



**LOS ANGELES COUNTY
SANITATION DISTRICTS**
Converting Waste Into Resources

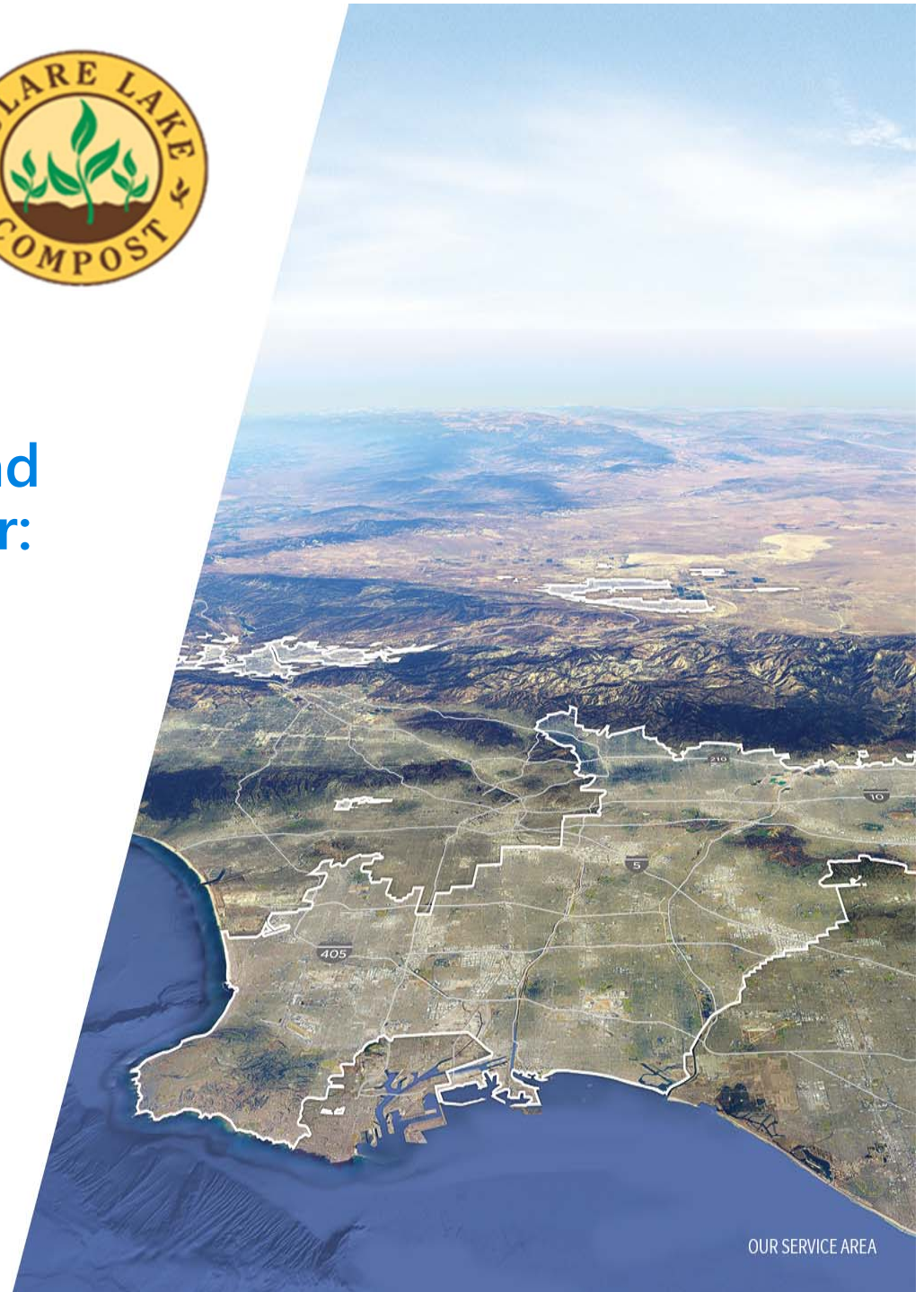


**American Academy of
Environmental Engineers and
Scientists Technical Webinar:**

Tulare Lake Compost

Attaining Sustainability in a
Nonattainment Area

June 4, 2020



Speakers



Carl Wm. Glass, P.E.

Carl is a Mechanical Engineer in the Reuse and Compliance Section with the Sanitation Districts. For the past 34 years he has been working on programs that apply technical engineering principles to resource recovery operations. He received a B.S in mechanical engineering from the University of Delaware and an M.S. in environmental engineering from Loyola Marymount University. Carl will discuss operational challenges and innovations at TLC.



Brian Polson

Brian is an Environmental Engineer in the Air Quality Engineering Section with the Sanitation Districts. For the past 5 years he has been evaluating regulations and audits to ensure compliance. He received a B.S in chemical engineering from the University of California Irvine and an M.S. in environmental engineering from California State University Fullerton. Brian will discuss air quality challenges and findings at TLC.



Larry Wong, P.E.

Larry is a Civil Engineer in the Wastewater Research Section with the Sanitation Districts. For the past 12 years he has been working on research programs that help develop practical solutions for the public sector. He received a B.S in civil engineering from the University of California Berkeley and an M.S. in civil engineering from the University of California Los Angeles. Larry will discuss research challenges and strategies at TLC.



Who are the Los Angeles County Sanitation Districts?

- 24 independent special districts
- Serving about 5.6 million people
- Approximately 850 square miles
- Encompassing 78 cities and unincorporated areas of the county





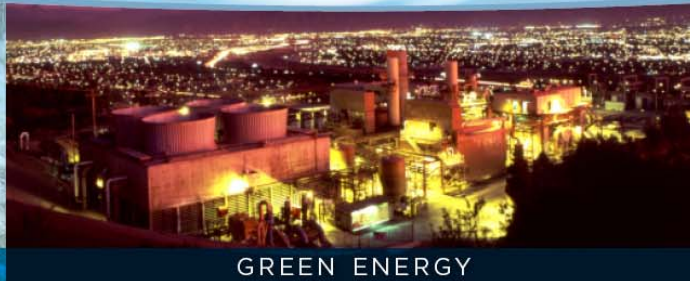
**LOS ANGELES COUNTY
SANITATION DISTRICTS**
Converting Waste Into Resources

OUR MISSION

To protect public health and the environment through innovative and cost-effective wastewater and solid waste management and, in doing so, convert waste into resources such as recycled water, energy, and recycled materials.



WATER RECYCLING



GREEN ENERGY



MATERIALS RECYCLING



Exceptional
Quality Compost
for the Central Valley

Topics to be Discussed Today

- Unique opportunity and vision at Tulare Lake Compost
- Challenges in meeting air quality regulations
- Research and results
- Meeting air quality and throughput objectives



Need to Manage Biosolids

JWPCP

- 260 MGD
- ~440,000 WTPY

488,000 tons
per year

Valencia WRP

- 14 MGD
- ~26,000 WTPY

1,300 tons
per day

Lancaster WRP

- 14 MGD
- ~13,000 WTPY

50x/day

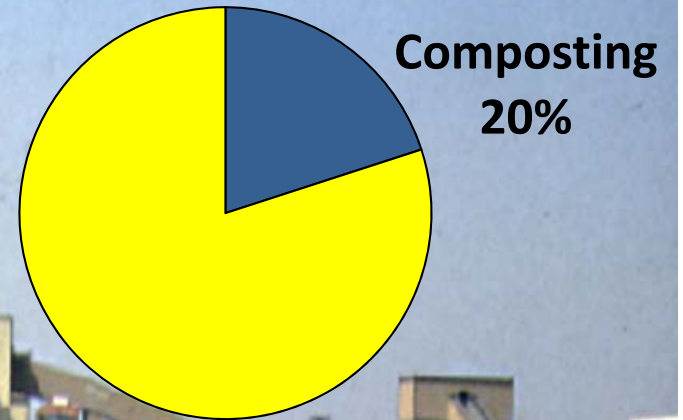
Palmdale WRP

- 10 MGD
- ~9,000 WTPY



Biosolids Management Circa 1990

Landfill 80%



Biosolids Options Start to Dwindle Circa 2000

- Puente Hills Landfill closure
- Onsite operations ended
- Land application bans



Districts Needed a Solution

- **Reliable**
- **Fully owned and operated**
- **Ability to handle full production**
- **Environmentally responsible**
- **Waste into resource**

