

Benefits resulting from the implementation of a real time odour impact monitoring and modelling system

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Who is Odotech?

- ODOTECH has been in the business of odour management since 1998, more than 500 interventions in all types of industries;
- 40 employees (North America, Europe and Latin America) active in :
 - Odour diagnostics;
 - Performance studies;
 - Modelling studies;
 - Liaison committees;
 - Odour mitigation plans and preventative programs;
 - Implementation of odour measurement (e-nose) and real-time modelling tools (More than 40 systems installed, nearly half on composting sites);
- Just in 2009, 35 residual waste management sites supported in Canada, France, Belgium, Switzerland (Composting, Digestion, Landfills and integrated sites).



Odours from composting... really?

We all know it - Odours are omnipresent :

- Incoming organic waste is already odorous (just doing its job rotting...);
- At the pre-treatment steps (reception, mechanical separation, grinding and other prep processes), sometimes discontinuous but significant releases;
- Nearly continuous releases in handling and treatment systems (variable based on technology, design and throughput but never truly “eliminated”);
- Also occur in the treatment and use of end products and by-products (wastewater, solids, “mature” composts)

Typical chemicals responsible for the odours

- Sulphides (H₂S, DMS, DMDS, CS₂, Methanethiol)
- Volatile Fatty Acids (Acetic Acid, Butyric Acid, Propionic Acid)
- Nitrogen Compounds (Ammonia, Trimethylamine)
- + Many Others depending on Organic waste managed and the process used!

Unfortunately : No single tracer gas can be used to estimate off site odour impacts (a blend of multiple components... many at the detection limits of existing methods): must rely on olfactometry (O.U.) and modelling.

Multiple Odour Emission Sources

- Transport to site (route to site, waiting queue to reception)
- Reception of material
- Pre-treatment of material (bag opening, mechanical separation, mixing/homogenization)
- Transportation on-site
- Treatment process releases (composting, digestion, drying, etc.)
- Building envelope releases (fugitives)
- Waste material and by-products management
 - Waste water ponds
 - Leachate accumulations
 - Screening and blending
- Finished products management



Typical abatement/control methods

- Minimize emissions (improved processing, recipes)
- Enclose, collect and treat (biofilters and scrubbers)
- Improve dispersion (tall stacks, high vertical velocities)
- Planned operations (avoiding unfavourable met conditions for odour causing activities)
- Additives (inoculants)
- Neutralizers
- Aeration optimization (composting and leachate ponds)

In the « old days » : implemented during a crisis or forced by new permit
Now: proactive operators manage odours from site's conception
However : tools needed to optimize the approaches (cost vs required abatement... varies almost every 10 seconds!).



Typical odour levels

Reception hall	Varies, can be >10 000 O.U./m ³
Active composting (or biological drying)	Varies, 1000 to >10000 O.U./m ³
Biofilter exhaust	Varies, but typically 100 to 800 O.U./m ³
Pond (leachate)	Varies, can be >100 000 O.U./m ³

Data extracted from Odotech's database (odour concentrations vary with processed material, process parameters and a multitude of other factors)

Odour management: doing enough?

