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Catalytic Ceramic Filter Systems Air Pollution Treatment

Air Quality Management Symposium
June 2015

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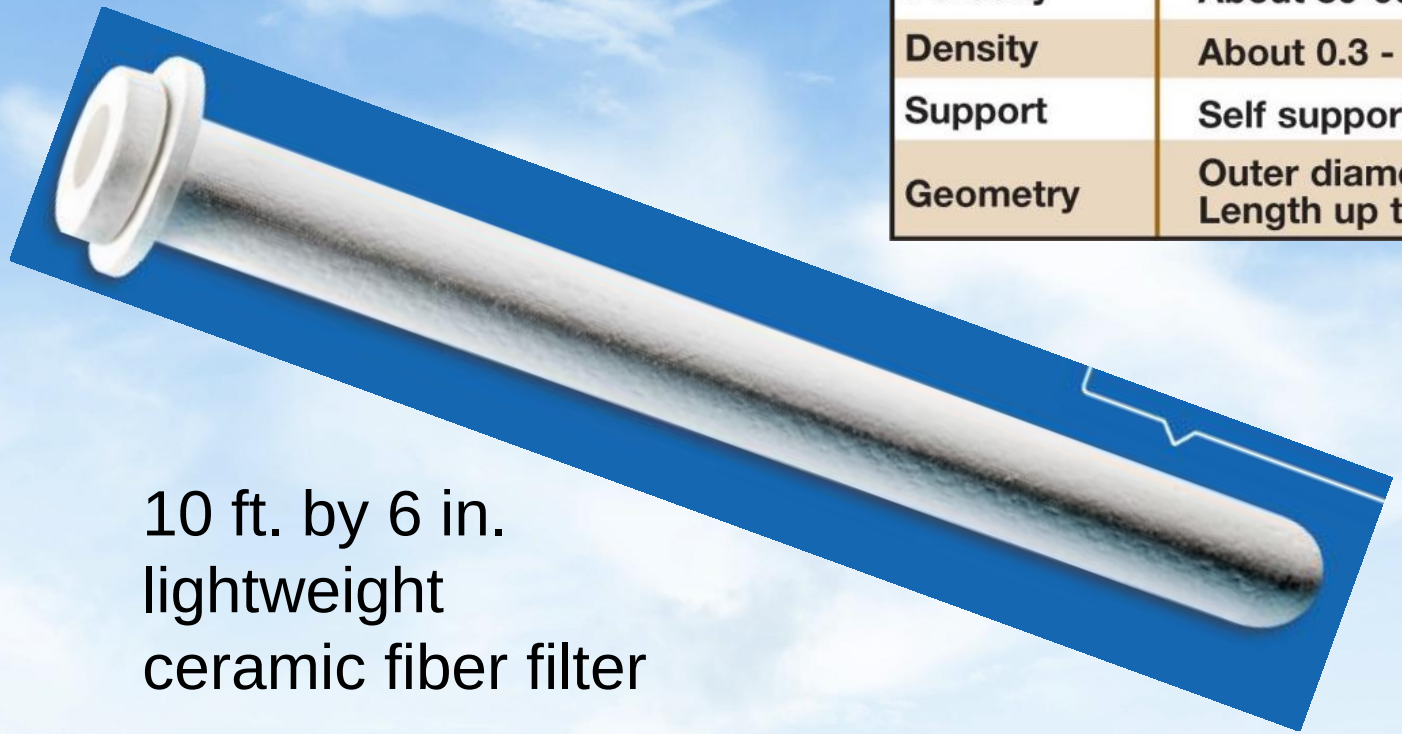
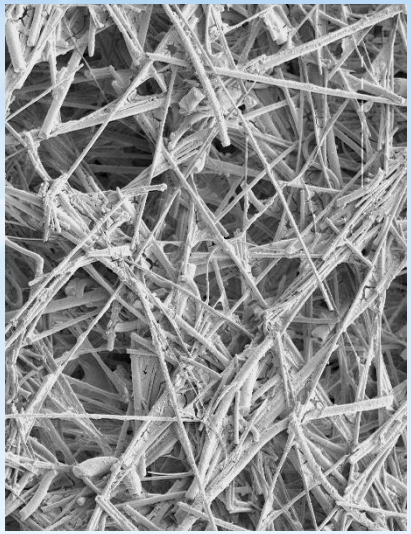
Business Development Director

Ceramic Filter Tubes (“Candles”)

