

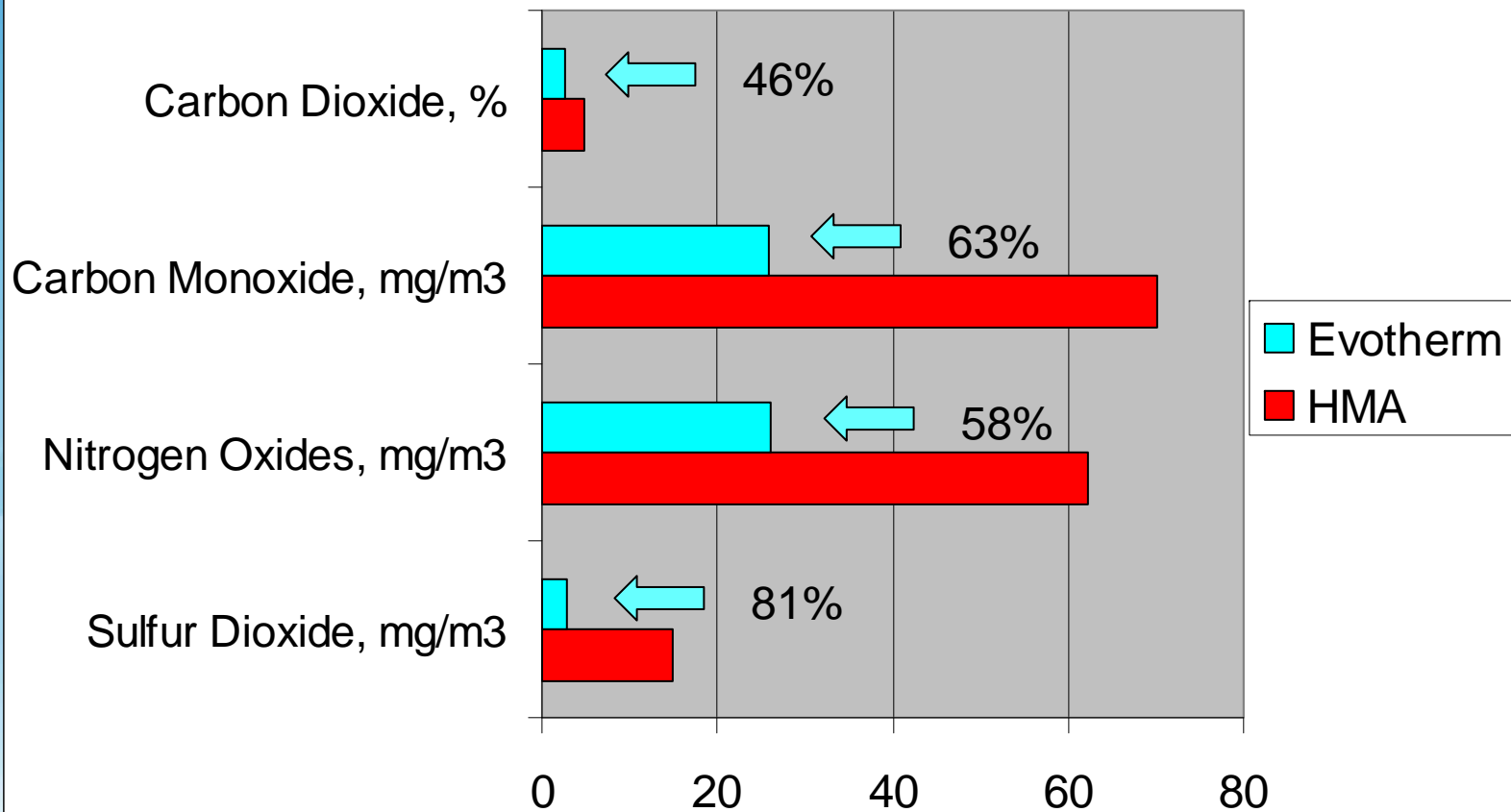
# Stack Emissions & Jobsite Fumes Reductions Using Evotherm® Warm Mix Asphalt