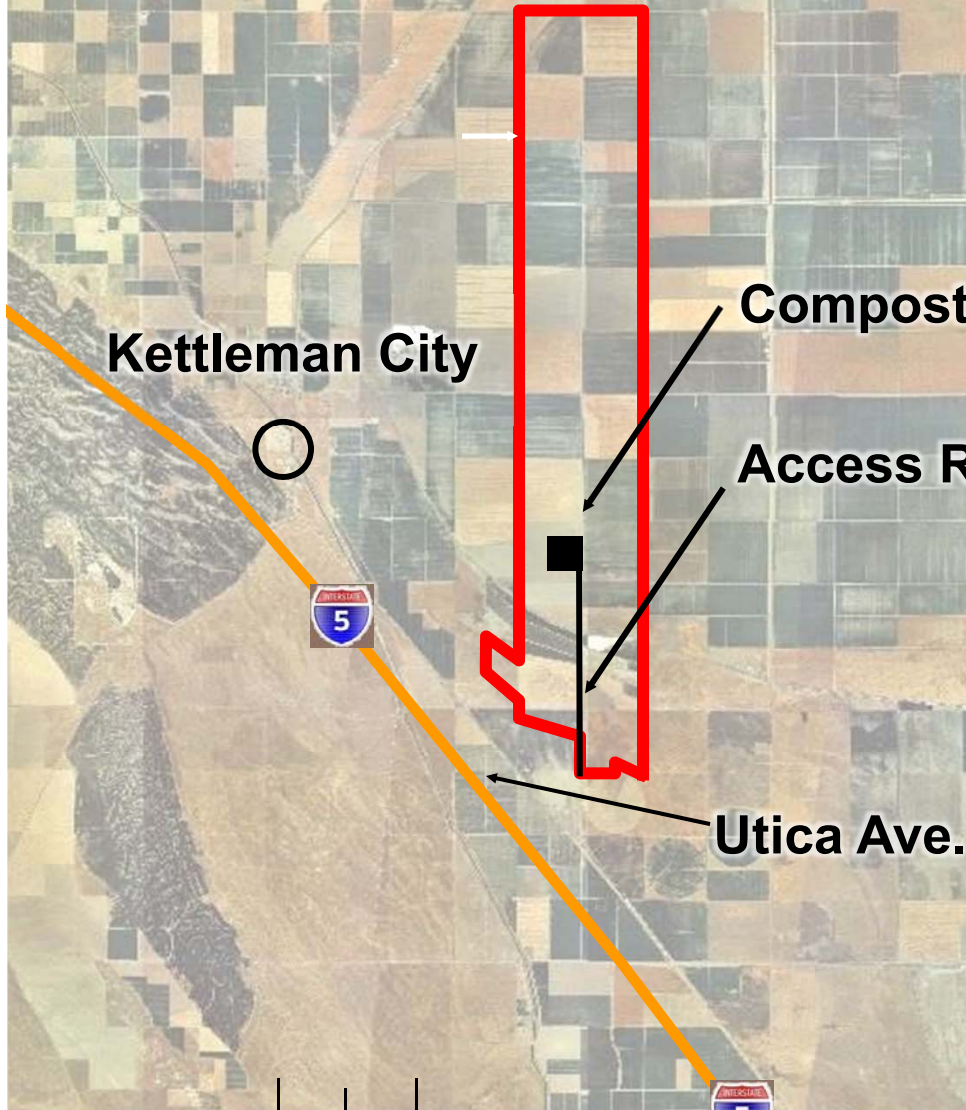


Central Valley Option

- Lots of available land
- One of the largest agricultural regions in the country
- Abundance of agricultural wood waste
- Huge demand for fertilizers and soil amendments



Tulare Lake Compost



Compost Facility

Access Road

Kettleman City

Utica Ave.



200 miles from JWPCP

WESTLAKE FARMS

LOS ANGELES COUNTY

NEVADA

ARIZONA

Composting turns biosolids into a valuable soil conditioner

Biosolids



**Bulking Agents
and Moisture**



**Elevated
Temperatures**



Compost



↑ **Soil health**

↑ **Crop yield**

↓ **Irrigation**

↓ **Evaporation**

↓ **Fertilizers**



EPA Definition of Class A Exceptional Quality Compost

- Biosolids treated beyond what occurs at the treatment plant
- PFRP – Process to Further Reduce Pathogens
 - Maintaining a temperature of 131°F for 3 days further kills pathogens
- VAR – Vector Attraction Reduction
 - 14 days at 104°F reduces the vector attraction potential
 - Vectors are animals or insects that can carry disease, such as rats, flies, mosquitos, etc.

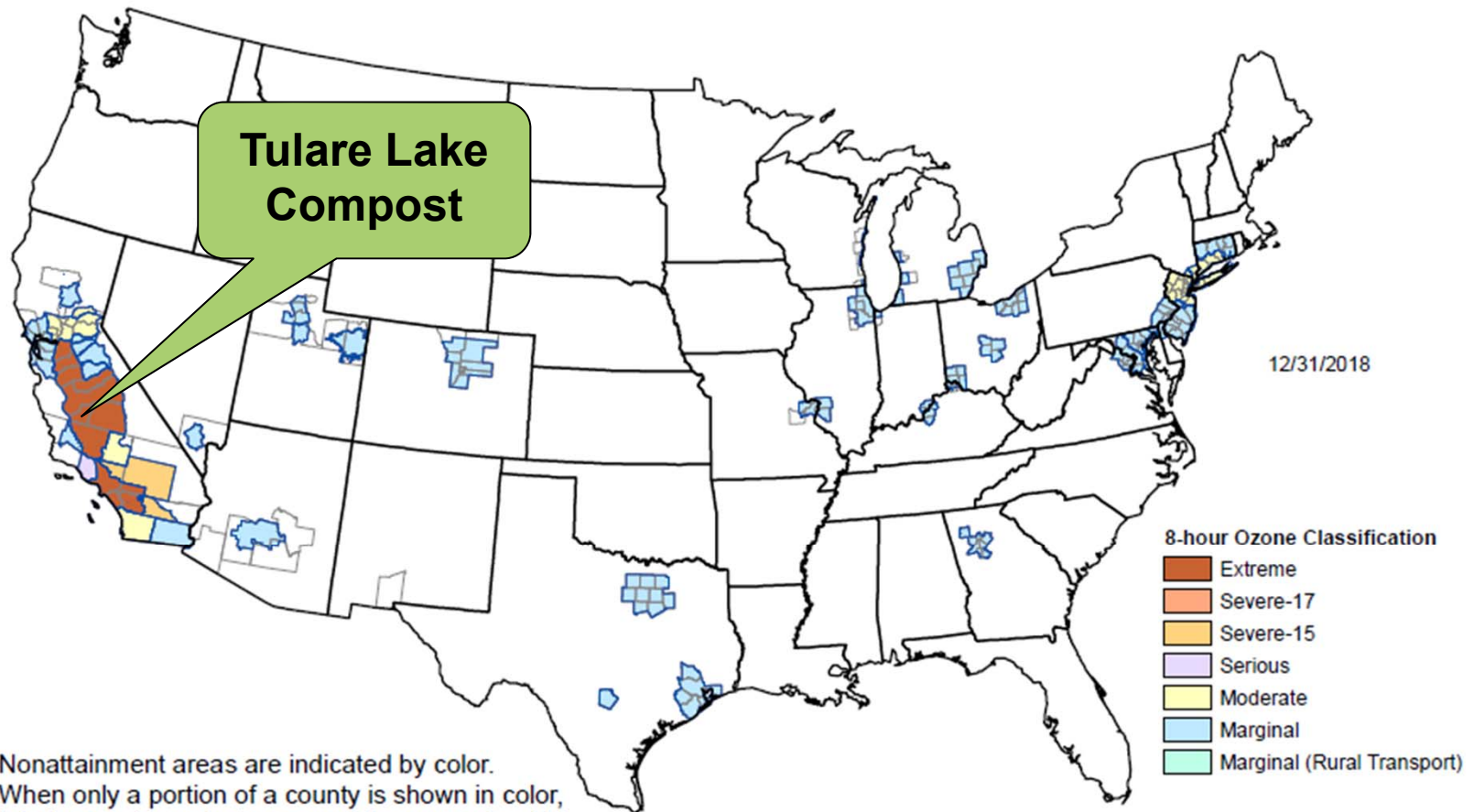


**Air Emissions
Challenges to Bring TLC Up To
Full Permitted Capacity**



Air Quality Concerns

8-Hour Ozone Nonattainment Areas (2015 Standard)

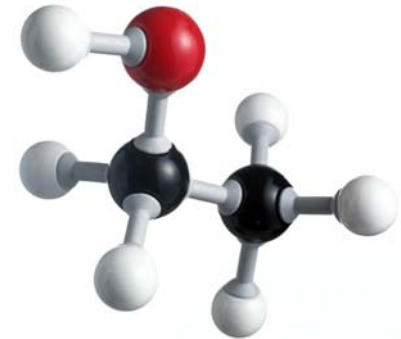


Nonattainment areas are indicated by color. When only a portion of a county is shown in color, it indicates that only that part of the county is within a nonattainment area boundary.

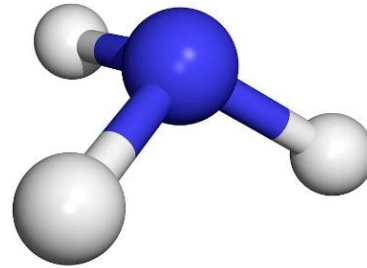


Composting Emissions

Volatile Organic Compounds
(VOCs)



Ammonia



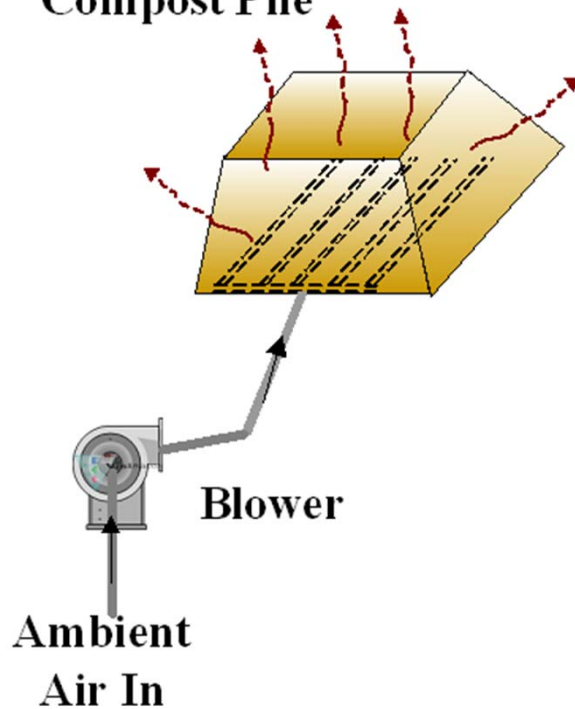
San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

Facility emissions cap for VOCs
and ammonia (pounds/year)

