

WARM MIX CASE STUDY





Project Overview I Producing and Paving with WMA

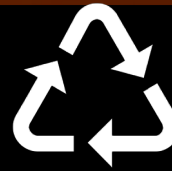
Project Overview – Producing and Paving with WMA



INITIAL STACK TESTING

Performed by
Alliance

CO – NO_x – VOCs –
CO₂



40% RAP MIX @
200 TPH

SP-9.5

PG 52-28



PRODUCTION TEMPS

325°F

275°F

265°F

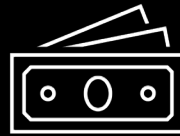
250°F

Project Overview – Producing and Paving with WMA



GREEN INITIATIVES

Visible Emissions
Tracking (at Plant &
Paver)



FINANCIAL SAVINGS

Fuel Consumption
Relative to
Temperature
Reduction



FIELD EFFECTS

Impact on
compaction efforts
and workability

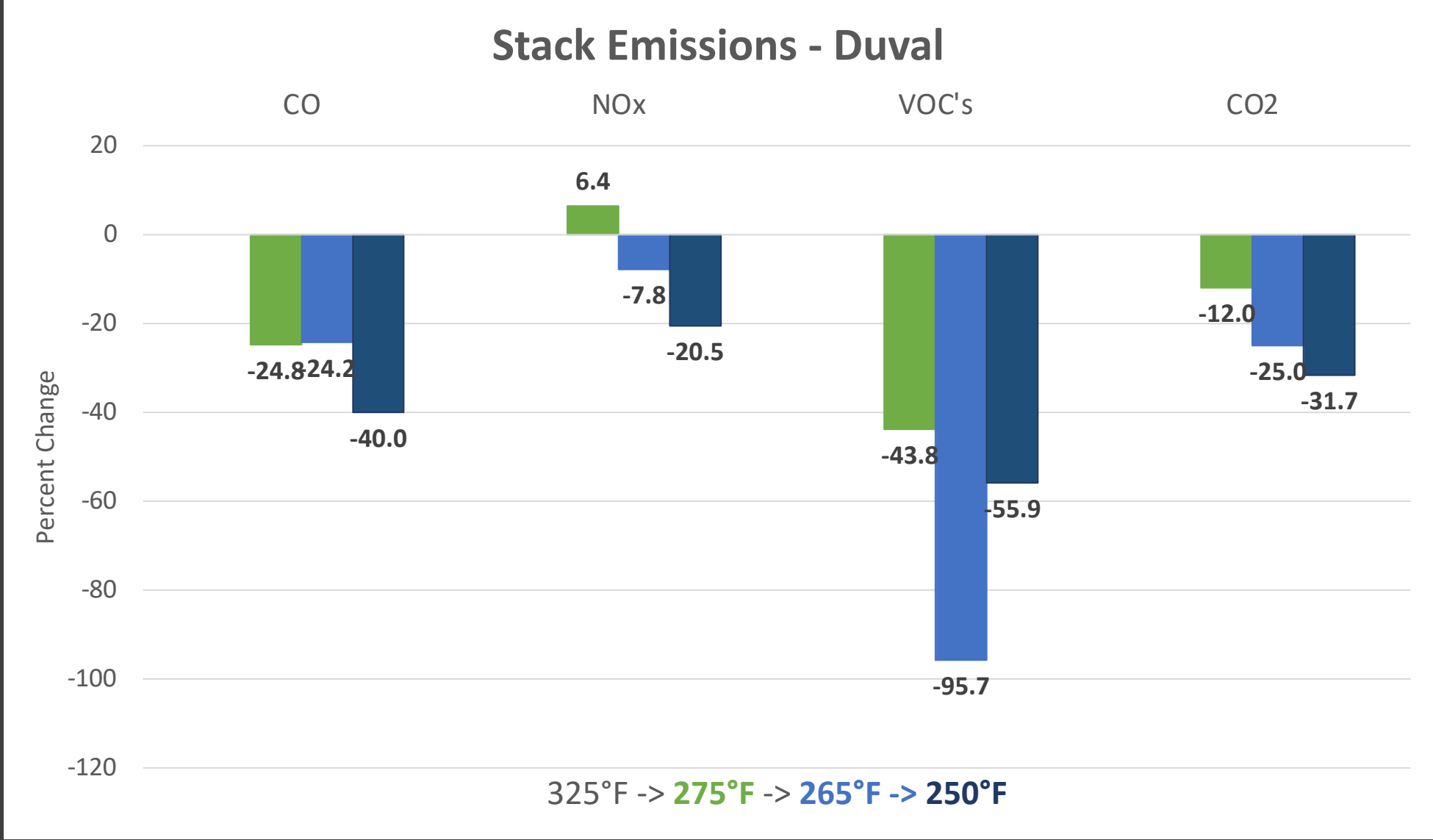


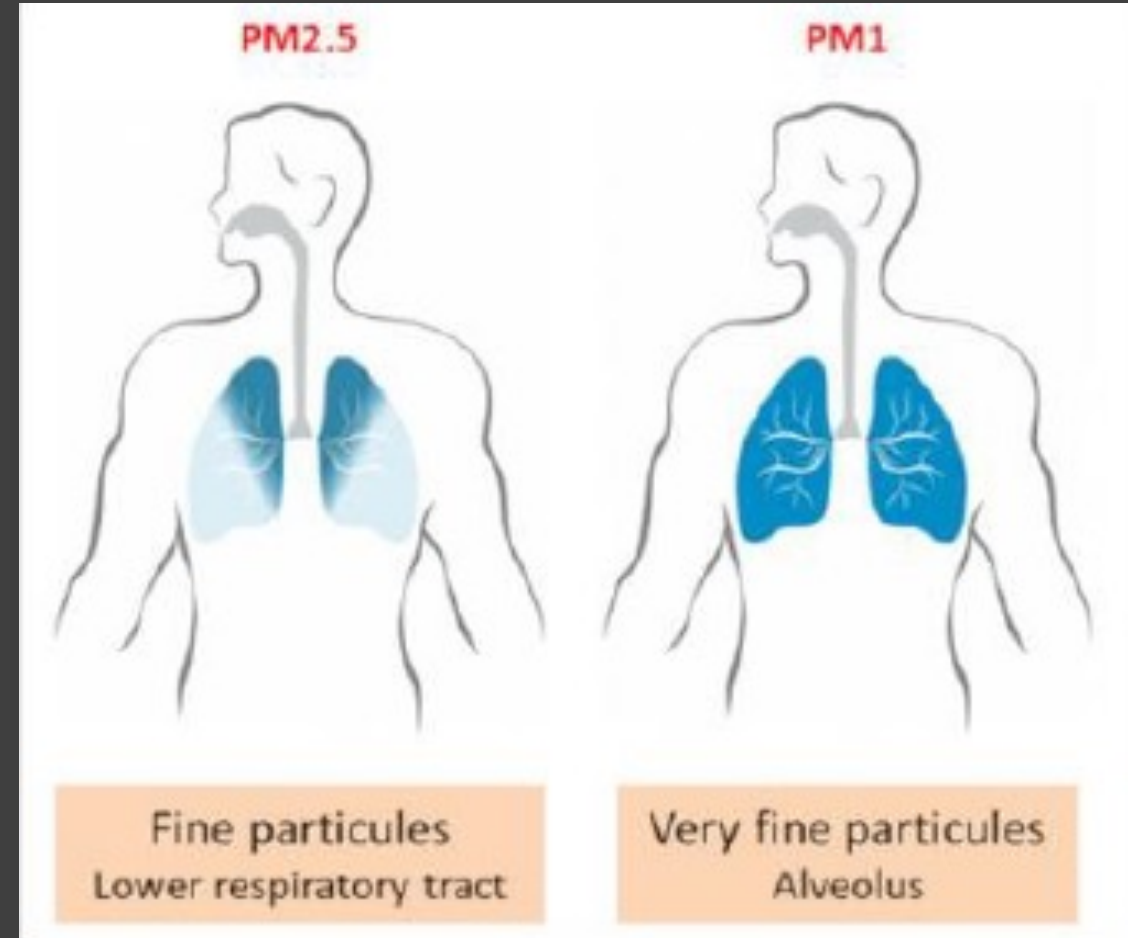
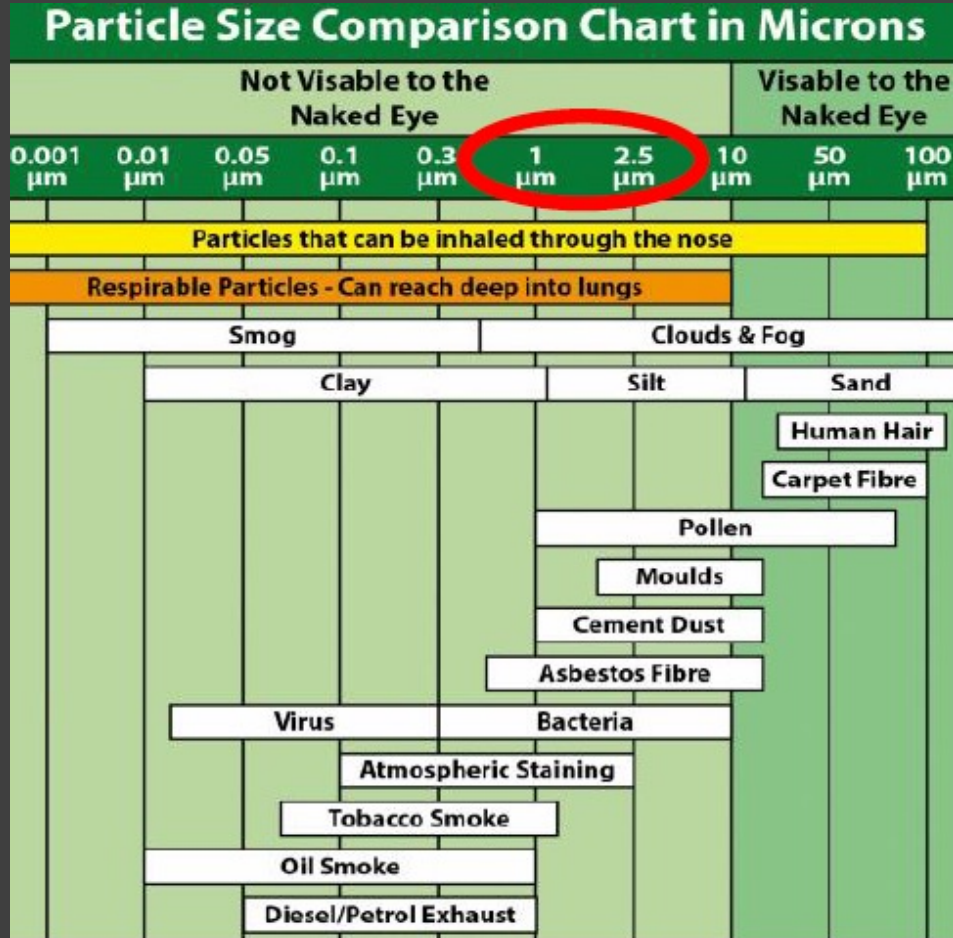
GREEN INITIATIVES