MWV Asphalt Innovations

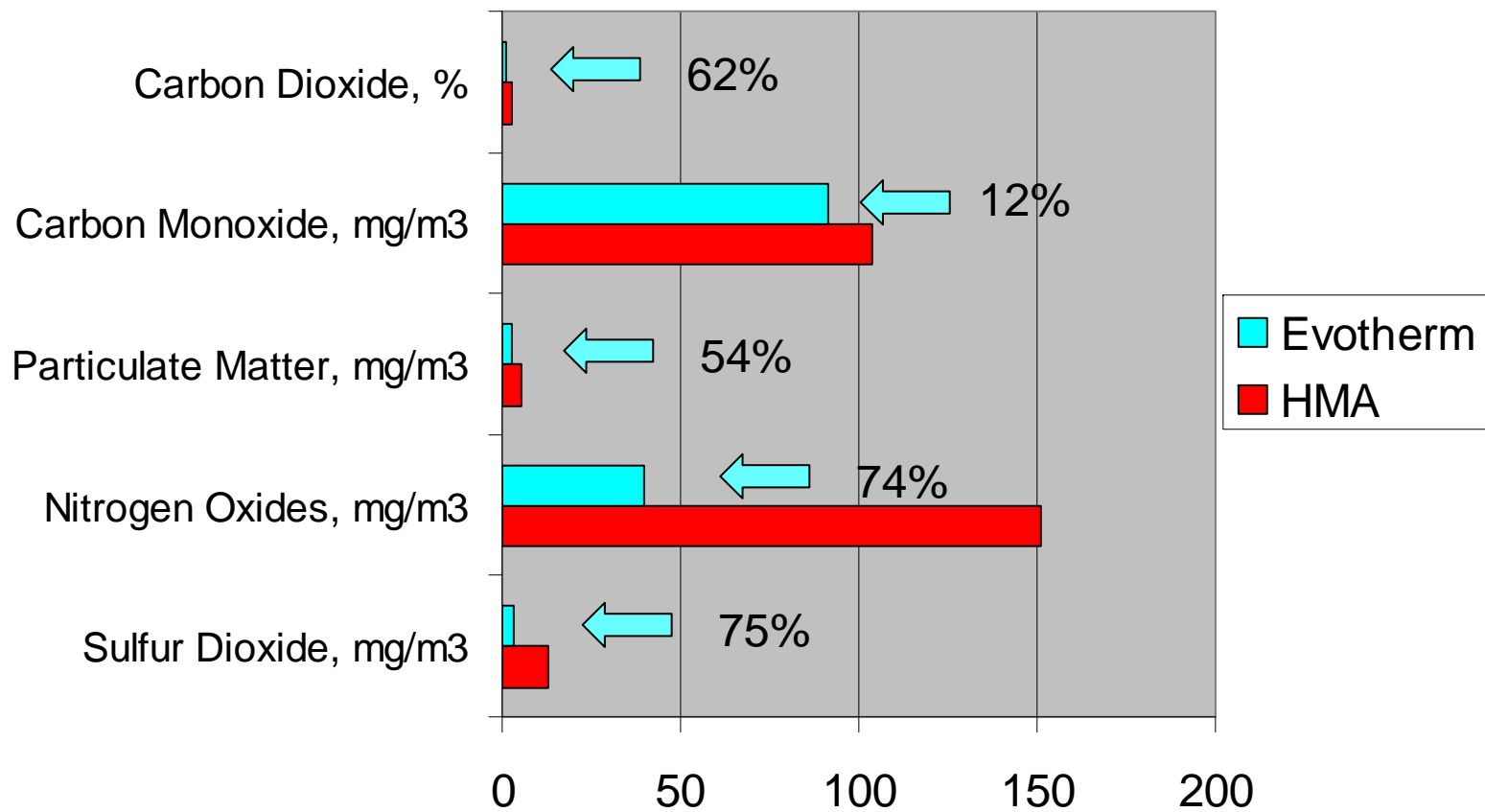
30 March 2010

**MWV EVO THERM**  
WARM MIX ASPHALT TECHNOLOGY