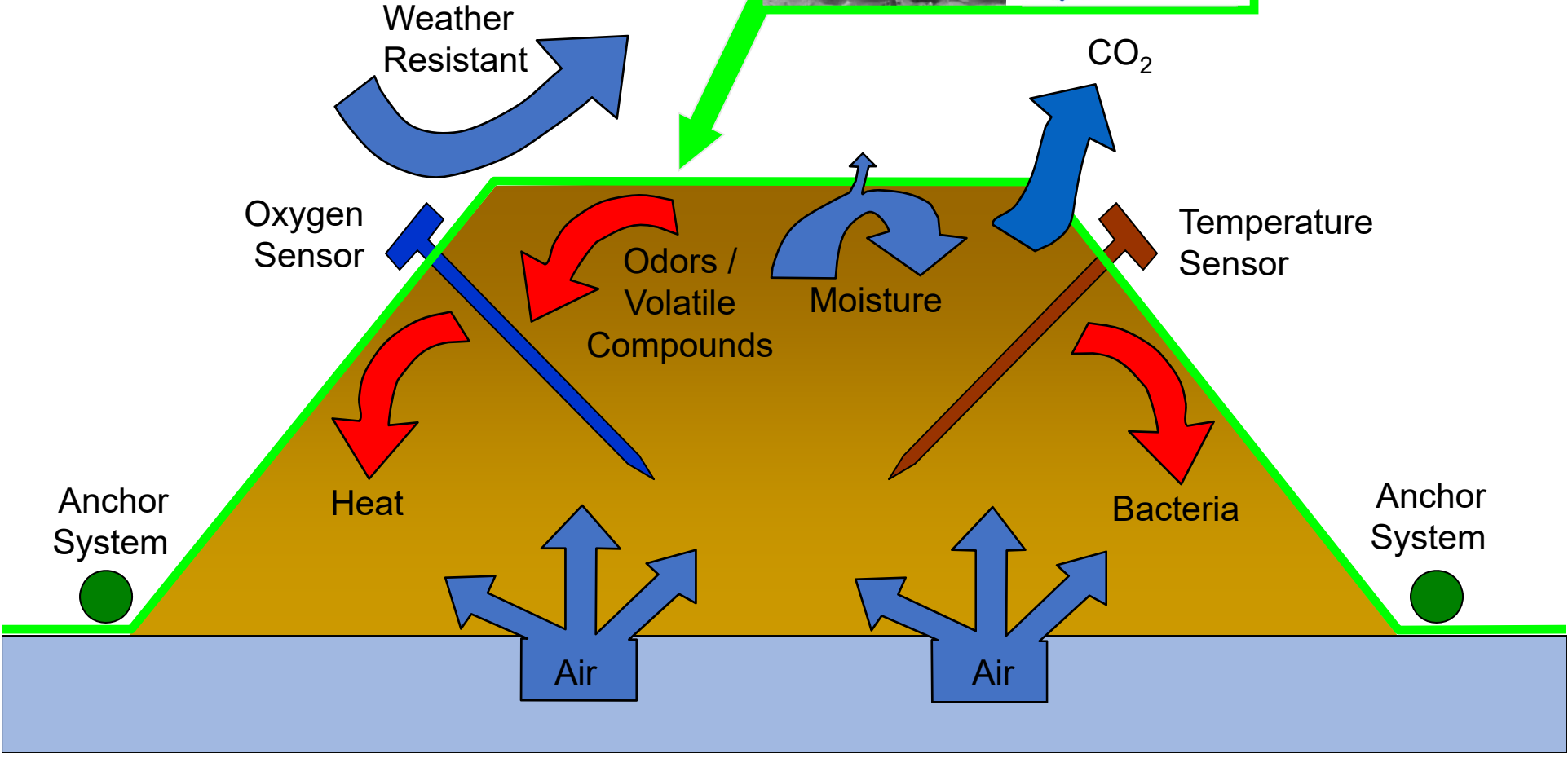
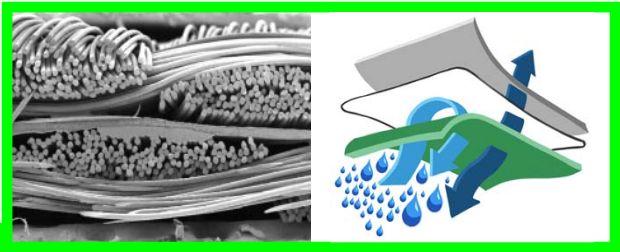


Positively Aerated Static Pile

Positive Aerated
Compost Pile



Aerated Static Pile with Engineered Cover



Synthetic Fabric Cover System



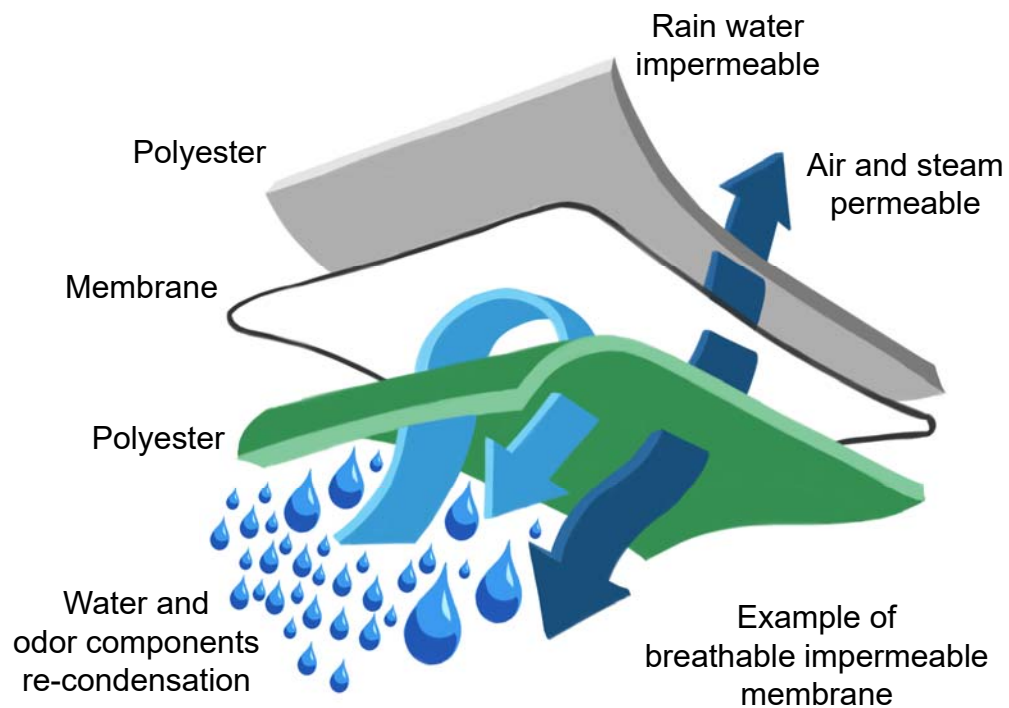
Synthetic Fabric Cover System Emission Results

	Cedar Grove Pilot Study	September 2016 Compliance Test	February 2017 Compliance Test
VOC EF (lb/ton)	0.2	2.6	0.75
Biosolids Throughput (tons/year)	500,000	39,000	135,000



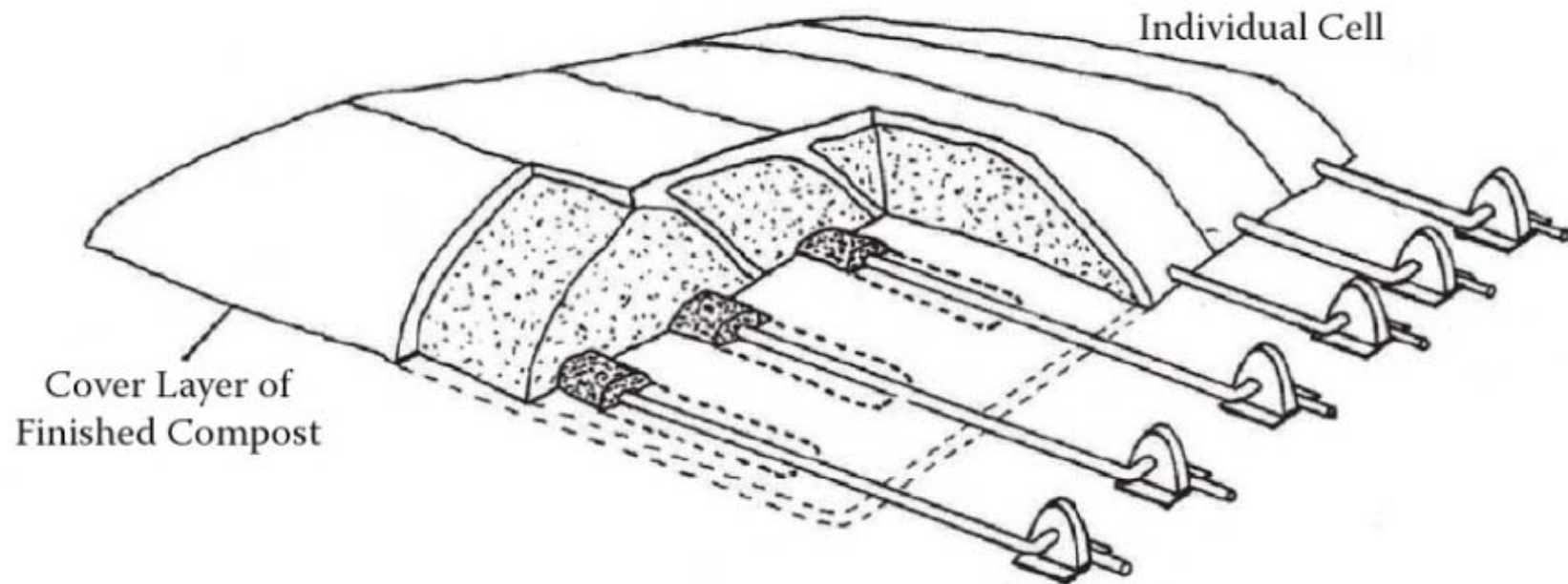
Synthetic Fabric Cover Conclusion

Climatic conditions of high temperatures and low humidity inhibited cover performance.