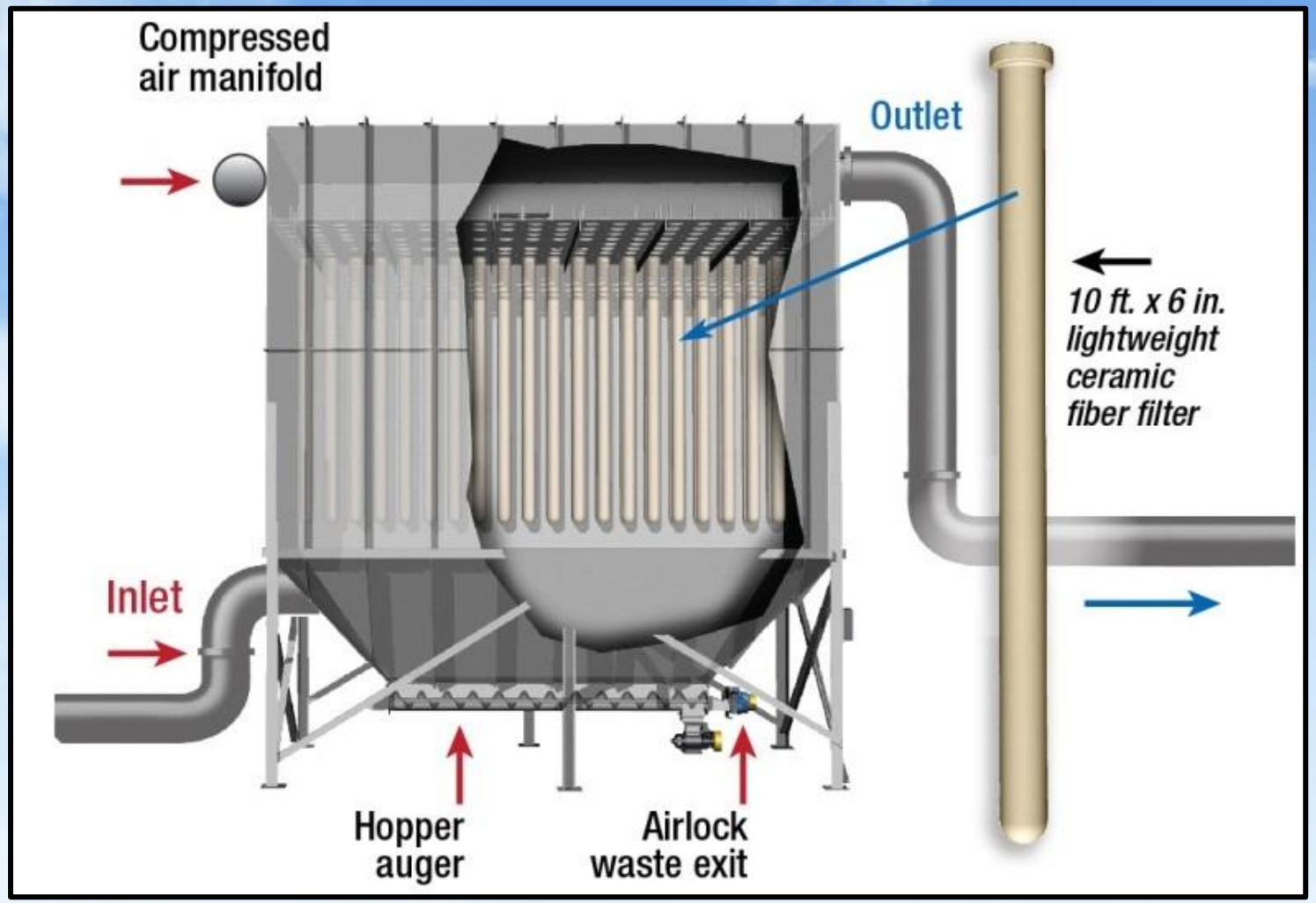
CHARACTERISTICS OF (LOW-DENSITY) CERAMIC ELEMENTS	
Form	Monolithic rigid tube
Composition	Refractory fibers plus organic and inorganic binding agents
Porosity	About 80-90%
Density	About 0.3 - 0.4 g/cc
Support	Self supporting from integral flange
Geometry	Outer diameter up to 150 mm; Length up to 3 m