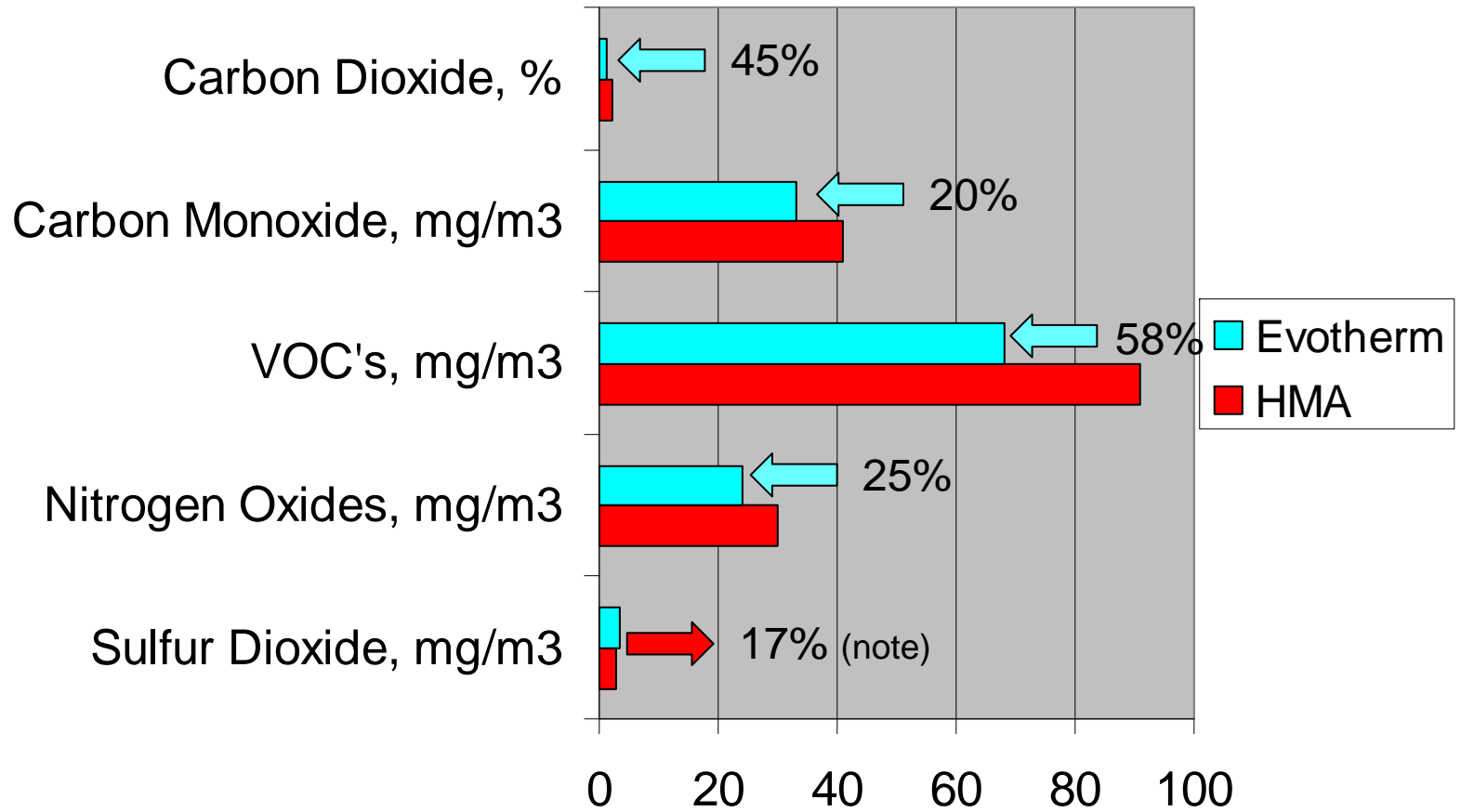
### Case I. Stack Emissions, Toronto, Canada, Pinchin Environmental Ltd.