Alternative Composting Method

- Extended Aerated Static Pile (eASP) with finished compost biofilter cover



Potential Benefits of eASP

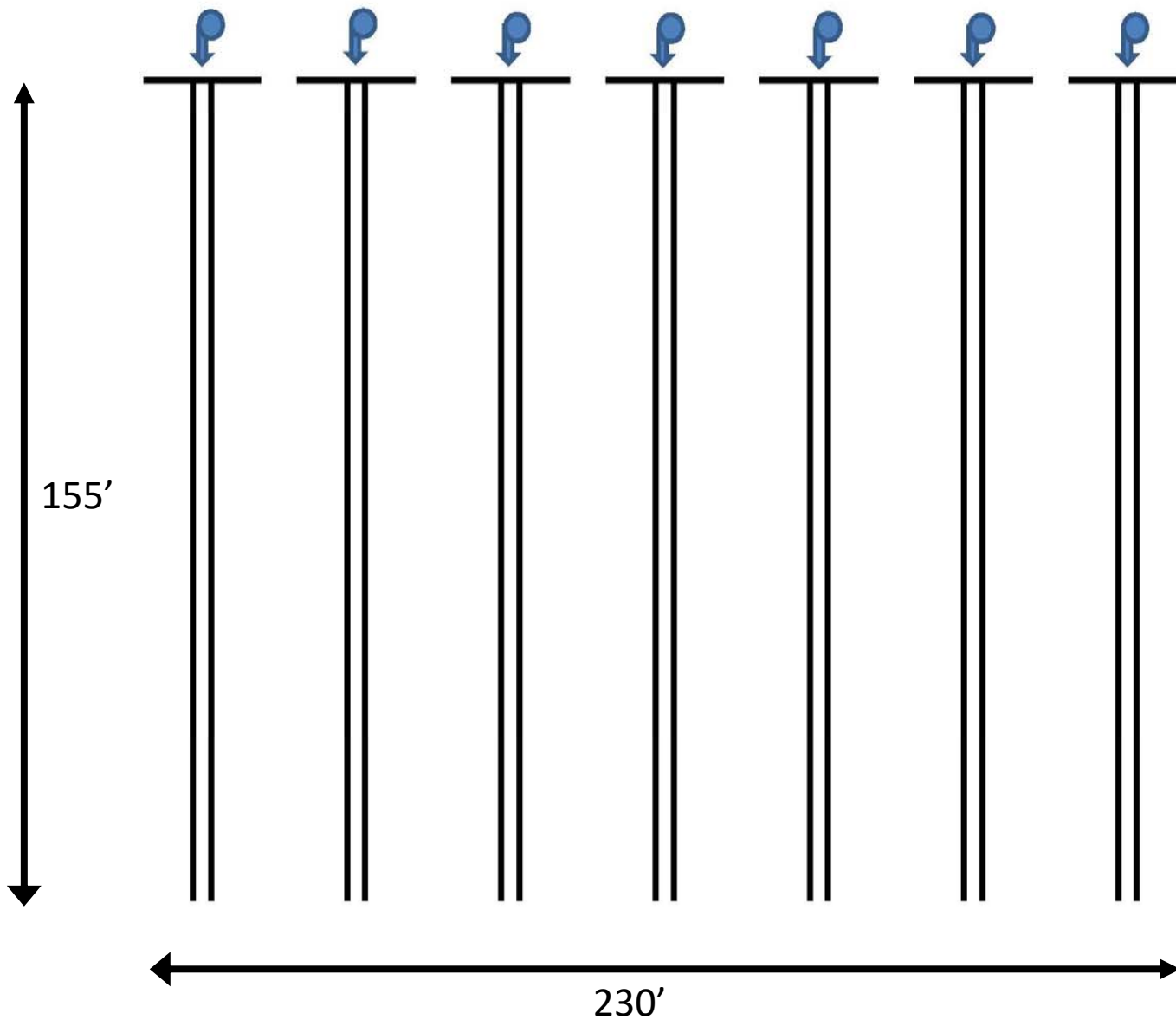
- Low VOC and ammonia emissions
- Biofilter cover made from recycled compost
- Operational cost savings
 - Adapts to windy and hot environment
 - Low material handling
 - Increased capacity within existing footprint
 - Easy to adjust the composting process
- Demonstrated in-practice and recognized as Best Available Control Technology for commercial biosolids composting facilities