10 ft. by 6 in.
lightweight
ceramic fiber filter



Tri-Mer Catalyst Filter & Housing

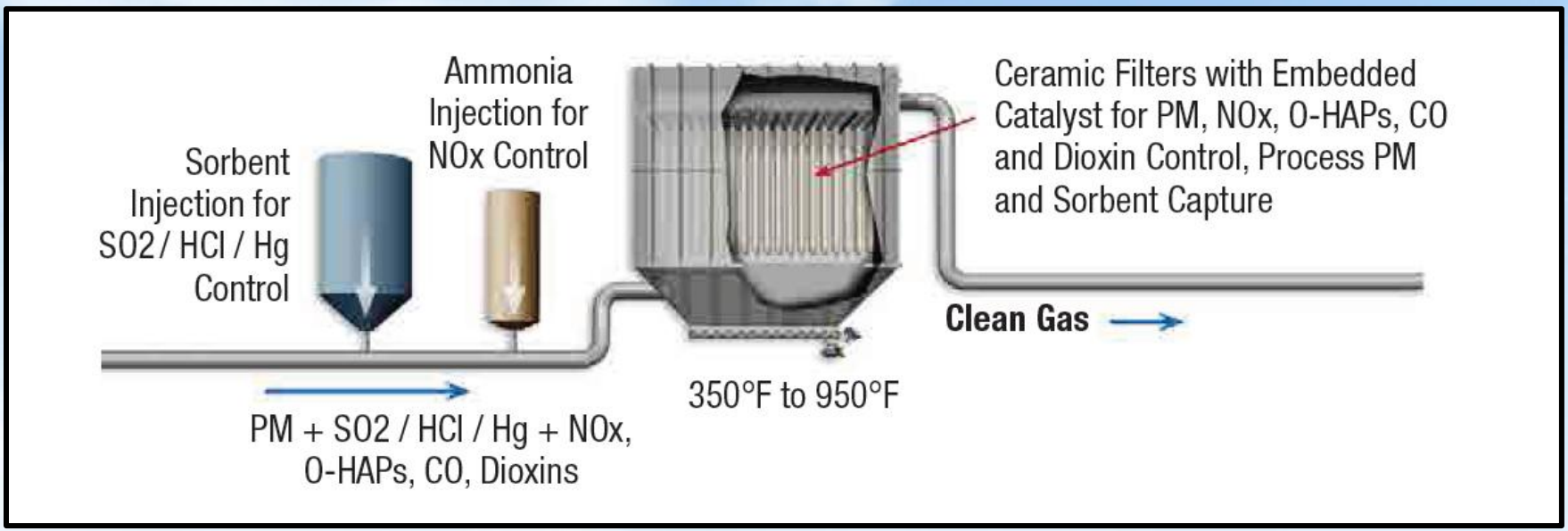


Pressure Drop and Filter Life

- Initial pressure drop dP approximately 4 inch w.g.
- Less than of 10% differential pressure increase per year.
- Increased pressure drop triggers filter change-out, not catalyst deactivation or change in performance.
- Fan has enough power to cover filter life.
- Time between filter changes is financial decision depending on local power cost.
- 5 to 10 year or more filter life – application dependent

