Comprehensive report nr.1 including VAS measurements and Conclusions for both reports 1 and 2.

VAS information

VAS Supplemental Sensor-Based Aerosol and Exposure Analysis

This method is used as a complementary analytical tool in the assessment of air quality and aerosol-related exposure in the work environment. VAS can be equipped with additional sensors depending on the parameters to be measured.

The method complements traditional gravimetric particle measurement according to current AFS regulations and standards by also analyzing particle number concentration, time-related variations occurring both outdoors and indoors, and so-called time-dynamic emission processes.

The purpose is to identify exposures and emission events that are not always apparent when using mass-based measurement methods alone. VAS provides an additional basis for future decisions and corrective actions.

VAS does not replace AFS-based gravimetric measurement. The method enables identification of exposures that may otherwise remain completely undetected in traditional mass-based measurements according to AFS/gravimetric methods.

Assessment according to the Swedish Work Environment Authority (AFS) is mainly based on:

- occupational exposure limit values
- gravimetric dust sampling
- substance-specific gas limit values

Particle assessments normally relate to:
SS-EN 481, ISO 7708, respirable/inhalable fraction mg/m^3 air.

Limitations of Mass-Based Methods

Gravimetric and optical PM methods mainly describe particle mass: $C_m = \frac{m}{V}$

Ultrafine particles (<100 nm) often contribute insignificantly to total mass despite occurring in very high numbers.

Low mg/m^3 values therefore do not exclude:

- high particle counts
- episodic fine particle events
- chemically reactive aerosol loads

The Supplemental Measurement Principle

VAS is based on simultaneous registration of:

- particle data
- gaseous indicators
- real-time outdoor and indoor data used as background information for understanding air movement within the area and how air penetrates into facilities
- indoor conditions during movement, entrances, changing areas, offices, and ventilation performance
- time progression and around-the-clock measurements

Simultaneous variation together with particle parameters is in this case used to identify probable emission sources such as:

- combustion
- excavation dust
- work intensity
- dust movement
- wind direction influence
- relative humidity (RH)
- temperature
- real-time 24/7 monitoring for limits set as alarms or warning thresholds

VAS together with the SEM tests we have conducted provides us with a good overall understanding and forms a strong basis for SSAB's continued action plan.

The measured environment can be presented on a VAS map including colors, wind directions, levels, and installed systems if SSAB wishes us to continue with that work.

Fine particles cannot be adequately described by mass concentration alone.

In addition to the currently activated particle sensors, standard NOX and VOC indicative sensors are also available and can be activated if desired.

The combination of: particle mass, particle count, gas indicators, time dynamic analysis Provides a more complete description of the aerosol profile of the work environment than gravimetric mass determination alone, but it must of course be carried out.

Conclusion for report 1 and 2

4Safe Air was asked to install the VAS system during very short preparations, so that SSAB could monitor dust flow and outdoor and indoor air continuously with these sensors. We carried out this at the same time as SEM samples that were taken in the outdoor and indoor environment so that you could get a full overview picture. We carried out an ocular inspection of the entire area. We will also after this make an action plan based on practical errors and observations we have seen. Together with the Management at site, we have obtained a very good basis and facts throughout the time.

The survey we conducted was carried out because of problems experienced by employees/subcontractors working both outdoors and indoors.

By performing real-time measurements of particles from 2.5µm and smaller, as well as inhalable and respirable dust continuously monitored 24/7, and correlating these results with the SEM samples collected during the same period, a good understanding is obtained of how the air behaves and how different particles are generated and deposited in different environments.

By not only performing individual air-content samples, but instead conducting continuous measurements, it becomes possible to obtain a clear indication of how and where particles are generated, accumulated, and deposited.

To relate all findings to possible health-related issues in individuals, we have the following observations:

We do not observe any elevated values in the elemental samples taken at several locations — outdoors, on the ground, inside work machines, as well as in ventilation filters, office spaces, and other indoor areas.

We also do not observe any high levels in our SEM samples, as shown in the attached SEM report.

Regarding PM measurements with VAS, we do not observe elevated levels either, only temporary peak events during shorter periods. The levels may be relatively low due to the comparatively low work intensity during the measurement period.

Based on my experience regarding how people react to dust exposure, together with several common factors concerning what occurred and when, different contributing factors should be evaluated and, where possible, eliminated.

Since cold periods occurred and many staff members were diagnosed with COVID through testing, I discussed this matter with Professor Niclas Arnberg at Umeå University, who among other things confirmed that our airways may become significantly more sensitive to respirable dust exposure during or shortly after COVID infection, despite otherwise normal dust values.