## Case II. Stack Emissions, Chinese National Environmental Testing Center (CNAEC)

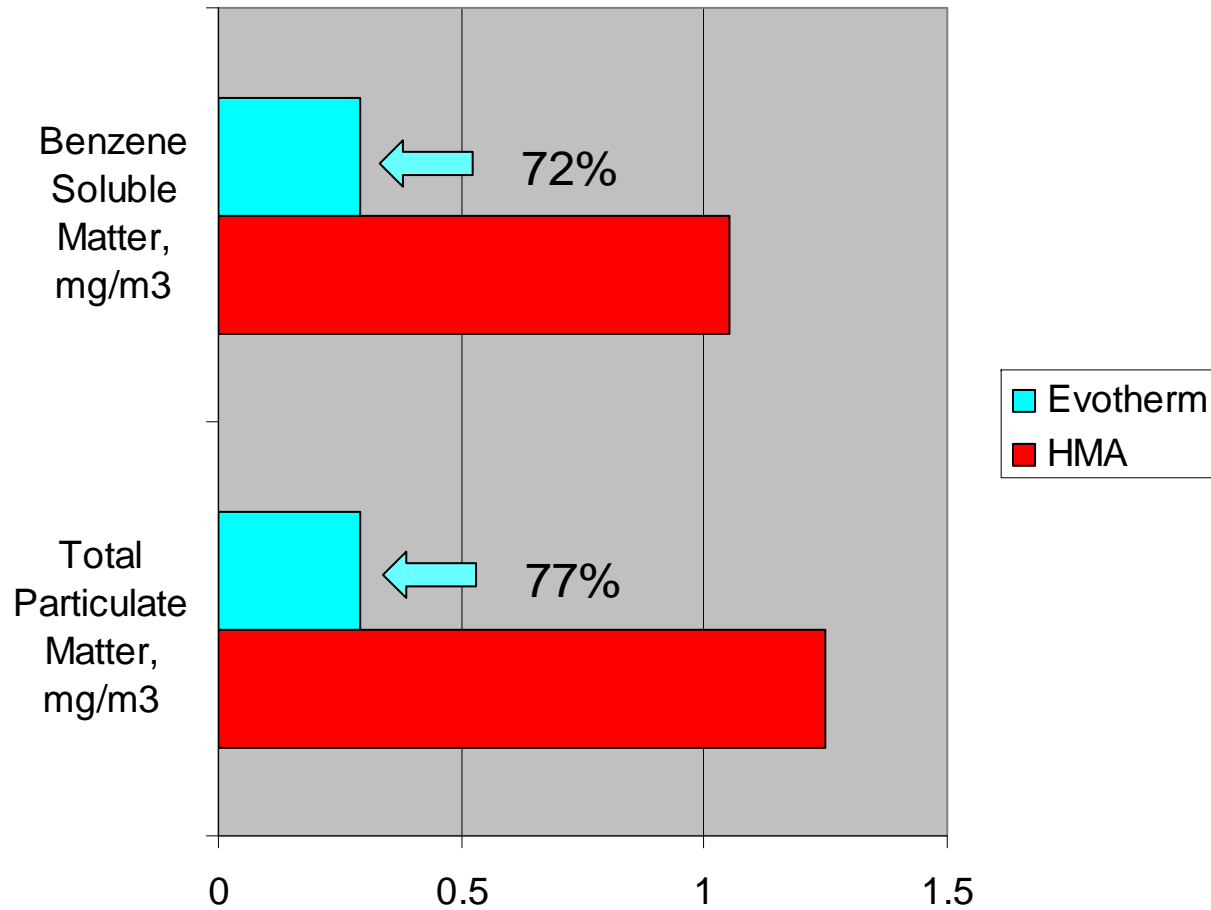


### Case III. Stack Emissions, London, Canada, Ortech Environmental

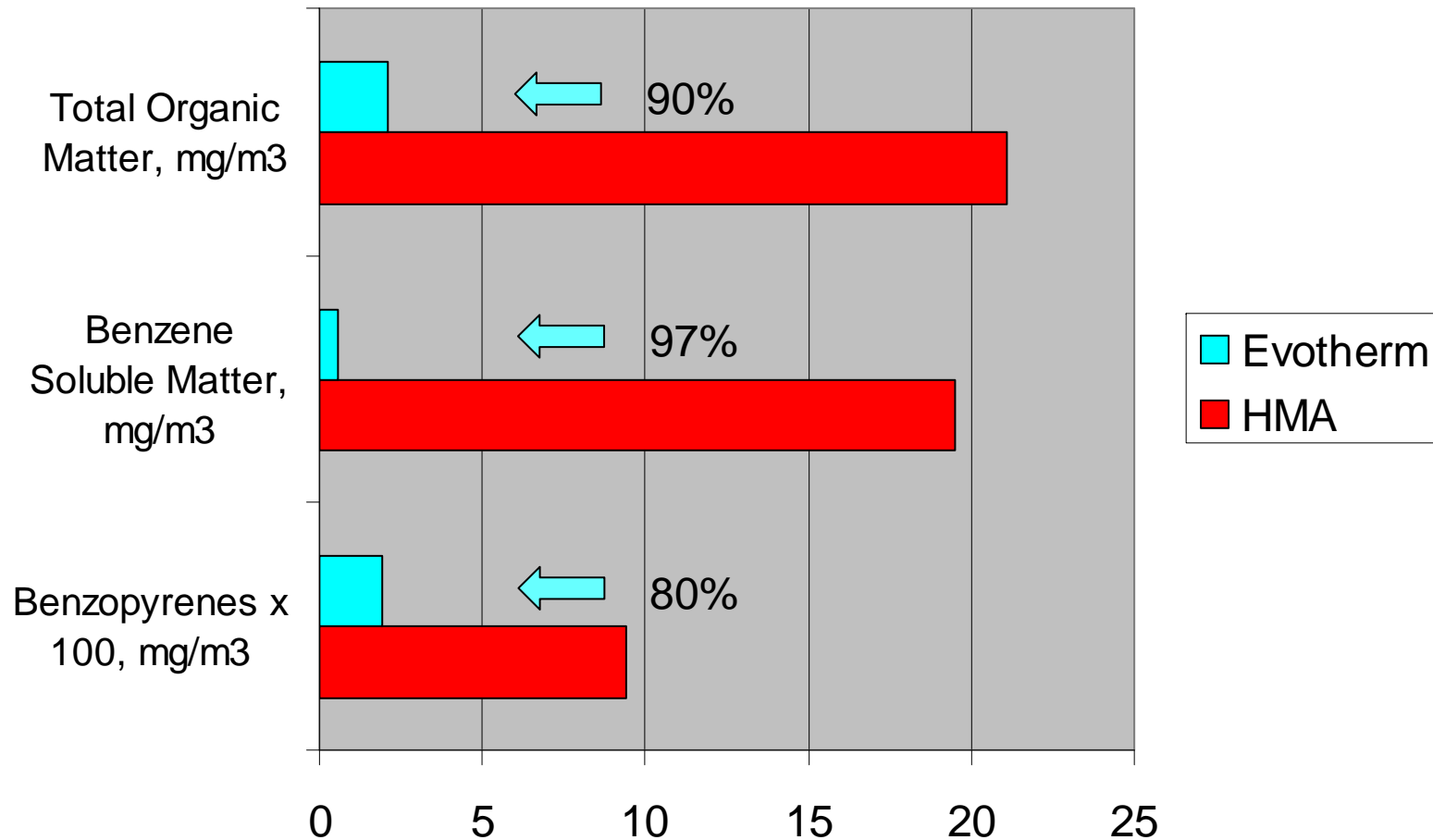


Note: increase in SO2 due to switch to high-sulfur fuel in middle of test.  
Evotherm contains no sulfur or sulfur-containing compounds.

