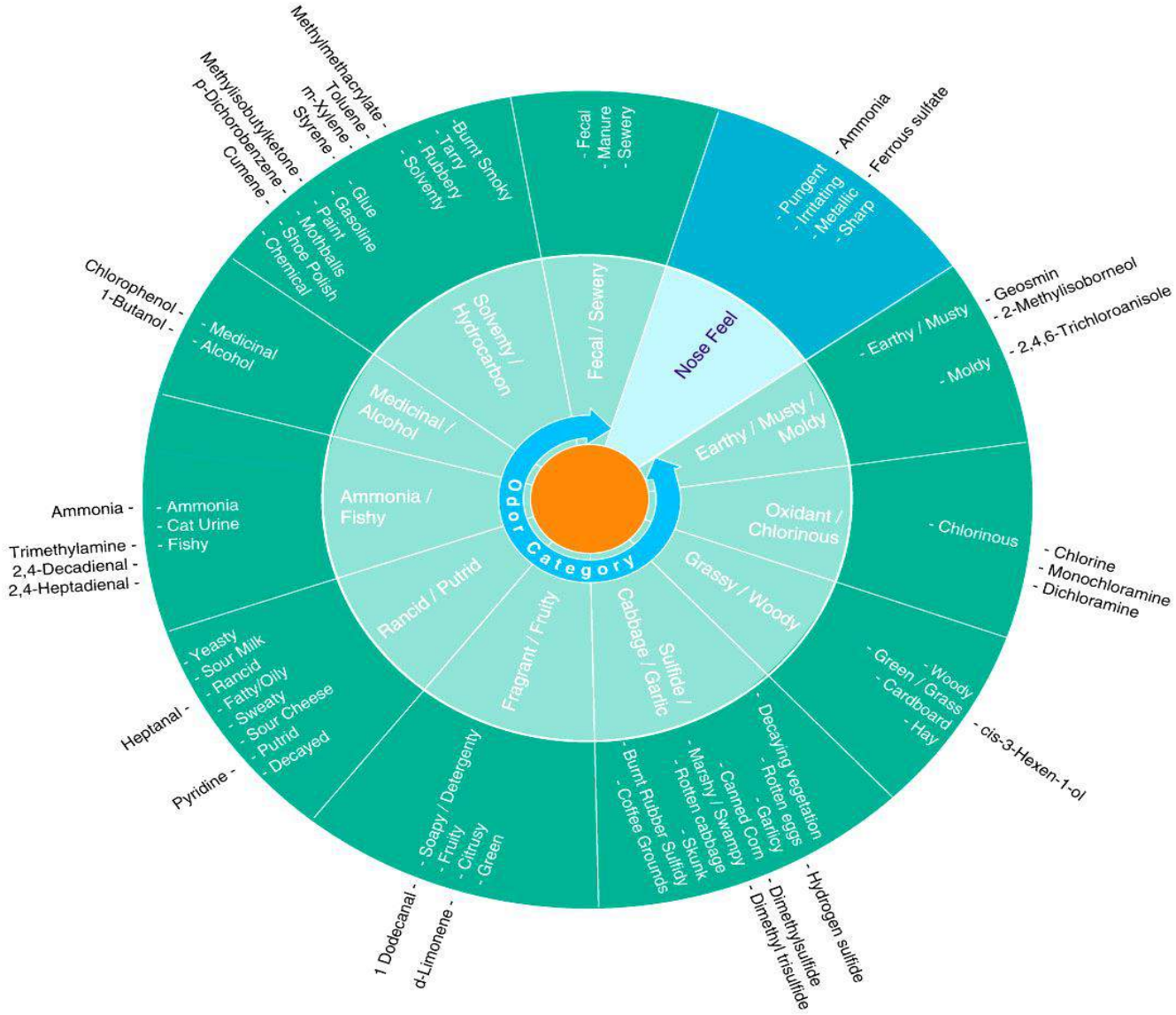
- Methods:
    1) **Odor Profile Method** to identify each odor & its intensity.

Method 1: An Odor Wheel Was Used to Define Odor Character



Odor Wheel

from: *Development of an Odor Wheel Classification Scheme for Wastewater*. G.A. Burlingame, I.H.Mel Suffet, D. Khiari, A.L. Bruchet. 2002. Sixth IWA Symposium on Off-Flavours in the Aquatic Environment, Barcelona, Spain.

