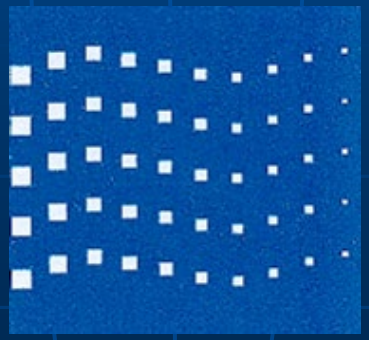
DRY SYSTEMS TECHNOLOGIES®

Technology for a cleaner and safer Mining Environment™

Dorian Pia, Dry Systems Technologies



Who is Dry Systems Technologies®

- Dry Systems Technologies® is the World's Leading Manufacturer of Diesel Power Packages for underground Mines.
- The Dry Systems Technologies® Main Offices and Manufacturing are located in Woodridge Illinois with a state of the art rebuild and installation facility in Vienna Illinois and Price Utah.
- The Dry Systems Technologies® team invented and developed the "Dry System®" Emissions Treatment and the Low Temperature Exhaust Filtration Technology.

What is the “Dry System®”

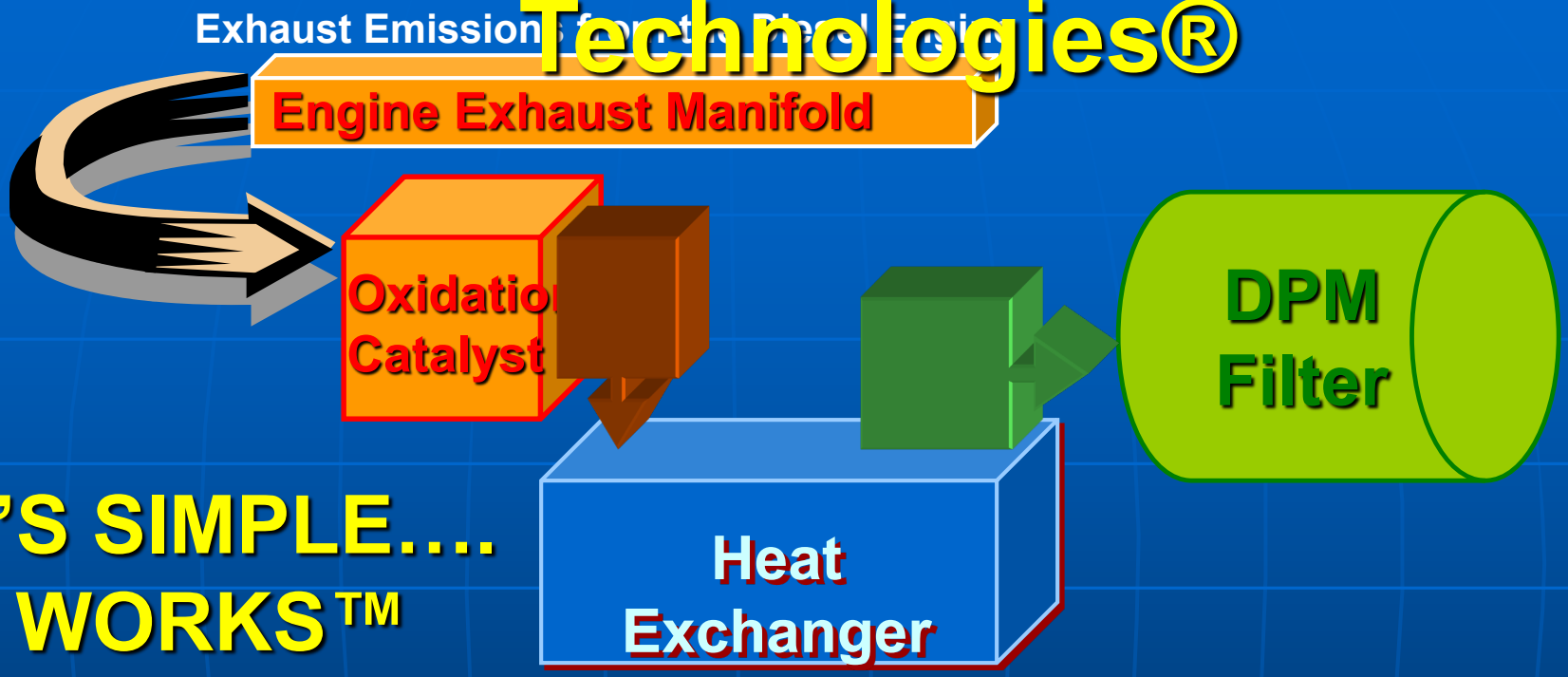
- The Dry System® Diesel Power Packages incorporate the most efficient methods to reduce Diesel Particulate Emissions from existing or new Diesel Engines used in Underground Mines.
- The Dry System® Diesel Power Packages are safe, user friendly and low maintenance and comply with stringent MSHA Diesel Regulations.
- The Dry System® will outlast Diesel Engines through multiple rebuilds and are exclusively available from Dry Systems Technologies®.