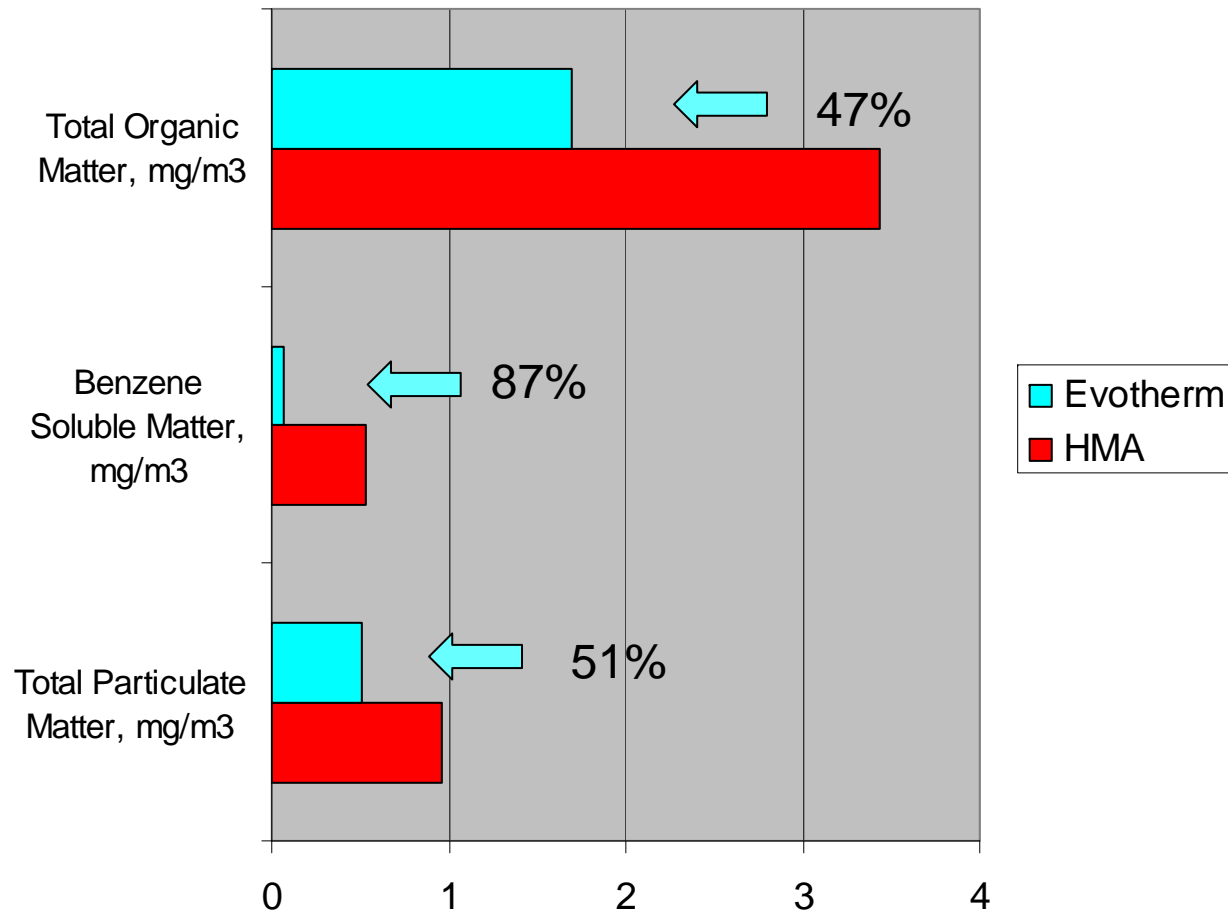
### Case IV. Fumes Study, SR 541 Ohio, Shelley & Sands, EES Group, Inc.



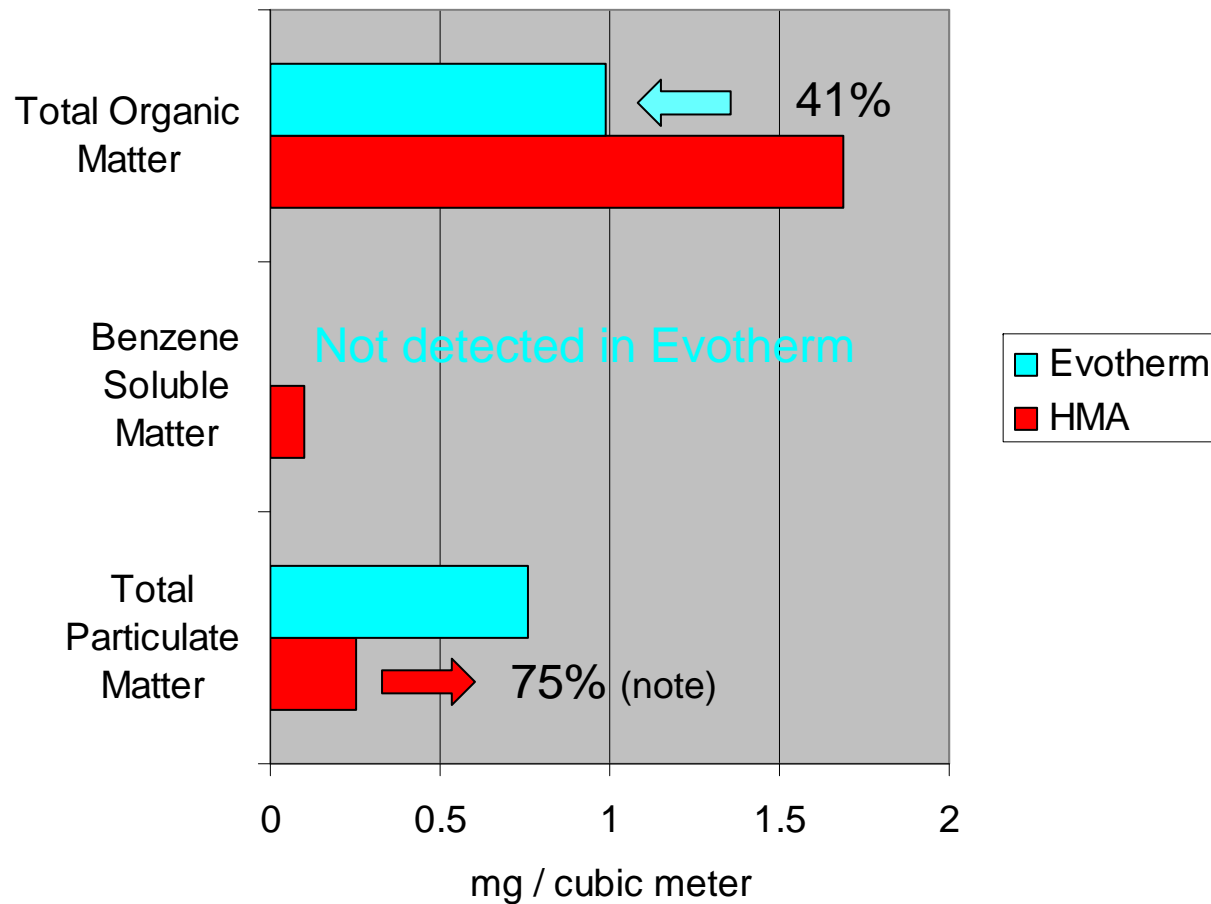
### Case V. Fumes Study by Chinese National Environmental Test Center (CNAEC)