This could therefore be a contributing factor in this case. Please refer to the attached documents: Scientific Studies no. 1, 2, and 3. This could therefore be one explanation for the problems experienced.

At the same time, we observe that dust levels are generally relatively normal for workplaces of this type.

There are also other contributing factors, such as insufficient filter classes in the ventilation systems within the work sheds, which should be upgraded.

We also observed ozone odor indoors, indicating that occupational exposure limit values may have been exceeded (0.1 ppm over 8 hours). This ozone was generated by a powerful ionization machine. Ozone is a respiratory irritant and also generates free radicals. We do not know how long the equipment has been installed indoors.

The SEM samples presented in report 2 also do not show elevated values — neither in outdoor air, on ventilation filters, in the work environment, nor inside the work machine where the reported problems occurred.

I believe there are measures and practical actions that could relatively easily reduce concern and direct health-related issues, while also increasing knowledge regarding how your work environment should practically be managed with respect to ultrafine and nanoparticles.

This would also provide better control during the operational phase you are now entering and could, in practical terms, reduce the risks associated with periodically elevated dust levels.

Investigation of airborne dust and installation of real-time measurement VAS system for SSAB Site Luleå also including analysis of dust via SEM. Report nr 2 shows the SEM results

1. Purpose and Objectives

- Ensure air quality in work environments.
- Assess exposure to particles in the size range of 0.1–10.0 µm, both in mass (µg-m3/h) and numbers-m3/h.
- Identify risk areas and the need for corrective actions.
- Identify elements with surface sampling and filter samples, with SEM

2. Scope

Measurements are carried out in:

- Outdoor environments also with SEM tests
- Office buildings and also surfaces in workplaces also with
- Heavy vehicles (driver cabins) VAS and SEM tests

2. Measurement Equipment

- System: VAS (air quality monitoring system)
- Measurement parameters: Particle concentration, particle count (0.3–1.0 µm)
- PM1.0, PM2.5, PM10, temperature, RH
- Surface sampling with elemental analysis using SEM (Scanning Electron Microscope)

4. Data Collection and Analysis

- Data collection via the VAS system
- Analysis of levels and variations
- Identification of exposure peaks
- Elemental analysis using SEM and EDAX

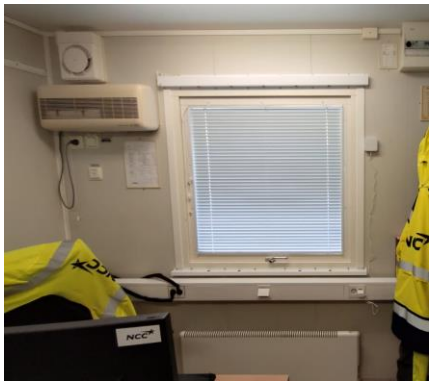
5. Deployment of the VAS system

Outdoor Environment:

- Routers for communication with the VAS system are installed strategically around the measurement area. (Temporary construction power is available around the area.)
- Measurement satellites are placed near work areas and exposed reference points.
- Battery power solutions may be used for measurement satellites where no electrical power is available.
- Measurement satellites are mounted on poles (approx. 2 meters high) with flags for visibility.

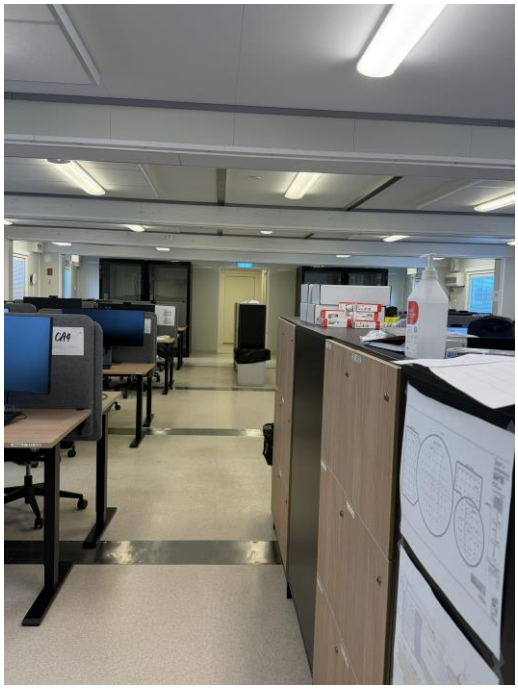
Site Offices / Temporary Construction Barracks:

- Placement in the breathing zone (~1.6 m)
- Measurement during normal operation conditions



Peab Office 2 (ground floor)

Wall-mounted installation in office area.

