Case Study

Revolutionary Solution in the Odor Market

Vigi e-nose recognized versus the competition

When odor issues occur at an industrial site, rapid diagnosis must be done and a strategy defined to treat odor sources definitively.

Today, the sensory panel approach using dynamic olfactometry analysis is considered as first approach to rank odor sources and subsequently to treat the most noxious odors. When investigating the source of the odor, an online monitoring system provides for the best available methodology. Conventional electronic nose (e-nose) technologies are designed to check odor variation and try to correlate results with a sensory approach (e.g., dynamic olfactometry using EN 13725 or ASTM 679-E04 methods). These approaches, however, have limitations since the current e-nose solutions do not provide the gas composition via speciation and require the use of technologies that are highly susceptible to interference. Manual sampling techniques are susceptible to additional loses of sample because the molecules are often lost during sampling and transport of samples to the laboratory for analysis. Therefore, the need for online analyzers able to monitor onsite odors constituents such as Volatile Organic Compounds (VOCs), sulfurs, and nitrogenous compounds is apparent.

In response to this need, Chromatotec has developed the solution for the online analysis of VOCs, sulfurs, and NH3.

This solution redefines the capability with online monitoring specifically suited for the 'odor' monitoring industry. Chromatotec solutions provide the ability to quantify concentrations in parts per billion (ppb) or parts per trillion (ppt) in ambient air and process applications. Chromatotec has proven that the traditional thinking that no analytical solution can be more sensitive than human nose. Chromatotec is the global supplier of online measurement platforms capable of meeting the strictest guidance from regulators and industry and deploy his solutions worldwide for use in the ambient air, industrial, research, and energy monitoring sector. Chromatotec's all-in-one, turn-key, vigiODOR solution can be deployed at any location, any environment, and any classification where odorant monitoring is required.

CANOPIA recovery center located in Bayonne, France, has recently deployed Chromatotec's vigiODOR solution. This site collects domestic waste from 200,000 citizens and converts it to compost, solid recovered fuel and biogas by utilizing the VALORGA methanization process. The CANOPIA site treats 84,000 tons of waste and produces 30,000 tons of compost per year. The site covers over three acres with 0.25 acres dedicated to air treatment. Urbaser Environment designed and managed the construction of the entire site and currently manages the site through the VALORTEGIA subsidiary.

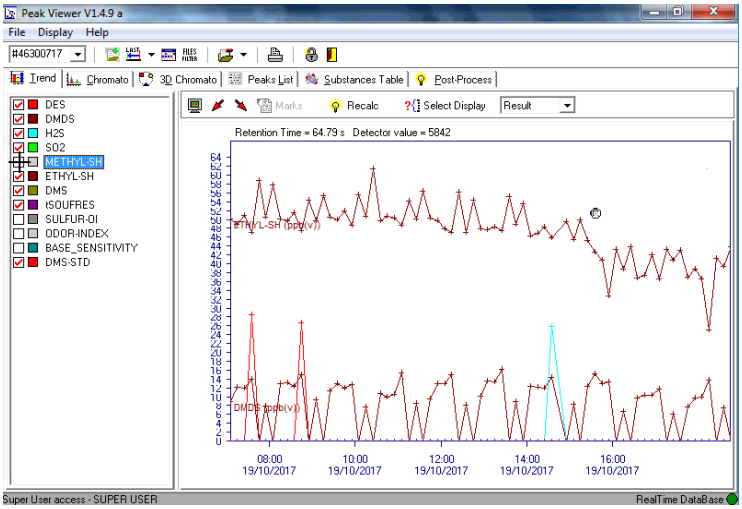
For Sebastien Cueillens, Project Director for Urbaser Environment organization and in charge of the site management, odor is a crucial point. In the past, Mr. Cueillens had used e-nose technology with Metal Oxide Sensors (MOS) technologies and was disappointed by such technology as the data lacked information about gas composition. He stated, “The quantification of sulfurs is very important to verify the performance of the biologic digester. The VOCs are important to verify the performance of charcoal filters. The odor monitoring is important to verify that processes work properly and are compliant with the legislation. It is important for us to dissociate odor perceived by the neighborhood from the potential odor generated on site. This is a crucial point as once we are sure that odor treatment works properly, we can focus on diffusing sources.”

When asked about his interest in Chromatotec’s vigiODOR solution, Mr. Cueillens adds, “We were looking for a solution able to monitor sulfurs and VOCs to facilitate our understanding about process variation. This was not possible with sensors-based electronic nose technology as such solutions did not help us to elaborate diagnosis of process malfunctions when odor concentration exceedance was observed on the effluent of the odor control system. Today, the Chromatotec solution with vigiODOR platform and vigi e-nose GC based technology give us the expected results.”

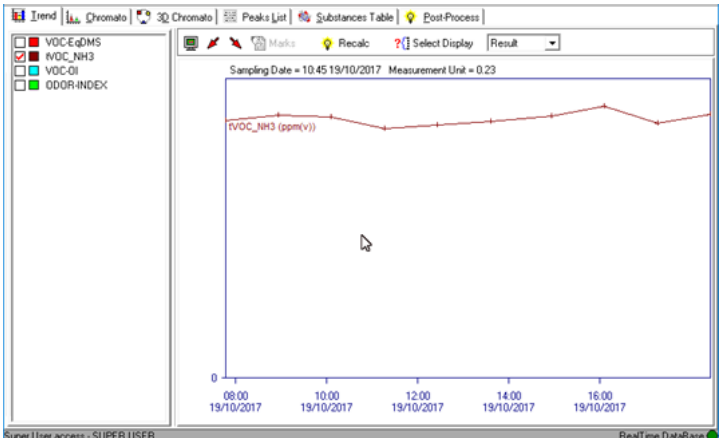
The vigiODOR solution is developed for online monitoring and modeling of the site contribution of the olfactory impact of the site, which allows for site mitigation procedures to treat and prevent odors. Odor events are better understood by using a scientific approach to determine sulfurs composition, VOCs concentration, and odor concentration measured according to EN13725. The measurement system performance evaluation is completed using the internal calibration (permeation tube) feature of the system, providing the correlation with olfactory response, field measurements, and impact forecasts. Spot measurement can be integrated into the online measurement cycle to demonstrate compliance with the odor concentration objectives defined in the French composting regulations (5 ouE/m3 not to be exceeded more than 175h per year (2% of time) in residential areas).