## Case VI. Fumes Study, Austin, TX, by Vulcan Materials, MWV Shared Industrial Services

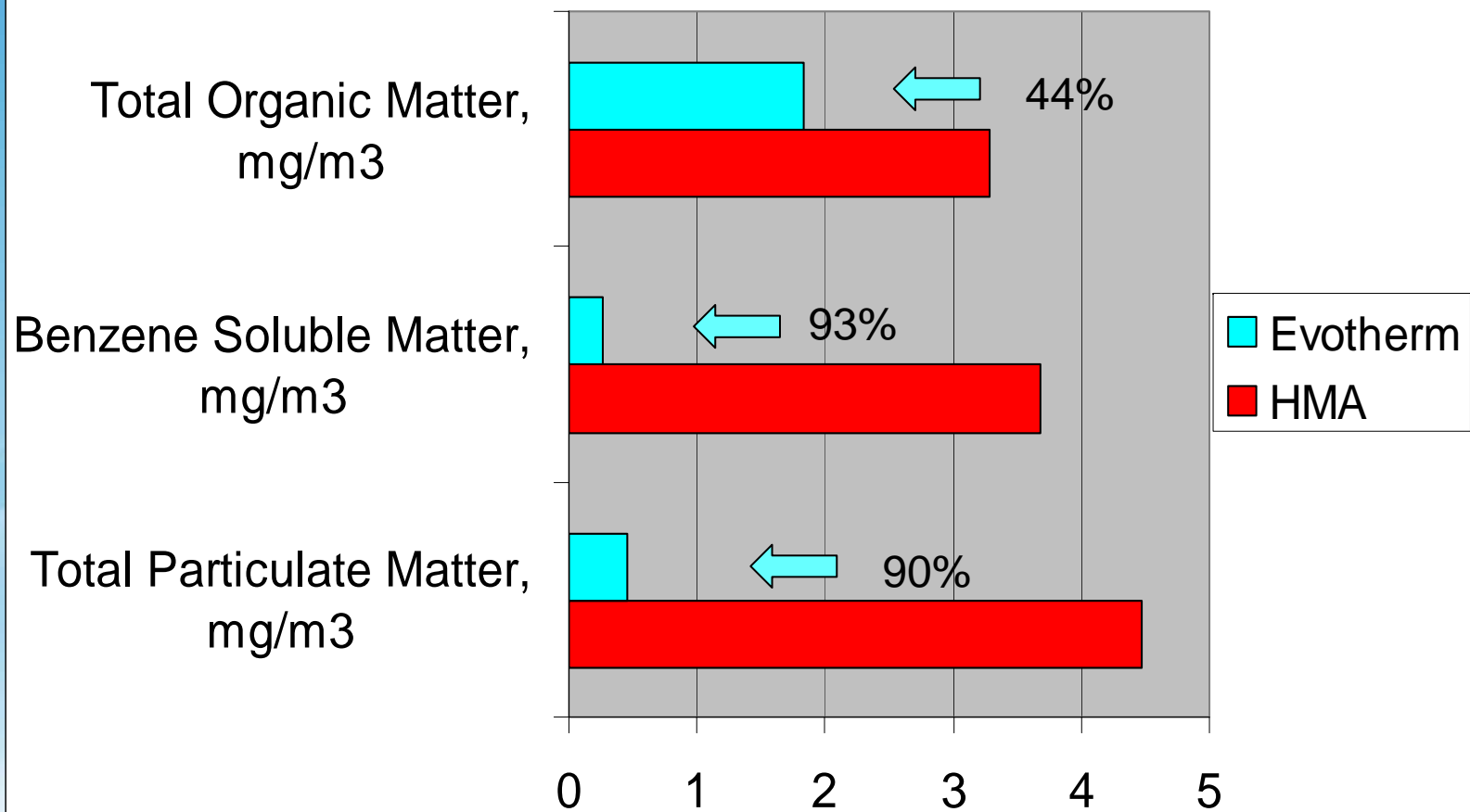


## Case VII. Fumes Study by Heritage Research Environmental

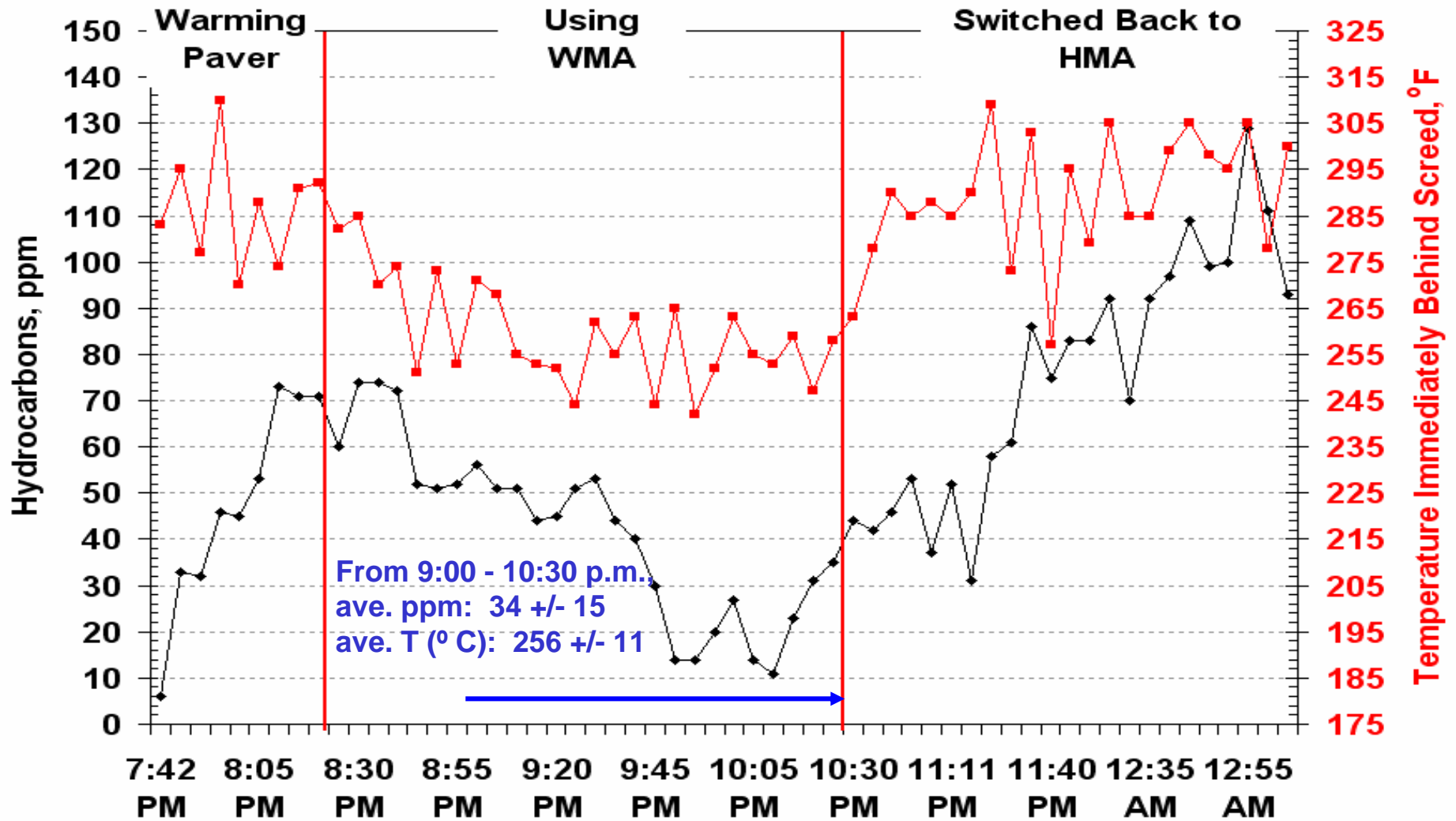


Note: increase in particulate matter due to wind-blown dust contamination from