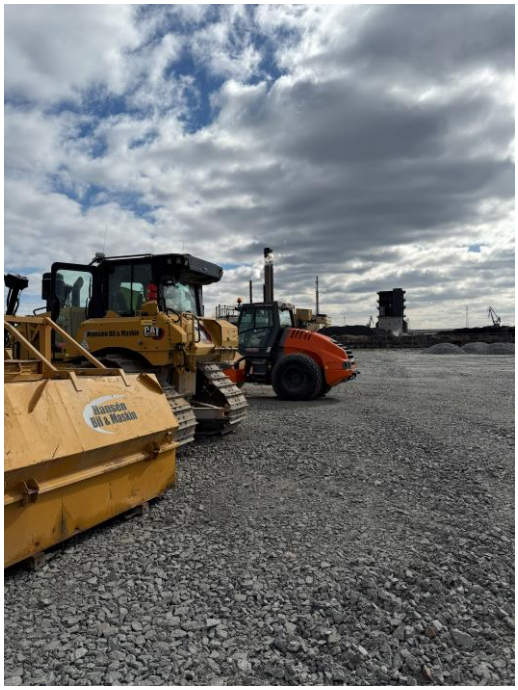


Peab CA4 (lower floor, open-plan office)

Wall-mounted outdoor sensor installation.

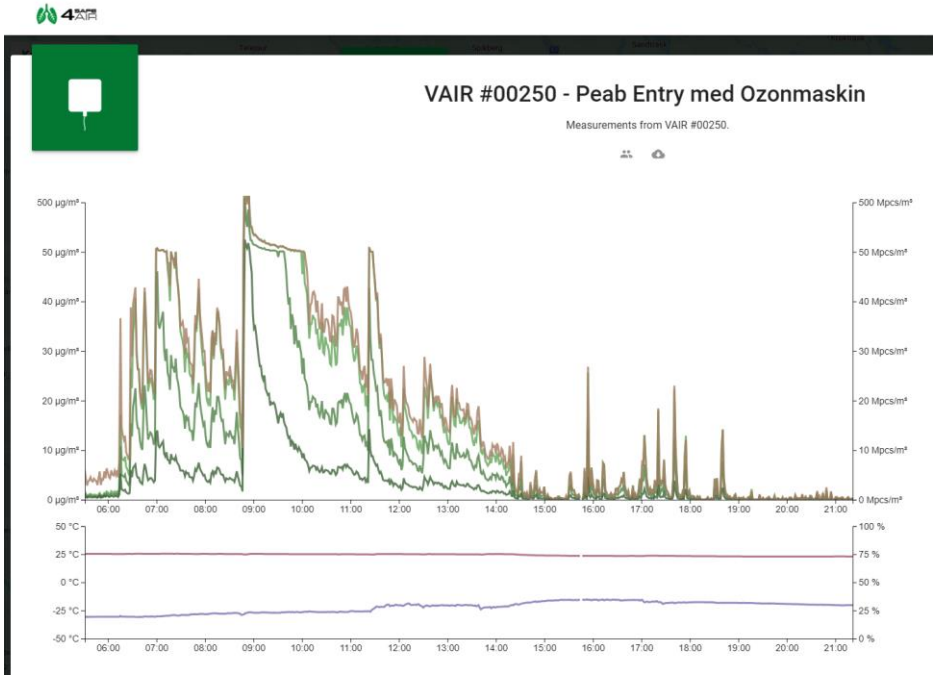
Heavy Vehicles:

- Placement in the driver's breathing zone
- Continuous measurement during operation/driving
- SEM surface test inside



