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**PM10 and Nano-particulates:
The Standpoint of the Swiss Agency for the
Environment, Forests and Landscape (SAEFL)**

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What does the SAEFL think about PM10 and nano-particulates? The organizers invited me to give you the answer. They may have thought that I should know because I work in this office. But let me be precise: I can only speak on behalf of the Air pollution control division.

The four sections of our division have to do with the emissions from traffic, industrial plants and heating, and with the immissions stemming from these sources. In the last few months, fine particulates have evolved into a main focus of activity for all of our sections.

Switzerland was the first European country to impose an annual impact threshold value for PM10. The new threshold values for PM10 were introduced because there was evidence that PM10 correlates more strongly with the health impact than the total suspended dust. These immission standards can be found in the Swiss Clean Air Ordinance.

In addition to this, the revised Swiss Clean Air Ordinance now classifies diesel soot (carbon) as carcinogenic. The same goes for the Swiss list of toxic substances in occupational health.

Since no safe concentration can be specified actually for carcinogenic substances, it is imperative to minimize their emissions.

The annual PM10 immission threshold values are exceeded at all but 2 of the 15 sampling stations. (Those 2 stations are both situated in mountain areas over 1500 m.) The available epidemiological studies demonstrate the serious consequences of inhaled fine dusts on the Swiss population and its economy.

The new regulations now trigger concrete measures for attaining the prescribed air quality in Switzerland. Let me just name three of them.

- The Swiss cantons are now compelled to formulate and enforce plans to reduce PM10 emissions from various pollution sources.
- Diesel powered machines and equipment subject to the Clean Air Ordinance (e.g. construction site engines) must curtail the emitted carcinogenic diesel soot according to the best-practicable-means-principle. The priority is to protect the population exposed to high concentrations of diesel soot. These occur, for example, in the proximity of large construction sites. Our office is actually preparing a guideline in order to help the entrepreneurs reducing the emissions in such sites.

The VERT-Project aims at curtailing emissions from diesel engines in tunnel sites. We are particularly delighted at the excellent collaboration, in recent years, with other agencies in this project. Our main partners are the Swiss National Accident Insurance Organization (SUVA) and their counterparts in

Germany and Austria.

VERT was instrumental in the development of diesel soot traps having high filtration rates for combustion aerosols (>90% of particulate mass, >99% of particulate count).

VERT succeeded in advancing the state-of-the-technology for soot filters on construction engines.

We are convinced about this filter technology. We will make efforts to promote large-scale deployment in new and older diesel engines.

All these activities are encouraging, but the job is far to be done. In fact, recent experience raises some new questions. Doubts pertain namely to the suitability of traditional gravimetric measurement methods to assess the emissions and immissions. These methods are probably not enough and must be supplemented by criteria for the particulate count:

- According to some newer measurements, modern diesel engines emit substantially reduced total particulate mass. The engine optimization was however ineffective on the ultrafine particulates. Some authors even report a serious increase in the nano-particulate count from newer engines.
- The investigations within the VERT-Project showed that many traps:
 - filter the larger particulates very efficiently,
 - but fail in the nano-particulate range.
 Other traps however have a balanced response or even perform better in filtering ultrafine particulates.
- One recent toxicological study indicates that the observed negative health impact is generally closer correlated with the concentration of the finer particulate fractions which seem to intrude deep into the respiratory tract.

The new insight indicates the demand for novel metrics **supplementary** to gravimetry. It seems fair to say that measurements which would include the particulate count would offer an important new criterion.

In the light of the actual body of evidence, the SAEFL advocates the following **position on fine dust, PM10 and nano-particulates**:

1. The health impacts of PM10 are established. Hence, the Clean Air Ordinance can stipulate mandatory immission limits for them.
2. There are some indications referring to a negative health impact from ultrafine particulates (nano-particulates) contained in the PM10 fraction. However, we cannot yet specify a separate immission limit for nano-particulates, because we do not yet know enough about the following:
 - the relevant parameters (e.g. particulate mass, particulate concentration count, chemical composition, morphology)
 - the pertinent measurement methods
 - the association between emission, transmission and immission.

3. One of the fundamental principles in environmental politics is precaution. According to this precaution-principle, measures to curtail particulate emissions should preferably allow a reduction of **all** particulate size fractions. Therefore, measures that do lower the mass of particulate emissions but produce a larger number of ultrafine particulates, cannot be recommended by our office.
4. Curtailment methods (particulate traps) are now available that very efficiently intercept **all** particulate size fractions from combustion exhaust gases. Since these methods are proven in operation, we can and will promote their use.