pavement shoulder on day of Evotherm evaluation.

### Case VIII. Fumes Study, Neligh, Nebraska, by Knife River Paving & MWV Shared Industrial Services



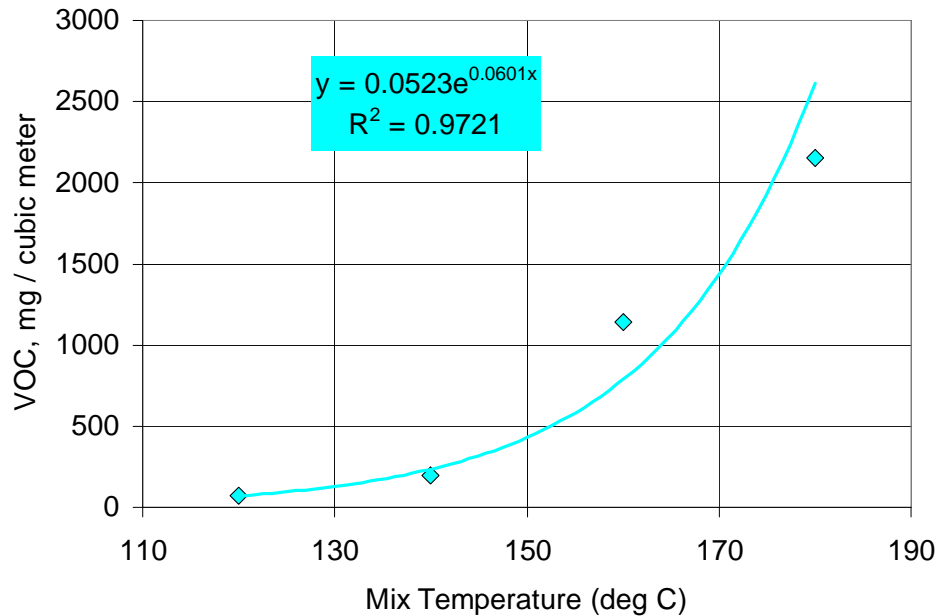
# Case IX. Fumes Study by Dr. Thomas Bennert, Rutgers University, Interstate 78 Evotherm Project, NuStar Energy LP.