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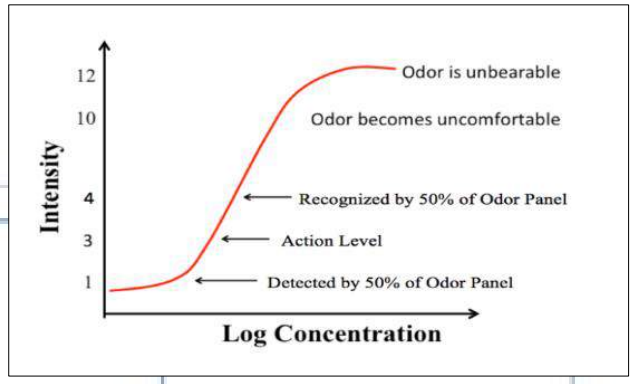
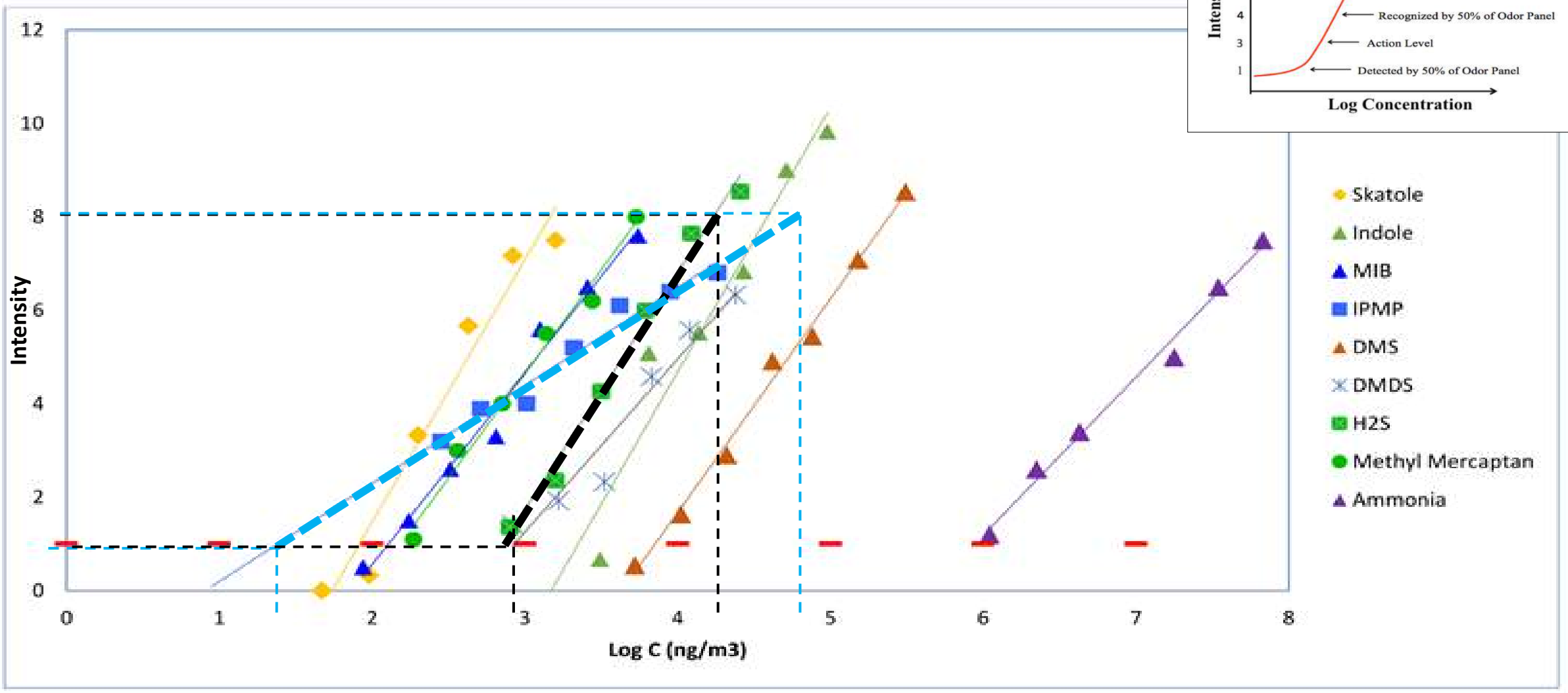
- Methods:

  1) **Odor Profile Method** to identify each odor & its intensity.

