

# **CARB + MANUFACTURERS**

## **Meeting on Active Particulate Trap Regeneration**

to increase success-probability  
when retrofitting in-service older engines  
of unknown technical conditions  
in undefinable applications

Pasadena 6.+7.September 2001

**DRAFT**  
**AGENDA**

**EUROPEAN TRAP MANUFACTURERS MEETING**

**SEPTEMBER 6, 2001**

<b>9:00 A.M.</b>	<b>Welcome and Introductions</b>
<b>9:15 A.M.</b>	<b>California Issues and Needs</b>
<b>9:35 A.M.</b>	<b>JMC</b>
<b>9:55 A.M.</b>	<b>ZEUNA-STAERKER</b>
<b>10:15 A.M.</b>	<b>DCL</b>
<b>10:35 A.M.</b>	<b>BREAK</b>
<b>10:55 A.M.</b>	<b>HJS</b>
<b>11:15 A.M.</b>	<b>UNIKAT/ECS</b>
<b>11:35 A.M.</b>	<b>AIRMEE</b>
<b>11:55 A.M.</b>	<b>LUNCH</b>
<b>1:00 P.M.</b>	<b>HUSS</b>
<b>1:20 P.M.</b>	<b>IBIDEN</b>
<b>1:40 P.M.</b>	<b>DEUTZ</b>
<b>2:00 P.M.</b>	<b>HUG</b>
<b>2:20 P.M.</b>	<b>SIEMENS/BUCK</b>
<b>2:40 P.M.</b>	<b>OCTEL</b>
<b>3:00 P.M.</b>	<b>BREAK</b>
<b>3:15 P.M.</b>	<b>RHODIA</b>
<b>3:35 P.M.</b>	<b>CDT/LUBRIZOL</b>
<b>3:55 P.M.</b>	<b>Mr. Andreas Mayer-VERT Program</b>
<b>4:15 P.M.</b>	<b>Open Discussion of California's needs with European Manufacturers</b>
<b>5:00 P.M.</b>	<b>FND</b>

# **CALIFORNIA TRAP RETROFIT ISSUES TO ADDRESS**

## **A. Application Issues:**

- 1. On-Road Applications - What types and model years of on-road vehicles does your product work on?**
- 2. Off-Road and Stationary Applications – What types and model years of off-road and stationary vehicles/equipment does your product work on?**
- 3. Application Limits – What vehicles/equipment cannot be retrofitted with your product?**
- 4. Application of your product for Two Stroke Engines, and Pre-1994 Engines.**
- 5. Temperature Limits – Discuss the temperature limits applicable for your product.**
- 6. Emission Limits – What level of soot or PM engine emissions is too high for your product?**
- 7. Sulfur Fuel – What is the range of sulfur in fuel in Europe?**
- 8. MECA List – Can you comment on trap application probabilities compared to Europe's vehicle retrofit applications? (Please see attached MECA list).**

## **B. In-Use Issues:**

- 1. In-Use Compliance – Describe testing and inspection procedures applicable in the countries that you sell your product?**
- 2. Failures – Describe your experiences with failures in detail and the causes and remedies (if any).**
- 3. Other Pollutants – Does use of your product cause an increase in other pollutants, NO<sub>2</sub> especially?**
- 4. Additives Effects – Do any additives harm your product? If so, which ones?**
- 5. Durability – What is your experience with in-use durability for your product?**
- 6. Maintenance Requirements – How well do vehicle owners comply with maintenance requirements?**

## **C. Marketing Issues:**

- 1. Current Production Capacity – Are you currently able to supply to the California market or do you have plans to increase production?**
- 2. Service Support – How would you provide service support in California? How do you provide service in Europe?**

## What are activ regenerated Trap Systems ?

- ART are cont. electron. soot-load controlled
- when the soot load reaches a limit
  - regeneration is started by providing the energy for controlled soot combustion
- this can be an automatic or a manual process
  
- automatic: full-flow-Diesel-burner  
twin-filter-Diesel-burner  
electric sequential heater  
engine intake throttling
  