Dry Systems Technologies®

The Original – and still the Best™

- Prototypes of the Dry System® have been in operation since 1987 and production Dry Systems® have been in continuous Mine service since 1992
- More than 850 DST Dry System® Diesel Power Packages are currently in operation worldwide.
- Dry Systems® Diesel Power Packages are Approved and are currently operating in more than 75 Mining and Tunneling Projects in North America.
- Dry Systems® Diesel Power Packages have been in successful and incident free operation for a combined 5,000,000+ hrs
- Dry Systems® Diesel Power Packages are available for a wide range of new and existing Engine Models ranging from under 50 Hp to more than 350 Hp

Dry Systems Technologies®



IT'S SIMPLE…
IT WORKS™

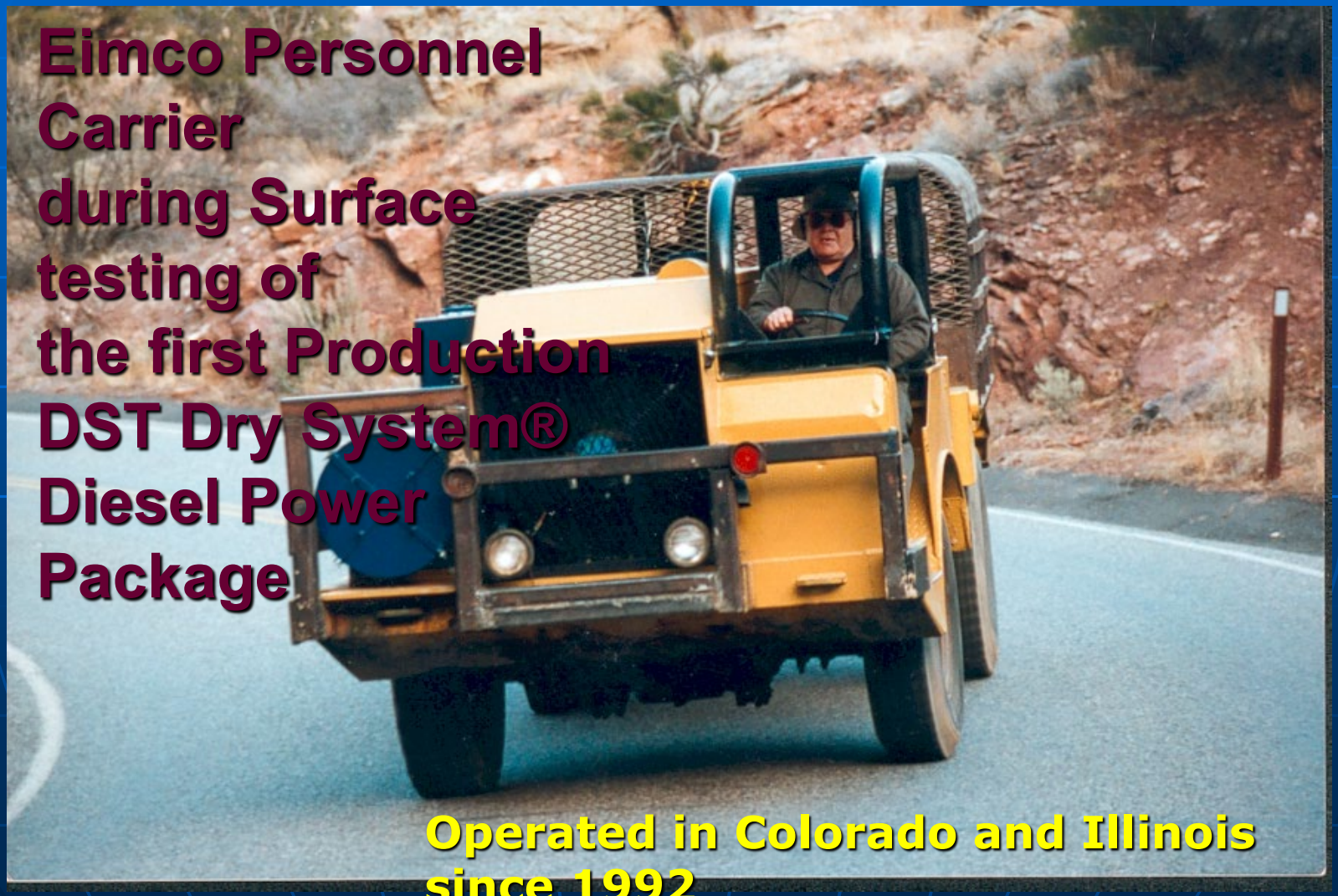
UNMATCHED PERFORMANCE

- **96% DPM REDUCTION**

> 90% CARBON MONOXIDE REDUCTION

> 97% SULFUR REMOVAL

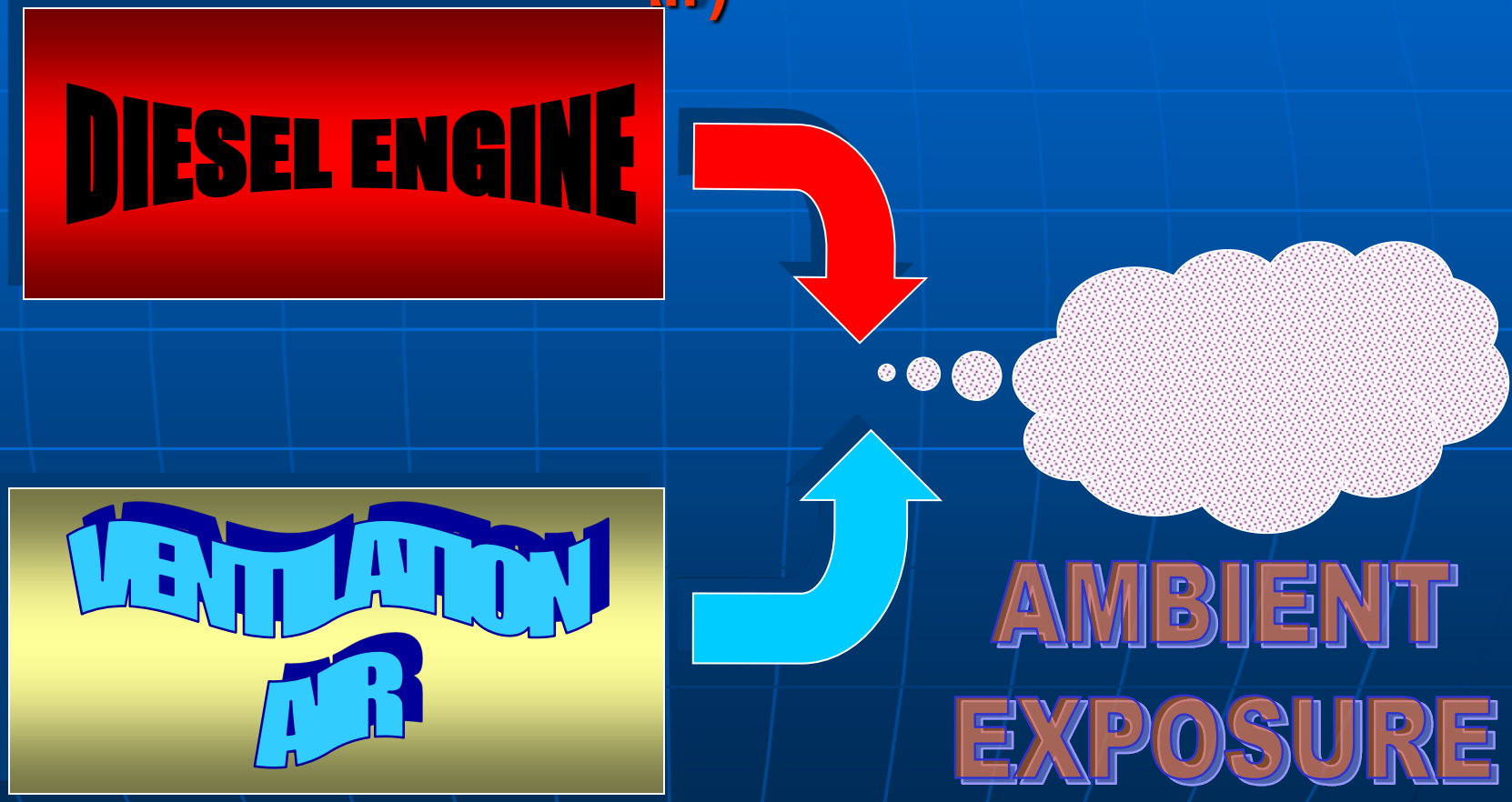
FIRST PRODUCTION DST DRY SYSTEM®

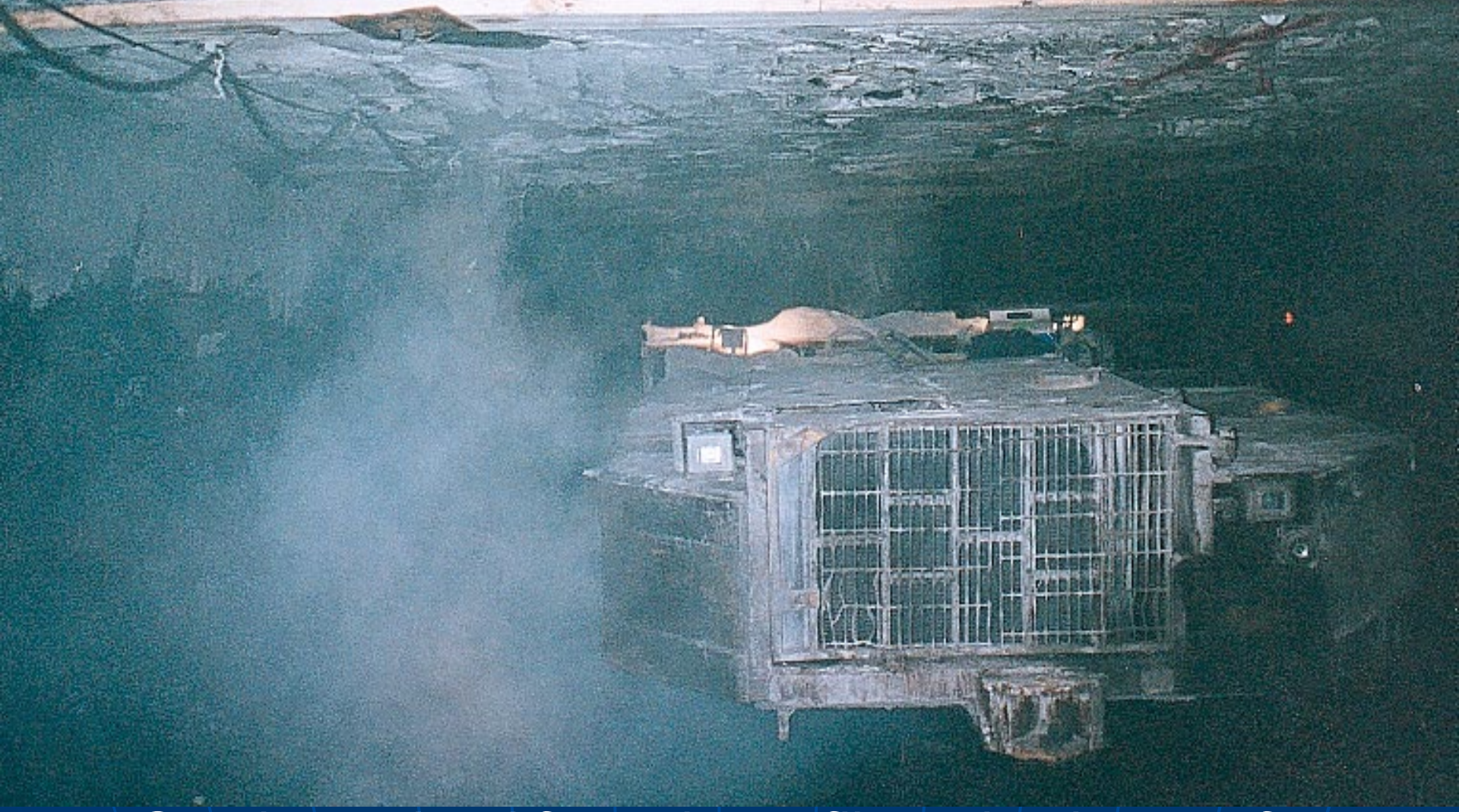


CURRENT SITUATION WITHOUT AFTERTREATMENT

DIESEL EMISSIONS CONTROL

(Traditional Method by Dilution with Ventilation Air)