  2**) Olfactometry** to determine the persistency of the odor
  (i.e., the rate of decrease of an odor intensity with dilution).

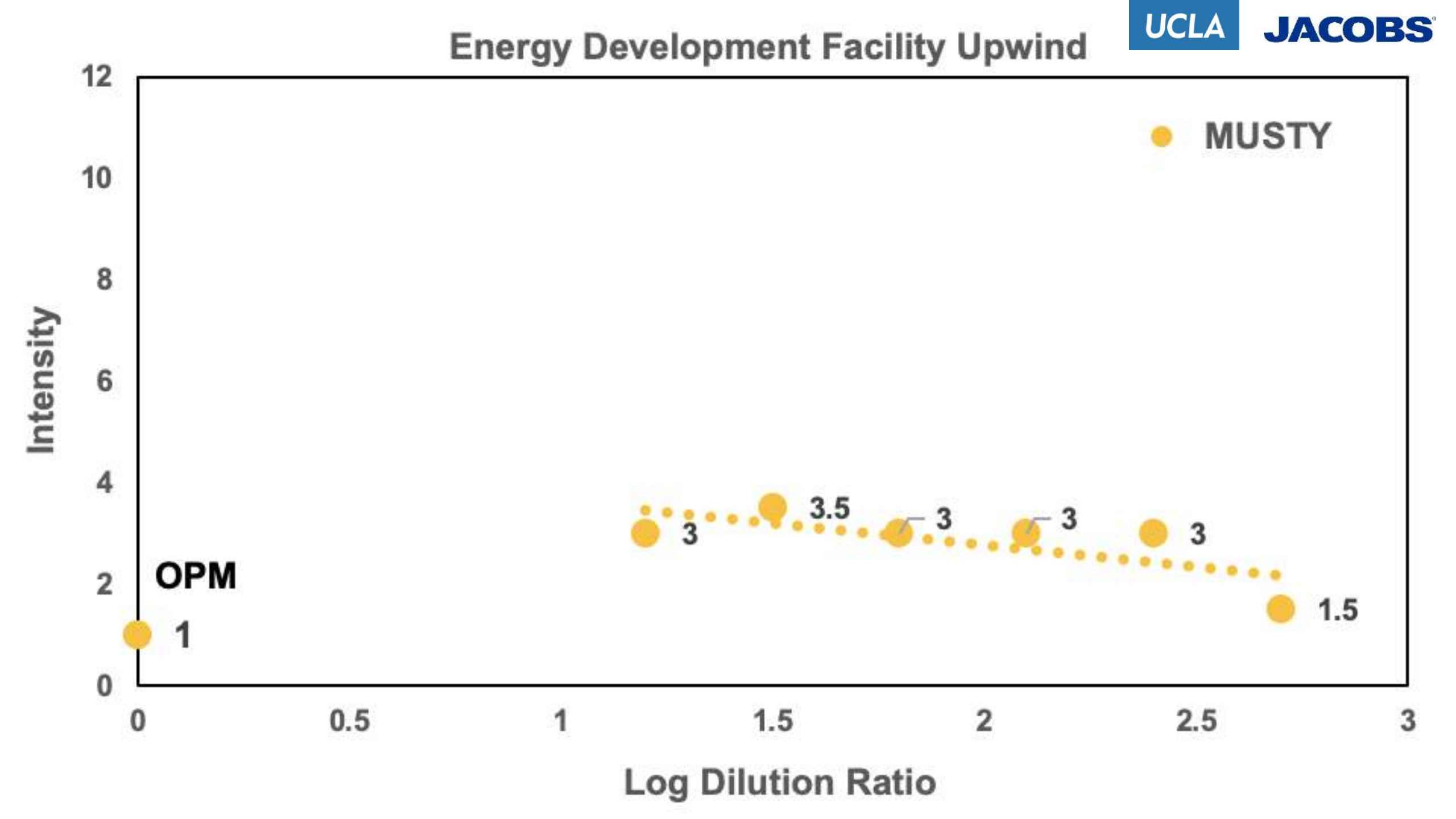
Method 2. The Weber-Fecher Law to characterize Intensity of each Odor Characteristic