- semi-automatic: plug in to net-electricity
  
- manual: of-board regeneration  
exchange-filters

Additives or catalytic coatings should be used to minimize energy consumption and smooth regeneration

## Active versus Passive Regenerating

### Passive

needs detailed information on engine emissions and application conditions  
→ ideal for OEM in case of vehicle fleets running under repeatable conditions Swiss eg modern city busses

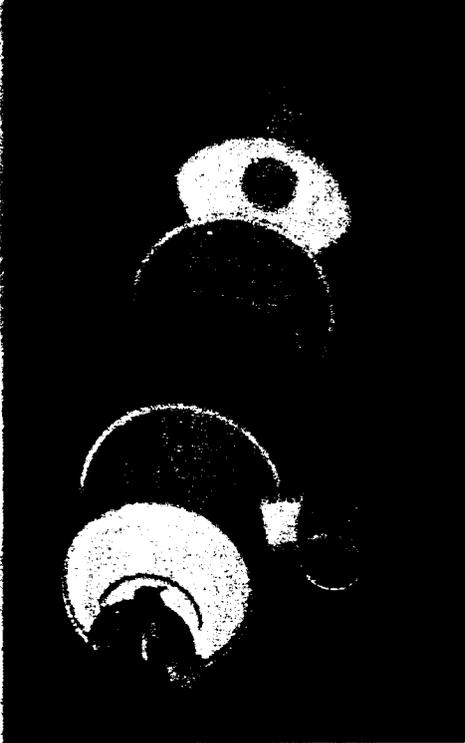
### Active

can handle all (4S) engine properties and all applications  
→ ideal for retrofit  
in case of vehicles with unknown or frequently changing operation conditions

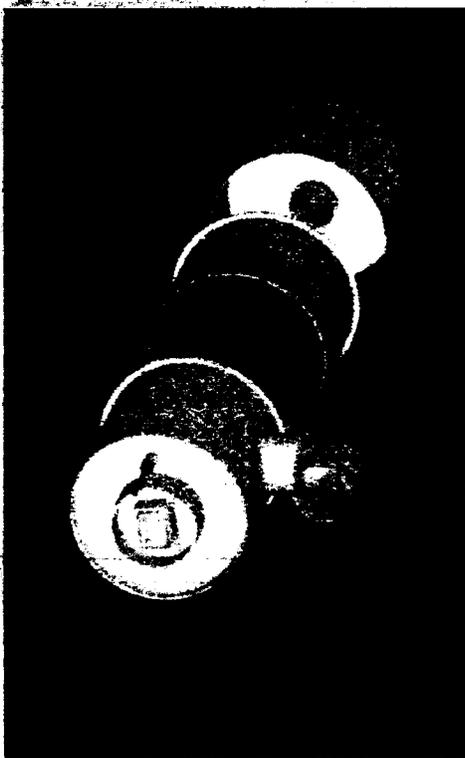
# New Soot Particulate Filter Generation (Modular Systems)