PM + SOx/HCl/HF/Hg + NOx/CO/O-HAPs/Dioxins

Tri-Mer provides completely integrated all-in-one system



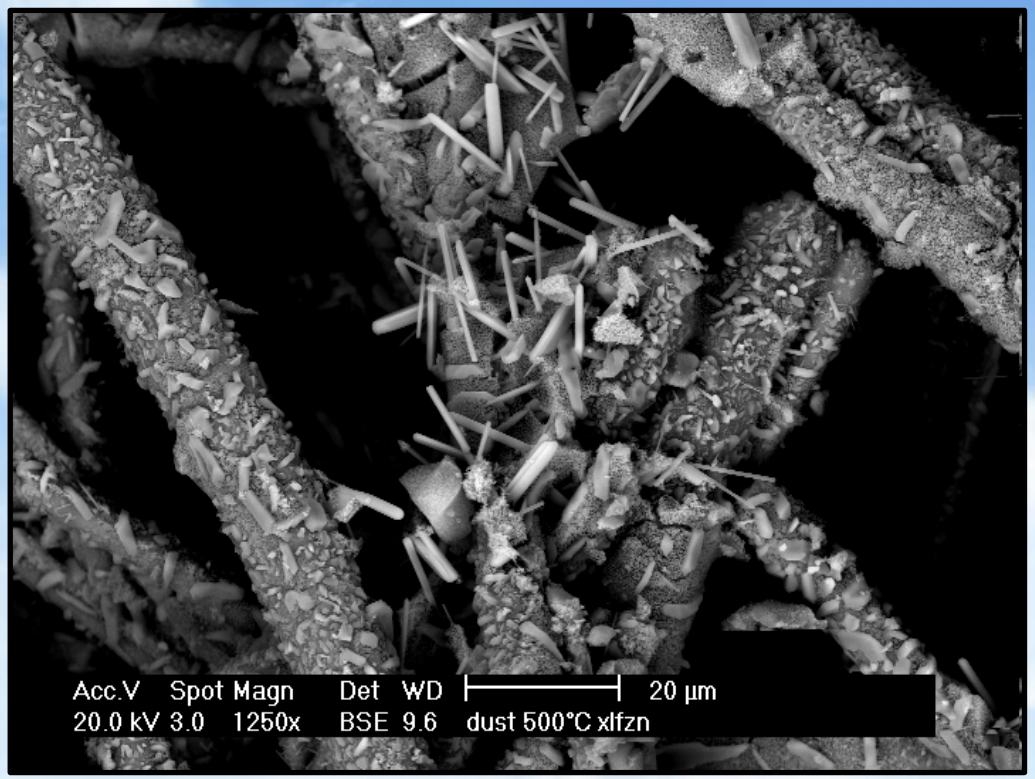
Typical Performance

- PM — Filterable Submicron PM, PM2.5, PM10
  Outlet less than 0.001 grains/dscf (2 mg/Nm3)
- SOx — Over 90% removal with dry sorbent injection (DSI)
  95+% in certain applications
- NOx — Over 90% removal at 400º F.
  95+% in certain applications

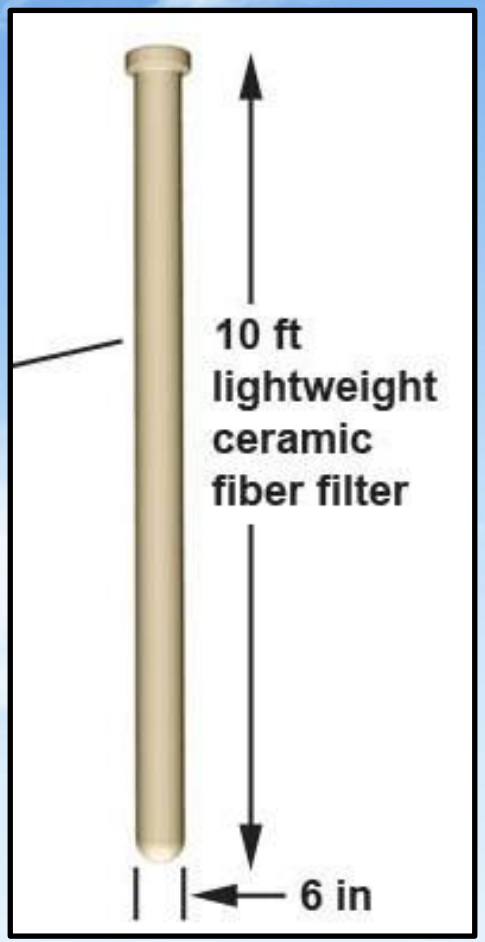
Also removes

- Cement Organic HAP VOC (Portland Cement MACT)
- HCl, HF (Many regulations)
- Dioxins (CISWI MACT)
- Mercury (Many regulations)
- Soon introducing a system for CO simultaneously

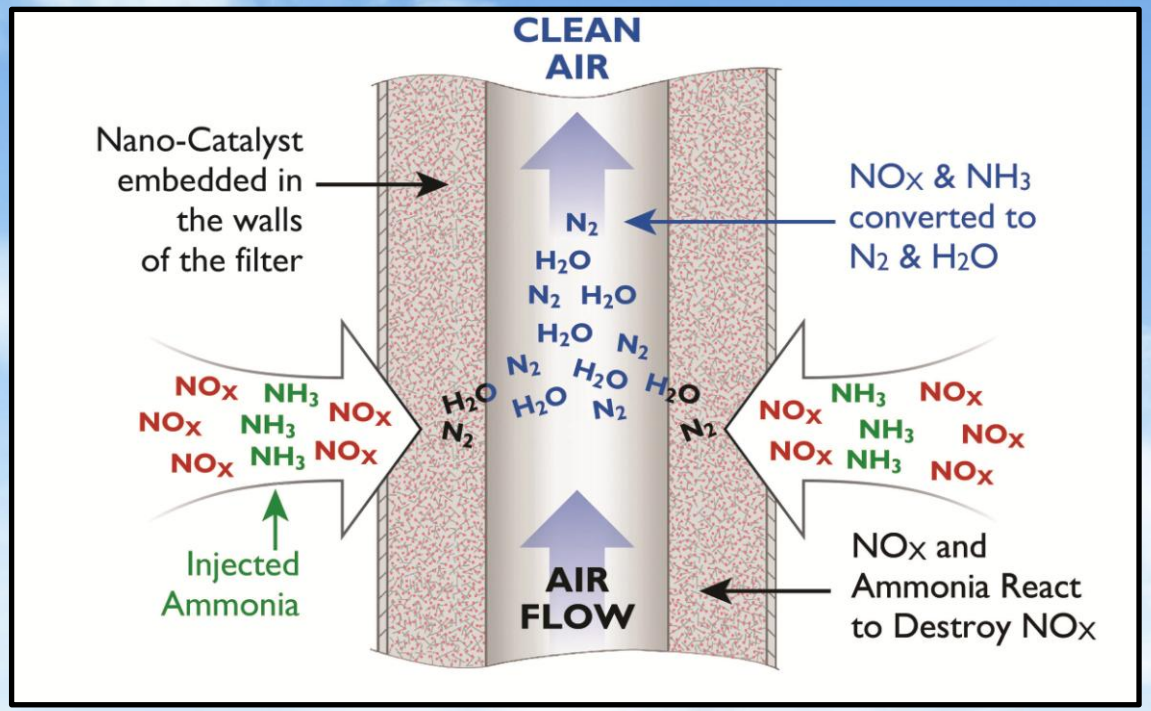
Embedded catalyst – NOx, O-HAPS, Dioxins, CO



