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## Proposed CB60 promotes compost and mulching facilities in Howard County



Proponents of CB60 have made a strong case showing the ecological and economic benefits of composting and mulching

Opponents of CB60 have raised concerns about the potential risks to public health from compost and mulching operations.

How strong is their case?

**My conclusions based on review of reports contained in the County's website on mulching and composting:**

The evidence indicates that there are enormous economic, ecological and environmental benefits to expanded composting in Howard County.

Modern jurisdictions are heading to zero waste policies with a decline of landfills—a major source of methane (potent GHG).

Although there are risks associated with particulates, bacteria and fungi from composting, opponents of CB60 and have not made the case that the risks are significant.

For example, as pointed out by Dr. Felton, most of the studies cited by Dr. Velculescu are from occupational exposures. Clearly wood workers and compost workers have close and more frequent contact with emissions than do residents located hundreds of feet from a source.

He focuses on study ( ) describe – and assumes the information can be extrapolated the kinds and sizes of facilities in Howard Co.

Moreover, failed to evaluate the many factors which affect the actual exposures of residents at varying distances from a source.

## SOURCE RECEPTOR RELATIONSHIPS

Pathway of Exposure = Air

### Transport and Diffusion

#### Composting Facility

- Contaminants
- Emission rates
  
- Size, locations of emission



- Wind direction
- Wind speed
- Turbulence levels
- Atmospheric diffusion
- Deposition (wet & dry)