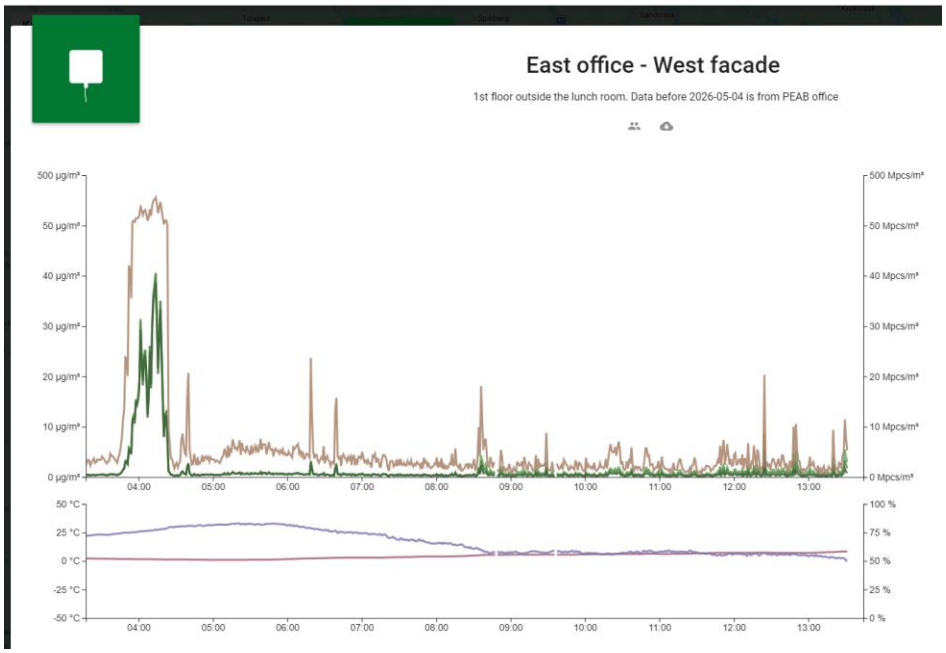

SSAB Bulldozer

6. Summary of some results (VAS system)

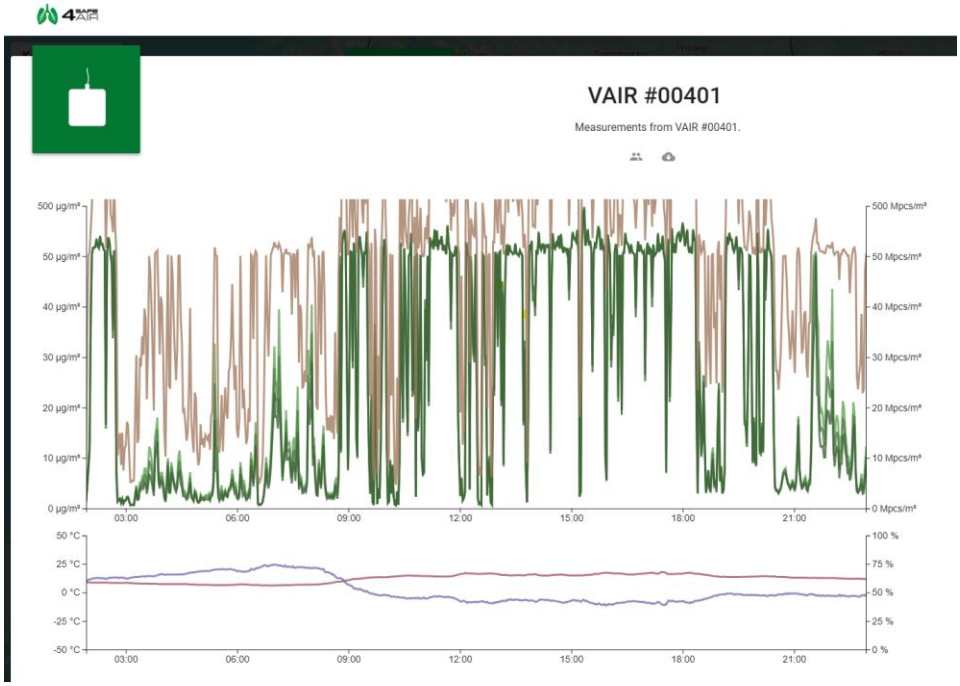


Wednesday, 2026-04-29

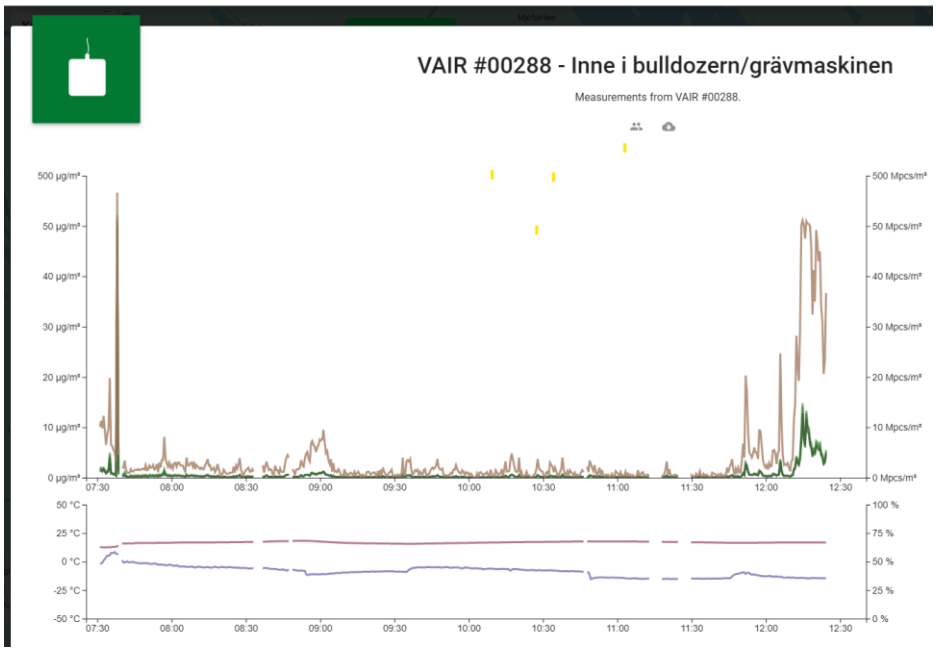
The particle concentration observed in the diagrams during the workday is highly uneven. Very high levels occur periodically, most likely due to activity in the area. This activity is probably caused by people moving through the area, as the particle sensor is installed at the entrance to Peab's office barracks. We also see that values are increased when changing and of course when entering and exiting.



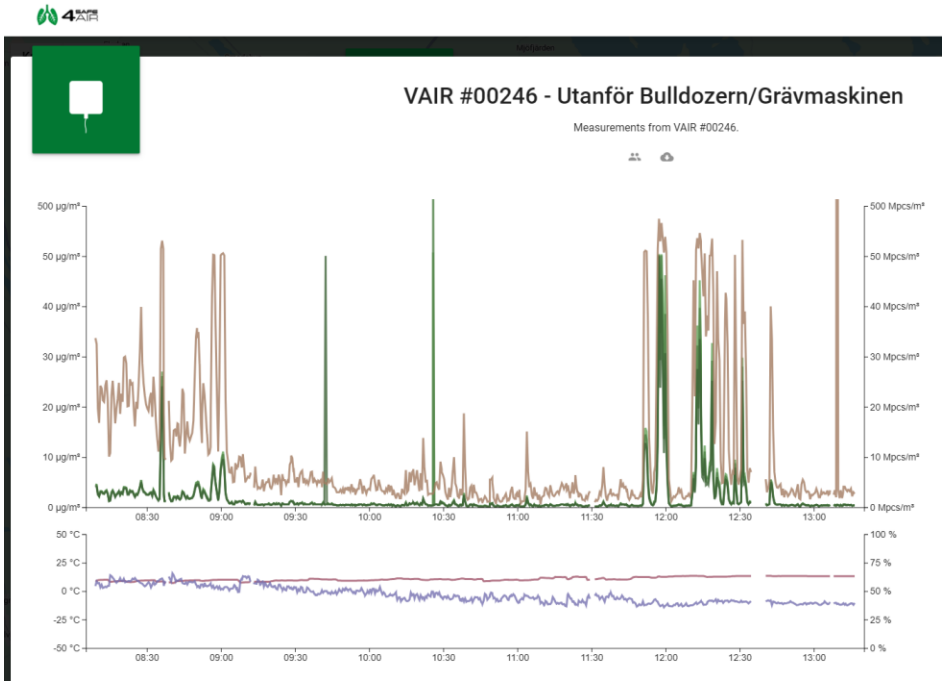
The outdoor air at west façade showed low particle levels on this day, with only an occasional peak early in the morning. Of course, is directly related to work intensity and wind direction



The outdoor air at Aronstorp showed extremely high particle levels on this day, most likely due to machinery in operation and a lot of activity at the worksite.



Inside the bulldozer we are able to see after start up 0715 rather low levels, but at lunch time gets higher



Outside the bulldozer the levels are higher periodically but at lunch time gets higher.

-Calibration and measurement using DustTrak as a reference because of drifting and calibration of VAS system. VAS is unique since we always have one unit sensor unused inside that are able to calibrate online each 6 month.

8. Follow-up

- Presentation of results
- Recommendations for corrective actions
- Possible follow-up measurements

9. Schedule going forward

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- Setup and measurements
- Following week: Analysis and reporting

10. Additional Images