ISO 29461 TC142 WG9
FEEDBACK MEETING IN PARIS

Dominique ORHON (TOTAL SA)

ISO 29461, MEETING IN PARIS

- September 2017, the 25th in Paris.
  - Experts and Observers
- Attendees: Filter Manufacturers
  - Ulf Johansson (Camfil)
  - Dr Thomas Caesar (Freudenberg)
  - Dr Hua Li (Freudenberg)
  - Mike Garnett (Freudenberg)
  - Hiroshi Tanaka (Japan Vilene Company, Ltd – Freudenberg)
  - Scott Taylor (AAF)
  - Chris Fisher (Donaldson)
  - Bruce MacDonald (Consultant, former Donaldson)
  - Manfred Sauer-Kunze (DencoHappel)
  - Stephen Hiner (Clarcor)
  - Christian Desquilles (Lydall)
  - Dr Kyung-Ju Choi (Clean&Science)
- Attendees: Others
  - Steffan Tmetschek (Fiatec- Testing Lab)
  - Keith Morris (BSI)
  - Dr Yoshio Otani (Kanazawa University)
  - Dr Zhang Tao (Guodan Science & Technology Research Institute)

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- Presentation of Part 5 “Offshore Filtration” by Scott Taylor (AAF)
  - Good progress
  - New test configuration (Latkin generator)
  - Discussion around Ashrae dust or ISO dust
  - One expert is reluctant to consider oil and soot loading
  - One observer reported that soot defeats the hydrophobic characteristics (any technical paper? To be provided)
  - One expert says that the ISO standard cannot cover the real site conditions. ETN says that if standard does not exist or does not give satisfaction, it leads companies to develop their own standard or to go to other standard than ISO (See example of GE test or Aramco test)
  - ETN enforce the message that we support the ISO working group and we have real needs for writing a standard. We will be very pleased to contribute.

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- Presentation of part 2 “Cleanable (pulse jet) filter systems” by Chris Fisher (DONALDSON)
  - No progress, no inputs,
  - Now Part 2 is subject to a new title, the one of part 6 “Cleanable (Pulse Jet) filter elements” and a cancellation of part 6,
  - Debate from expert on « people achieving research work instead of writing a standard »,
  - Working group remains in back position.
  - Experts are not very supportive.
  - Debate about asking Aramco to be part of the WG9.

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- Discussion about part 3 “Filter Integrity”
  - Stephen Hiner (Clarcor) and Steffan Steffan Tmetschek (Fiatec) are volunteers to lead this part.

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- Presentation from Dr Zhang Tao (Guodan Science & Technology Research Institute)
  - Filter pressure drop with presence of water.

AIR FILTRATION IN OFFSHORE CONDITIONS

Flare, Exhaust and Vents

Dominique ORHON (TOTAL S.A)

OFFSHORE ENVIRONMENT

1. Exhaust

- Gas Turbines.
- Diesel Engines.
  - Generators.
  - Fire fighting pumps.
  - Supply Boats.
- Boilers.

2. Flare

- HP Flare.
- LP Flare.

3. Vent

- Lube Oil systems.