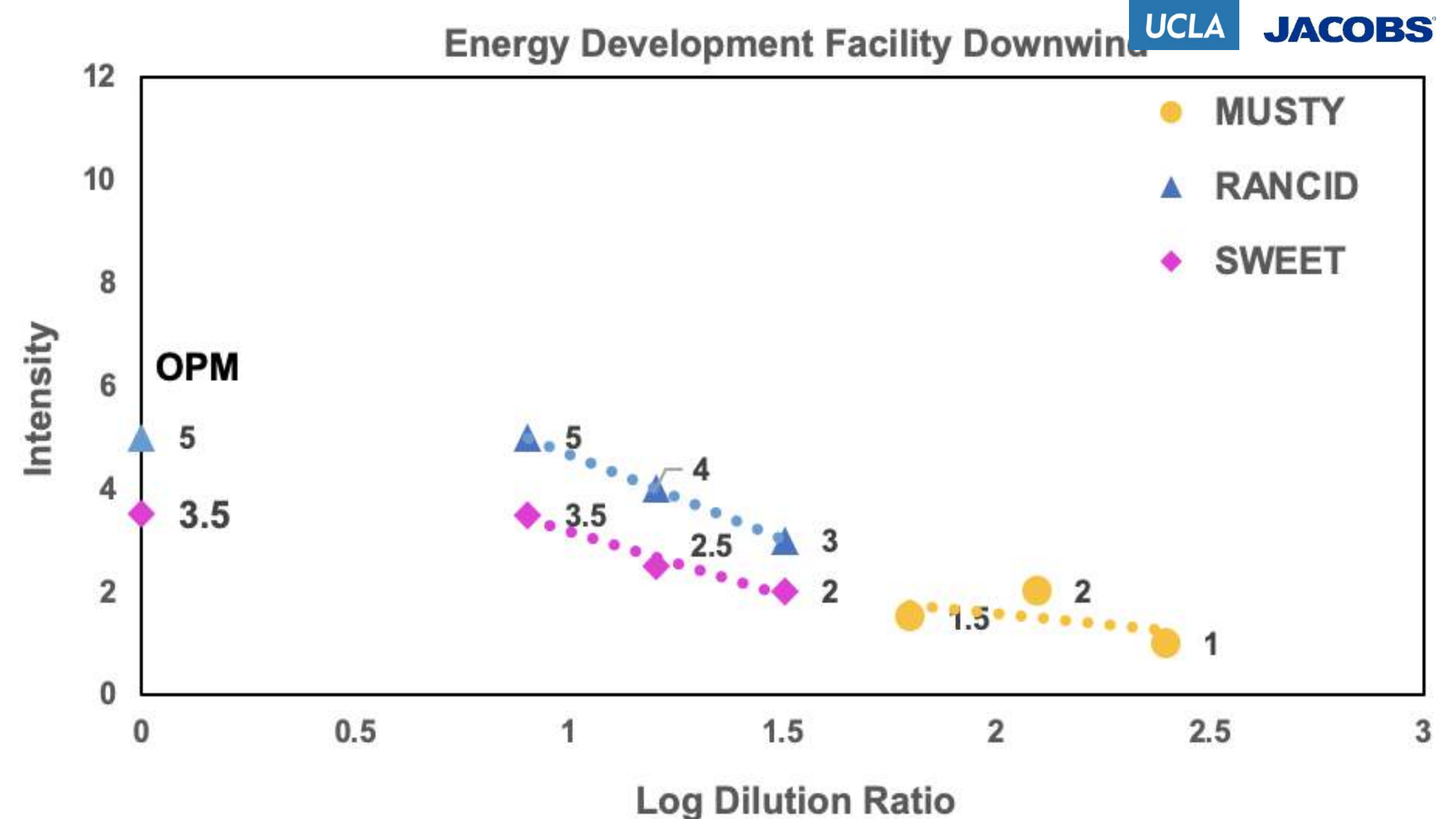


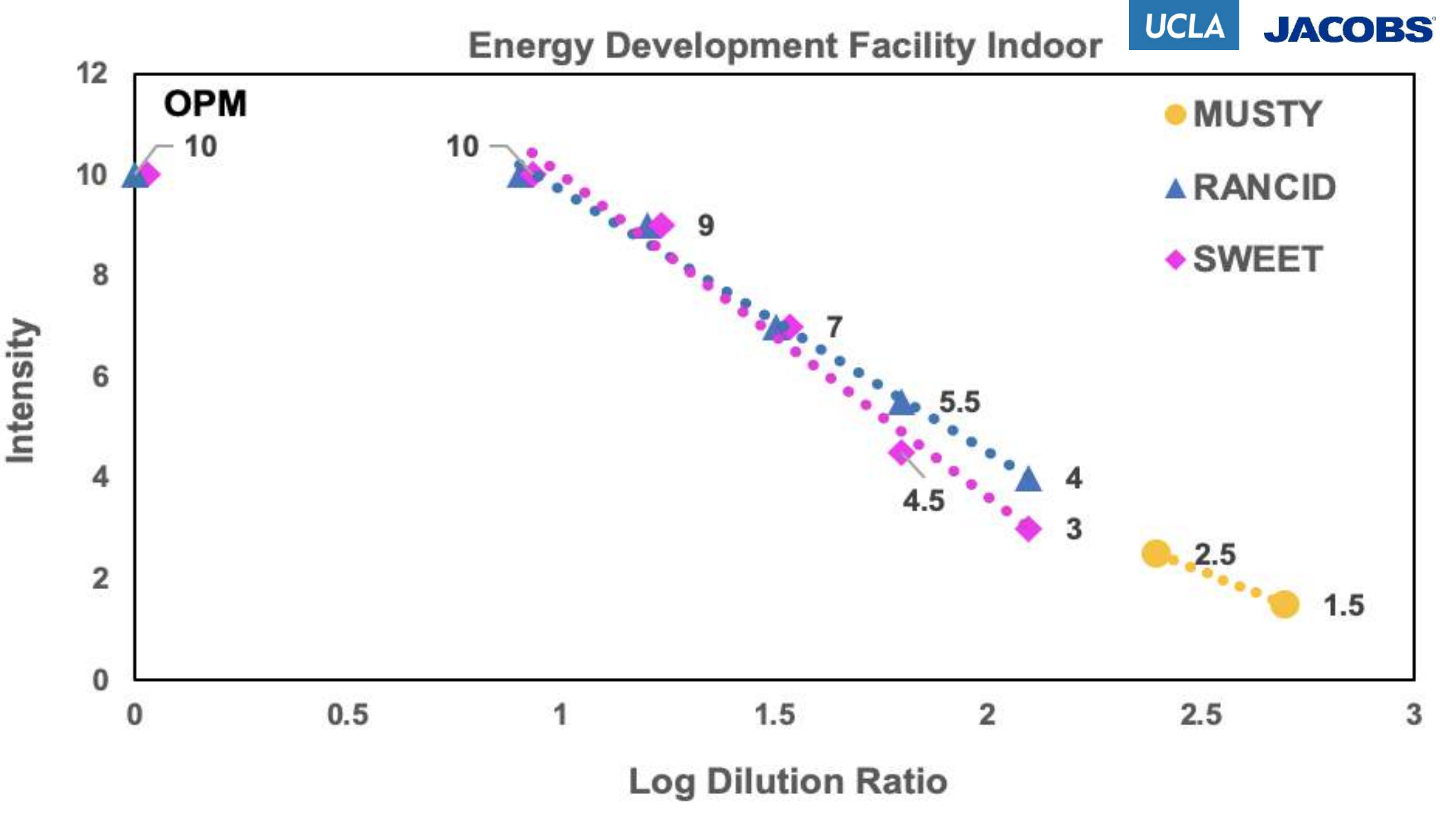


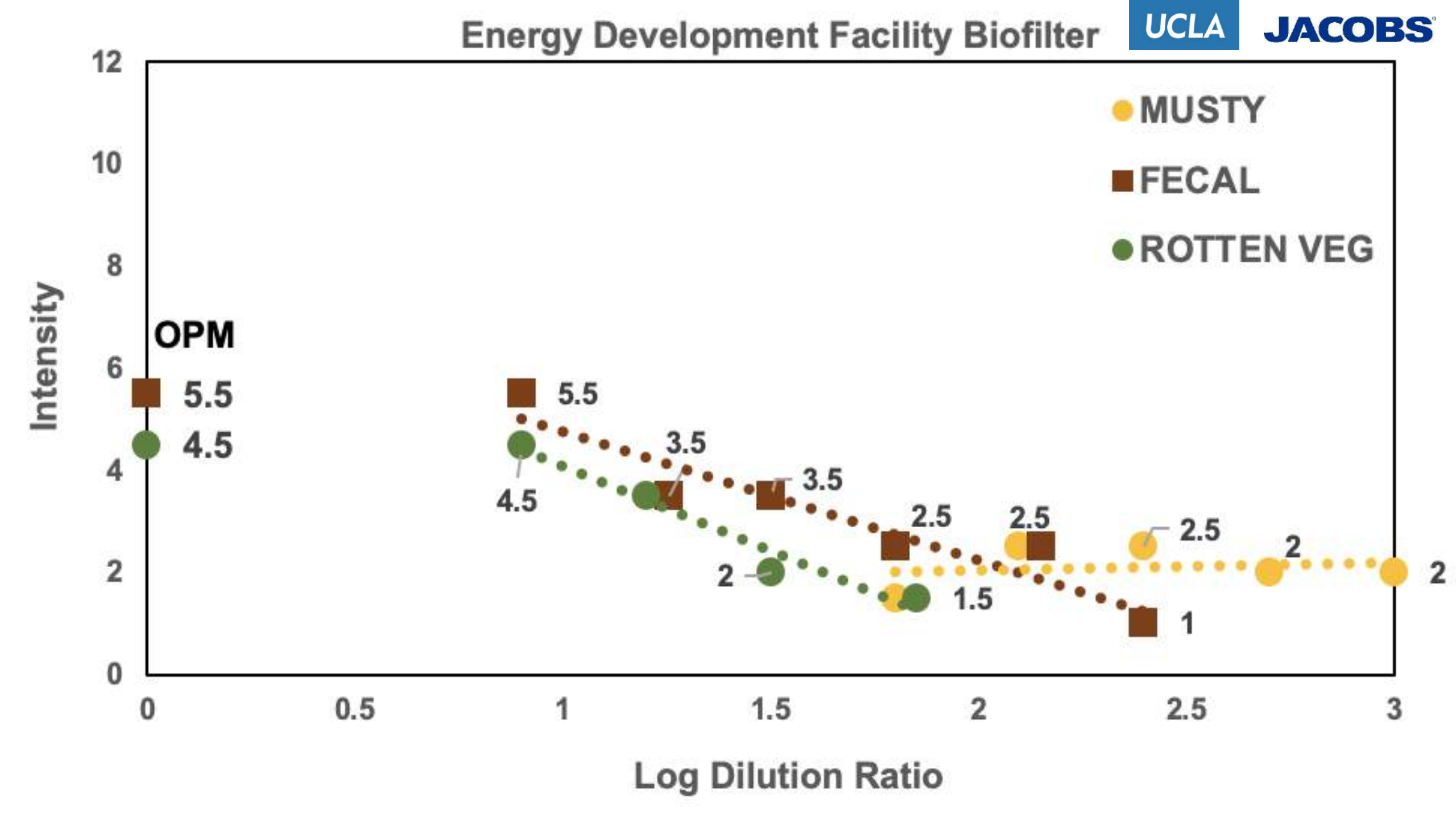
Odor Profiling Analysis Data

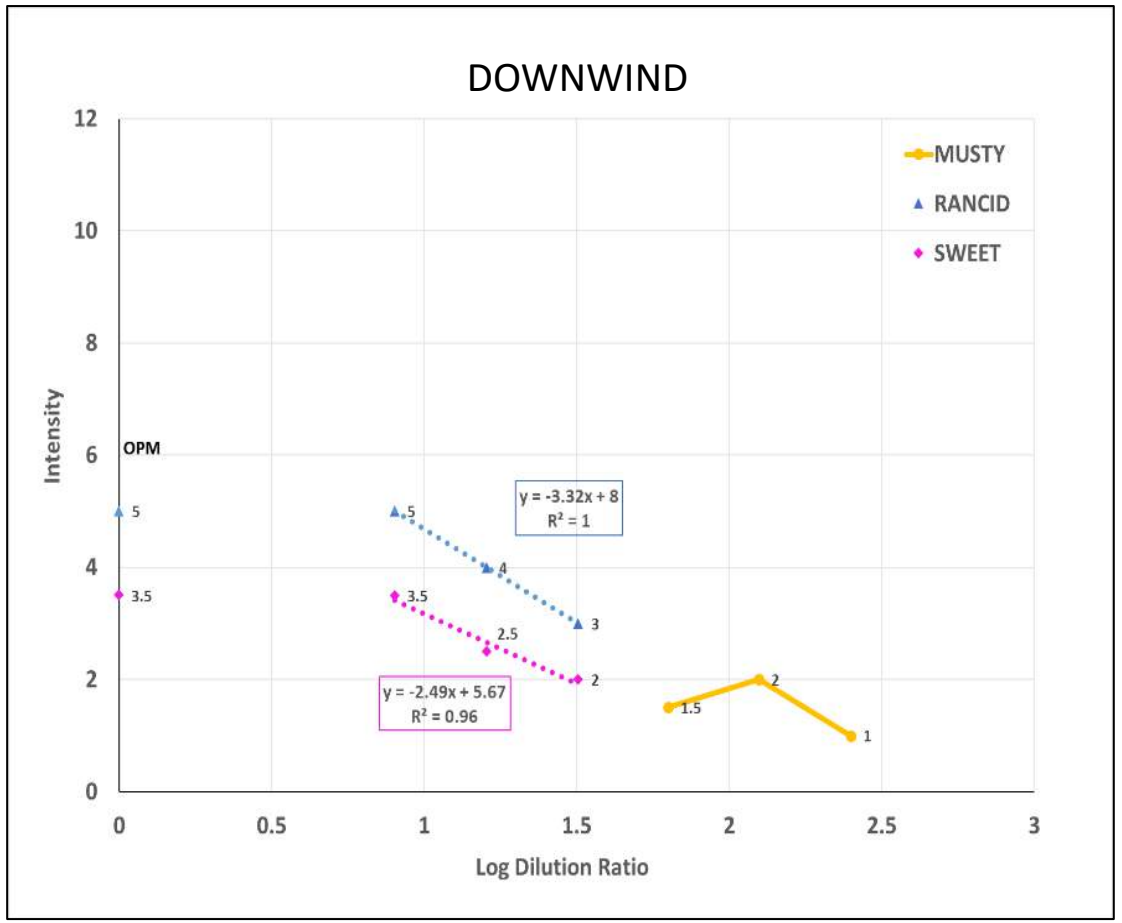