Nano-bits of NOx catalyst are embedded within the fibers and on the fibers



Lower Temperature Activation of Catalyst

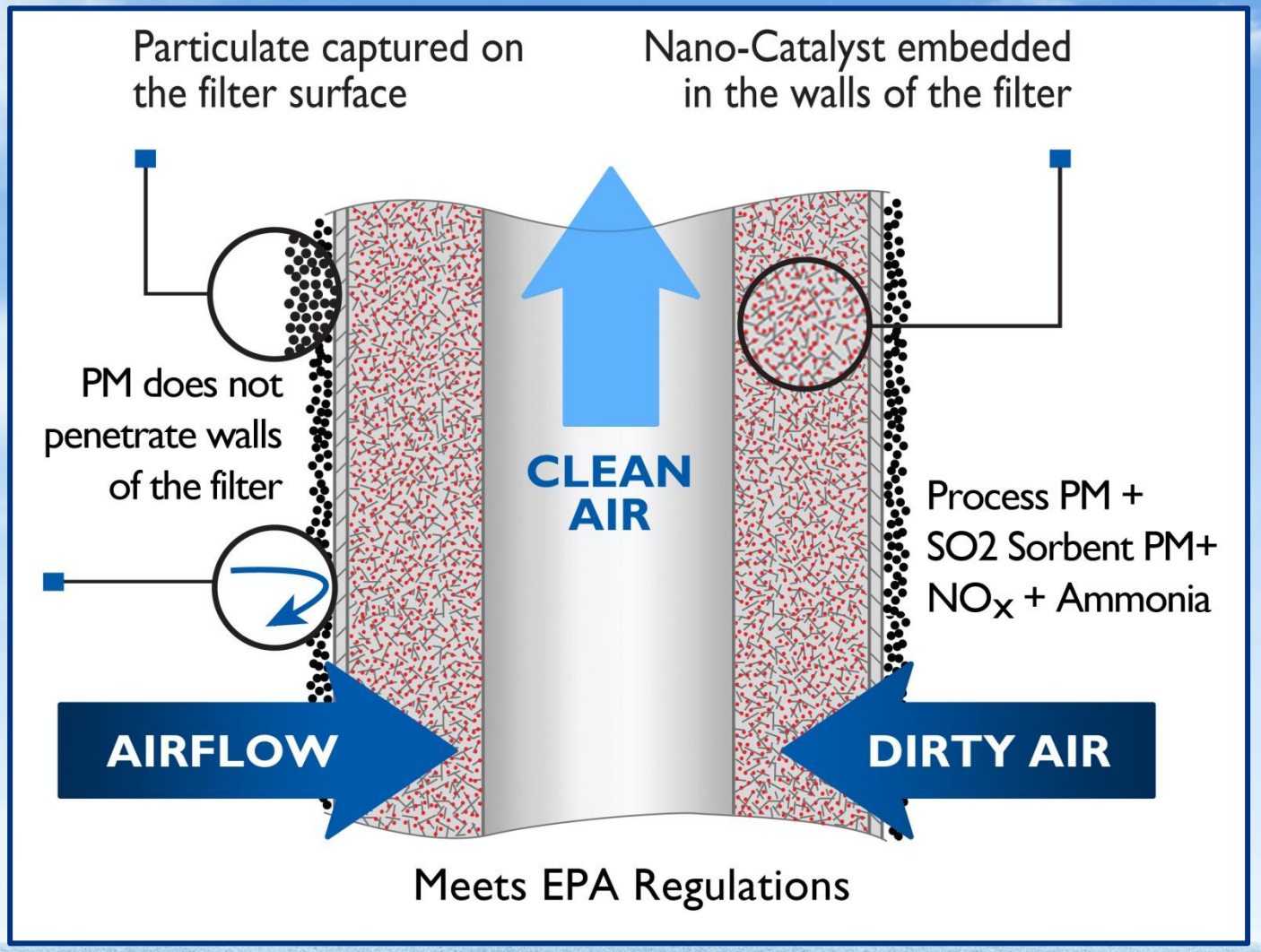


Utilization of catalytic surface is almost 100%, compared to 15% for traditional SCR

Lower temperatures achieve higher removal efficiency-- 60-70% starting at 350^{o} F, and over 90% at 400^{o} F and above.