All those arrive dilute to filter

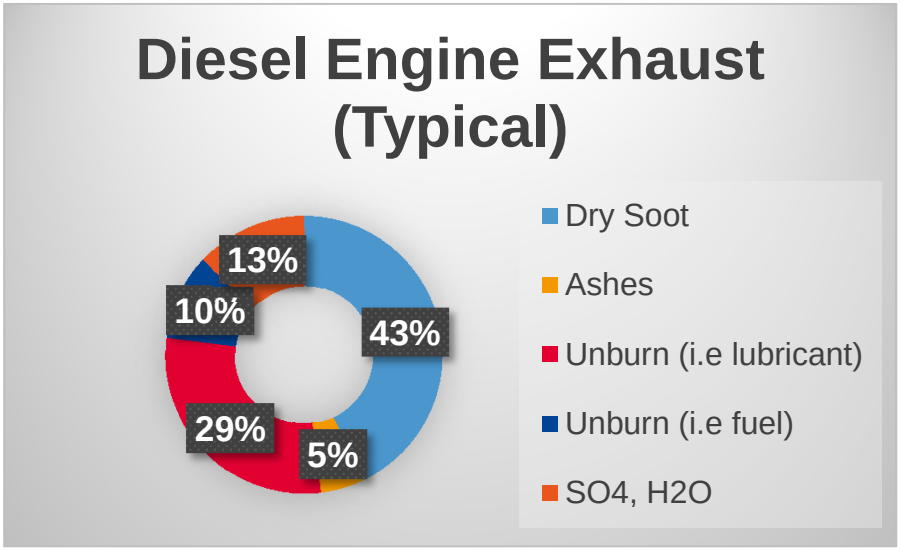
GAS TURBINE AND ENGINE EXHAUST

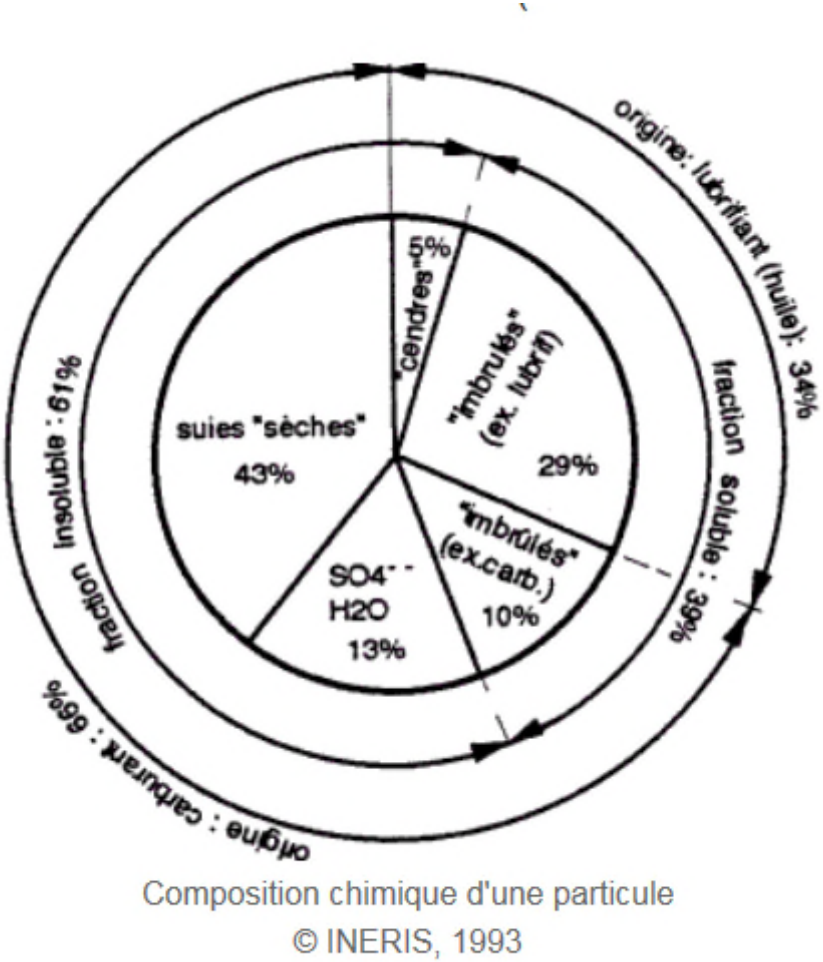
- Exhaust from Supply Boats and Diesel Generators

- Exhaust from Gas Turbine

ENGINE EXHAUST

- Solid residue (carbons)
- Soluble fraction (unburnt hydrocarbons from fuel and lubricant)
- Insoluble fraction (sulfates and derived products)





