Evaluation of Biosolid Aerosols for *Staphylococcus aureus*

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THE *STAPHYLOCOCCUS* STORY: FACTS

Staphylococcus aureus

- Gram positive coccus
- Commonly found within nose of healthy people
- Can result in minor or major skin infections
- To date, no scientific data or epidemiological study has been published linking *S. aureus* to land application of biosolids

THE *STAPHYLOCOCCUS* STORY: ALLEGATIONS

- *S. aureus* is found in biosolids
- *S. aureus* from biosolids results in adverse public health affects
- *S. aureus* from land applied biosolids has resulted in deaths
- Irritant chemicals increase host susceptibility (no scientific evidence)

EXPOSURES TO *STAPHYLOCOCCUS AUREUS*

Carriers	%
Children	25
Adults	20–40
Physicists	50
Hospital Workers	90
Occurs in household dust	Not known

Biosolid

↓

M *Staphylococcus* Enrichment Broth

↓

Mannitol Salt Agar and Baird Parker Medium

↓

Staphylococcus confirmation:

- gram positive
- catalase positive
- coagulase positive
- slide coagulase positive
- resistant to polymyxin B
- cocci

S. AUREUS RESEARCH AT THE UNIVERSITY OF ARIZONA

- Samples collected from 14 sites across the United States, SW USA to East Coast
- Five sewage samples
- 23 different biosolid samples
- 27 aerosol samples from land application sites

TYPES OF BIOSOLIDS ANALYSED

Class B

- Anaerobic mesophilic digestion
- Aerobic mesophilic digestion
- Aerobic mesophilic digestion, lime
- Anaerobic mesophilic digestion, lime

Class A

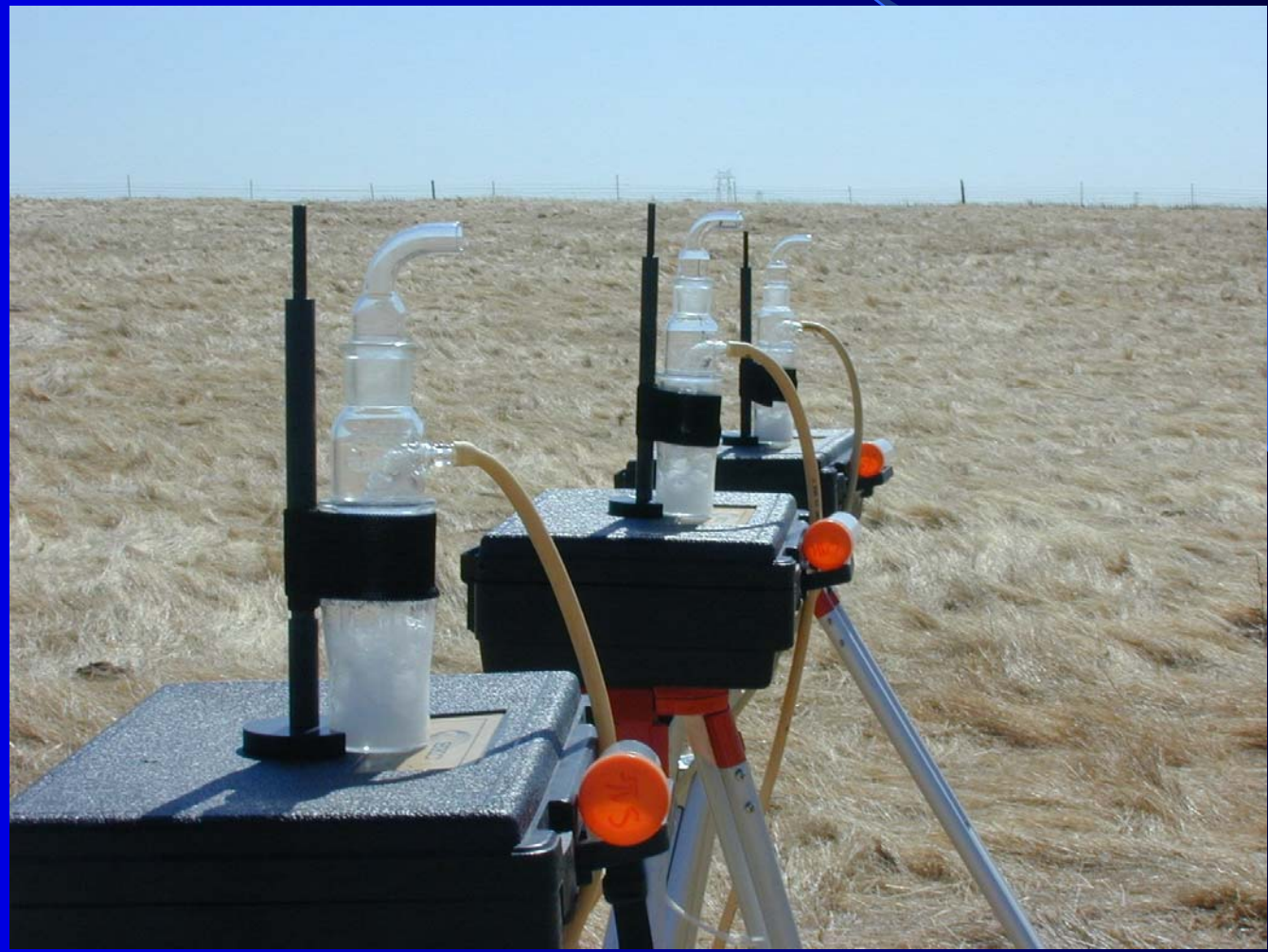
- Thermophilic aerobic digestion
- Anaerobic thermophilic digestion
- Heat dried pellets made after anaerobic mesophilic digestion
- Heat dried pellets made from undigested sewage
- Heat dried pellets following anaerobic mesophilic digestion
- Heat dried pellets from mixture of undigested thickened primary and thickened waste activated sludge
- Composted aerobic pile

