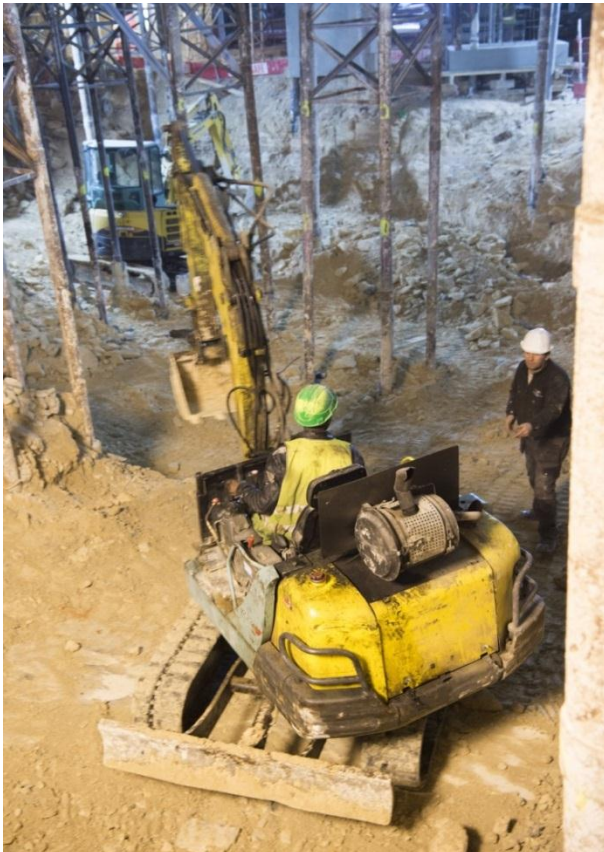


# Field control of proper functioning of DPF for non-road diesel machineries

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► Restoration works of buildings « Hôtel Lutétia » and « La Samaritaine » in Paris.

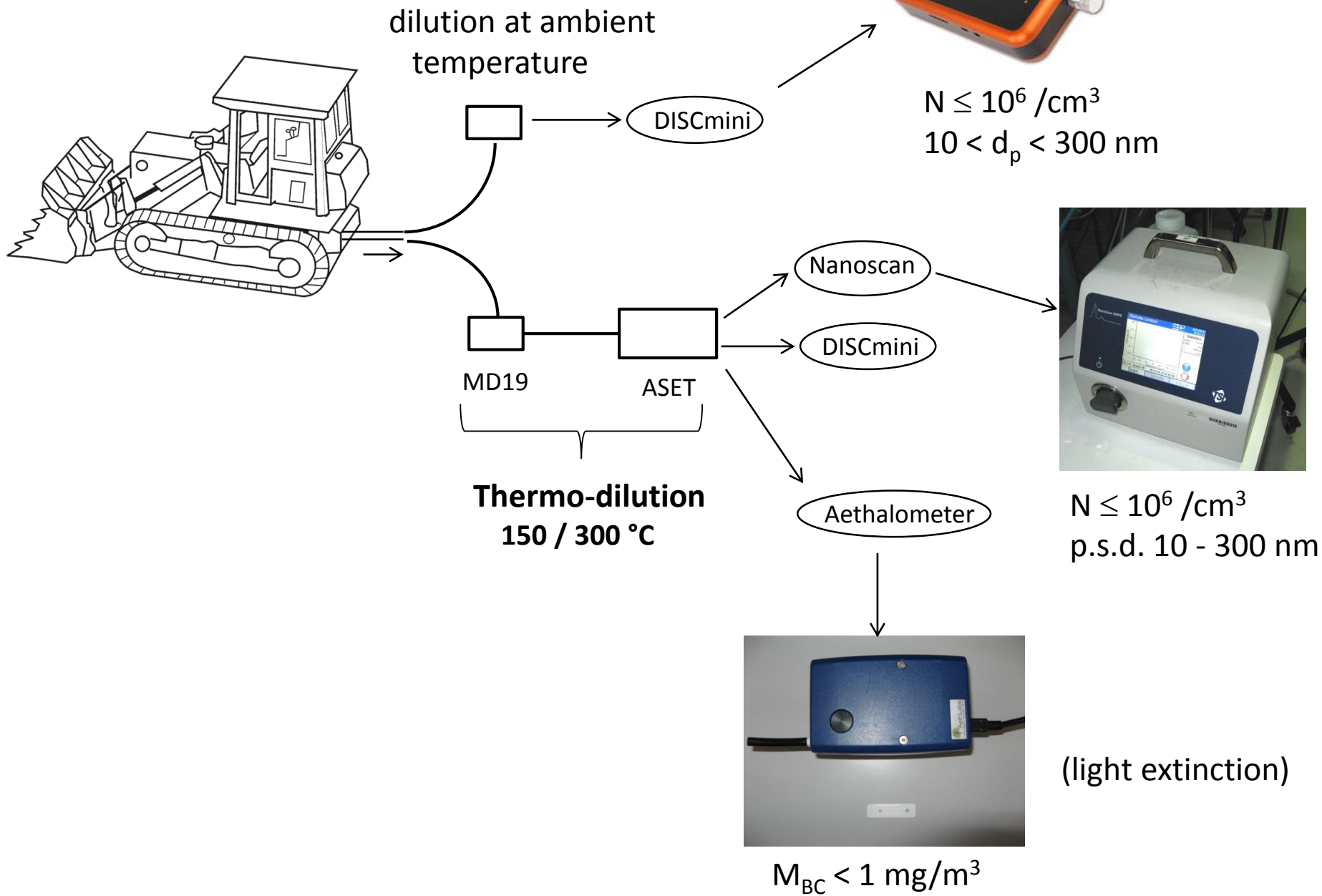
► Construction machineries equipped with DPF in retrofit.