Energy Development Facility	
Sample Location	OPM Odor Characteristics and Avg. Intensity by 4 Panelist
Upwind	Musty 1.0±1.2;
Downwind	Rancid 5.0±2.0, Sweet 3.5+1.0; other odor note: Rotten Veg.
Indoor Facility	Rancid 10.0±1.6, Sweet 10.0±1.6;
Biofilter Effluent	Fecal 5.5±2.5, Rotten Veg. 4.5±5.3;


Energy Development Facility Upwind
UCLA
JACOBS
MUSTY
Intensity
Log Dilution Ratio
OPM
1
3
3.5
3
3
3
1.5
0
2
4
6
8
10
12
0
0.5
1
1.5
2
2.5
3

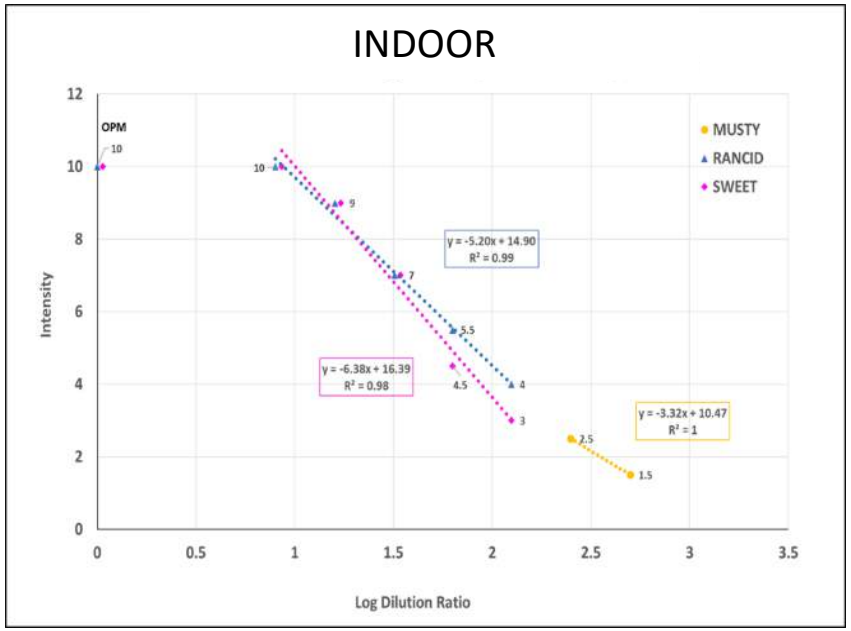

UCLA
JACOBS
Energy Development Facility Downwind
MUSTY
RANCID
SWEET
OPM
5
3.5
5
4
3.5
2.5
3
2
2
1.5
1
Intensity
Log Dilution Ratio
0
2
4
6
8
10
12
0
0.5
1
1.5
2
2.5
3