According to GHG Emissions Inventory for Asphalt Mix Production in the United States, Current Industry Practices and opportunities to Reduce Future Emissions, **one way to reduce emissions at the plant is to implement or increase the use of WMA technologies.**



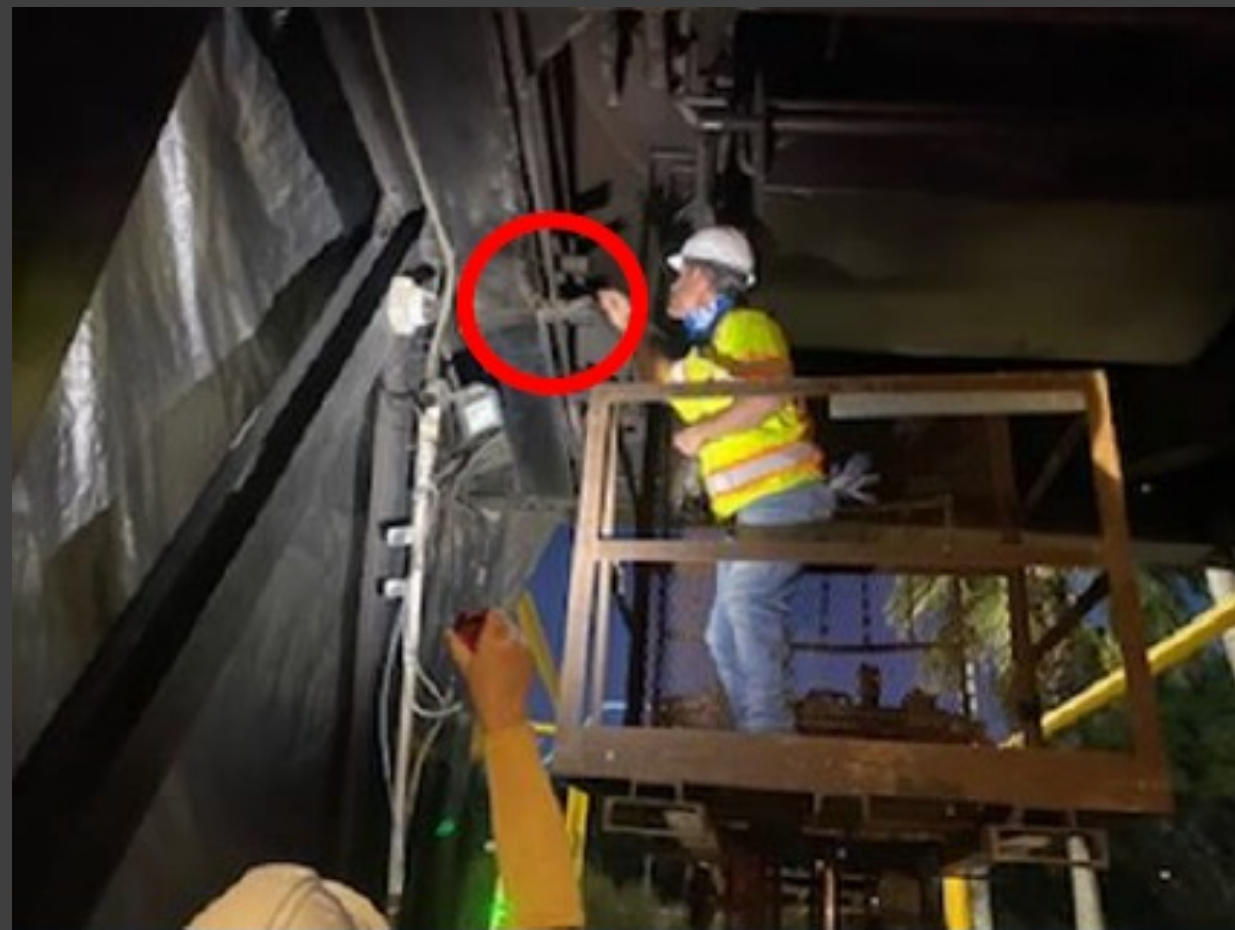