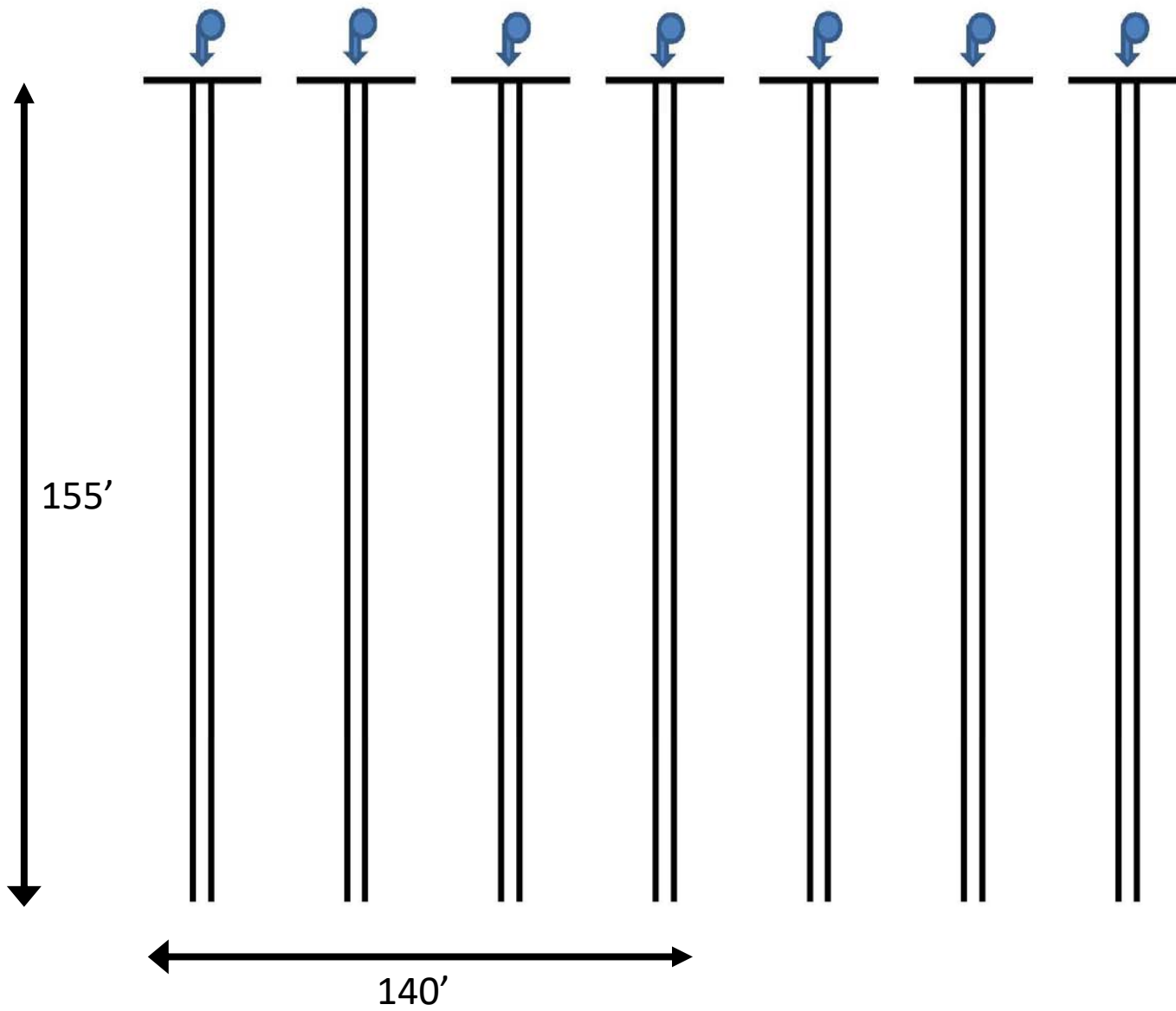


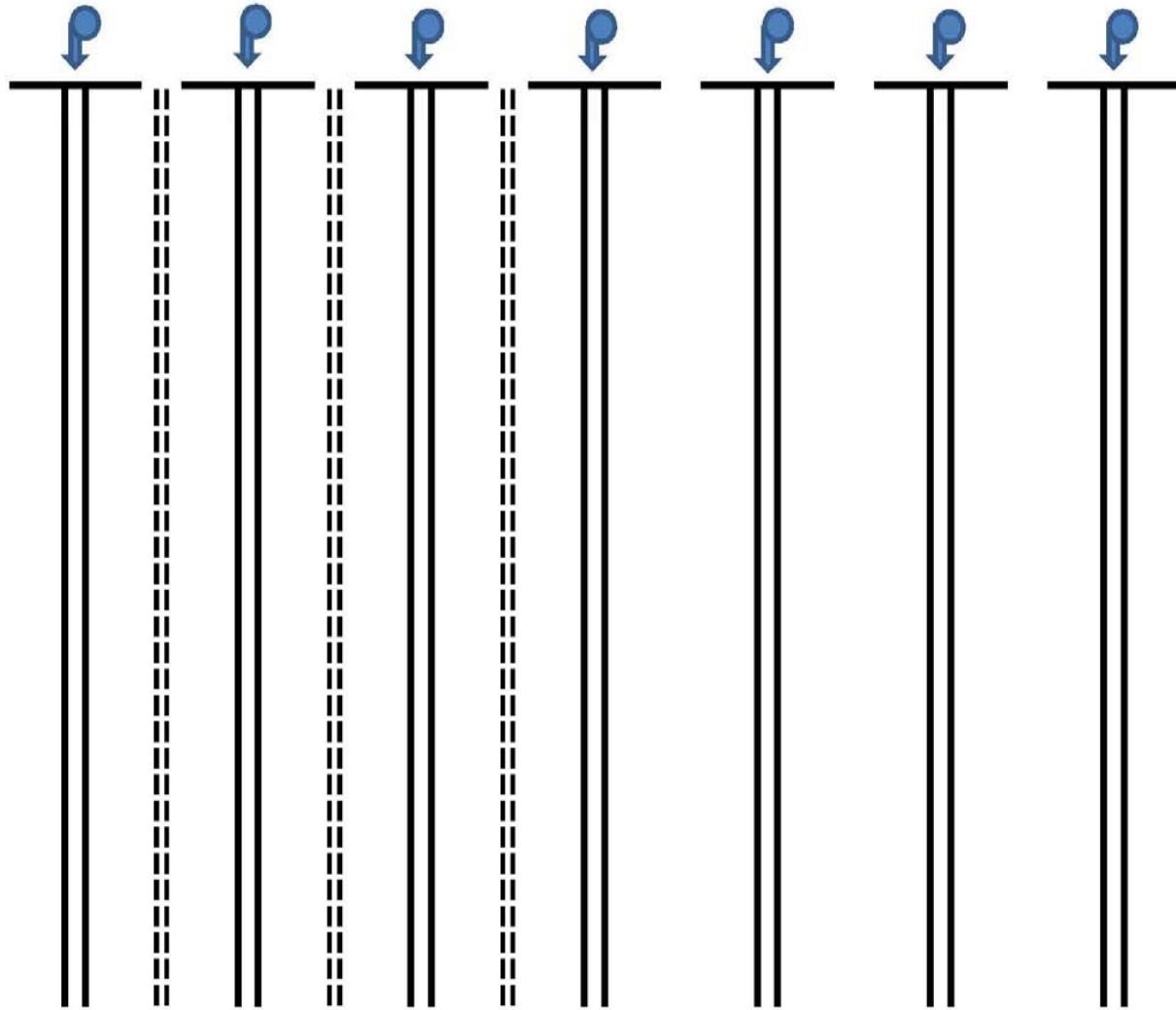
**Windrow Construction
vs
eASP Design and Construction**