Traditional block SCR requires 600 - 650^{o} F to reach 90%.

Protection from Catalyst PM Blinding and Poisoning



Turnkey Projects – Civil, Ductwork, Ceramic Systems

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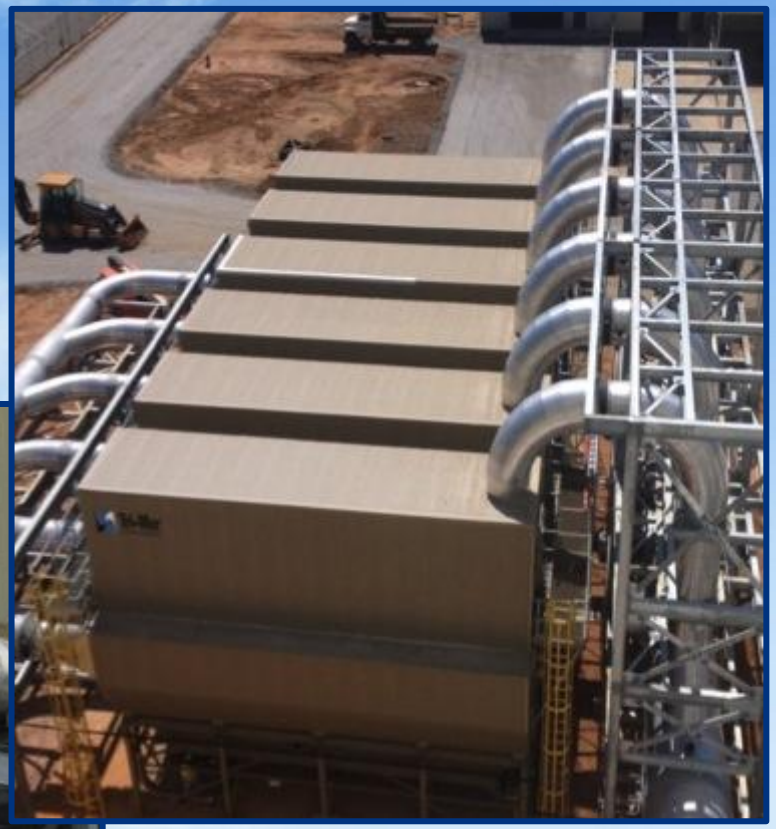
12 Housings – Ceramics (PM, SO2, NOx)

- Ceramic fracking proppants
- 2 kilns
- Operational Q1 2013
- Compliance verified



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Barge-mounted Ceramic Catalyst Filters – At-Berth Ships