► Measurement of the diesel particle concentration at the engine exhaust.



DPF can be damaged or even removed.

- ➔ We need a test method for rapid determination of particle emission at the exhaust of non-road machineries equipped with DPF.
  
- ▶ Not an accurate method for exact PN determination.
  
- ▶ Just a test procedure for determination of DPF proper functioning.

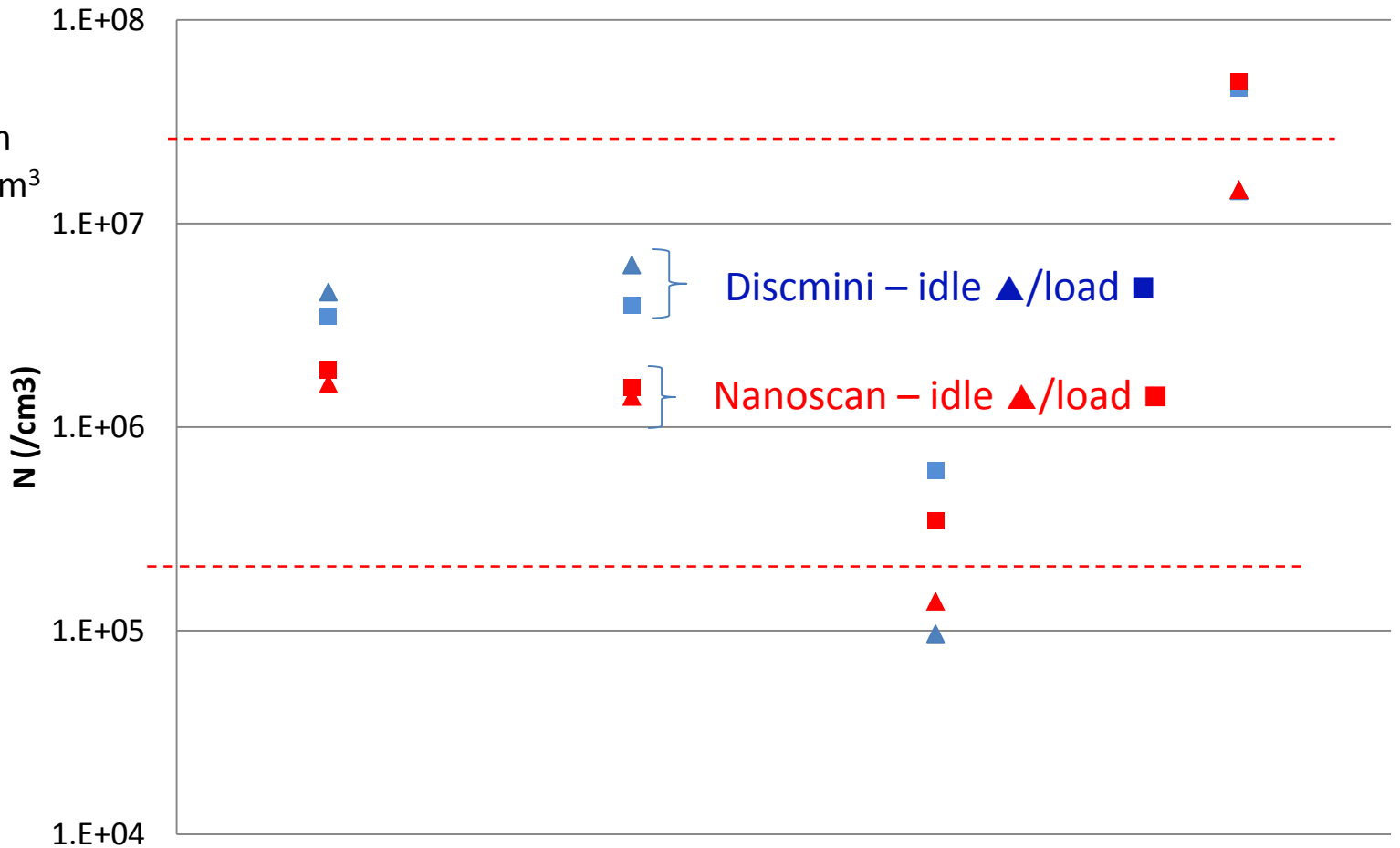


# Building site : Lutétia hotel

**NV particles**  
(thermo-dil.)

0,025 g/kWh  
 $\approx 2,5 \cdot 10^7 / \text{cm}^3$

$10^{12} / \text{kWh}$   
 $2 \cdot 10^5 / \text{cm}^3$

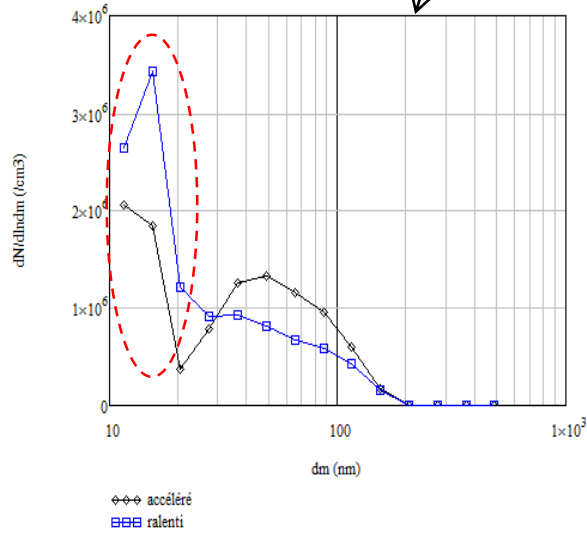
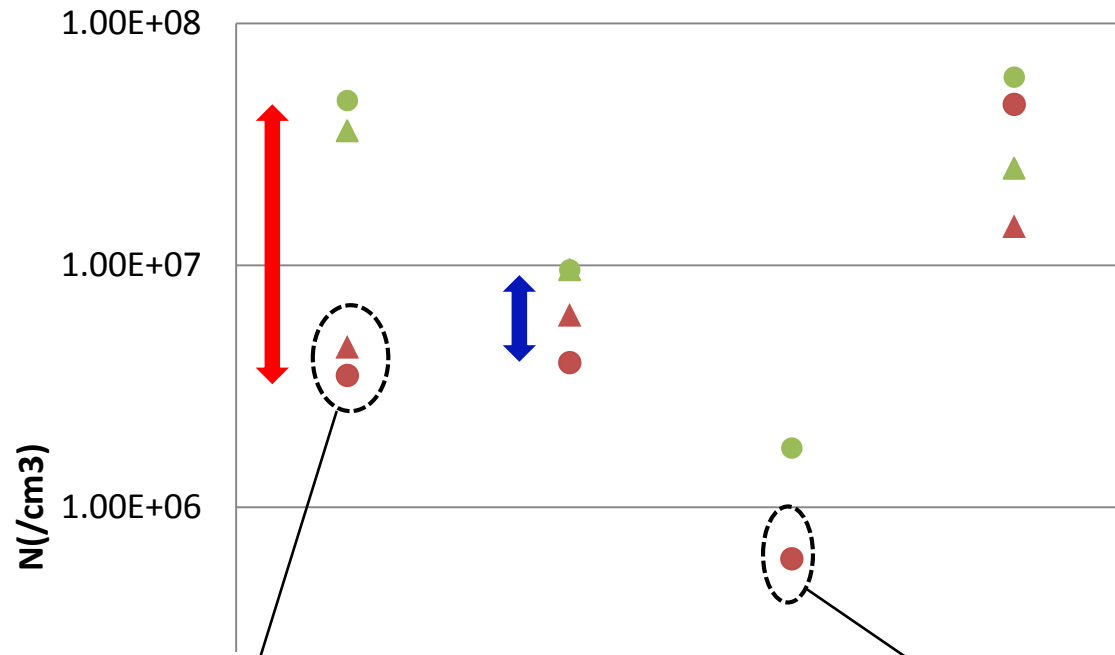


*Particle filters:*

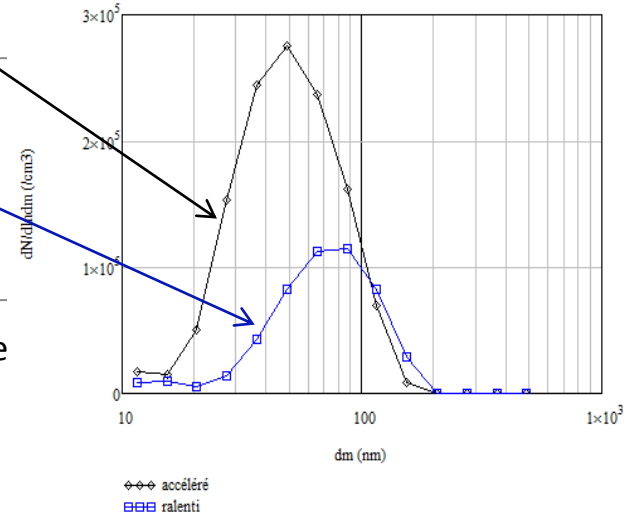
*glass fibers*  
*short duration*  
*usage*