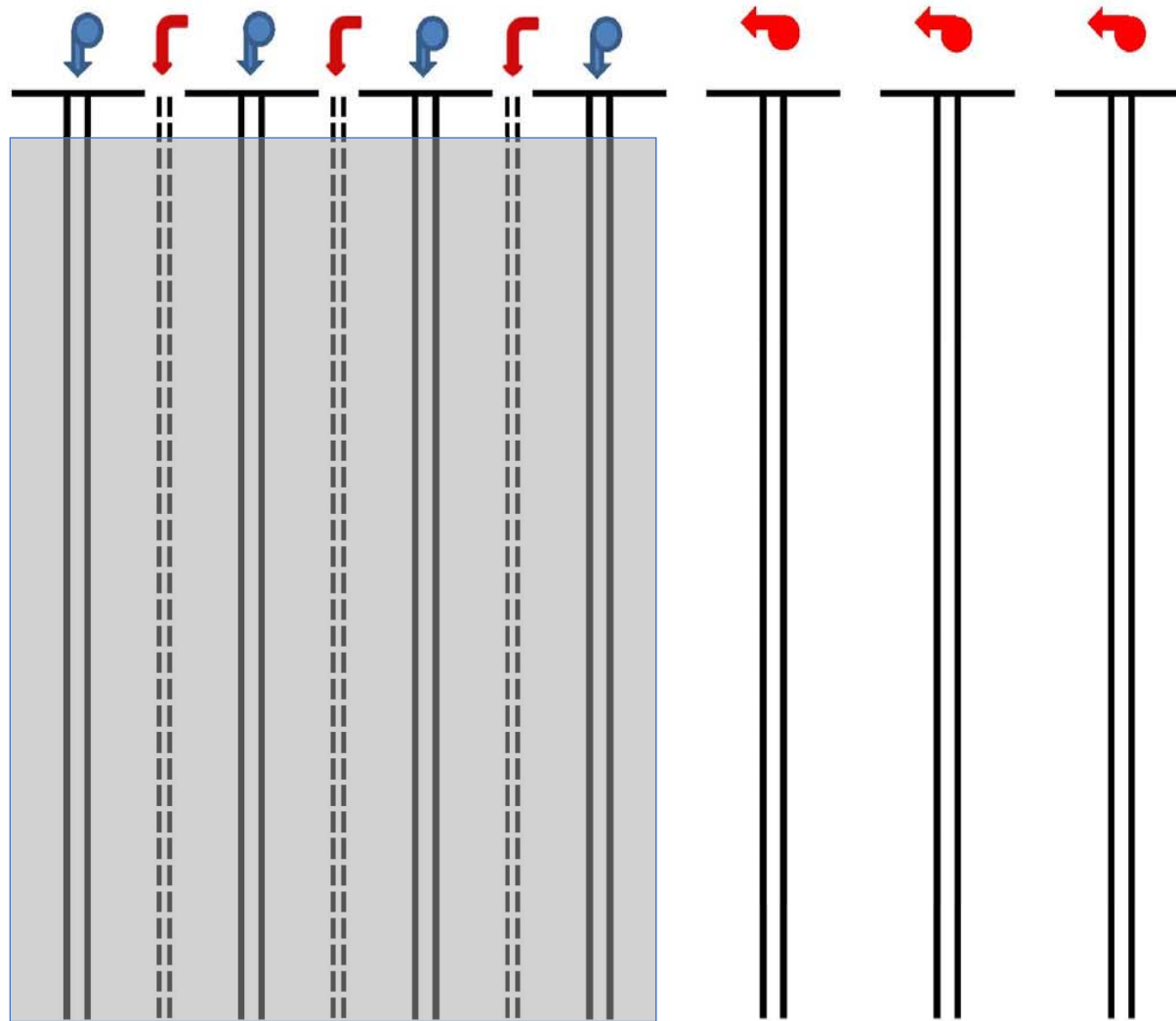


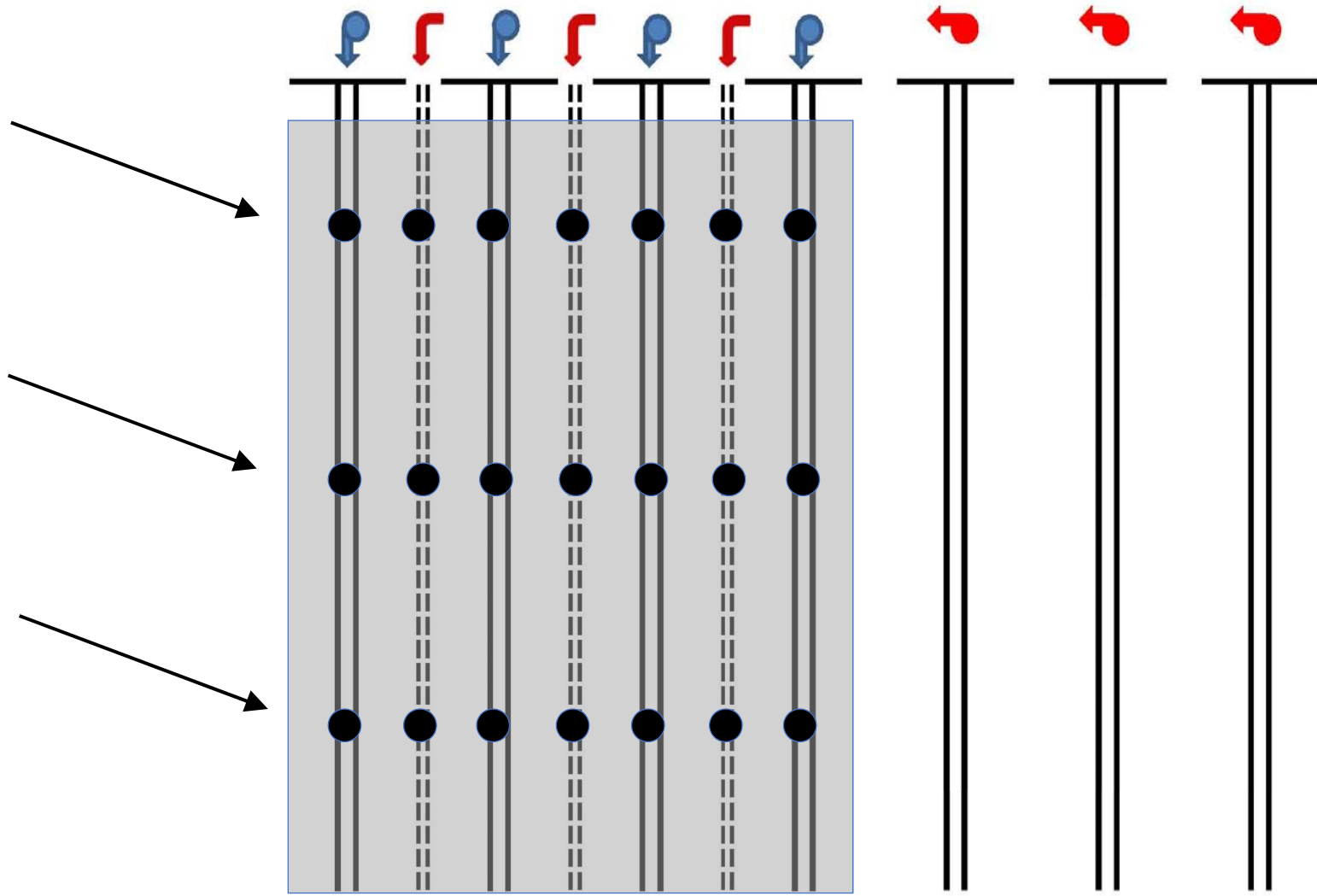








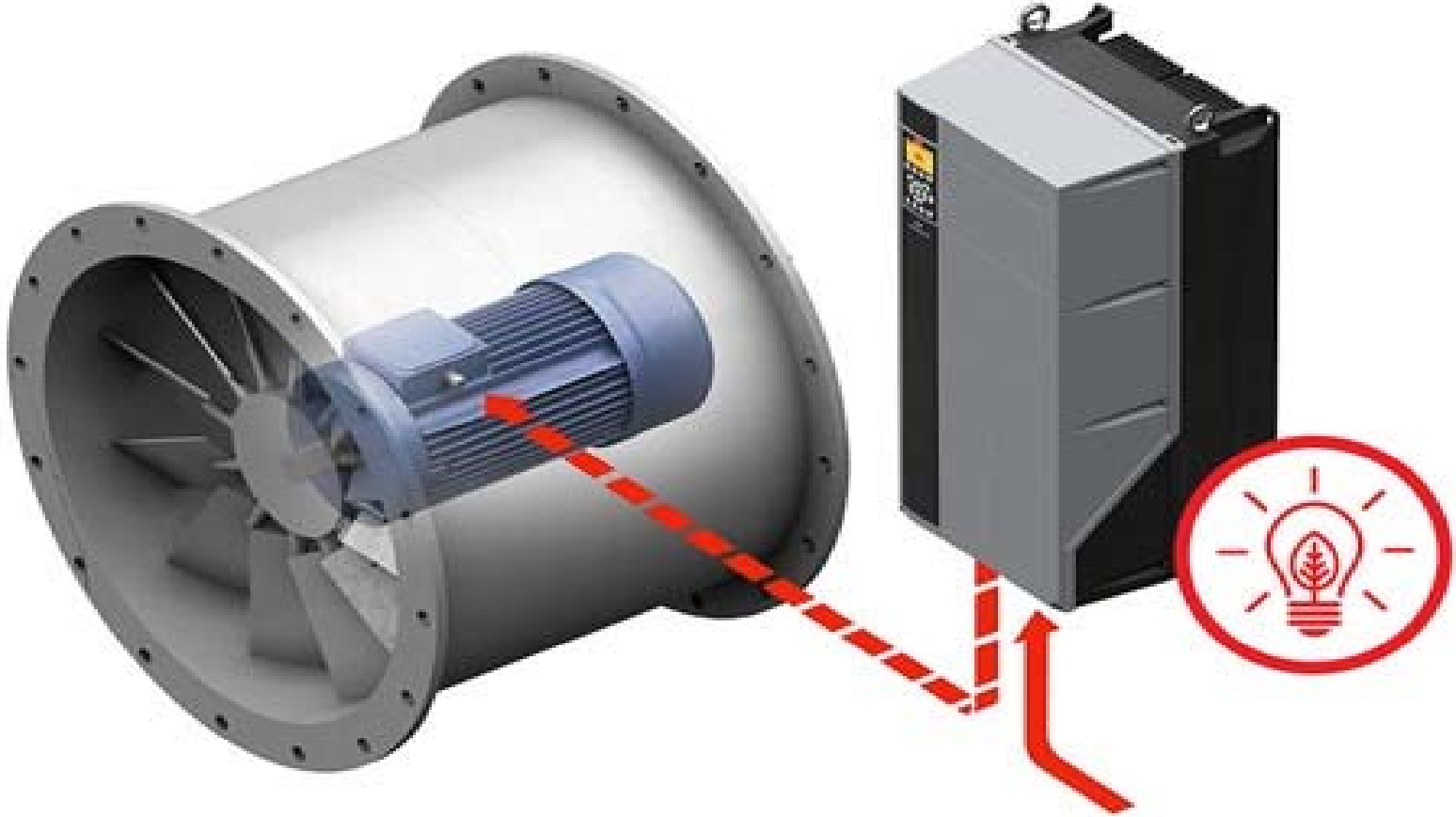






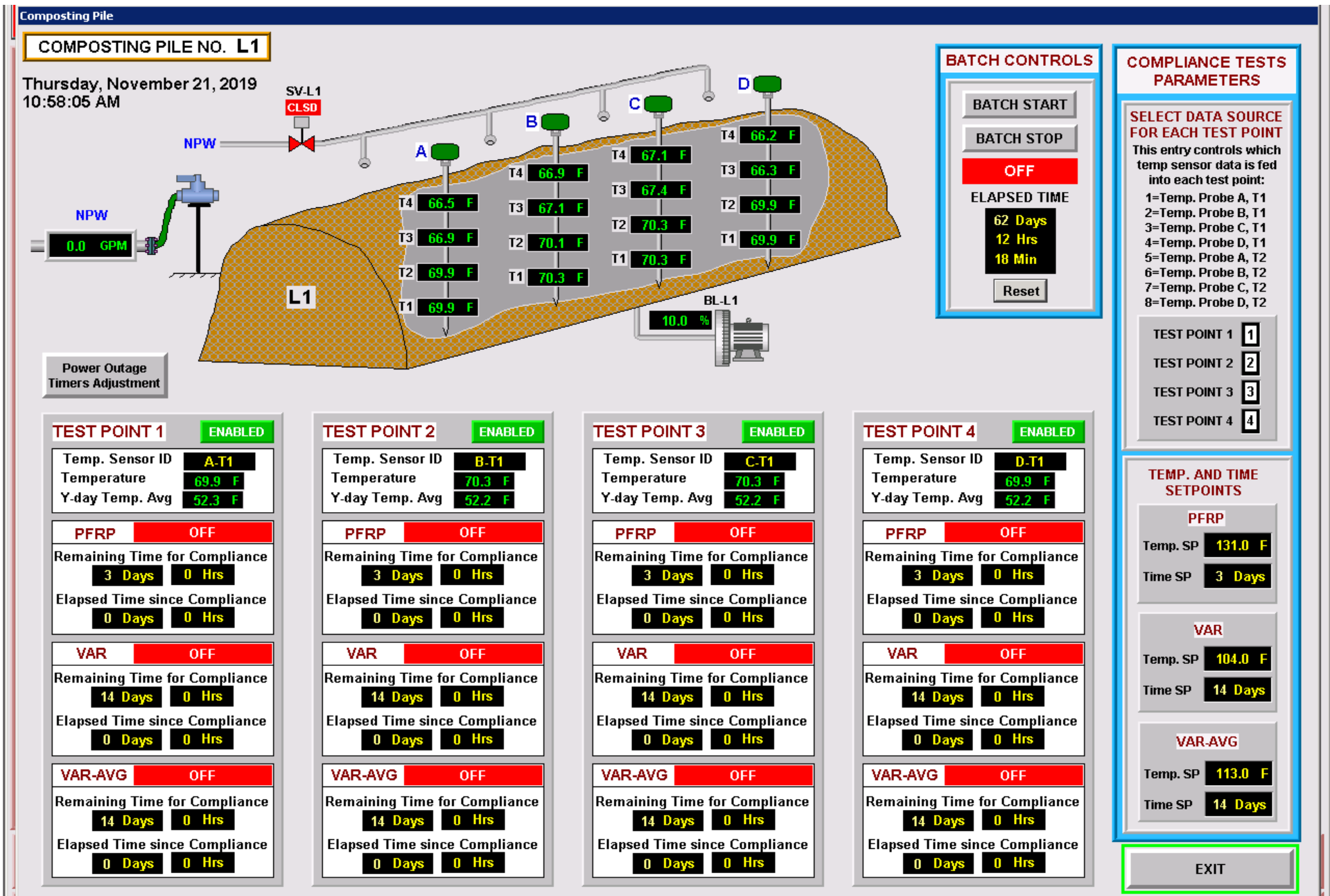








Supervisory Control And Data Acquisition



**Research and Results
Challenges to Bring TLC Up To
Maximum Capacity**



Research and Results

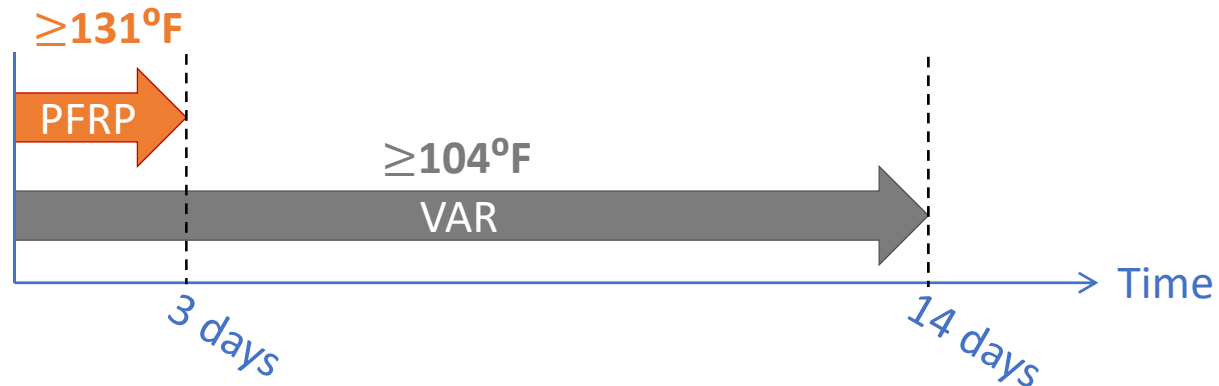
- Early trial and error – eASP #1-4 (in-house testing)
- Emissions compliance test – eASP #5-6 (3rd party testing)
- Optimization results – eASP #7-12 (in-house testing)

There are Two Major Compliance Requirements

Emissions (Air Permit)

Constituent	Emission Factor Target
NH ₃	<1.79 lbs-NH ₃ / ton mix
VOC	<0.20 lbs-VOC / ton mix

Compost Core Temperature (EPA 503)






eASP #1: Learning to Build, Operate, and Test



Biofilter Cover
Cross-Section



Test	Compliance		
	Emission Factor (lbs / ton mix)		Operations
	NH ₃	VOC	Core Temp
eASP #1	0.10 	1.6 	20 of 21 Zones Passed 
Target	<1.79	<0.20	