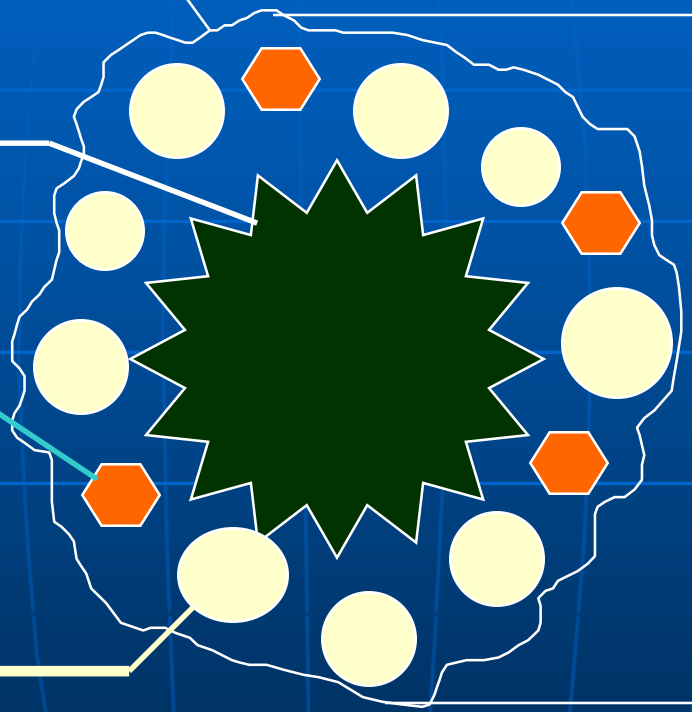




Smoke emitted from the unfiltered exhaust of a diesel scoop limits operator's view and contaminates the ventilation air

DPM COMPOSITION

TOTAL PARTICULATE MATTER



ELEMENTARY CARBON CORE (INORGANIC)

SULFATES

UNBURNED HYDROCARBONS (ORGANIC)

< 1 micron

Engine Ventilation Requirements to meet 0.15 mg/m3 (150 µg/m3) **without After-treatment**