*SiC*  
*regeneration*  
*catalytic coating*

*cordierite*  
*regeneration*  
*catalytic coating*

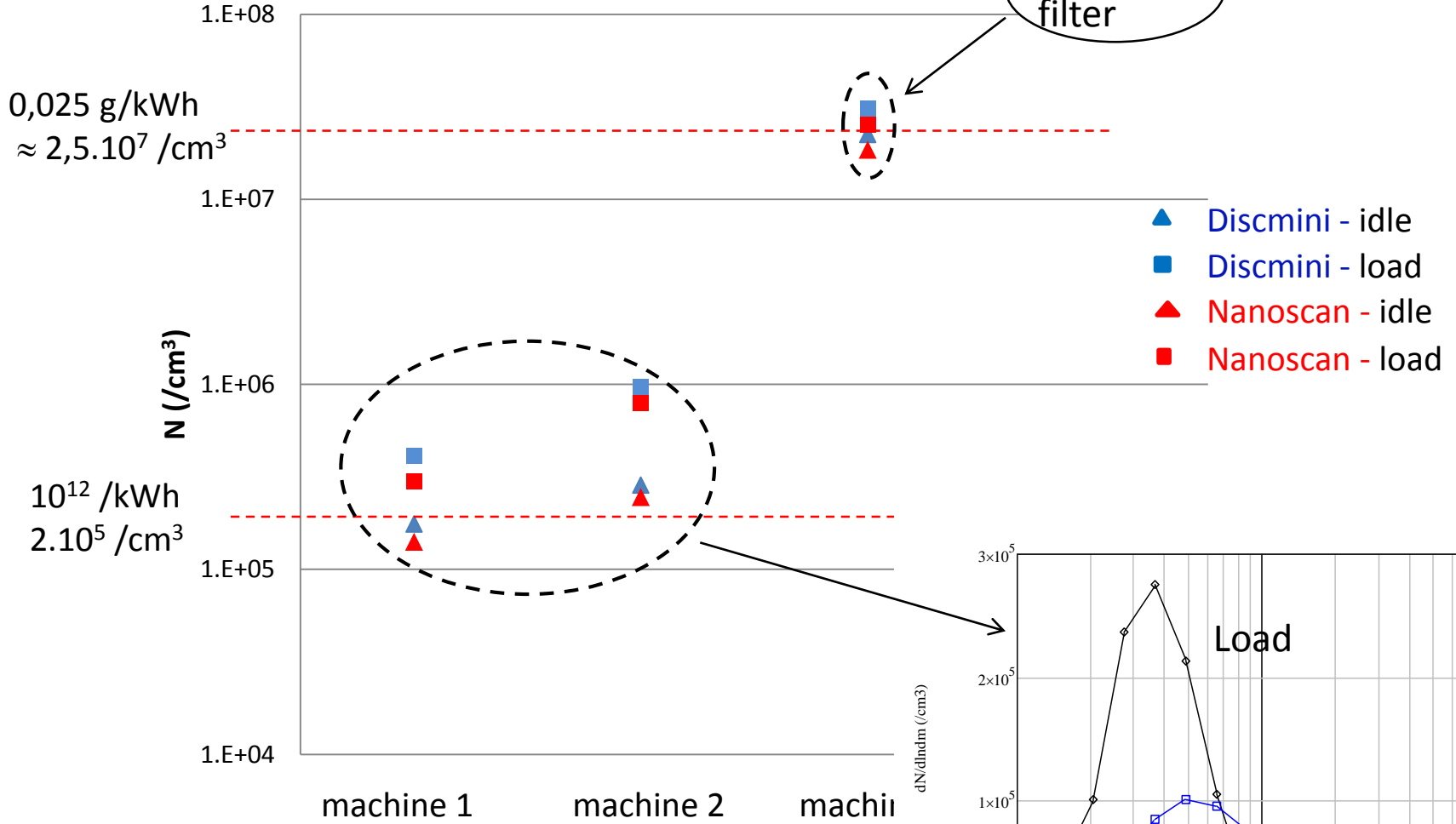


machine 2      machine 3      machine