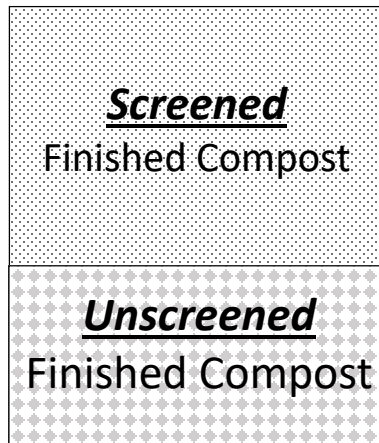





eASP #2: Implemented Major Changes to Improve Emissions



Block wall retains heat and prevents air intrusion

Biofilter Cover
Cross-Section



Test	Compliance		
	Emission Factor (lbs / ton mix)		Operations
	NH ₃	VOC	Core Temp
eASP #2	0.04 	0.05 	all passed *1 slow 
Target	<1.79	<0.20	

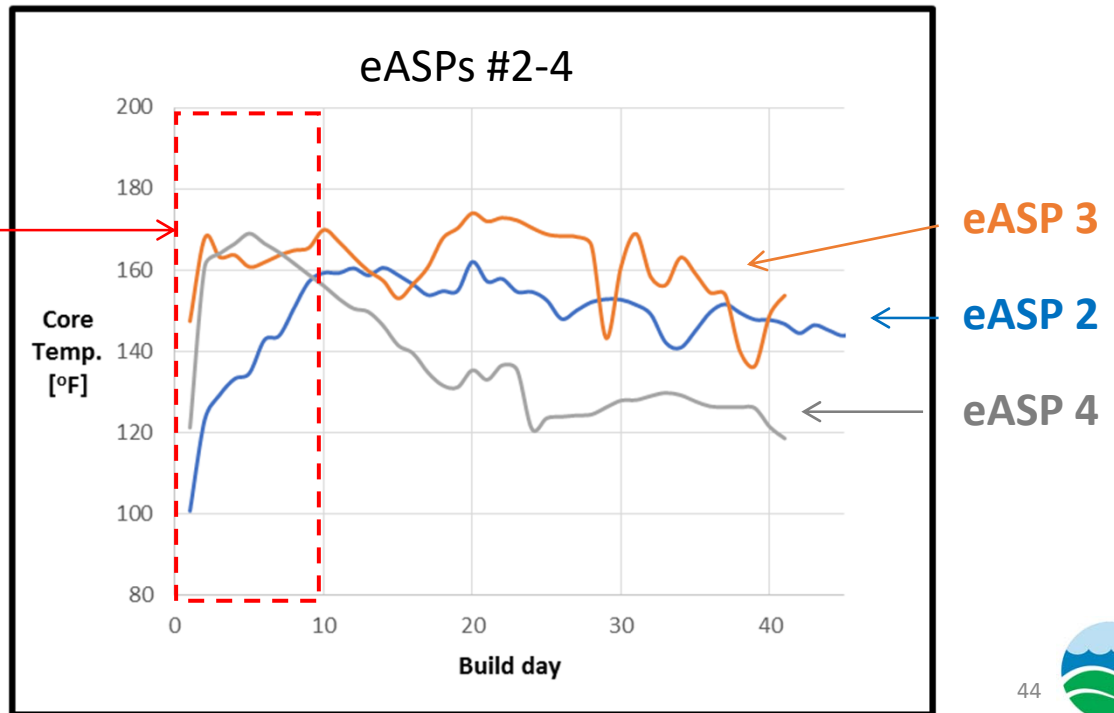


eASPs #3-4: Adjusting Aeration Scheme to Achieve Temperature Compliance Quicker










More starting air appears to speed up meeting PFRP

eASP	Starting Air		Days to Pass PFRP	
	Timing	Blower Setting	Avg	[Min, Max]
2	After Build	50%	7.5	[4,23]
3	During Build	100%	3.3	[3,4]
4	During Build	100%	3.7	[3,4]

More starting air appears to increase early core temp.






Early Results Recap for eASPs #1-4

Test	Compliance				
	Emissions			Operations	
	NH ₃		VOC		Core Temp
eASP #1	0.10		1.6		1 failed 
eASP #2	0.04		0.05		1 slow to heat up 
eASP #3 / 4	-		0.20		All passed 
Target	<1.79		<0.20		

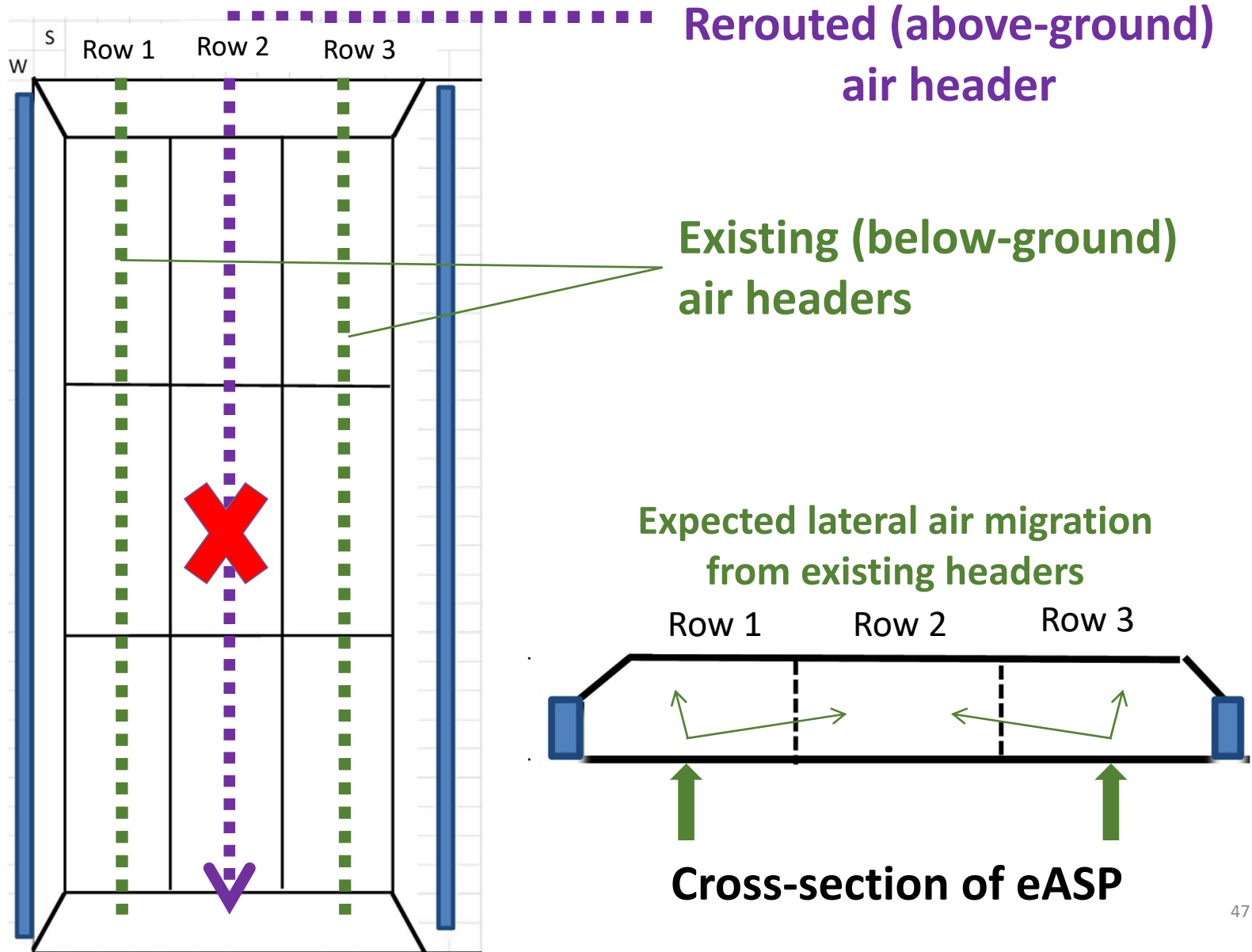
eASP #5-6: Verify eASP Emissions for SJVAPCD Compliance Test



Test	Compliance		
	Emissions		Operations
	NH ₃	VOC	Core Temp (PFRP / VAR)
eASP #5 / 6	0.03 	0.12 	All passed 
Target	<1.79	<0.20	