GREEN INITIATIVES







GREEN INITIATIVES





GREEN INITIATIVES





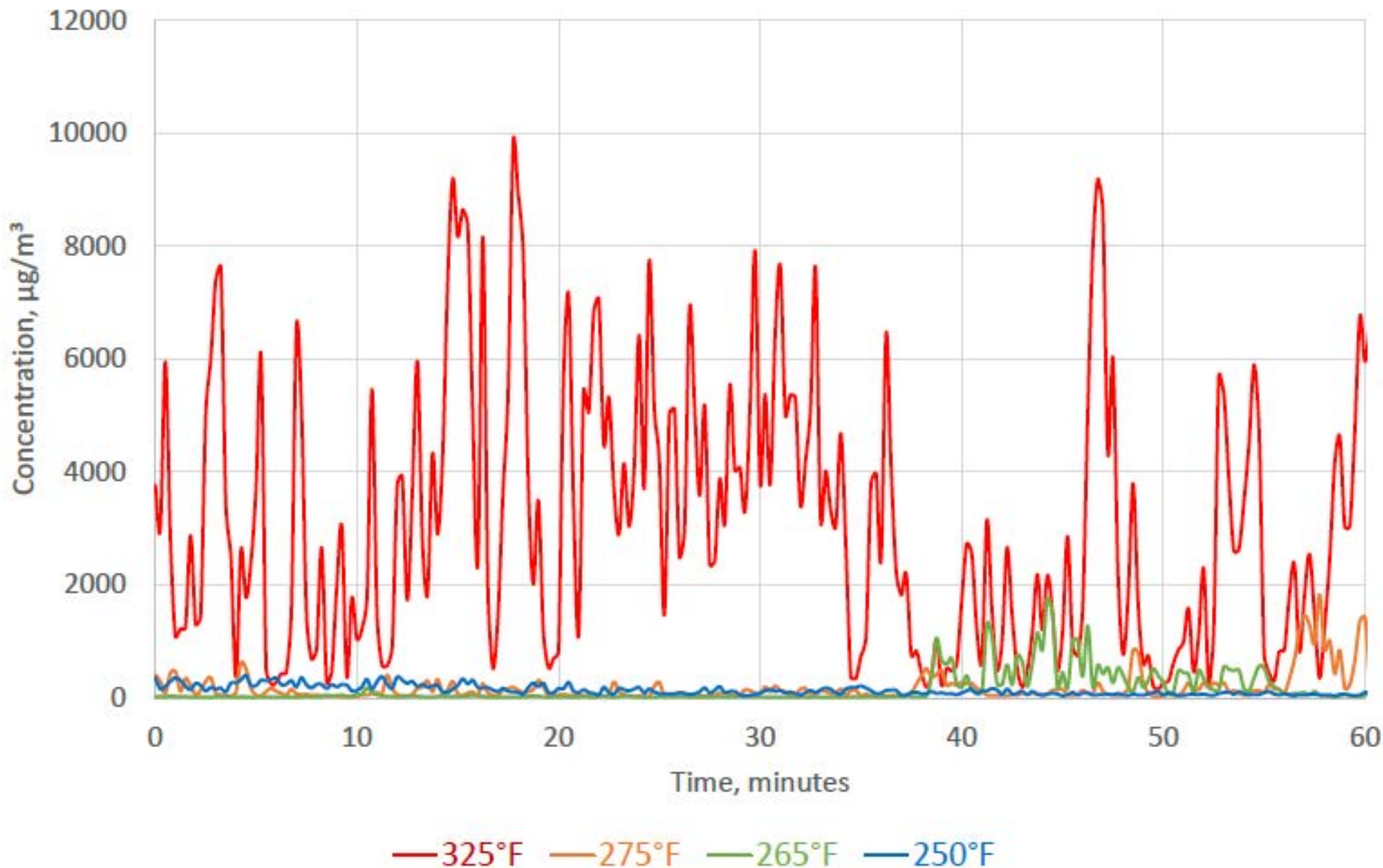
GREEN INITIATIVES





GREEN INITIATIVES

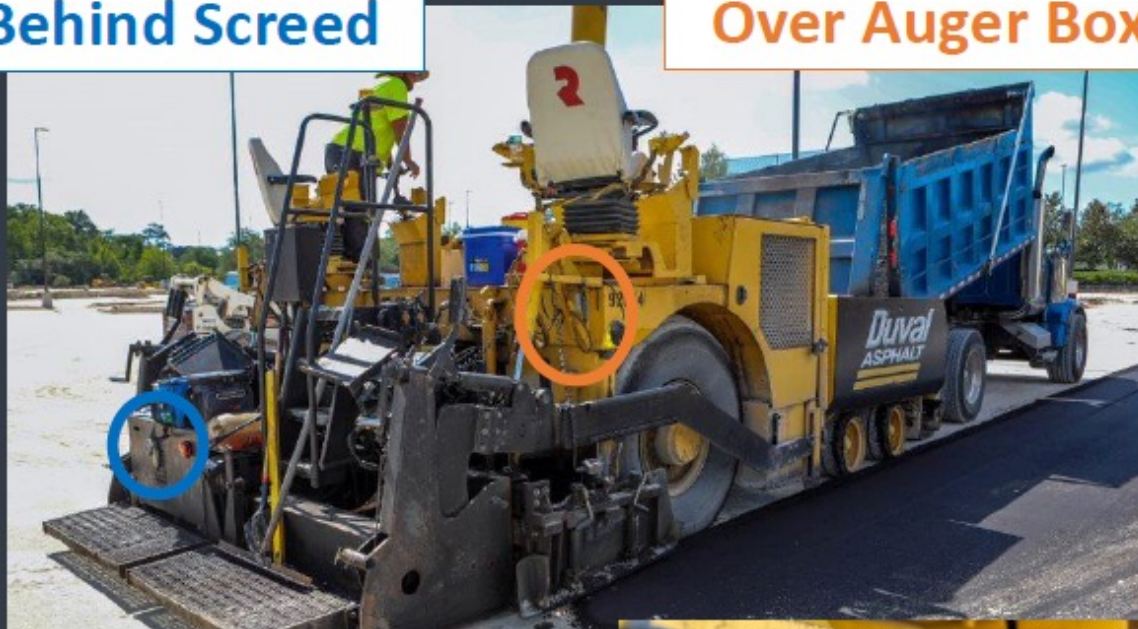
Comparison of HMA and WMA Particulate Matter (PM_{2.5}) Emissions