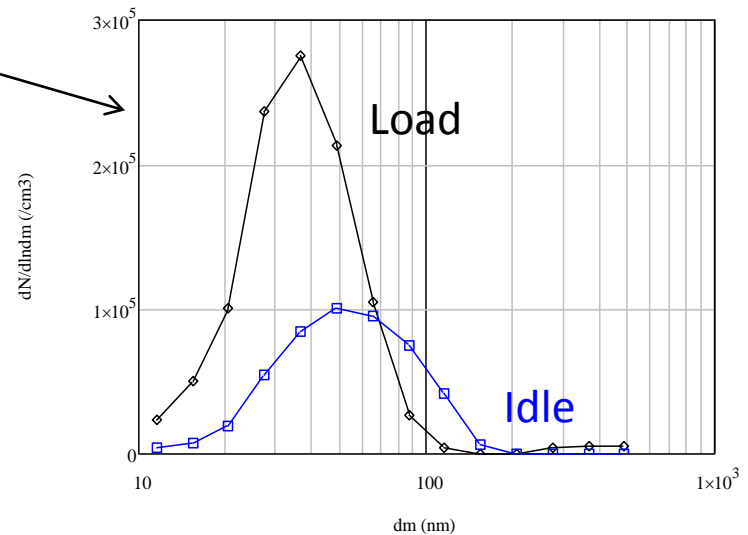


# Building site : Samaritaine

**NV particles**  
(thermo-dil.)



*Particle filters:      Ceramics – regeneration by catalyt*

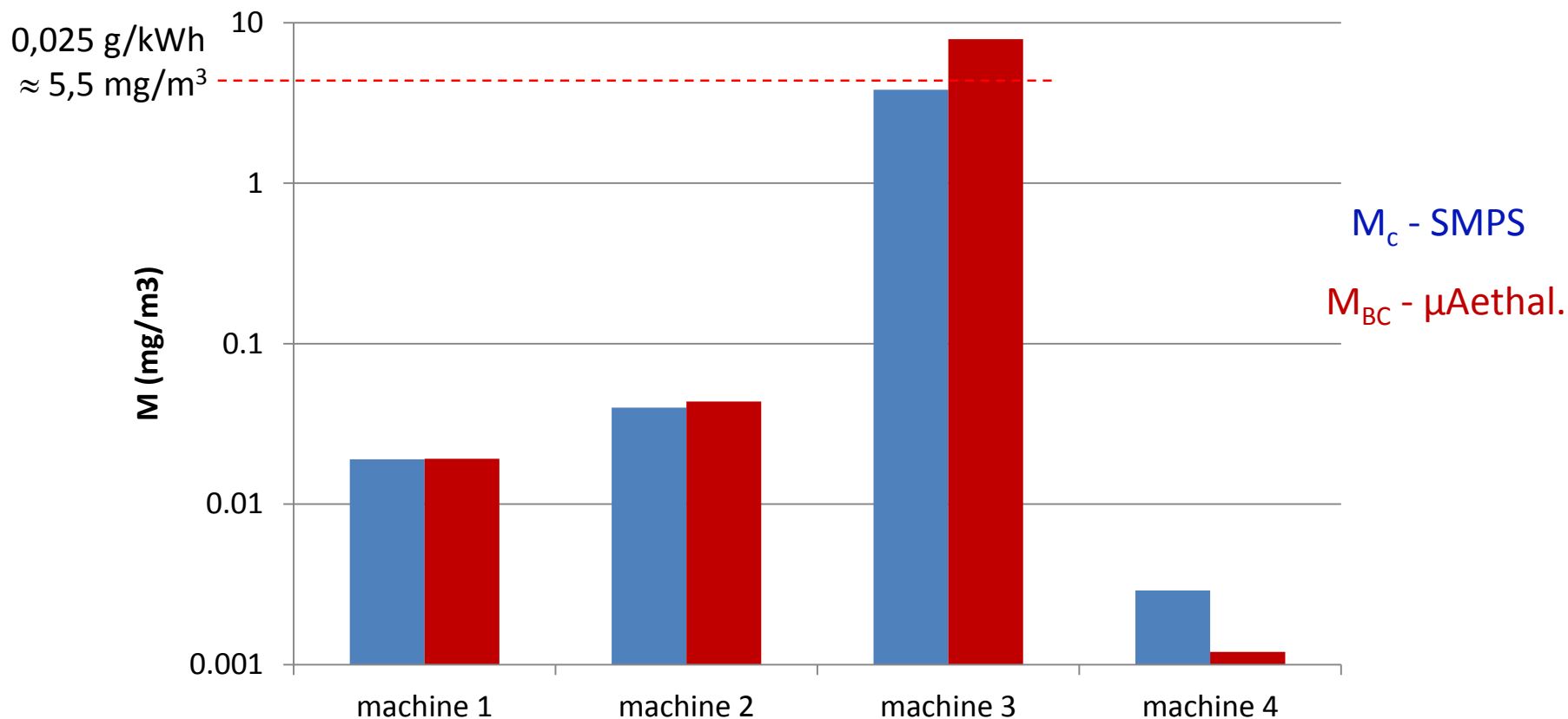