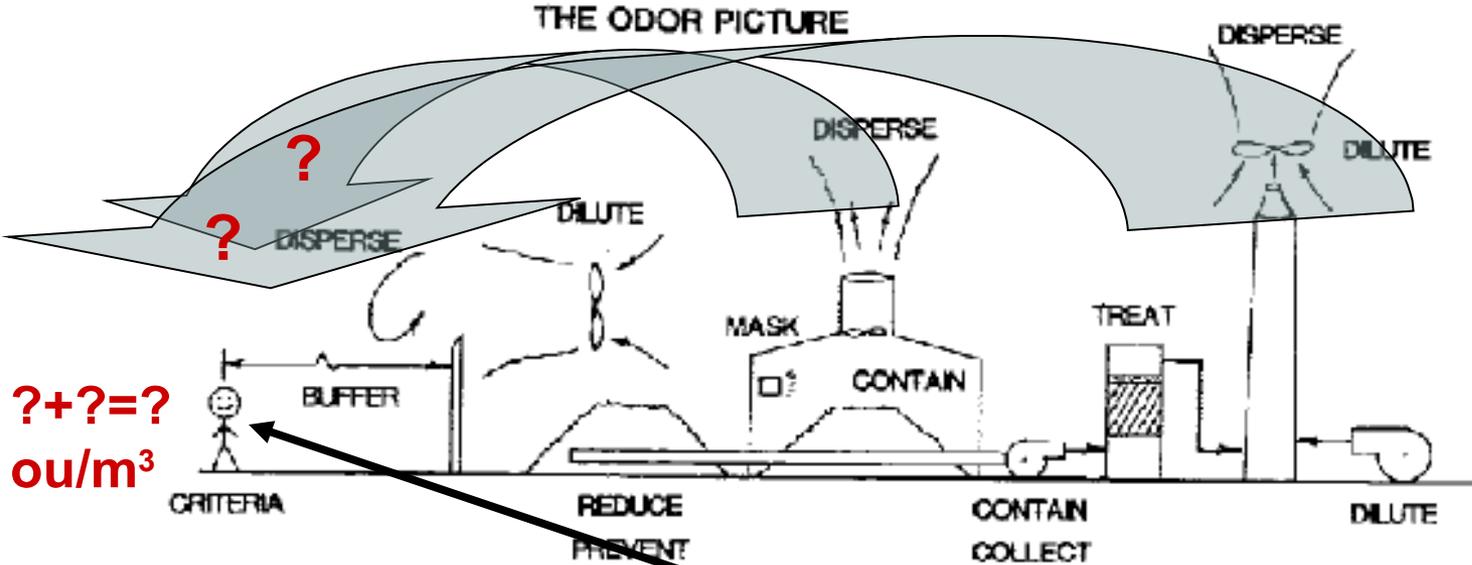


Figure 18.1. The tools of odor management.

Your objective:
Keep this character smiling!

Source: The practical handbook of compost engineering

Off site assessments

- The standard approach : assumed or measured odour emissions modelled to assess the off site impacts and establish mitigation measures
- Odotech identified the need to move from a static to a dynamic assessment approach to further optimize results while reducing costs

A need for odour monitoring/modelling

- You cannot solve a problem efficiently if you don't understand the context and variables;
- You cannot monitor and optimize performance (and costs) if you can't measure or calculate relevant parameters.

Odoscan/Odowatch (accompanied by a preliminary site diagnostic) enables the operator to do both.

Off site ambient odour monitoring/odour surveys cannot capture the unbiased time/space coverage modelling can.



Case study: Composting facility - North of France

- Construction: 1998
- 110 000 t/yr (open windrow composting site), one of the largest composting plants in Europe
- Closest receptor: 550 metres
- Problems faced:
 - Repeated complaints from neighbours
 - Relationship with elected officials and regulatory agencies degrading
 - Facing a requirement to cover all operations
 - Action plan required (with priorities)
 - Facing potential permit loss
 - Imposed a limit of 5 u.o./m³ at receptors
- Implemented a 2 year abatement plan to minimize odour impacts with the Odowatch system