GREEN INITIATIVES

Behind Screed



Over Auger Box



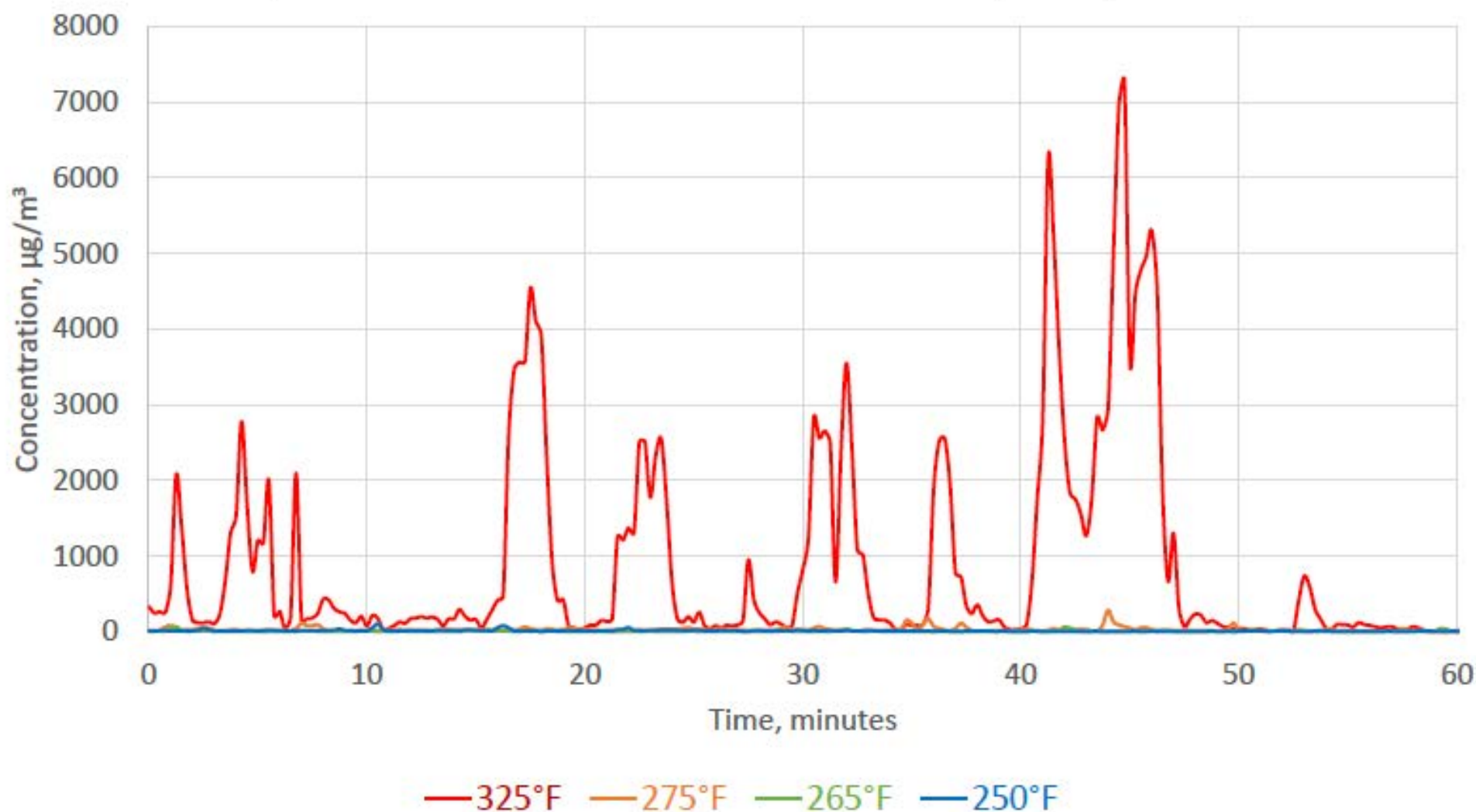
Behind Hopper





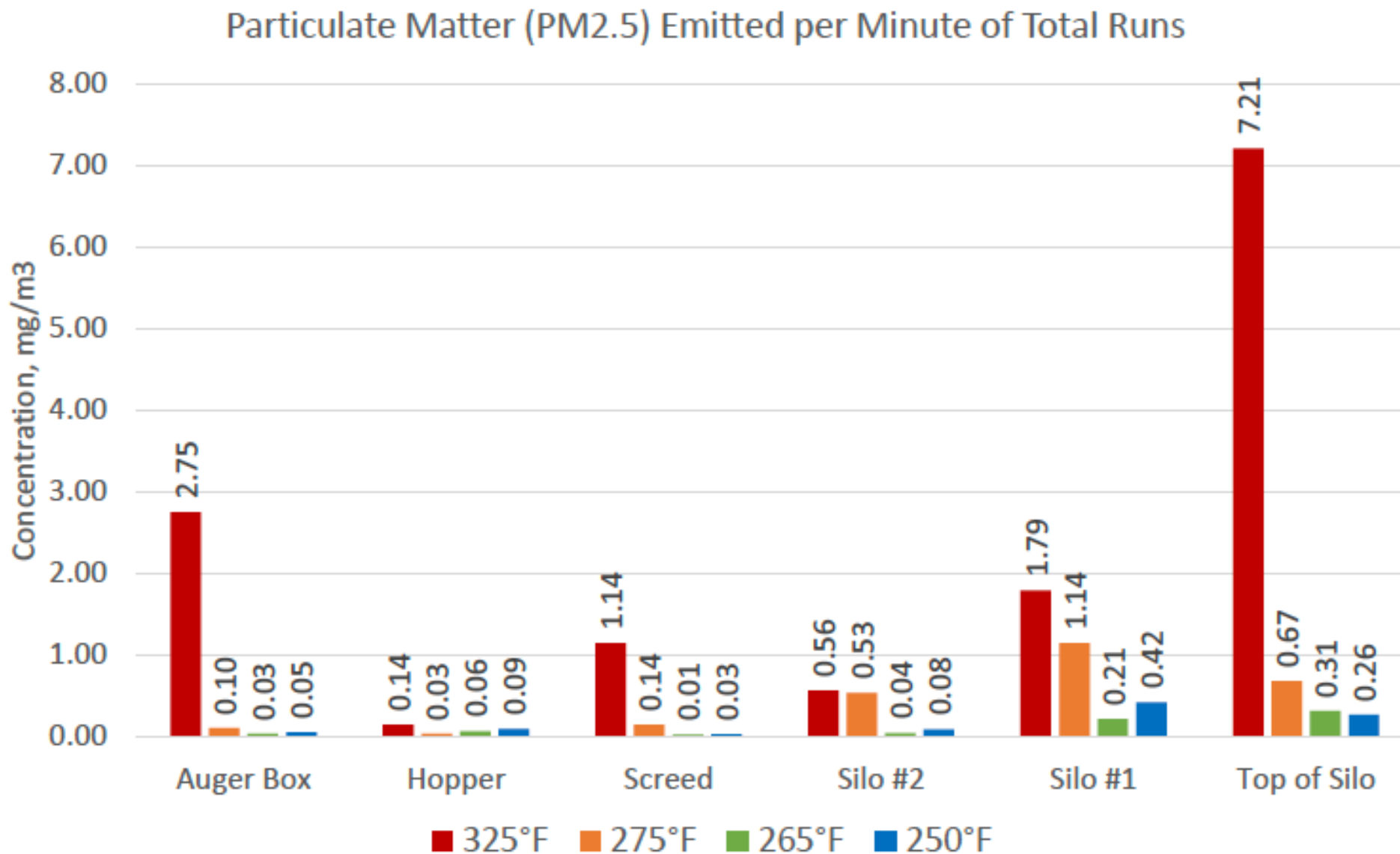
GREEN INITIATIVES

Comparison of HMA and WMA Particulate Matter (PM_{2.5}) Emissions



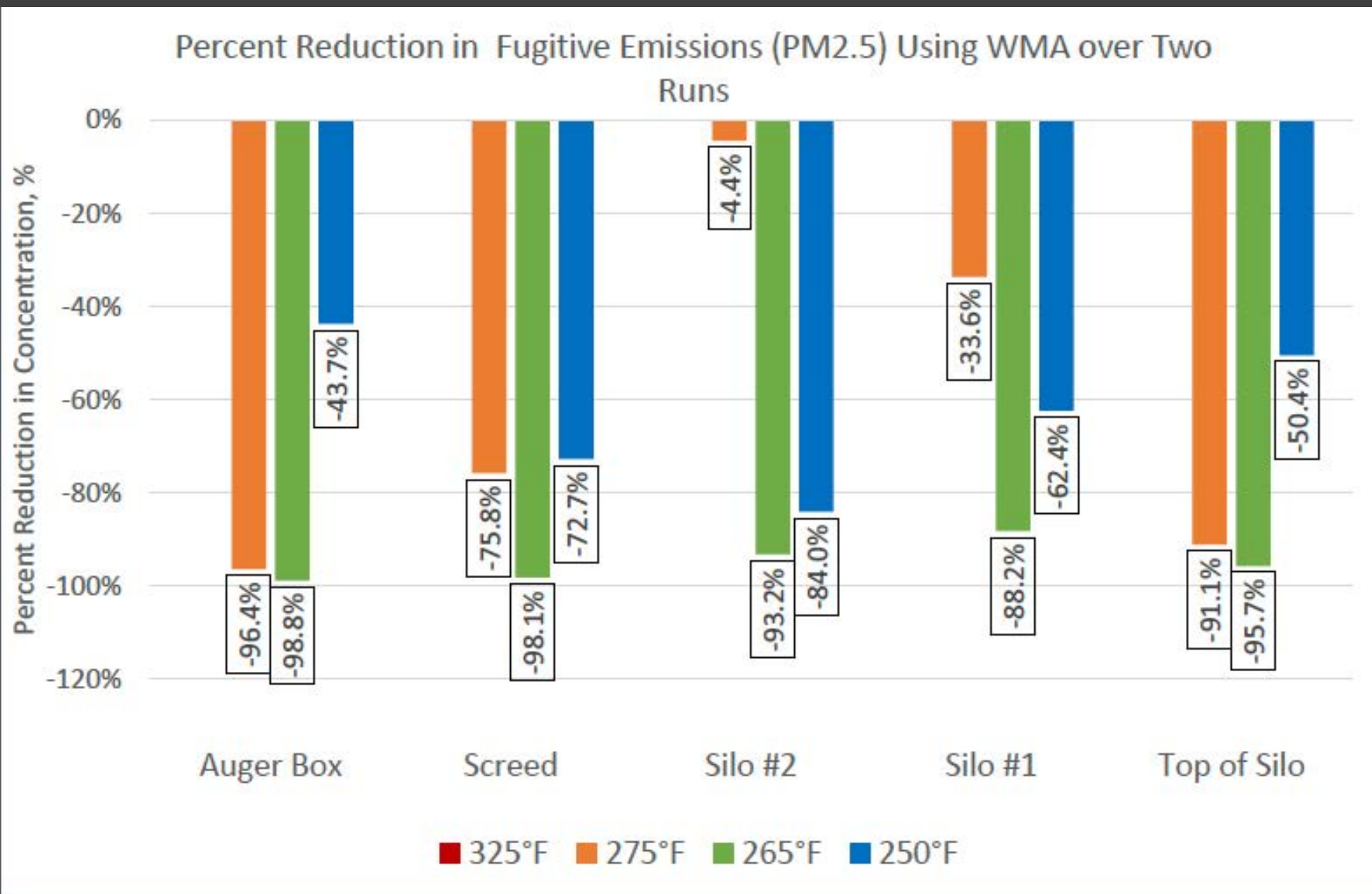


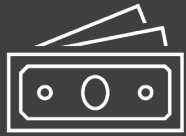
GREEN INITIATIVES





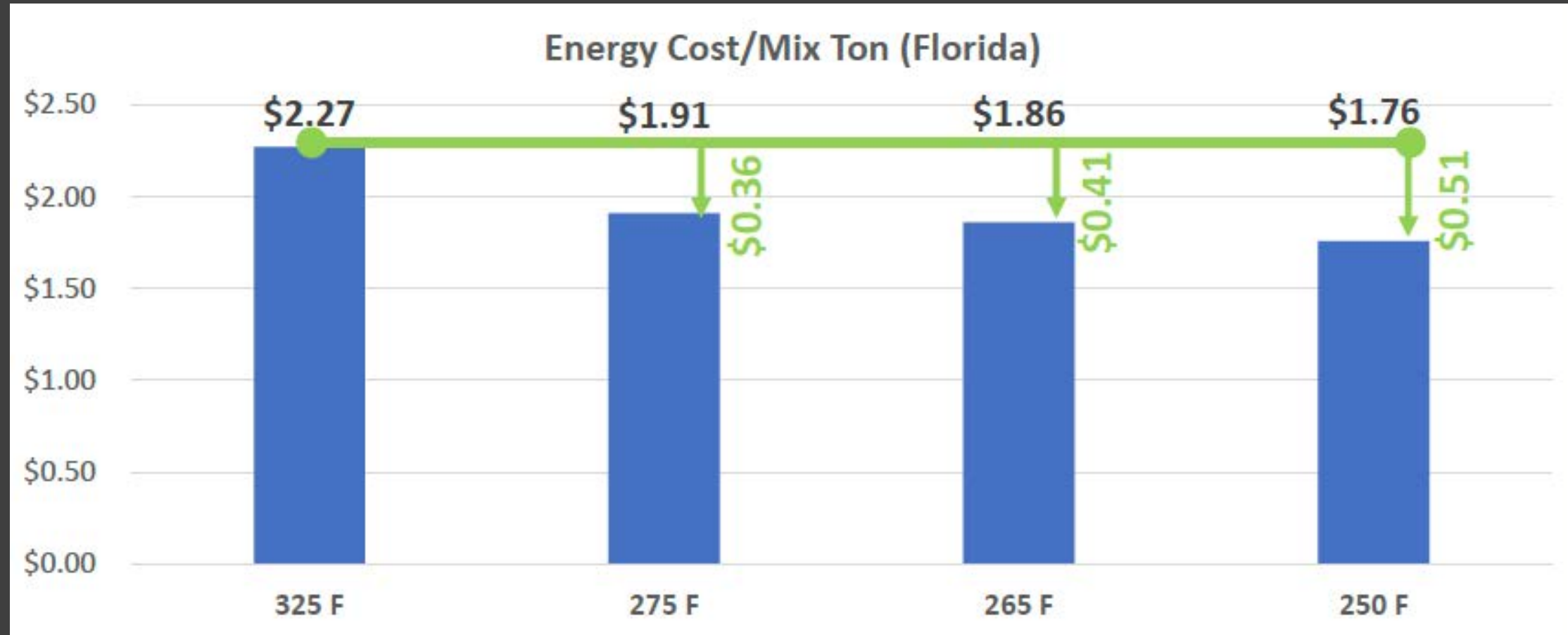
GREEN INITIATIVES





FINANCIAL IMPACTS

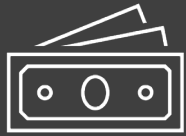