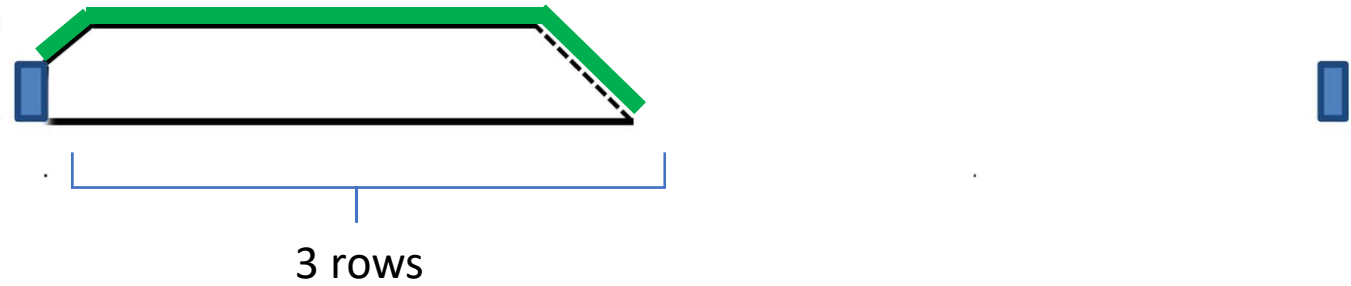


eASP #7-8 Simplified Aeration

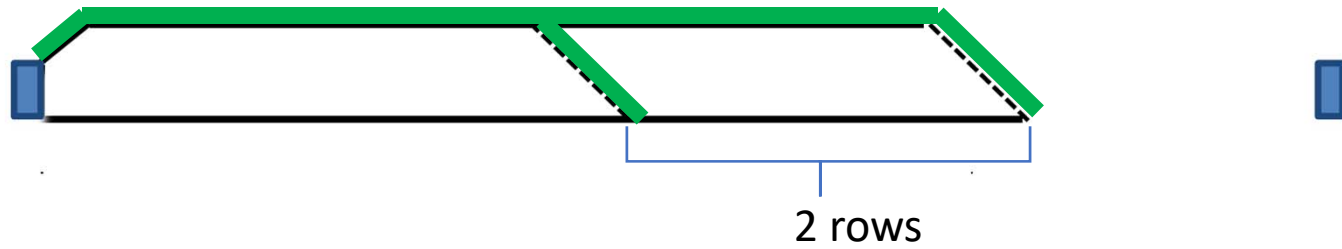


eASP #9 – Full Pad

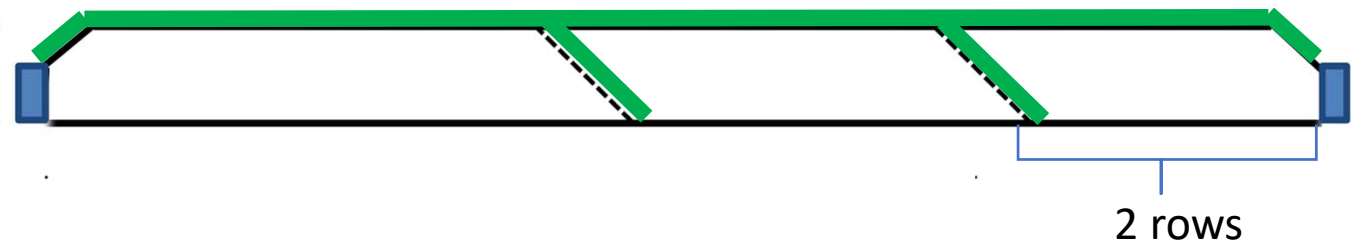
Week #1







Week #2



Week #3



Completed Optimization Results

Test	Compliance	
	Emissions	Operations
	VOC (lbs / ton)	Core Temp (PFRP / VAR)
eASP #7 – air headers	-	
eASP #8 – air headers	1.35 	
eASP #9 – full pad	-	
Target	<0.20	

How did emissions go awry?



Prime Suspects









eASP #10 – Control Pile

- Full thickness biofilter cover
- Increased irrigation
- Existing air headers

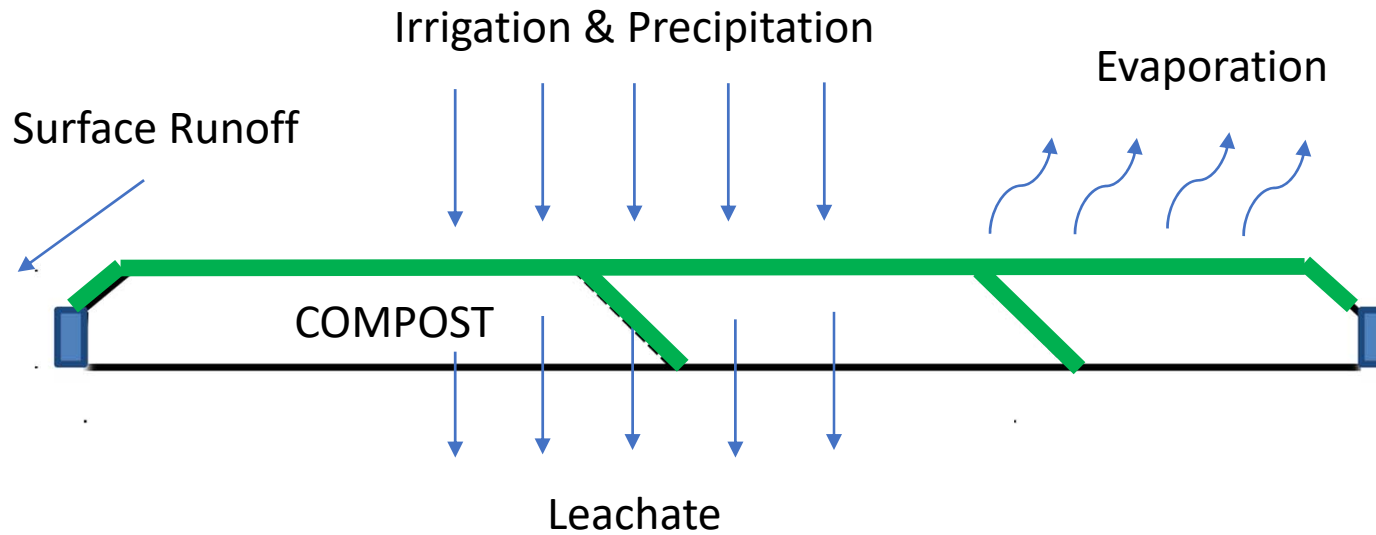


Completed Optimization Results Recap

Test	Compliance	
	Emissions	Operations
	VOC (lbs / ton)	Core Temp (PFRP / VAR)
eASP #7 – simplified aeration	-	
eASP #8 – simplified aeration	1.35 	
eASP #9 – full pad	-	
eASP #10 – control	0.08 	
Target	<0.20	

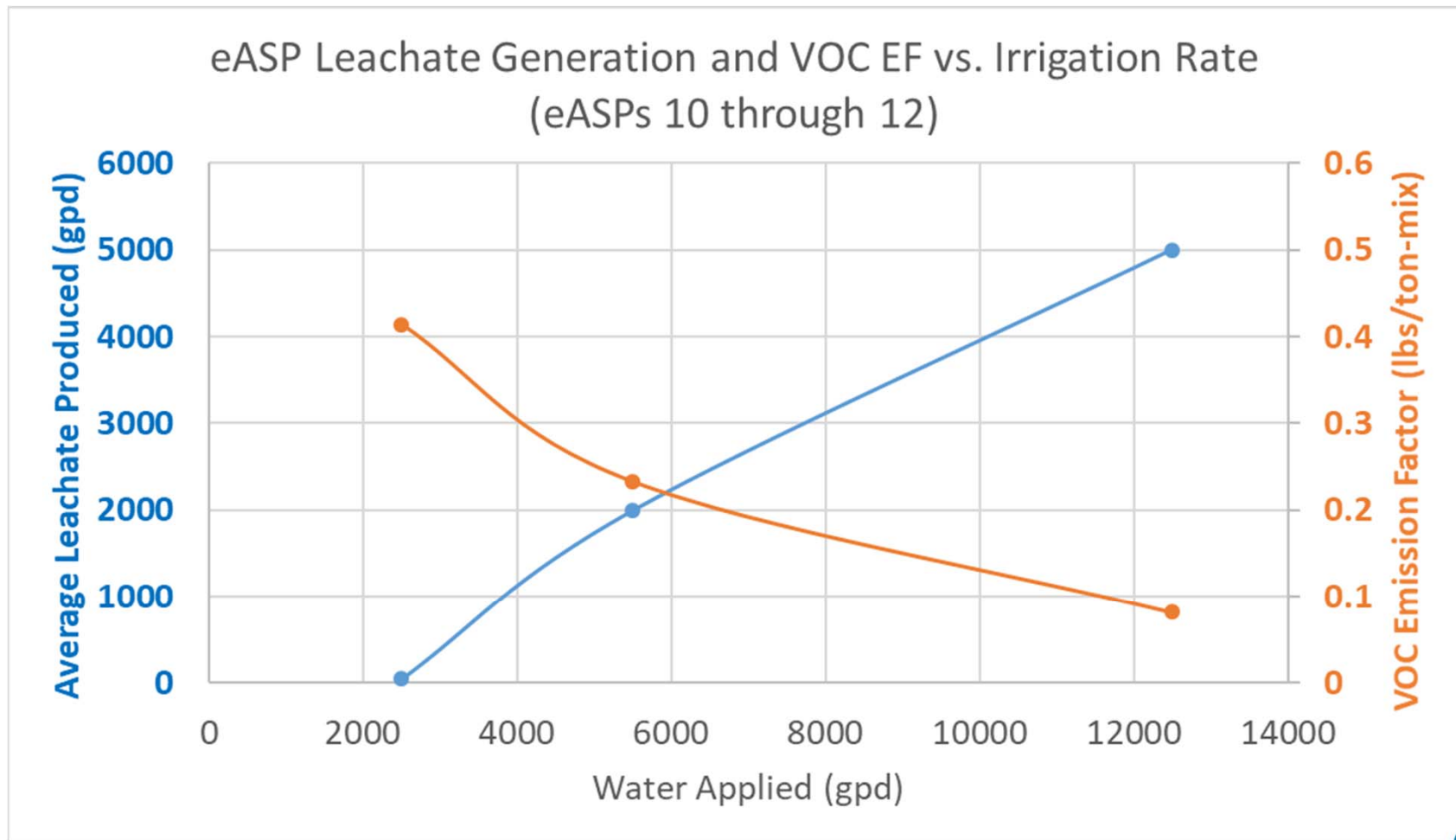


eASP Irrigation and Leachate Production



Current Work eASPs #11-12: Optimize irrigation program to minimize both emissions and leachate generation

Preliminary Results – Relationship Between Irrigation/Leachate Generation/Emissions



Summary of Achievements



- Fully owned and operated management solution for full production of Sanitation Districts biosolids
- Understanding the air quality challenges of composting the central valley
- Adaptation of existing infrastructure for alternative composting system
- Proved eASP technology at TLC to maximize throughput





**LOS ANGELES COUNTY
SANITATION DISTRICTS**

Converting Waste Into Resources

QUESTIONS?

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