Aerial view of the site



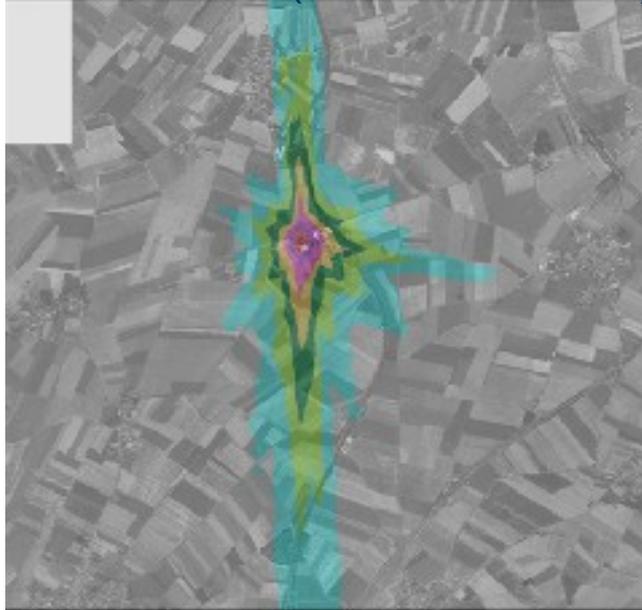
Source: Google Earth

Actions initiated at the facility

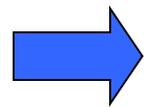
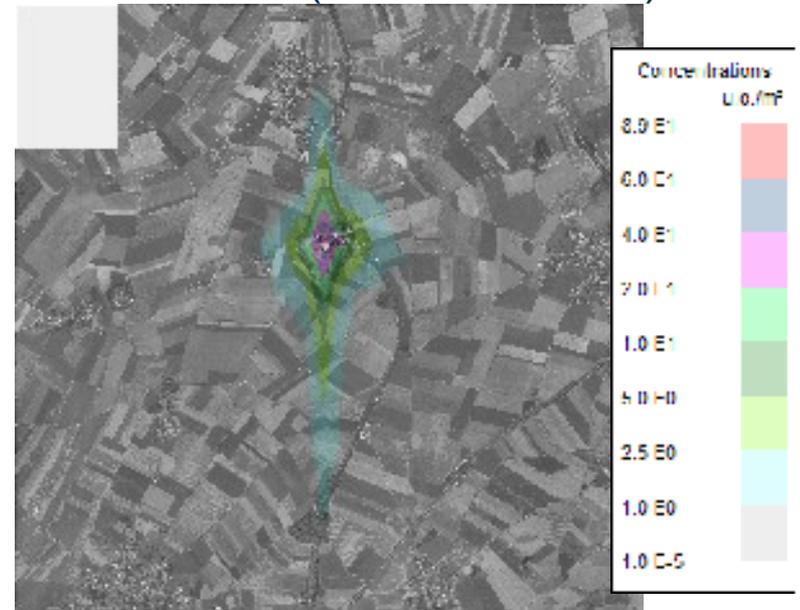
- 0 - 6 months:
 - Communication of the action plan with stakeholders
 - Continuous Monitoring of Odour emissions
 - Hierarchysation of sources (based on rates, impacts, peaks, etc.)
 - Identification of abatement solutions
- 7 - 12 months:
 - Solution integration to existing operations (i.e. Aeration cycle optimization, Windrow cover trials)
 - Continuous Monitoring of Odours
 - Monitoring of abatement efficiency
 - Communication of results to stakeholders

Results

0-6 months (98th Percentile)



7-12 months (98th Percentile)



- levels down 40 %
- complaints down to 4 for a 6 month period

Return on investment

- **Requirement to cover all processes lifted**
 - Capital savings : about 8 m€
 - Value of capital savings (rate of 5 %) : **400 K€ / yr**
- **Increased production capacity**
 - Revenues : $30 \text{ €} * 10\,000 \text{ t} = \mathbf{300 \text{ K€ / yr}}$
 - Capital savings : about 500 K€
 - Value of capital savings (rate of 5 %) : **25 K€ / yr**
- **Energy savings (aeration optimization)**
 - Cost savings of : **11 k€ / an**
- **Stakeholder management**
 - Human resources (redirected to other activities): **6 k€ / yr**

NET GAIN OF : 742 K€ / yr

Other gains

- Improved relationship with stakeholders
 - Reduced complaints
 - Reduced risk of shutdown or scale-back of activities
 - Improved corporate image
- Co-benefits
 - Optimized production
 - Increased production capacity (with existing infrastructures)
 - Minimized abatement costs