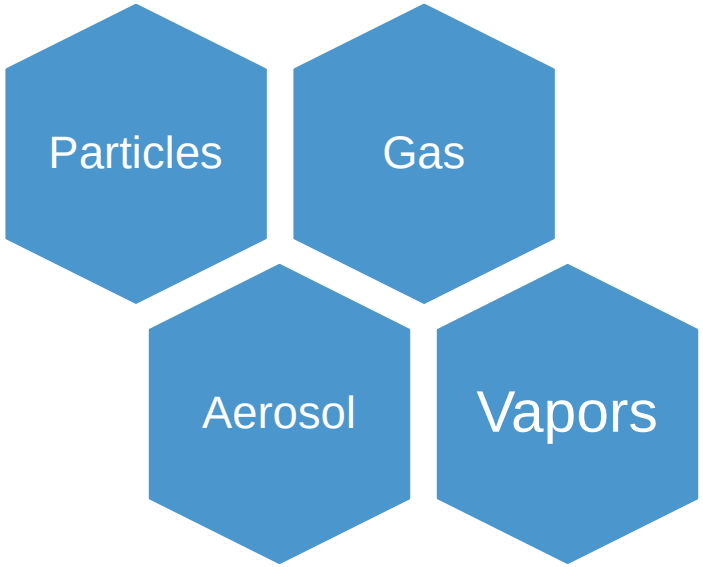
Composition chimique d'une particule

© INERIS, 1993

* Source: INERIS, Institut National de l'EnviRonnement Industriel et des risqueS

ENGINE EXHAUST

- Exhaust contents:



- Specific Diesel Engine Exhaust Content:
  - Carbon black, soot.
  - Particles.
  - Water vapors.
  - Carbon Monoxide (CO).
  - Carbon Dioxide (CO2).
  - Oxygen (O2),
  - Nitrogen.
  - Nitrogen Monoxide (NO).
  - Nitrogen Dioxide (NO2).
  - Sulfur Monoxide (SO).
  - Sulfur Dioxide (SO2).
  - Alcohols.
  - Aldehydes.
  - Ketones.
  - Hydrocarbons.
  - Polycyclic Aromatic Hydrocarbons (PAH).

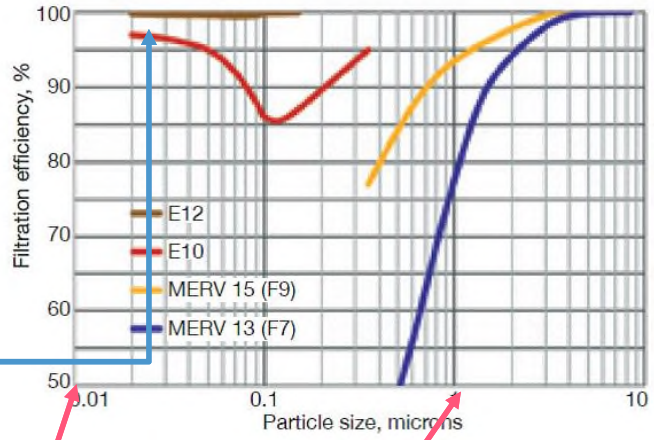
*Source: Site CCHST (Centre Canadien d'Hygiène et de Sécurité au Travail).

ENGINE EXHAUST

What can we do between 0,003 and 0,02?

- SOOT AND CARBON BLACK
  - Carbon/Soot – PM2,5 (0,1 to 0,3 microns).
  - Microsoot (0,05 to 0,1 microns),
  - which may aggregate together
  - Carbon impregnated with hydrocarbons
    - agglomerate of microspherule of carbon(1)
      - « embryo » 0,005 microns to 0,015 microns
      - Aggregate 0,08 microns to 1 micron