Measuring the **NV particle** mass concentration

▶ SMPS :  $N (/cm^3) \rightarrow M_c (mg/m^3)$

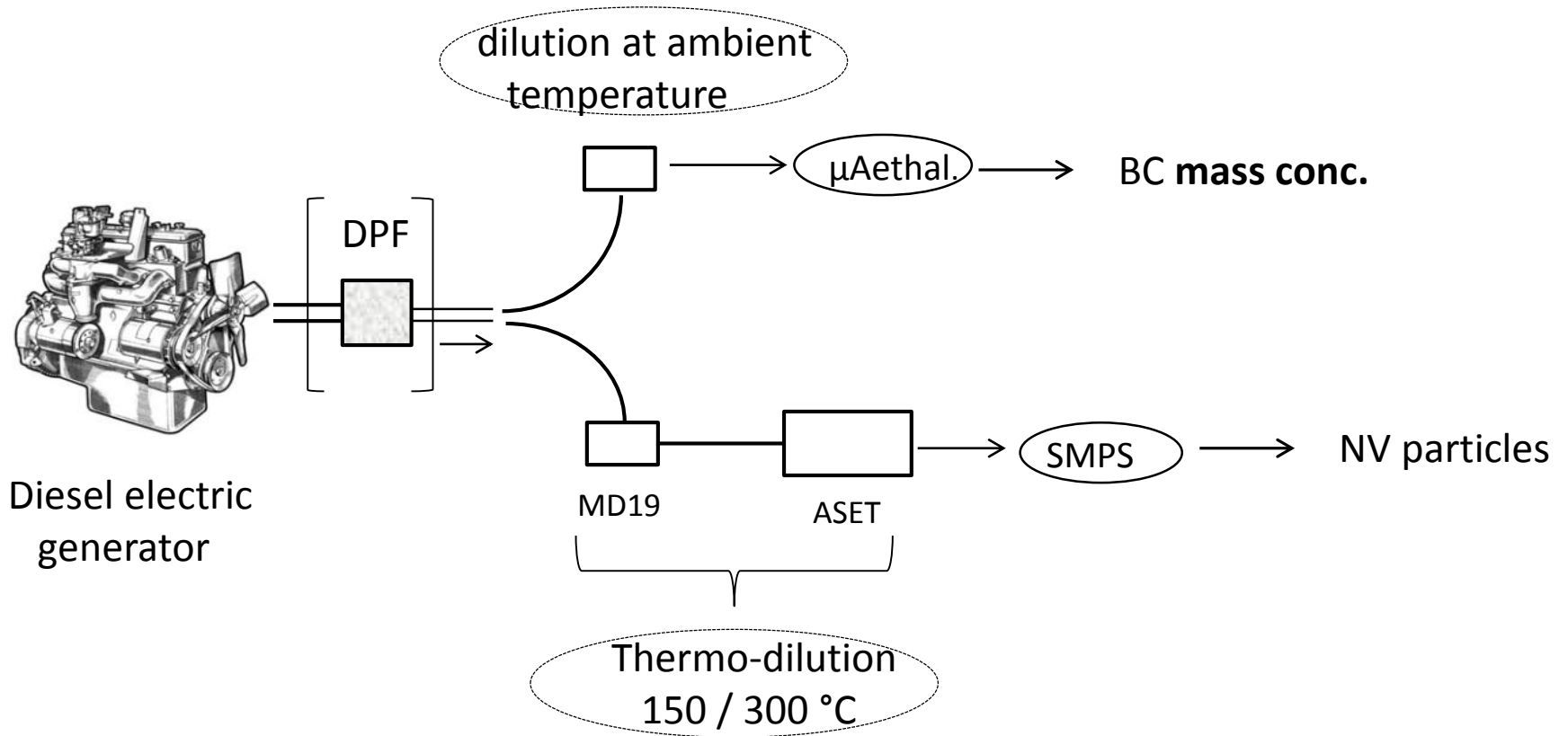
▶ Aethalometer :  $M_{BC} (mg/m^3)$