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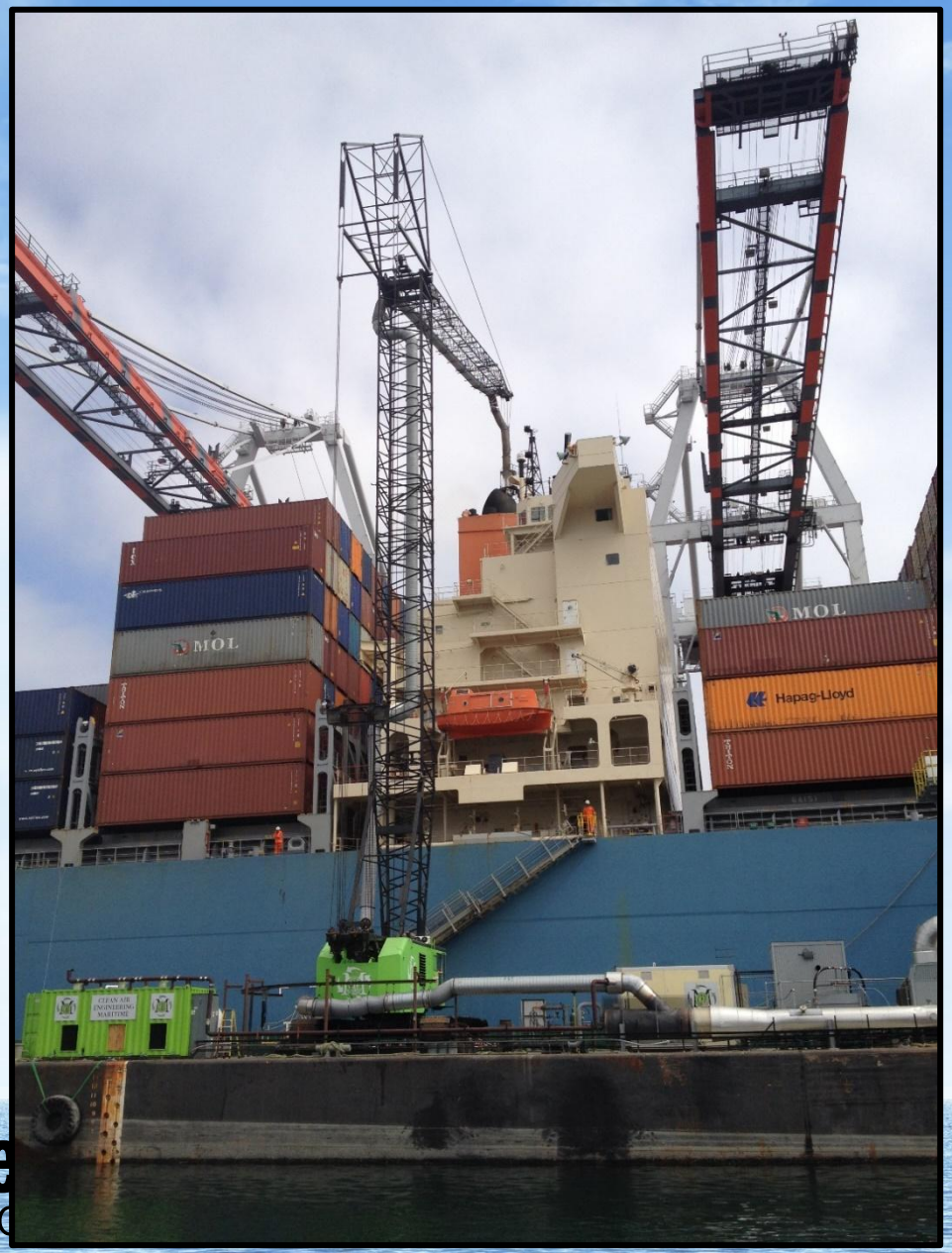
Clean Air Engineering Maritime (CAEM) system at POLA



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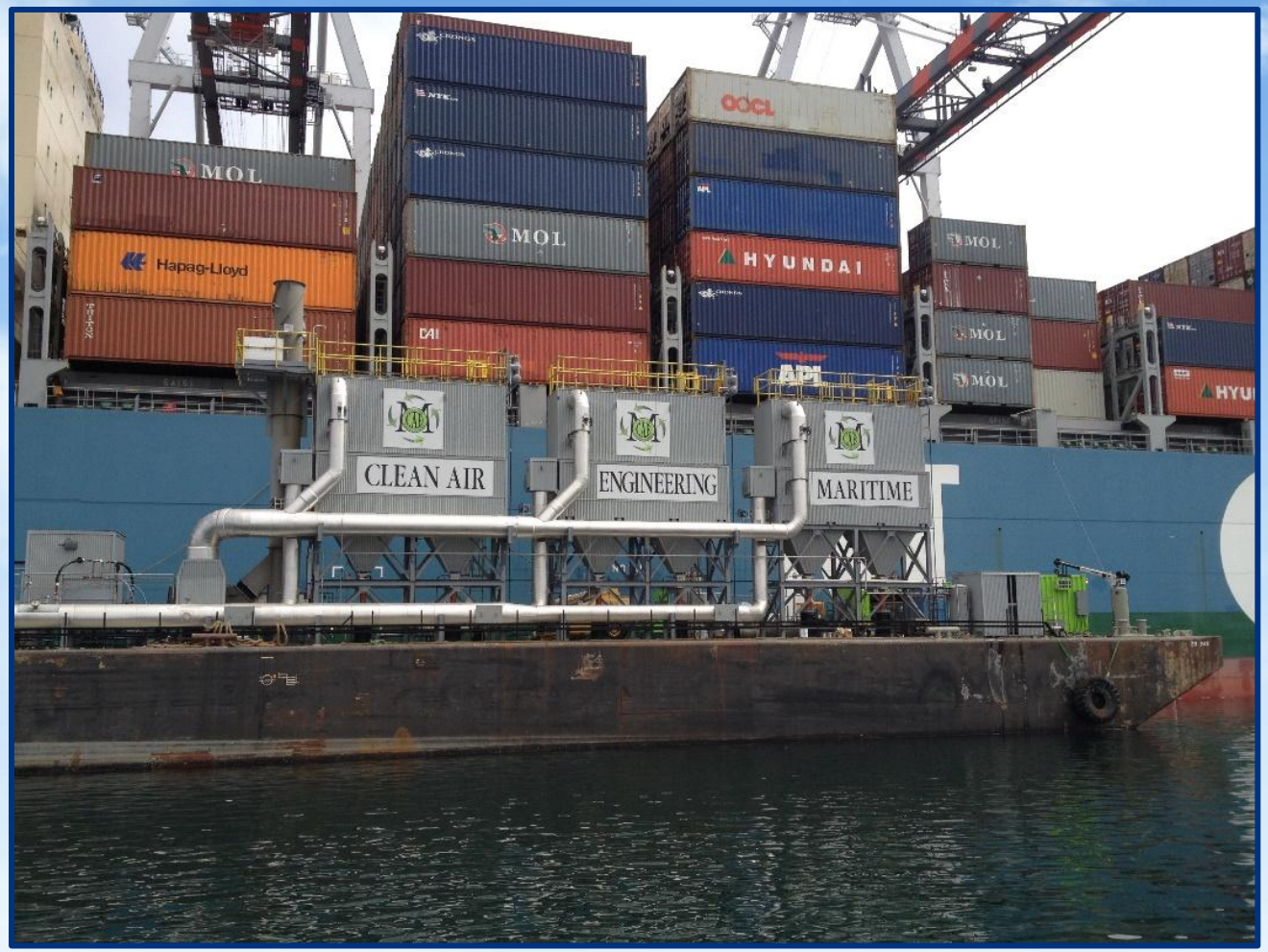
Clean Air Engineering Maritime (CAEM) system at POLA