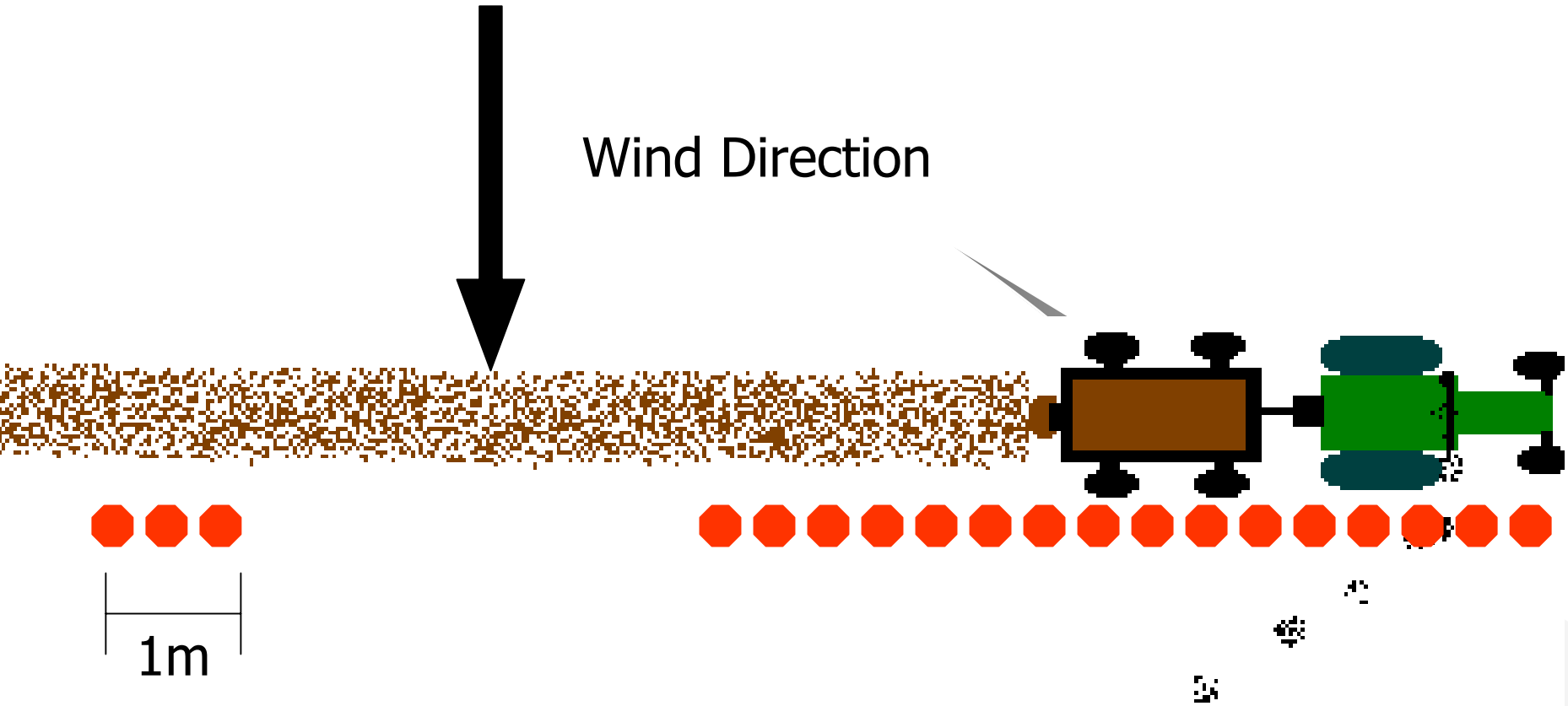
AEROSOL SAMPLES

- 2 m downwind of liquid spray biosolids
- 23 m downwind of hopper applying biosolids
- 29 m downwind of hopper applying biosolids
- 11 m downwind of truck unloading biosolids
- 2 m downwind of loading biosolids into hopper

Triplicate

Samplers at Work





Biosoilds spreader is a point source for short distances (1m)

(Microorganisms aerosolized/meter) • (meters driven)

=

Total microorganisms aerosolized

Tucson Operation

- 4,250 gal Betterbuilt© spray tanker
  - Traveling @ 3mph

Mojave, AZ Operation

- Application Method – Slinger
  - Sling Biosolids – 60-90’

Solano, CA Operation

- Application Method – Hopper
  - Spread Biosolids

Unloading

Loading

S. AUREUS RESEARCH AT THE UNIVERSITY OF ARIZONA

- *S. aureus* found in 3 of 5 sewage samples (60% incidence)
- *S. aureus* never detected in 23 biosolid samples (8 Class A and 15 Class B) (0% incidence)
- *S. aureus* never detected in 27 bioaerosol samples (0% incidence)
- Limit of Detection less than 30 per 100 gram of biosolids

S. AUREUS RESEARCH AT THE UNIVERSITY OF ARIZONA—DISCUSSION

- This study provides scientific evidence for the absence of *S. aureus* in land applied biosolids
- It shows that biosolids are not a source of *S. aureus* human exposure
- Therefore, biosolids cannot be a source of *S. aureus* infection in humans

LATEST ALLEGATION

- Irritant chemicals increase host susceptibility to *Staphylococcus* aureus infections
- *S.* aureus ubiquitous

PURE SPECULATION

- No precedent for this phenomenon
- No documented evidence in the literature