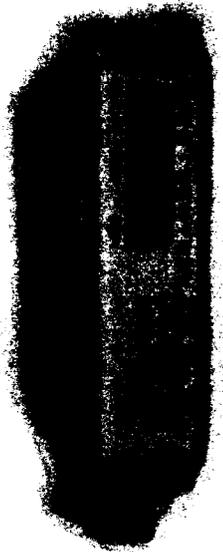
System with fuel burner



System with electric heater

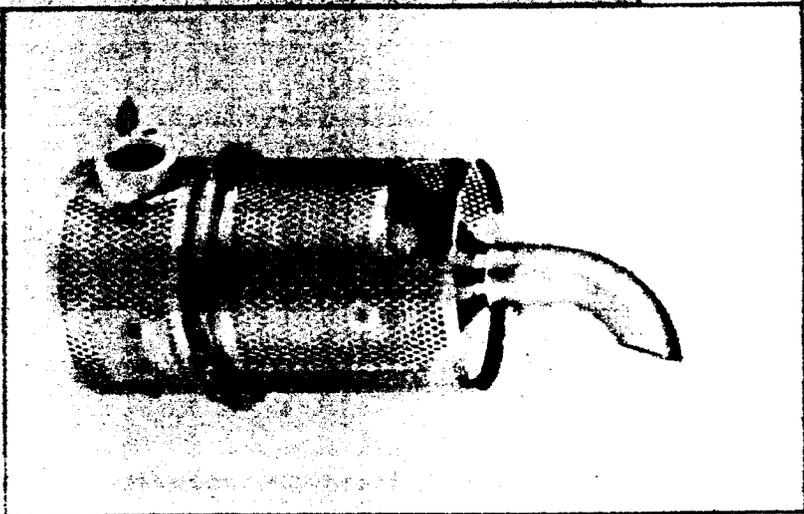
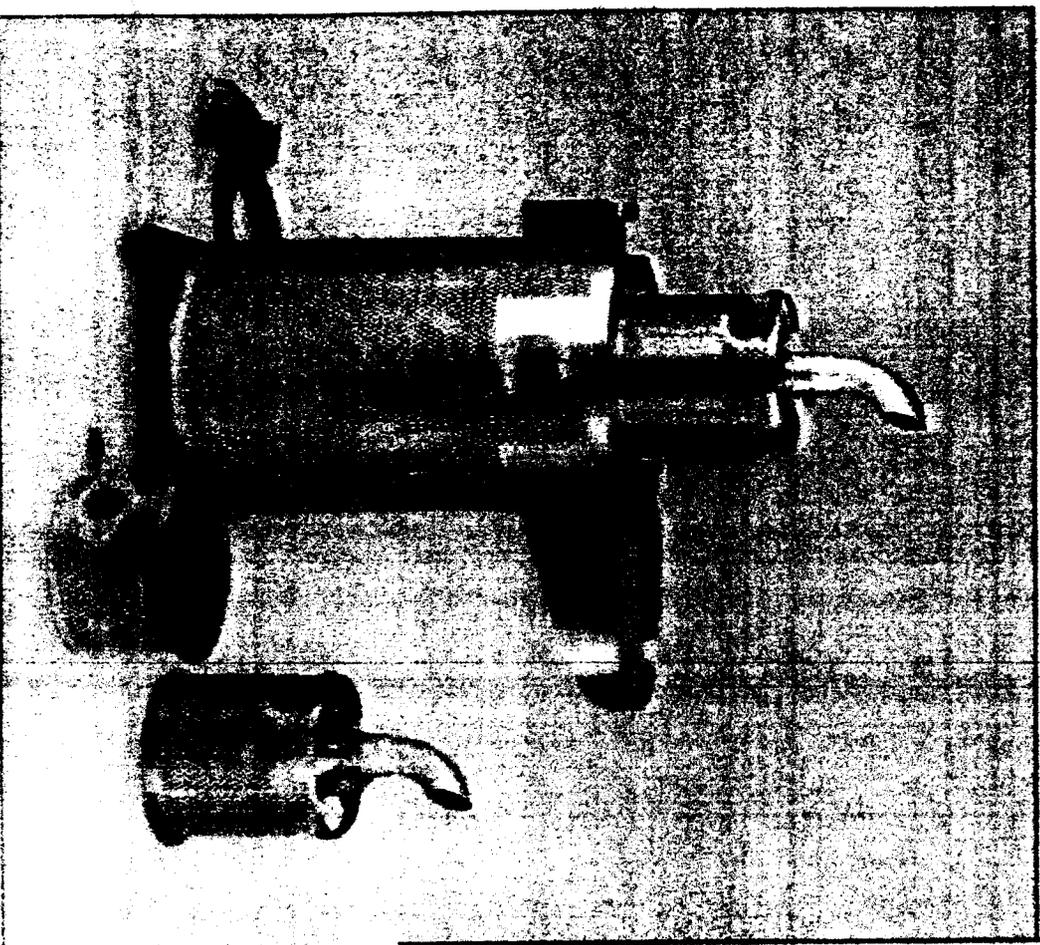