**based on Natural Gas Fuel \$9/MMBTU



275°F = \$54k annual savings

265°F = \$61.5k annual savings

250°F = \$76.5k annual savings



FINANCIAL IMPACTS

Evotherm WMA Plant Fuel Consumption Data 2022

Note: Natural gas fuel \$9.00/MMBtu assumption

Input Data from Contractor (Utah)

- 360 Tons/hr run rate
- Gencor Counter Flow Drum
- 15% RAP Content
- Assume 250k Mix Tons/yr
- **\$147.5k Savings (single plant)** running at 260°F

Input Data from Contractor (Florida)

- 200 Tons/hr run rate
- Astec Double Barrel Green
- 40% RAP Content
- Assume 150k Mix Tons/yr
- **\$61.5k Savings (single plant)** running at 265°F

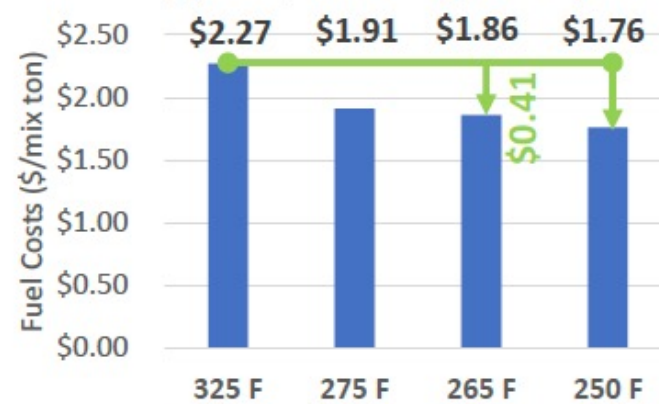
Input Data from Contractor (Virginia)

- 290 Tons/hr run rate
- Astec Double Barrel Green
- 30% RAP Content
- Assume 250k Mix Tons/yr
- **\$107.5k Savings (single plant)** running at 260°F

Energy Cost / Mix Ton (Utah)



Energy Cost/Mix Ton (Florida)