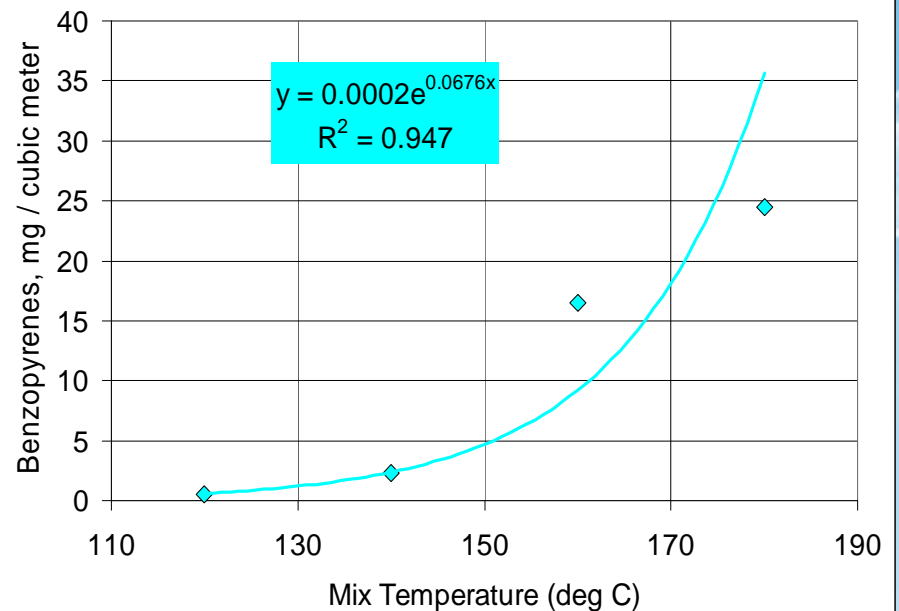
# SUMMARY

It is well known that decreasing mix temperature results in decreased fumes & vapors at the job site. Results in the graphs below are among many such examples of the effect of lowering mix temperatures in the field.

Mix **Fumes** Increase Exponentially with Mix Temperature According to Measurements from China Research Institute of Highways (CNAEC)



Mix **Benzopyrene Vapors** Increase Exponentially with Mix Temperature According to Measurements from China Research Institute of Highways (CNAEC)



The reduction of mix production temperatures & laydown temperatures made possible with the use of Evotherm WMA technology leads directly to the emissions & fumes decreases shown in the preceding slides.

## REFERENCES

- **“Evotherm Warm-Mix Asphalt Fume Exposure Assessment Report,”** Prepared by Heritage Research Group, 7901 W. Morris Street, Indianapolis, IN 46321, July 6, 2005.
- **“Particulate and Gaseous Emission Testing at TCG Asphalt Plant, London, Ontario,”** Prepared by Ortech Environmental, 2395 Speakman Avenue, Mississauga, Ontario, Canada, L5K 1B3, July 14, 2006.
- **“Report for a Combustion Gas Emission Testing Program at the Miller Aggregate Resources Facility in Brechin, Ontario,”** Prepared by Pinchin Environmental Ltd., Air & Noise Group, 5749 Coopers Avenue, Mississauga, Ontario, Canada, LAZ 1R9, October 7, 2005.
- **“Airborne Emissions Monitoring Results Evotherm Warm Mix Asphalt & Hot Mix Asphalt Paving Trial,”** prepared by Jon Hellerstein CIH, CSP, Senior Safety, Industrial Hygiene & Product Stewardship Consultant, Safety Health & Environment, Shared Business Services MWV Corp.
- **Stack tests were conducted according to method specifications established by the US EPA, CFR, Title 40 Part 60 (40 CFR 60), Appendix A, Methods 3A (CO<sub>2</sub>), 6C (SO<sub>2</sub>), 7E (NO<sub>x</sub>), 10 (CO), & 25A (Total Organic Compounds).**
- **Fumes and particulate matter measurements were conducted in accordance with NIOSH Standard 5042.**

# SELECT PHOTOGRAPHS SHOWING FUMES REDUCTIONS REALIZED USING EVOTHERM WMA TECHNOLOGY



Vulcan Materials Co., San Antonio, TX

## SELECT PHOTOGRAPHS SHOWING FUMES REDUCTIONS REALIZED USING EVOTHERM WMA TECHNOLOGY



Evotherm on the left, HMA on the right

# SELECT PHOTOGRAPHS SHOWING FUMES REDUCTIONS REALIZED USING EVOTHERM WMA TECHNOLOGY



Tunnel Paving  
Evotherm on the left, HMA on the right