Control unit with display



Berthold Becker  
09/2001 - HUSS UH  
c:/pms/c/101000.ppt

# Rechargeable Soot Particulate Filter System



Bestandteil Prokon  
00/22001 HUSS III  
c3/pms/c bo/bo/01/ppi

# Markets / Applications and Our Products



Forklift Trucks



- Soot particulate filter with fuel burner
- Soot particulate filter with electric heaters
- Rechargeable soot filter

Construction Machinery



- Soot particulate filter with fuel burner
- Rechargeable soot filter

Marine Application



- Exhaust mufflers
- Catalytic exhaust gas cleaners
- Spark arresters

Diesel-Lokomotives



- Exhaust mufflers

# ■ Diesel- Exhaust Technology ■

Oxidation Catalyst



DPF-System

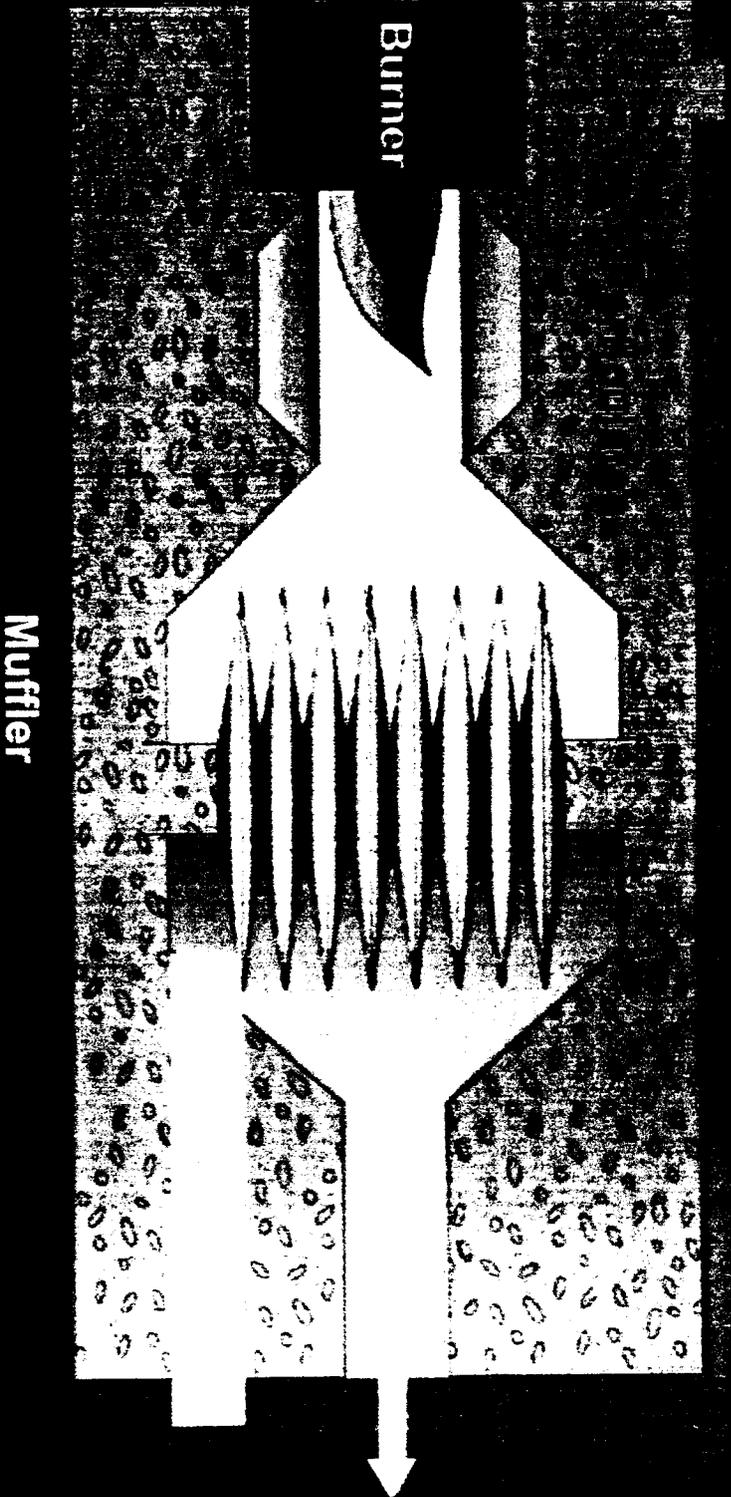


Modular CRT-System



Helium fotoresistant  
56 10120

# ■ Schematic View DPF ■



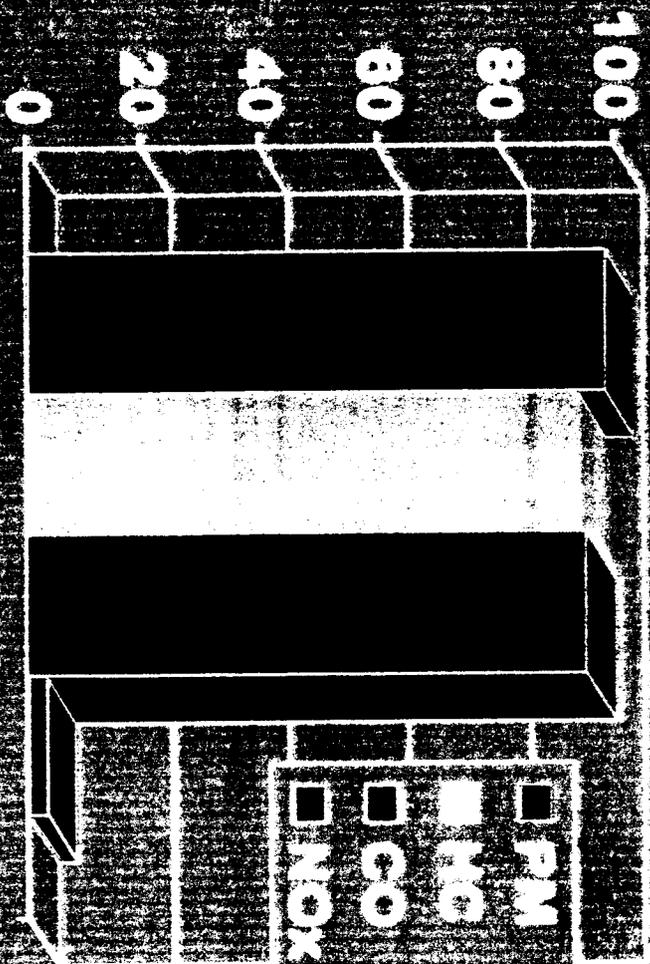
**HJS**

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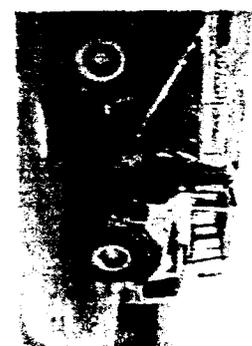
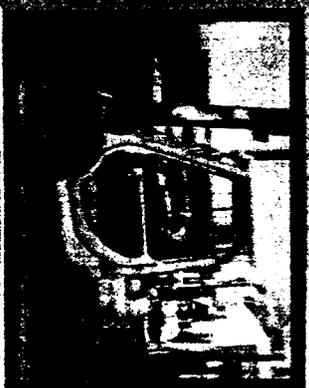
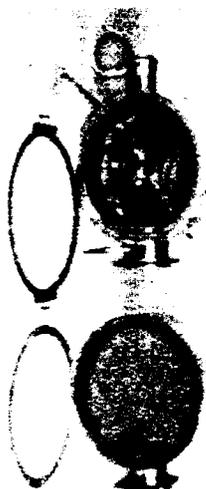
# Unikat Combifilter™

Actively Regenerated DPF for Captive  
Fleet Use & Stationary Engines

Emission Reductions (%)