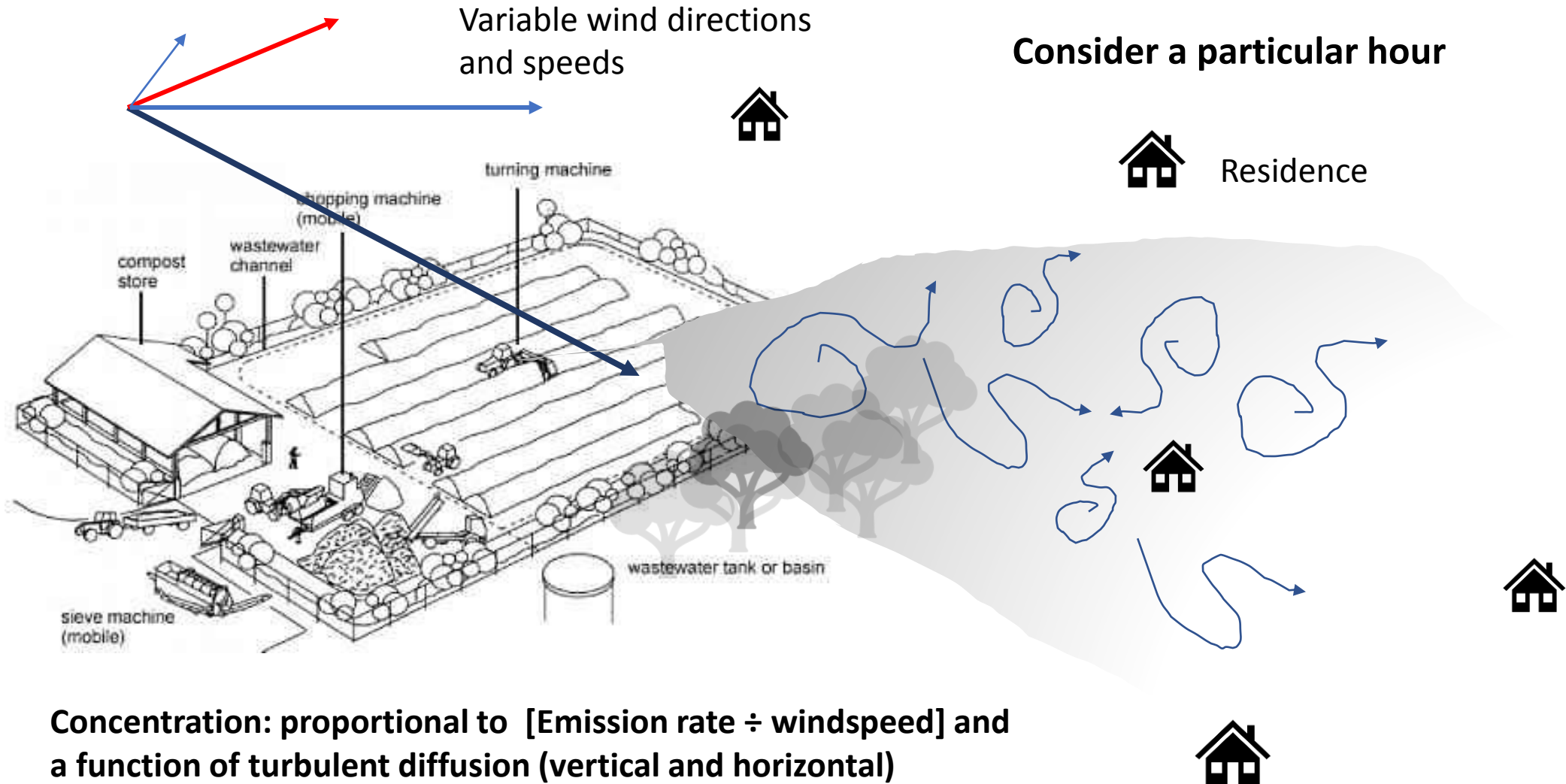


#### Receptor Location (People)



**Exposures**

- Exposure routes (ingestion, inhalation, direct contact)
- Exposure: level, duration, frequency
- Toxicity of the pollutant Only 1 factor



For a given time period the wind (direction & speed) and stability (how turbulent) determine location and level of maximum ambient concentrations & exposures

Particulate plumes moving unobstructedly over open terrain are significantly broadened, both horizontally and vertically, when they encounter a forest edge; this in effect dilutes the concentration of particulates in the plume. The amount of broadening is influenced by the foliage density. Dense fo

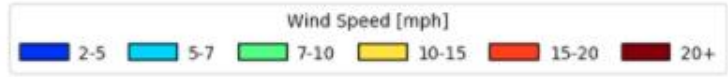
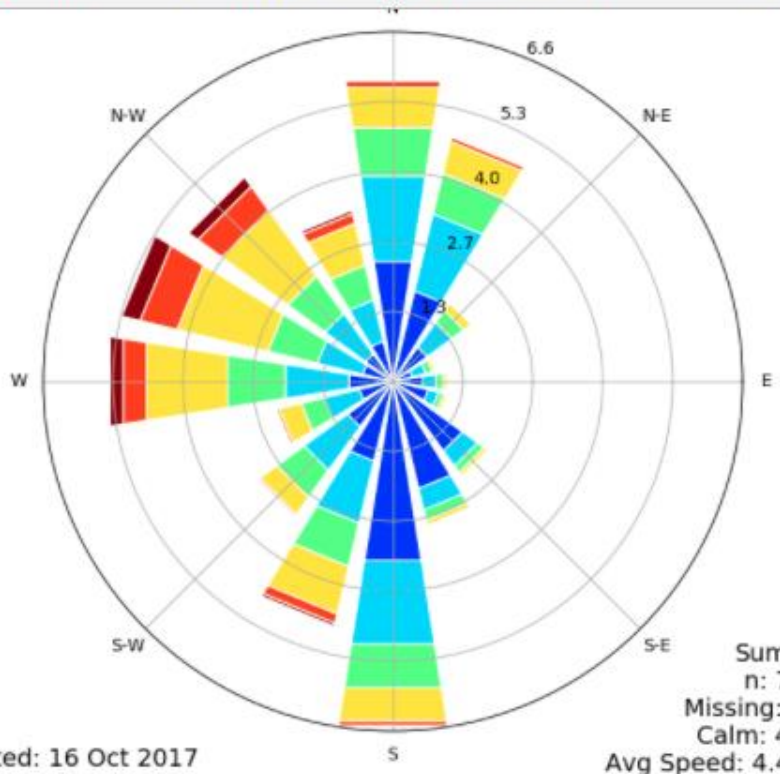
Well established and part of the Task Force Record

ANALYSIS OF HEALTH IMPACTS

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## **BIOAEROSOLS AND COMPOSTING**

Edited by Patricia Millner, Jan.  
1995 , major study



EPA modeling guidance: five years of meteorological data and algorithms that simulate the impact hourly conditions (wind, solar intensity, surface characteristics) to determine how emissions will be transported and dispersed in the atmosphere.