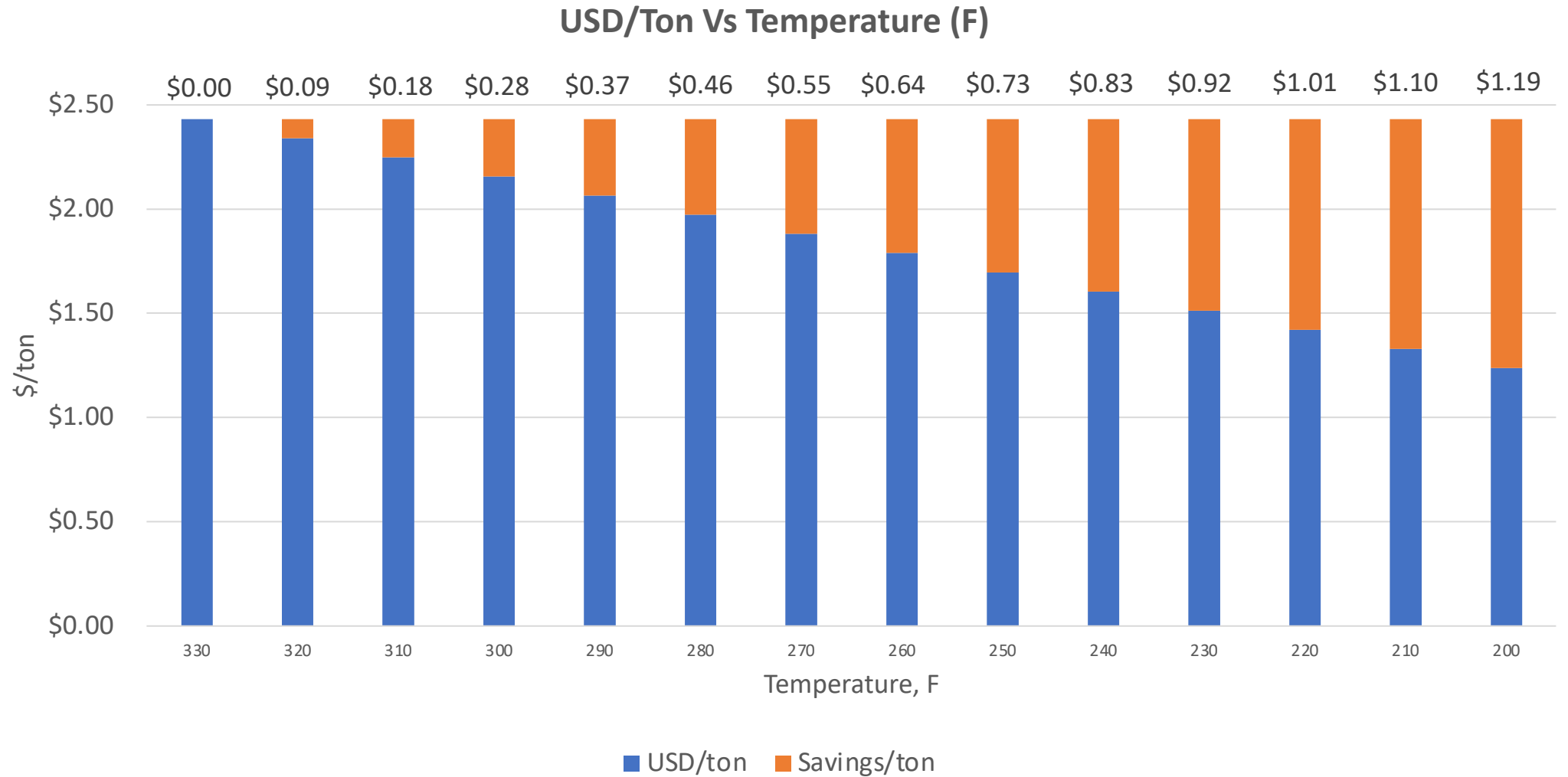
Energy/ Mix Ton (Virginia)





FINANCIAL IMPACTS

**based on Natural Gas Fuel \$9/MMBTU





FIELD EFFECTS





TEST RESULTS

ATS Quality Control Density Gauge Readings

Project: Amazon DJX2

Client: Ingevity

QC Technician:

Chase Harris

| Density Gauge Placement Location: | Gauge Compaction Percentage: | Density: | Mat Temperature: | Target Mix Temperature | Date |
|--|------------------------------|--------------------------|------------------|------------------------|-----------|
| Number One: Located 11' West of the Light Pole in the Northwest end of the Center Parking Area in Lot 1 (Blanding) | 96.9% | 148.2 LB/FT ³ | 223.9 F° | 325 F° | 5/9/2022 |
| Number Two: Located 10' West and 49' South of the Light Pole in the Northwest end of the Center Parking Area in Lot 1. | 95.8% | 146.5 LB/FT ³ | 232.9 F° | 325 F° | |
| Number Three: Located 10' West of the Light Pole in the West end of the Center Parking Area in Lot 1. | 96.2% | 147.1 LB/FT ³ | 235.0 F° | 325 F° | |
| Number One: Located 8' East of the Light Pole in the East end of the Center Parking Area in Lot 1. | 97.1% | 147.3 LB/FT ³ | 155.5 F° | 275 F° | 5/10/2022 |
| Number Two: Located 10' East and 28' South of the Light Pole in the East end of the Center Parking Area in Lot 1. | 96.7% | 146.7 LB/FT ³ | 160.2 F° | 275 F° | |
| Number Three: Located 11' East of the Light Pole in the Southeast end of the Center Parking Area. | 97.3% | 147.7 LB/FT ³ | 174.6 F° | 275 F° | |
| Number One: Located 8' East of the Light Pole in the West end of the Center Parking Area in Lot 2 (Wesconnett) | 97.0% | 147.9 LB/FT ³ | 165.2 F° | 250 F° | 5/11/2022 |
| Number Two: Located 10' East and 18' South of the Light Pole in the West end of the Center Parking Area in Lot 2. | 97.7% | 149.1 LB/FT ³ | 164.8 F° | 250 F° | |
| Number Three: Located 10' East of the Light Pole in the West end of the Center Parking Area in Lot 2. | 97.6% | 148.9 LB/FT ³ | 180.3 F° | 250 F° | |



Questions?



duvalasphalt.com



asphaltesting.info