*ADEME 1998



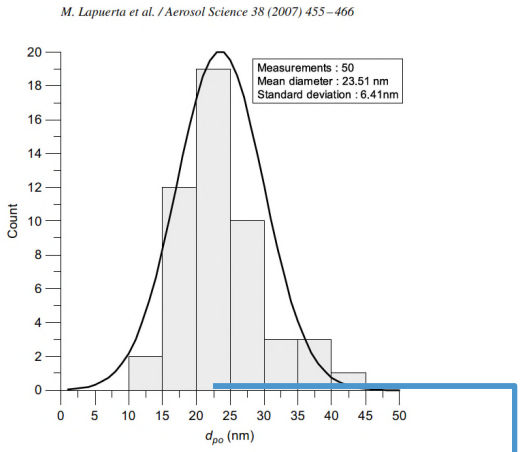
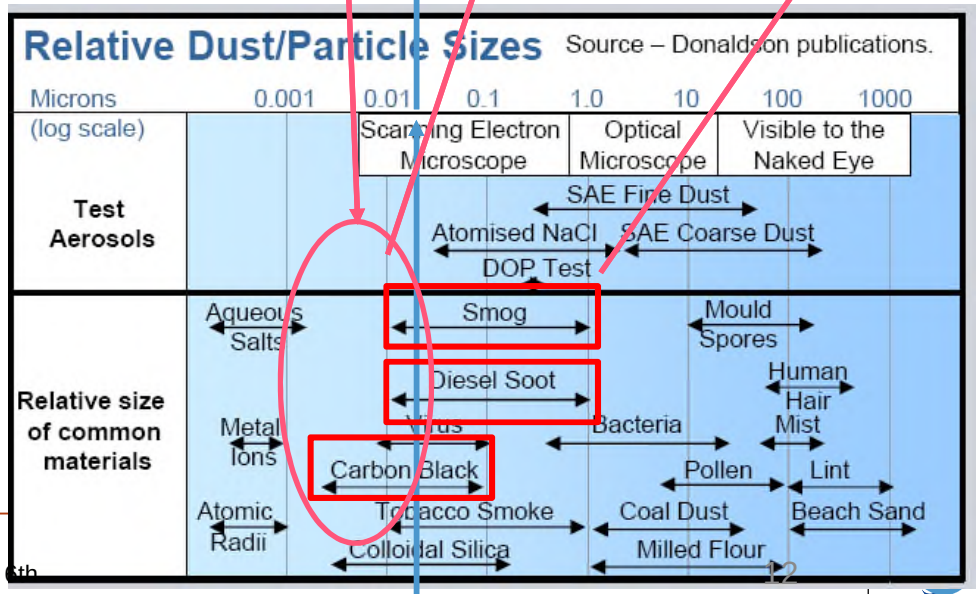


Fig. 3. Primary particle diameter distribution with fitted normal distribution, for the reference operating condition.



ENGINE EXHAUST

- COMPONENTS OTHER THAN SOOT
  - Lead
  - Iron
  - Copper
  - Calcium oxide (from lubricant additives)
  - Metallic oxide (Aluminum oxide, catalytic exhaust)
  - Halide – PM2,5
  - Lead bromide (volatile then adsorpted by particles) – PM2,5
  - Lead chloride (volatile then adsorpted by particles) – PM2,5
  - Polycyclic Aromatic Hydrocarbons (PAH)
  - SO2 agglomerates with sulfate (salt or acid) and merged with particles
  - Sulfur oxide (SO2) and nitrogen oxide (N2O), which are extremely hygroscopic
    - Covering water and stop the water evaporation (smogs)

*Source ADEME 1998

FLARE

FLARE

- No robust data.
- Gas turbine air inlet towards prevailing wind. Nevertheless, it is a matter of statistics => Fumes may cross gas turbine air inlet filters.
- Flare run in transient condition.
- Flare with bad and incomplete combustion (98% efficiency).

LUBE OIL VENT

LUBE OIL VENT

- Use of mineral oil as TOTAL Preslia 32 and 46
  - Mixture of C20 to C50 hydrocarbon molecule with additives.
  - Vent smokes are made of the shortest molecules…C20, additives and other fraction.
- Use of synthetic oil as TOTAL Preslia SE JET
  - Mixture of synthetic ester.
  - Vent smokes are made ester


Questions ?