Combifilter with AZ Purifier

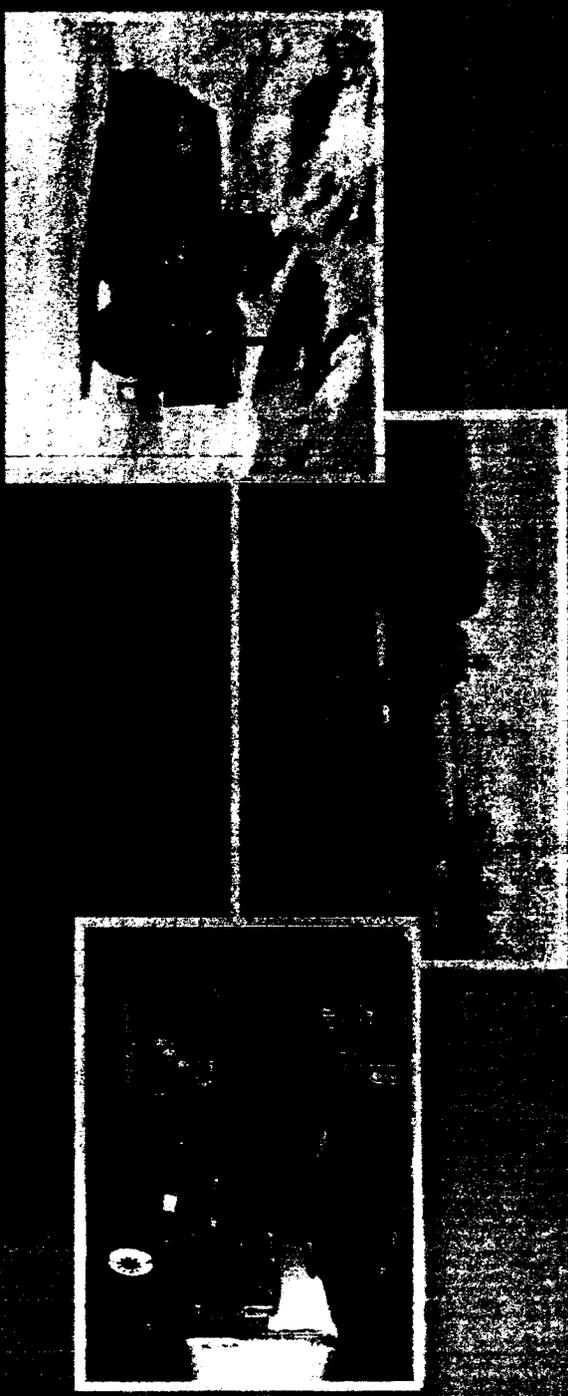


**LUBRIZOL**



**LUBRIZOL**

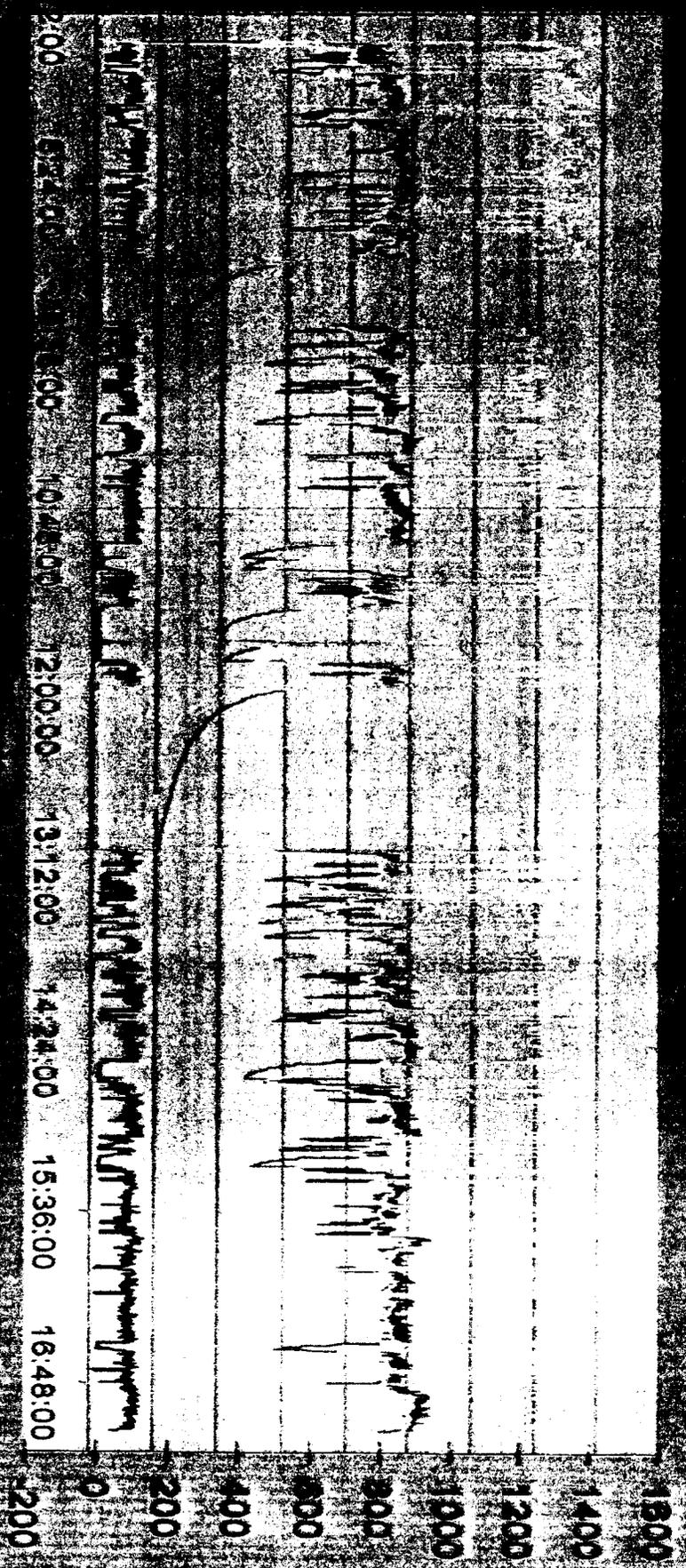
Specialty Engine Oil



# Diesel Emission Upgrade Products from Lubrizol and Engine Control Systems

European Trap Manufacturers Meeting  
September, 2001

# Caterpillar 320B with Combifilter K18 Full Day, 5511 Additive, post conditioning



— Back pressure (mbar) — Inlet (Deg.C)  
Outlet (Deg.C) Engine Speed (rpm)

Wind and Scale  
Engine Speed



## **Filter Regeneration Strategies**

- **MINE-X SOOTFILTER®**
  - (A) Ideal: Self regeneration under normal duty cycle
  - (B) Non-Ideal: Loading of engine at fixed periods or off-board regeneration cleaning by kiln or compressed air
- **DCL Titan™ System**
  - (A) Off-board regeneration at end of operating shift
- **DCL BlueSky™ System**
  - (A) On-board passive regeneration under high temperature duty
  - (B) On-board active regeneration as required