The models also use detailed information about the source including emissions, release heights, temperatures, and physical characteristics of the source.

Particle size distributions are important in determining health impact and deposition rates.



# Cancer

- “The association between occupational exposure to wood dust and various forms of cancer has been explored in many studies and in many countries.” (CDC)
- “There is *sufficient evidence* in humans for the carcinogenicity of wood dust. Wood dust causes cancer of the nasal cavity and paranasal sinuses and of the nasopharynx. Wood dust is *carcinogenic to humans (Group 1)*.” (WHO, IARC)

Most concerns are from indoor, occupational studies; However Dr. Velculescu's slide presentation includes one study on odor and health effects associated with a composting facility in Germany. The study was conducted nearly 15 years ago. See Felton's assessment, a large facility.

## Real World Example of Composting Health Effects on Nearby Residents

- Health effects to a residential area from environmental outdoor pollution hundreds of meters from a composting site (Occup Environ Med 2003;60:336–342)

Reported health complaints§	SSI†	Bioaerosol pollution in residential air‡ up to >10 <sup>3</sup> CFU m <sup>-3</sup> air		Duration of present residency > 5 years	
		OR**	95% CI††	OR	95% CI
Respiratory tract					
Frequency of colds >5x/year	209	1.94	0.65 to 6.78	4.72	1.19 to 31.83
Bronchitis	210	3.02	1.35 to 7.06	2.91	1.29 to 7.03
Waking up due to coughing	202	2.70	1.23 to 6.10	2.51	1.19 to 5.53
Wheezing	207	1.96	0.84 to 4.82	2.95	1.22 to 7.99
Shortness of breath at rest	203	3.99	1.31 to 15.19	1.50	0.56 to 4.49

Opponents Expert Slide:

Assessing Benefits Risks and Adverse Impacts:



## Impacts or risks associated with exposures to contaminants and their toxicity

Short-term (acute, hours or days); Long term (months-years).

Example: Particulate matter PM<sub>2.5</sub> (less than 2.5 micrometers diameter)

Short-term	24 hours	35 $\mu\text{g}/\text{m}^3$	98th percentile, averaged over 3 years
Long-term	1 year	12.0 $\mu\text{g}/\text{m}^3$	annual mean, averaged over 3 years

Cancer risk a function of total exposure to one or more carcinogens over many years or a life time.

## **Risks and adverse impacts from a source of air emissions**

- **Pathway of exposure (air, water)**
- **Atmospheric transport and diffusion**

## **Occupational vs Ambient Exposures**

Data from biosolids composting sites have indicated that at distances of 250 to 500 feet from compost facility perimeters, the airborne concentrations of *A. fumigatus* were at or below background concentrations.

In response to the question initially posed to the experts at the workshop, the answer that emerged was: "Composting facilities do not pose any unique endangerment to the health and welfare of the general public."

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The results confirm that, close to the source of composting processes, large concentrations of bacteria, actinomycetes and fungi, and to a lesser extent endotoxin and dust, may be aerosolized. Bacteria and fungi frequently in excess of 100,000 ( $10^5$ ) cfu/m<sup>3</sup> of air and sometimes in excess of 1 million ( $10^6$ ) cfu/m<sup>3</sup> air were measured immediately adjacent to the release area (windrow turning).

Although the pattern of concentrations varied at some of the sites, from the data gathered in this study it could be observed that there was a general trend of decreasing bioaerosol with distance from the source. This is most prominent at 50m distance from the source compared to the immediate area of release (samples taken outside vehicle cabs), and at 10m distance. By 50m and 100m distances downwind of the process, bioaerosol concentrations were substantially reduced by comparison to those levels measurements at source.



Health and Safety  
Executive

**Bioaerosol emissions from waste  
composting and the potential for  
workers' exposure**

Prepared by the Health and Safety Laboratory  
for the Health and Safety Executive 2010



- **Composting can reduce methane emissions from landfills and GHG impacts from agriculture**

## **THE SOURCE(S)**

### **Nature of contaminants emissions:**

- **Particles (size distribution and composition)**
- **Gases/volatile chemicals:**
- **Bioaerosols (size, types, etc.)**