Real-time odour modelling at the facility

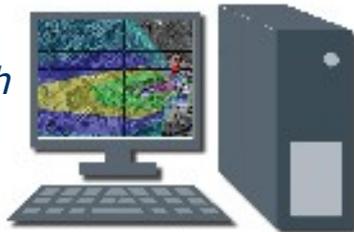
5 Electronic noses



Met tower

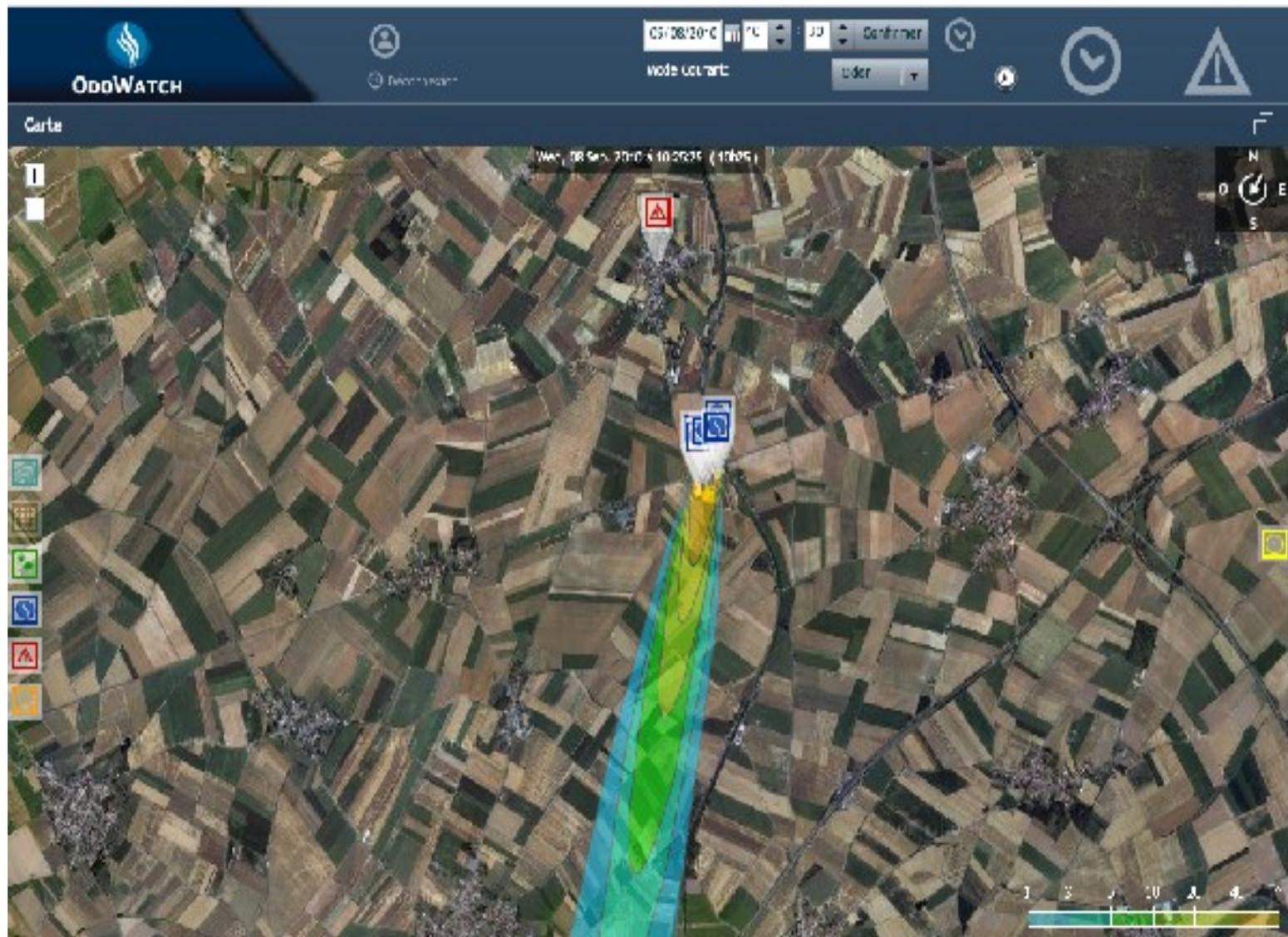


Computer with modelling software and database



Real time impact assessment and archiving





Why install a real time system?

1. Emission rates are extremely variable for some sources (a large number of distinct samples would be needed to have a clear picture of the variations), a nose can:
 - Provide a tool to track fluctuations and trends;
 - Allow for immediate reaction and pro-active actions;
 - Improve understanding;
 - Focused efforts towards the real issues... reduced odour management costs.

“Allowed us to rank odour sources and to set up corrective actions”

“Good correlation between the complaints and the system’s data”

Why (continued)?

2. Real time modelling will present the current situation:
 - Which periods and conditions are putting the facility at risk;
 - Enables activity planning (i.e. first phase windrow turning, screening...);
 - Ensure odour events are minimized ;
 - Allows for production increases in optimal periods.