Thank You

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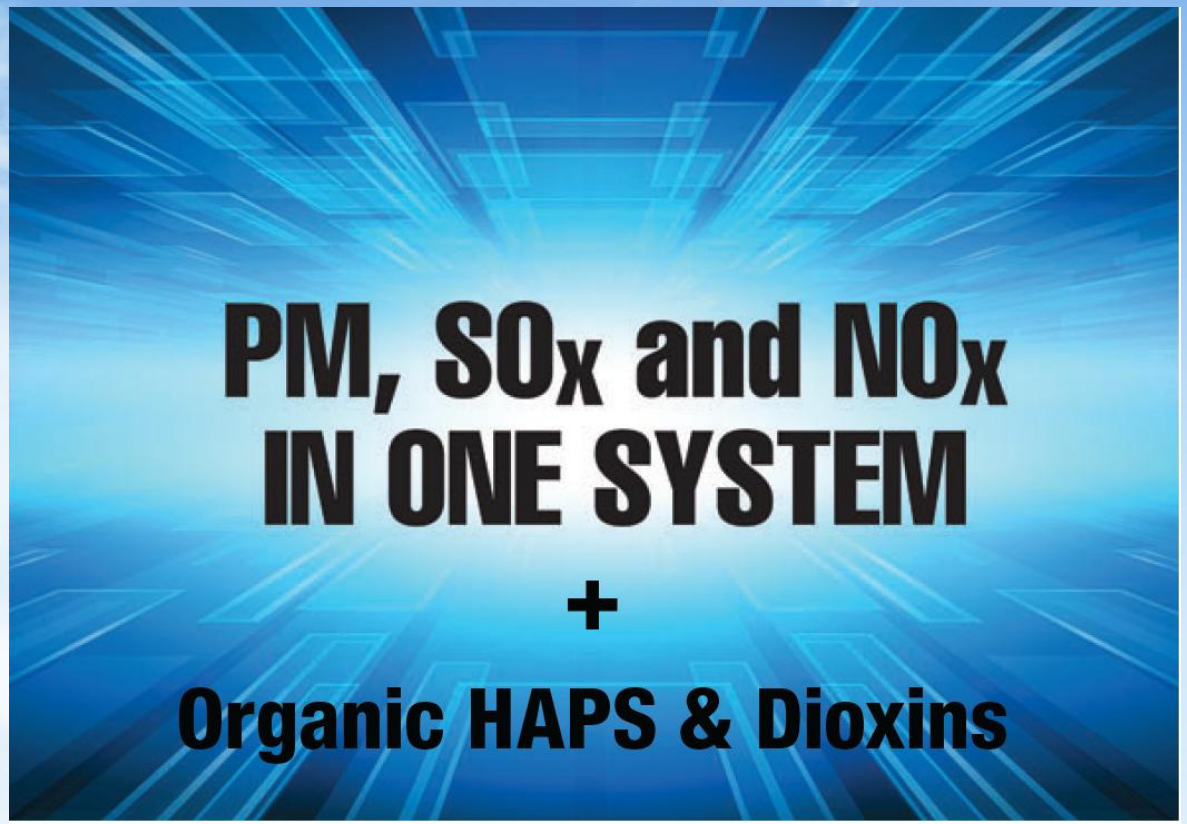

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