with thermo-dilution



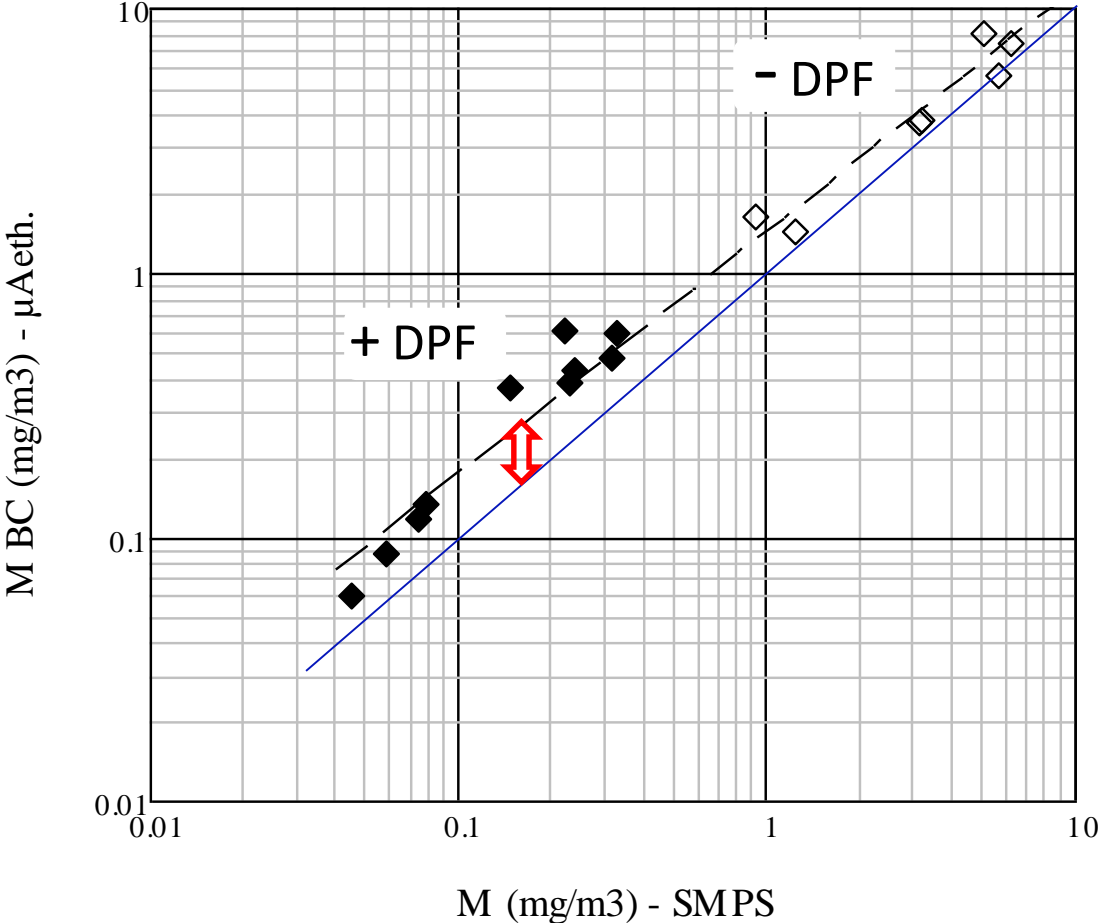


# Laboratory measurements



**BC mass conc.**

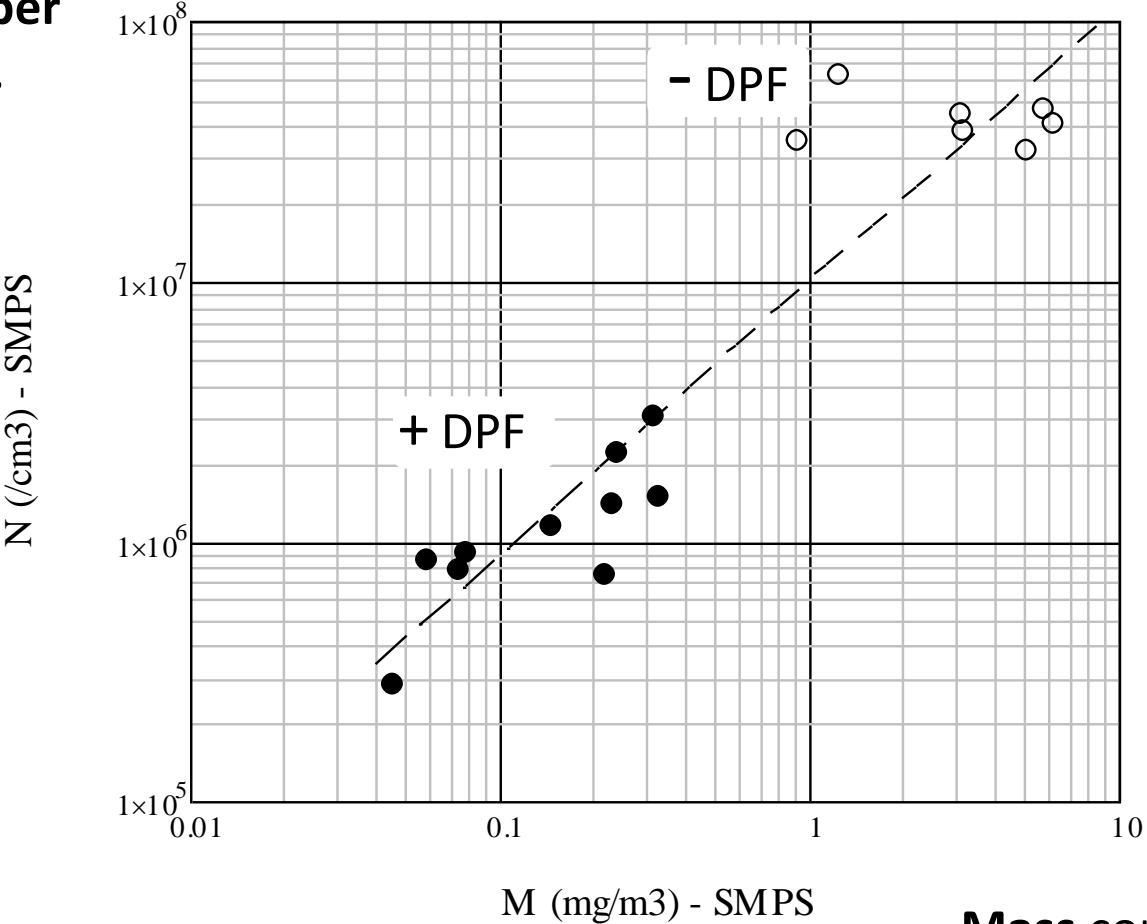
(Aethalometer, dilution  
at ambient temp.)