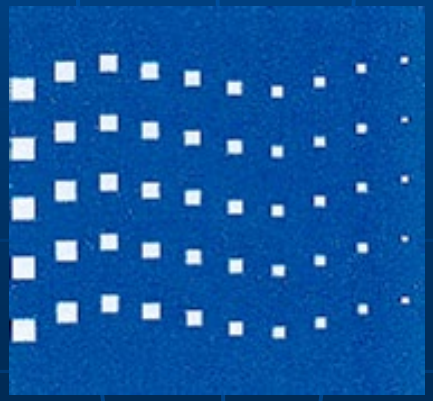
Typical “Dirty” 30 g/hr (500 mg/min) Engine:

117,655 cfm (3,333 m3/min)

Typical “Clean” 5 g/hr (83 mg/min) Engine

19,591 cfm (555 m3/min)

AFTER-TREATMENT WITH DRY SYSTEMS TECHNOLOGIES® DIESEL POWER PACKAGES



Dry Systems Technologies® Performance

- Dry Systems® reduces Diesel Particulate Matter (DPM) by 96%.
- Dry Systems® reduces Carbon Monoxide (CO) by 90%.
- Dry Systems® reduces Sulfur Dioxide (SO2)and Sulfates (SO4) by 97%. (reference for other markets)
- Dry Systems® reduces the Diesel Odor.
- Dry Systems® reduces Oil and Fuel based Hydrocarbons by 85%.

Engine Ventilation Requirements to meet 0.15 mg/m3 (150 µg/m3) **with Dry Systems® After-treatment**

Typical “Dirty” 30 g/hr (500 mg/min) Engine with Dry System® After-treatment:

4,695 cfm (133 m3/min)

Typical “Clean” 5 g/hr (83 mg/min) Engine with Dry System® After-treatment:

777 cfm 22 m3/min

THE DST DRY SYSTEM®

UP TO 90% CO & HC REDUCTION

DIESEL ENGINE

CATALYST

EXHAUST MANIFOLD

COOLS GASES FROM 1200°F to 260°F

MORE THAN 96% DPM REDUCTION

HEAT EXCHANGER

DPM FILTER

IT'S SIMPLE - IT WORKS

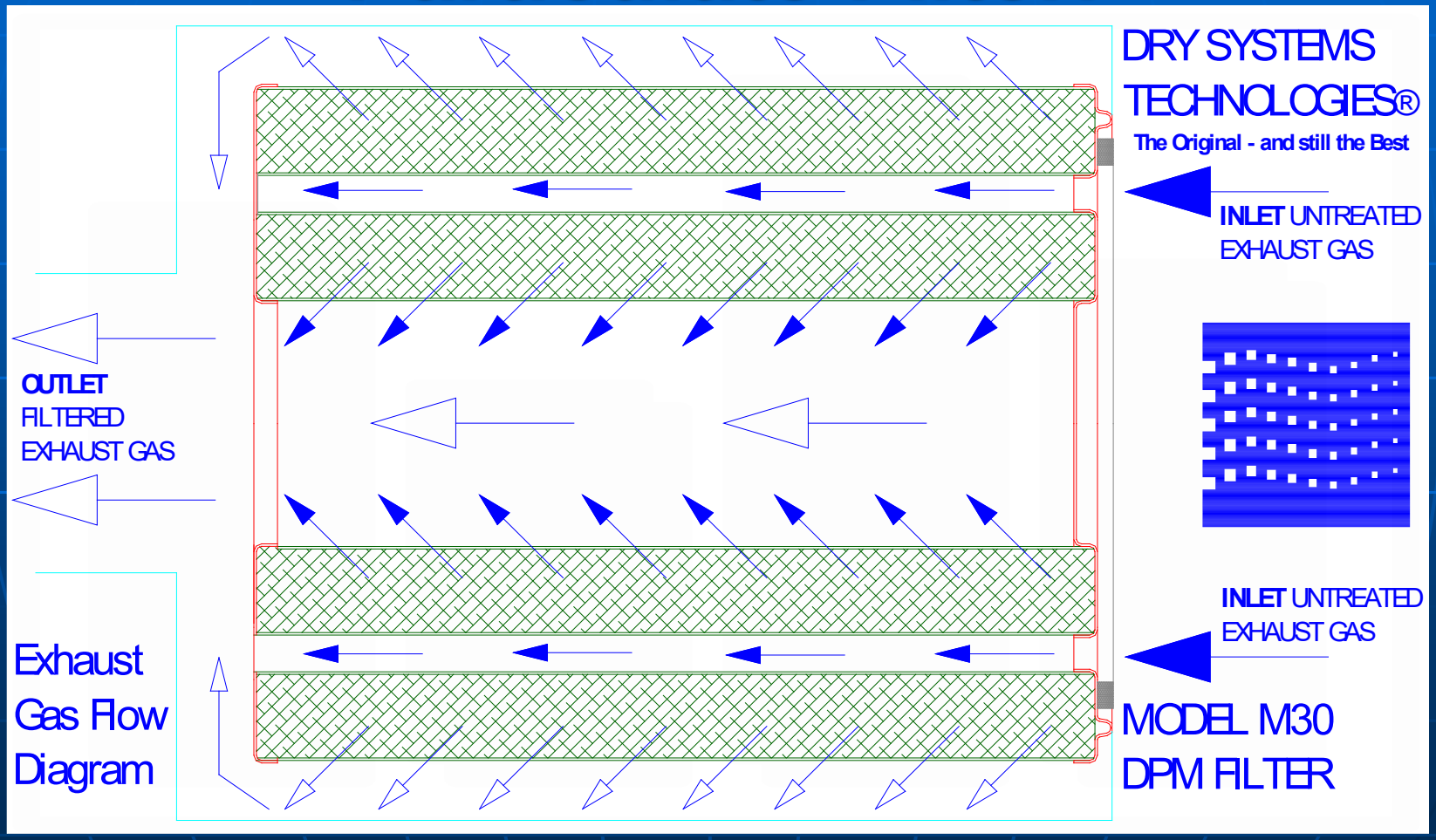
The Main Components of the "Dry System®"

- Oxidation Catalyst
- Heat Exchanger
- Low temperature Diesel Particulate Filter
- Engine and Exhaust Cooling System
- Patented Onboard Cleaning System

The Dry System® Applications

- The “Dry System®” Diesel Power Package can be used anywhere where control of Gaseous and Particulate Emissions from Diesel Engines is required.
- The “Dry System®” Diesel Power Package can be used in Underground Hard-rock Mines and Tunnels.
- The Explosionproof Version of the “Dry System®” Diesel Power Package can be used in Coal Mines, gassy Mines and gassy Tunnels where explosionproof designs are required.
- The “Dry System®” Diesel Power Package is equally suited for Surface applications where control of Gaseous and Particulate Emissions from Diesel Engines is desired.

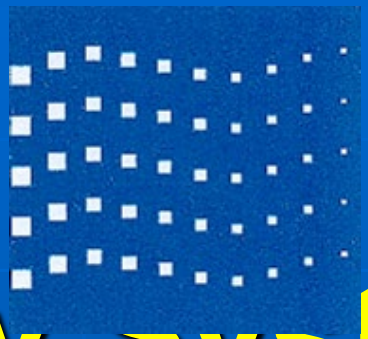
Flow through the patented Dry Systems Technologies Exhaust Particulate Filter.



Converted Permissible 973 and 320 Machines for Tunneling
New DST Model 35-S Scoop Available in Permissible and Non Permissible Versions

BENEFITS OF RETROFITTING WITH THE DRY SYSTEM

- The Dry System® can be retrofitted to older “dirty” engines as well as newer “clean” engines.
- With an unequalled DPM reduction of 96%, the Dry System® saves cost with low ventilation requirements while providing the best possible ambient environment for miners.
- The Dry System® will last for the life of the engine and several rebuilds with very little routine maintenance.
- The Dry System® can be built to fit any machine with moderate machine modifications



Dry Systems Technologies®

Thank you for attending our Presentation