## **Experience - Applications List**

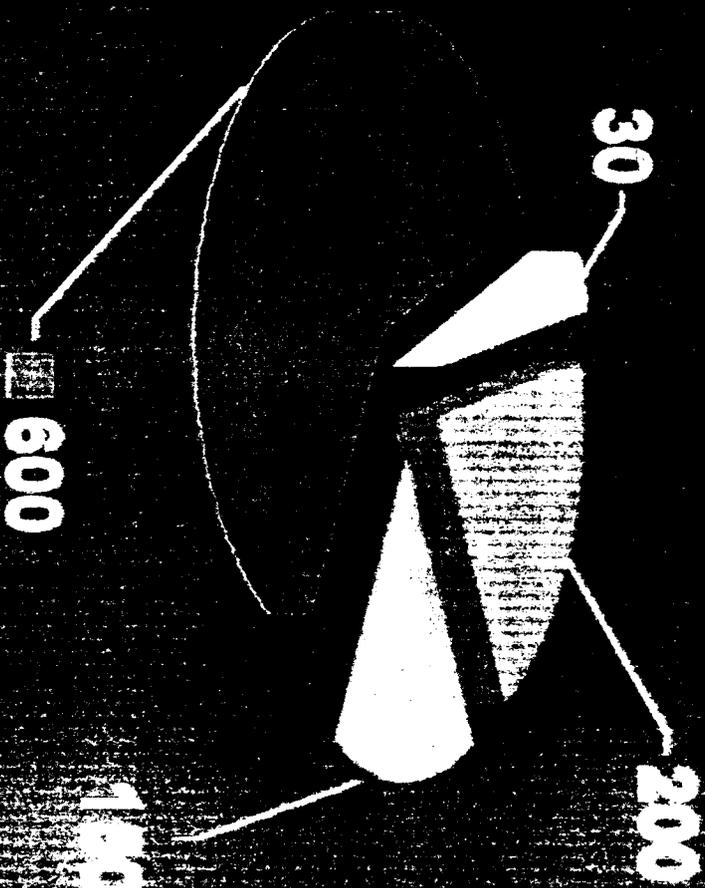
- Excavators
- Wheel Loaders
- Articulated Haulers
- Bulldozers
- Dump Trucks
- Forklift Trucks
- Load-Haul-Dump (LHD) Trucks
- Gensets
- Skid Steer Loaders
- Road Grader
- Concrete Mixers



# ON ROAD APPLICATION

1998-1999-2000

- Street Sweeper
- Refuse Hauler
- Urban bus
- HD truck



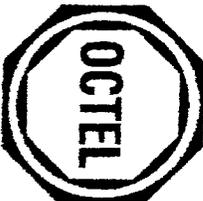
AKBPRE309/2001

# AIRMEEX EXPERIENCE

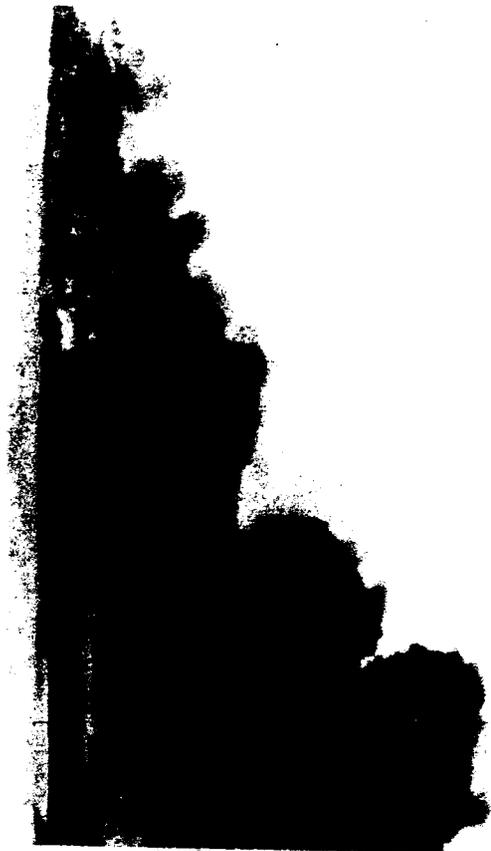


type	unit	date	Km or h	Engine hp
Forklift	3000	1996	15 000h	45-150
Constr. M	150	1996	8000 h	15-280
Locom	25	1996	3000-5000	300- 800
Genset-C	130	1996	2500-6000	30-1000
City bus	600	1998	200000 km	150-280
HD truck	30	1999	130000 km	200-425(1300)
LDV	25	1998	100000 km	80-130
Swiper	200	1996	6500 h	60-150
Refuse H	150	1998	80 000km	150-320

# Burning Crude Oil



Octel Deutschland GmbH



Without Ferrocene



With Ferrocene