**NV particles mass conc.**  
(SMPS with thermo-dil.)

# NV particles


**Number  
conc.**



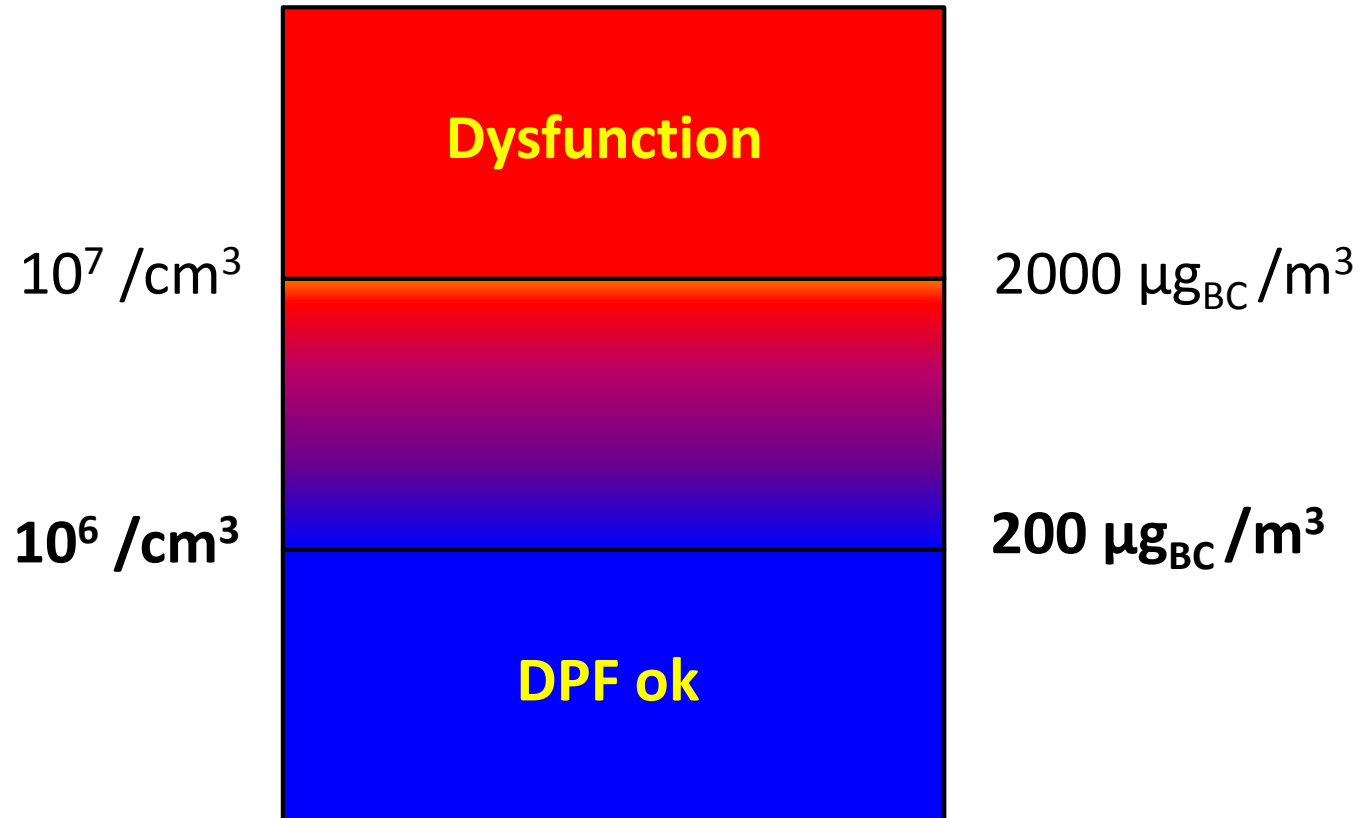
**Mass conc.**

➡ 1 mg/m<sup>3</sup> ≈ 10<sup>7</sup> part./cm<sup>3</sup>

## Conclusions

- ▶ Particle number concentration measured **without aerosol conditioning** is a good indicator, despite it can be greatly overestimated in some cases (volatile part.)
  - ▶ Measurement of black-carbon mass concentration with an **aethalometer, without aerosol conditioning**, gives a good estimation of the NV particles mass concentration.
-  Combination of these two techniques for DPF control

# Decision rule



# PROJECT GREAT PARIS EXPRESS



# GREAT PARIS EXPRESS

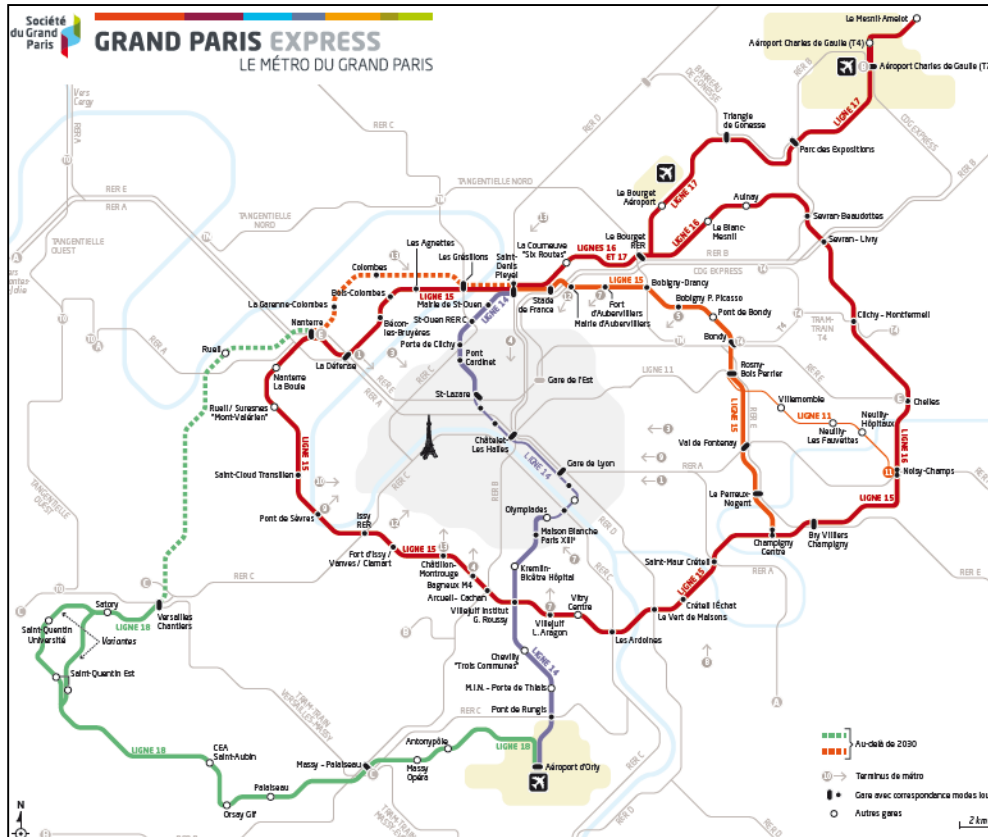
## A large transportation network

- More than 200 km of railways :
  - Some new lines 15, 16, 17 and 18,
  - Extension of lines 11, 14 and RER E,
- 78 new stations



Villejuif station

# GREAT PARIS EXPRESS





# GREAT PARIS EXPRESS

## A new transportation network

- Almost 80% underground
- 15 years of work at least (end planned for 2030)
- Parallel construction of several sections
- Simultaneous use of tunneling machines  
( up to 10 on line 15 south)
- 12 000 jobs / year for the construction of infrastructures  
(source FNTP)

# GREAT PARIS EXPRESS

## A major challenge for CRAMIF

- Define the main requirements for the prevention of occupational hazards
- Monitor construction work and implementation of these requirements
- Demand DPF for construction machines



DTE266