“The real time plume allows for visualisation of our odour impact at all times, more useful and relevant than met tower info”

“My monthly survey can be correlated with the Odowatch information”

“Odour events are avoided by planning around unfavourable conditions”

Why (continued)?

3. System can be programmed with alert points:
 - Monitoring of odour concentration at a nose/source or modelled off site odours at specific points;
 - Operator is actively informed (alert);
 - Neutralizers could be activated, additional aeration (or closure of a fan), startup of a treatment system, etc.;
 - Leads to reduced operational cost and rapid response.

“ The alert points allow compilation of statistics at specific sensitive points”

“Agreement reached with authorities to cease recurrent odour studies.
Replaced by an annual report extracted from the monitoring system
demonstrating limits are met”

Thank you!

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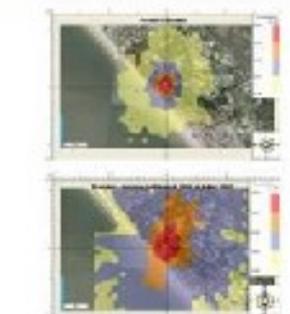
Additional information available at: www.odotech.com

Also, some interesting odour management facts on our blog:
blog.odotech.com

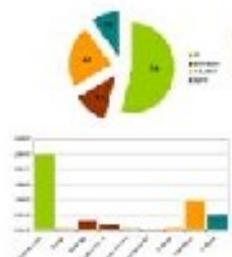


Supplemental information

Odotech's Odour Management Plan (OMP)



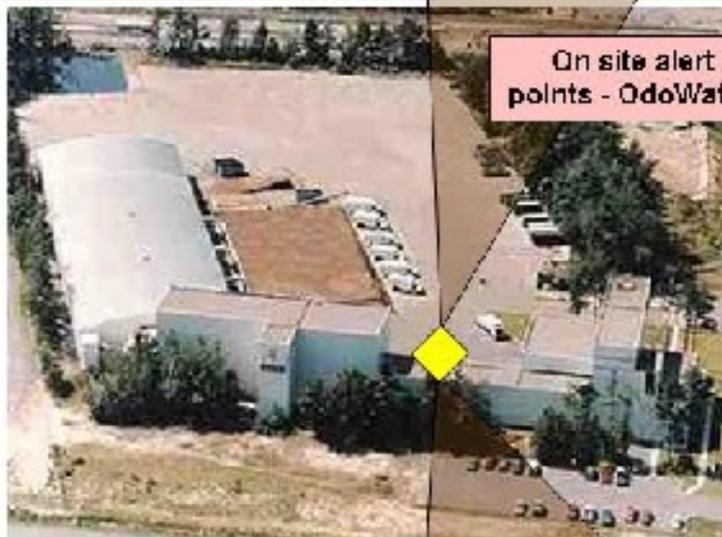
Preliminary odour impact assessment (based on Odotech's database)



Operational strategy for off-site odour impact minimization

Meteorological station

OdoWatch (Real time odour monitoring)

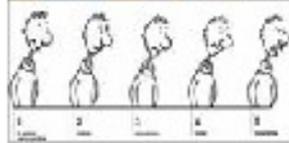


On site alert points - OdoWatch



Emission rate monitoring

Off site alert points - OdoWatch



Citizen committee, training, communication



Performance reports

Preventative

On - site (operations and equipment)

Off - site

The objectives of the OMP

- Establish a trust based relationship with stakeholders (elected officials, neighbours, regulatory agencies)
- Rational evaluation of the project and site based on existing and anticipated constraints
- Management of odour events in real time and based on a proactive approach (prevention of off-site impacts)
- Continuous improvement and associated off-site impact reduction
- Minimization of odour management costs (capital and operational)
- Optimization of odour abatement equipment and processes
- Revenue maximization
- Risk reduction
- Odour traceability

Odotech's services

- Odour management plan expertise
- Support for site selection
- Local ambient level audit
- Audit of an existing site (best practices and measurement of odour emissions)
- Air dispersion modeling (impact assessment)
- Technology performance (odour) assessments/confirmation
- Met Tower installation
- Risk grid creation
- Transport route and method optimization
- Third party validation of studies
- Support in permit applications
- Odour monitoring tools