**Emission rates and their variability**

### **Source characteristics, configuration**

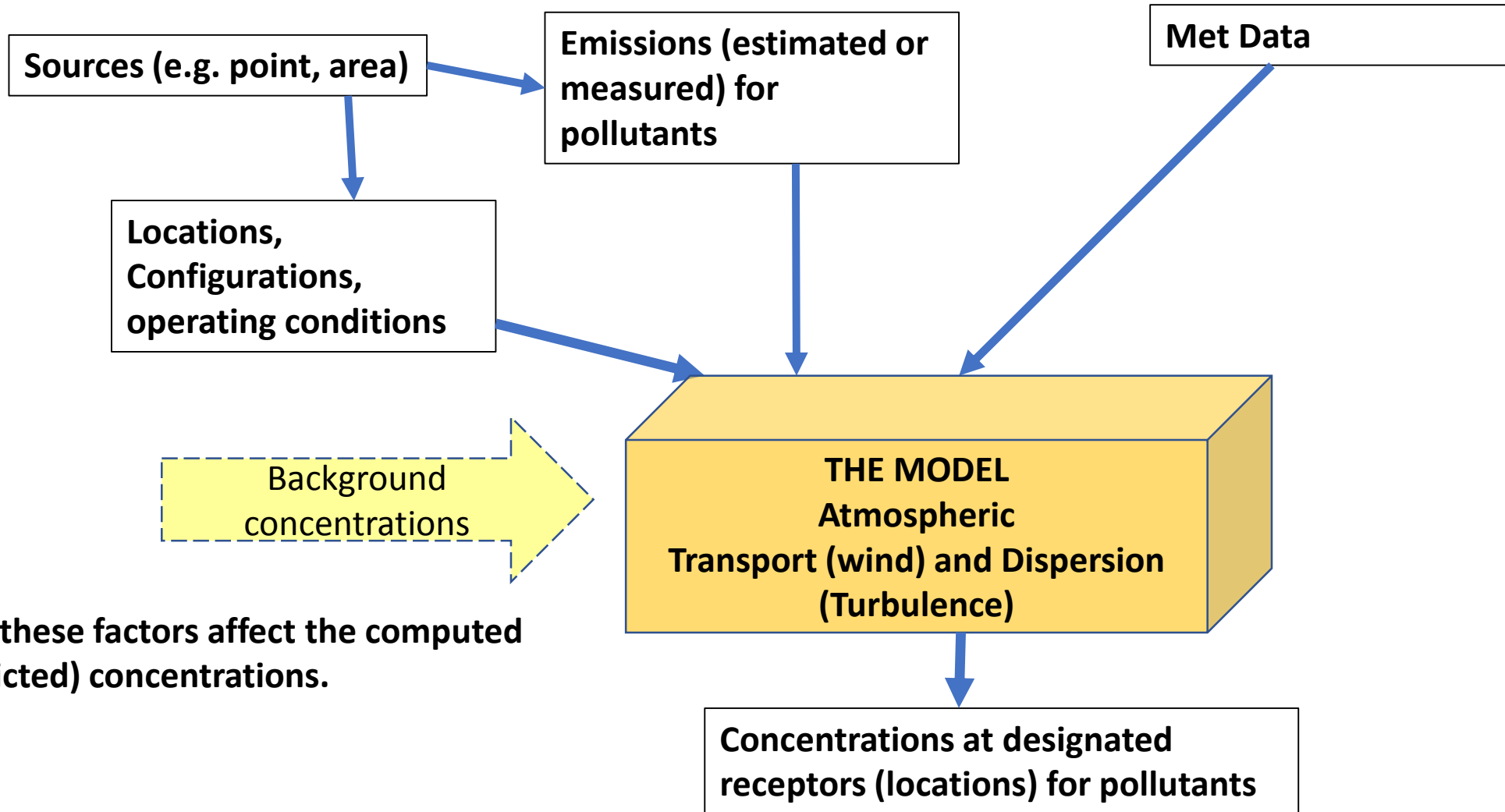
- **Point, Area, Volume**
- **For a compost pile, surface area exposed, moisture content, aerobic vs. anaerobic, etc.**
- **Height(s) of release**

## **Emission rates**

**Etc. grams/second particles per second  
Tons per year, etc.**

**Particulates from compositing, wood  
chipping**

# AIR QUALITY IMPACTS ARE DETERMINED BY A NUMBER OF FACTORS



All of these factors affect the computed (predicted) concentrations.