The vigiODOR solution is the comprehensive odor monitoring system incorporating a multiplexer (stream selector) that automatically collects process gas from three odor control systems: bio filtration, charcoal filters, and waste reception area. The analysis is done by an automatic gas chromatograph (vigi e-nose) integrated in an environmentally controlled shelter. The stand-alone, all-in-one system includes an automatic calibration module and gas generators, alleviating the need for traditional support equipment (gas bottles, regulators, etc.).

The vigi e-nose analyzer monitors 14 specific sulfurs such as H2S, Mercaptans, sulfides such as DMS DMDS, SO2. In addition, the solution monitors VOCs producing data specific to odor intensity and concentrations measured locally in accordance with EN 13725. Concentrations are tracked at ppb or ppt levels, all lower than what the human nose can detect.

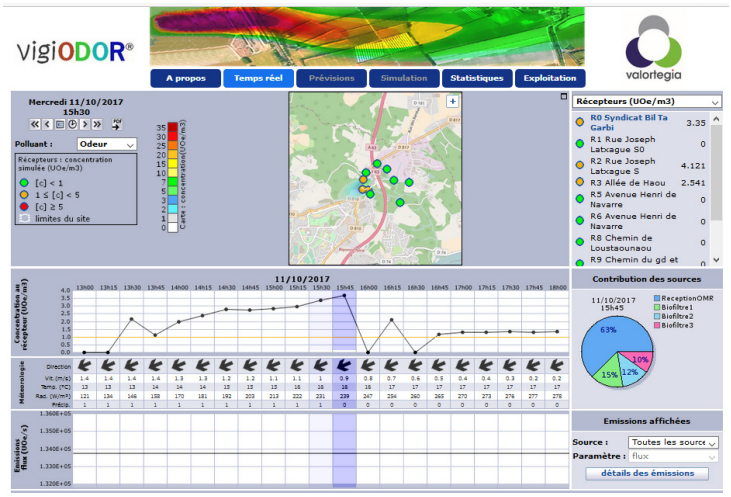


Concentration trend for Suphurs and some mercpatans on outlet odour control monitored with vigi e-nose



Concentration trend for tVOCs on outlet odor control monitored with vigi e-noseon outlet odour control monitored with vigi e-nose

To evaluate the chemical and odor impact of the source on the neighborhood, the topography, meteo, and concentrations monitored by the analyzer are input into the dispersion modelling software. The meteo data, source origin contribution, analytical data, and alarms are centralized on the vigiODOR platform installed on the local server (cloud-based solutions available as well). The solution was preconfigured to provide for rapid access of the data (see vigiODOR interface image below).



vigiODOR interface with dynamic plume for sulfurs and contribution of odor source in addition to meteo data

The vigiODOR platform is engineered specifically to adapt to our customer's needs. Besides the CANOPIA methanization center, the solution is widely deployed at several sites including waste water treatment plants in Paris, Dubai, Poland, US, and Asia. This unique solution provides the ability to monitor and forecast in real-time the dispersion of odor and gas plumes (H2S, NH3, VOC, TBM, etc.) around industrial sites.

When connected to the network of vigi e-nose analyzers and on-site weather station, the solution provides key, real-time information to optimize facility operations and efficiently manage chemical and olfactory pollution. The solution provides a real-time display of discharge and atmospheric dispersion. The system's «Forecasting Mode» provides forecasts of up to 48 hours in advance enabling warning activation or production programs re-adjustment. The latest generation dispersion models (e.g., simple Gaussian model, ADMS reference model, latest-generation Lagrangian model) is integrated into the platform. The solution's «Service Mode» (SaaS) provides the same level of information and display and requires only a simple subscription and an Internet connection. The complete, decision-support tool provides real-time display of plume by emission levels and weather conditions, odor and specific pollutant gas concentration profiles at emission source, and receptor points with relative contribution of the different sources. This centralizes the visualization of analyzers and meteorological data from the on-site installed station. To provide intelligent measurement, the solution provides warnings from configurable threshold overruns on emission points or on pre-defined receptor points (neighborhood, sensible sites, property lines) with data archiving for statistics calculations on historic data (e.g., exposition frequency, percentiles, monthly or annual means, etc.). Reports are automatic and accessible for non-experts in gas chromatography or dispersion software. Results are provided at a glance with automatic data validation. The analyzer integrates an internal permeation tube with a specific stable standard analyzed after each analysis.

The Chromatotec vigi e-nose concentration as depicted below provides a solution with increased responsiveness to the risk of odor nuisance with e-mail alerts when exceeding 5 ouE/m3 on one of the 9 receptor points or on the source emission. It gives Sulfurs and VOCs profiles in addition to odor profile with automatic reports and alerts on site on each source monitored or on neighborhood.

The solution can be considered as a tracking system for the performance of the odor treatment facility by the continuous measurement of odor, VOCs, and sulfur gas. It allows identification of the sources causing environmental odors. The solution enables transparent communication for the sharing of information on odor management with the authorities, if required. Annual, monthly and daily automated reports provide the necessary data to assess the odor and chemical impact of the site and to facilitate odor understanding.