Energy Development Facility Indoor
UCLA
JACOBS
OPM
10
10
9
7
5.5
4
4.5
3
2.5
1.5
MUSTY
RANCID
SWEET
Intensity
Log Dilution Ratio
0
2
4
6
8
10
12
0
0.5
1
1.5
2
2.5
3

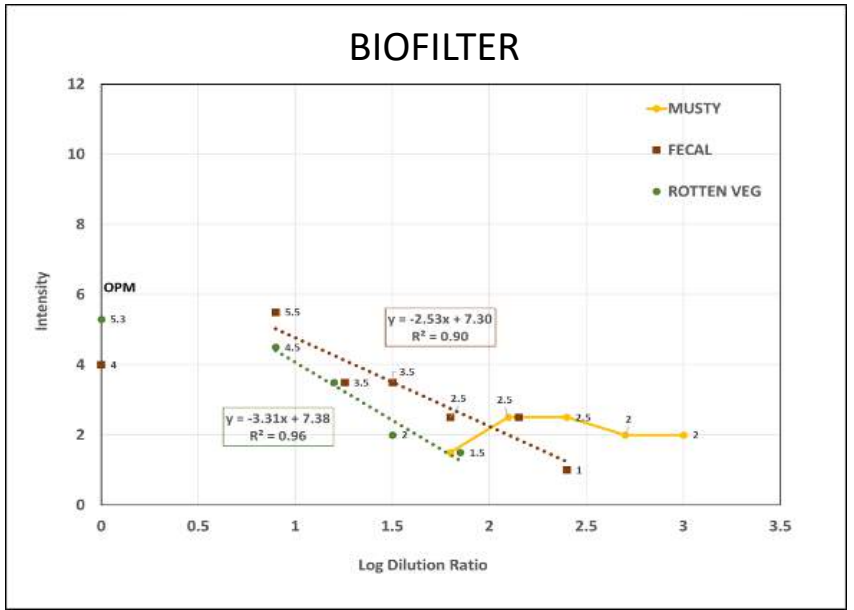

Energy Development Facility Biofilter
UCLA
JACOBS
MUSTY
FECAL
ROTTEN VEG
OPM
5.5
4.5
Intensity
Log Dilution Ratio
0
2
4
6
8
10
12
0
0.5
1
1.5
2
2.5
3
5.5
3.5
4.5
3.5
2.5
2.5
2.5
2
2
1.5
1


DOWNWIND
MUSTY
RANCID
SWEET
Intensity
Log Dilution Ratio
OPM
y = -3.32x + 8
R² = 1
y = -2.49x + 5.67
R² = 0.96

=


INDOOR
MUSTY
RANCID
SWEET
Intensity
Log Dilution Ratio
OPM
y = -5.20x + 14.90
R² = 0.99
y = -6.38x + 16.39
R² = 0.98
y = -3.32x + 10.47
R² = 1

?


BIOFILTER
MUSTY
FECAL
ROTTEN VEG
Intensity
Log Dilution Ratio
OPM
y = -2.53x + 7.30
R² = 0.90
y = -3.31x + 7.38
R² = 0.96

Conclusions

- **OPM with Persistency curves** can help understand which odors are dominant at the source and which odors become dominant when they travel into the community.
  - **Air samples from the Facility** showed high levels of rancid, rotten veg. & fecal odors (that can mask the musty odorants that are more persistent).
  - **Air inspectors** might detect a high level of odor from location at the Facility, but the odor nuisance in the community may be different after dilution.

- **OPM with Persistency curves** helped identify the major odor source causing odor nuisance.
  - **Upwind**: a minimum background musty odor.
  - The **biofilter:** a medium level of fecal & rotten veg. odor that could be a community nuisance.
  - The **major source** of odor to the community was the rancid from the indoor area of the EDF.
  - The air coming out from the Facility added to a musty odor nuisance for the area further away after the rancid odor dissipated.

Thank you

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