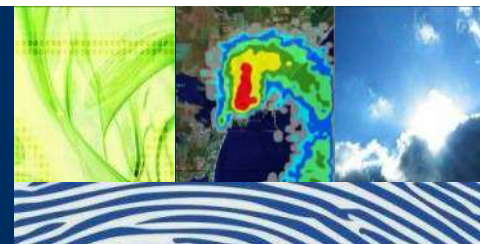




RQ Box Solutions

Odor & VOC Pollution Monitoring



RQ BOX Solutions

eNose Technology for Environmental Applications

www.env.alpha-mos.com



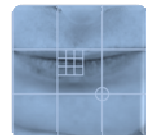
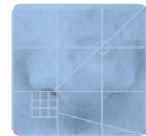
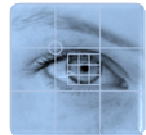


Company Profile

Corporate Mission

► Alpha M.O.S

- A world leader in the manufacture of human sense digitization systems
 - Smell, taste, sight
- Alpha M.O.S offers multi-organoleptic solutions and services
 - Analyzers
 - Chemical and sensory analysis laboratory services
 - Customized industrial solutions
- French distributor of advanced GC and LC instruments





Company Profile

Company Vision

- ▶ To help industrials handle their sensory evaluation challenges by:
 - Offering a full range of services and advanced e-sensing technologies
 - Correlating instrumental measurement with human perception
 - Delivering easy-to-use, cost effective and automated solutions
 - Providing decision tools for multiple industries





Company Profile

Facts & Figures

- ▶ Founded in 1993 by Jean-Christophe Mifsud
- ▶ 1st company to introduce e-noses to the market
- ▶ Leading provider of multi organoleptic systems
 - Over 1400 instruments sold worldwide
 - Deployed in over 20 countries
 - Strongly committed to research and innovation
- ▶ 60+ highly qualified experts
 - More than 50% PhD and Engineers
- ▶ Traded on the Paris Stock Exchange





eNoses & Regulations



French Regulations





eNoses & Regulations

French Regulations

- ▶ French regulations for rendering and composting plants
 - 1st regulations in the world to recognize the relevance of e-noses for environmental follow up
 - Include the use of e-noses for continuous odor monitoring
 - Allows longer intervals between on-site campaign of odor measurements

Regulations references

Composting plants

Ministerial circular of 2009, March 6 - Article 27

Circular related to the decree of 2008, April 22

Rendering plants

Decree of 2003, February 12 – Article 46



French regulation - composting



French regulation - rendering

Composting regulation



Article 27

Fréquence des mesures de débit d'odeur

Le débit d'odeur des principales sources odorantes doit être mesuré à une périodicité fixée dans l'arrêté préfectoral, qui pourra également préciser la saison ou les conditions atmosphériques dans lesquelles cette mesure doit être réalisée. [...]

[...] La fréquence minimale de ces contrôles sur site peut en outre être allongée en cas de mise en place d'un nez électronique, dans la mesure où une phase d'étalonnage ou d'apprentissage de ce nez aura permis d'établir des corrélations avec les valeurs en concentration d'odeur mesurées ou directement avec la gêne ressentie par les riverains.

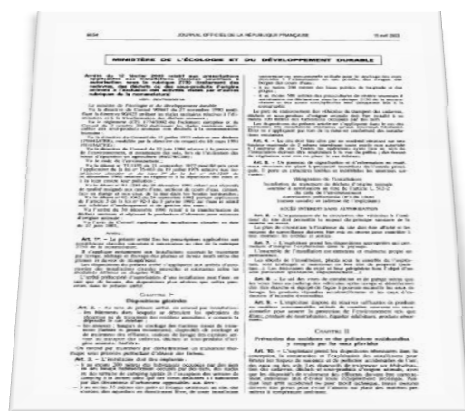
Ministerial circular of 2009, March 6 related to the decree of 2008, April 22

- ▶ Odor flow rates must be measured at a periodicity fixed by decree
- ▶ Longer interval of time allowed between measurements if an e-nose is implemented

Need to correlate instrumental measurement with:

- measured odor concentrations
- or nuisance level felt by nearby residents

Rendering regulation



French decree of 2003, February 12
Article 46

- ▶ Longer intervals of time allowed between odor measurements in case of continuous monitoring with e-noses

REQUIRED PERIODICITY OF ODOR MEASUREMENT

Odor concentration range (ou _E .m ⁻³)		
0 - 5000	5 000 – 100 000	> 100 000
1 year	6 months	3 months
3 years	2 years	1 year

With continuous odor
monitoring (e-noses)



RQ Box Solutions



RQ Box At A Glance

RQ Box

RQ Box Anywhere





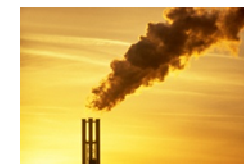
RQ Box Solutions

RQ Box At A Glance

1/4

Why use an air quality monitoring system?

- ▶ Achieve and maintain compliance with regulations
- ▶ Better understand the odor issues
- ▶ Get relevant data to improve communication with:
 - Nearby residents
 - Associations
 - Authorities
- ▶ Be alerted when emissions limits are exceeded
- ▶ Anticipate nuisance and treat emissions before they affect nearby residents
- ▶ Optimize the performance of odor treatment facilities
- ▶ Know how to adjust process operations in order to reduce odor emissions





RQ Box Solutions

RQ Box At A Glance

2/4

Continuous monitoring of olfactory nuisance and gas emissions



Waste . Industry . Composting . Water . Rendering

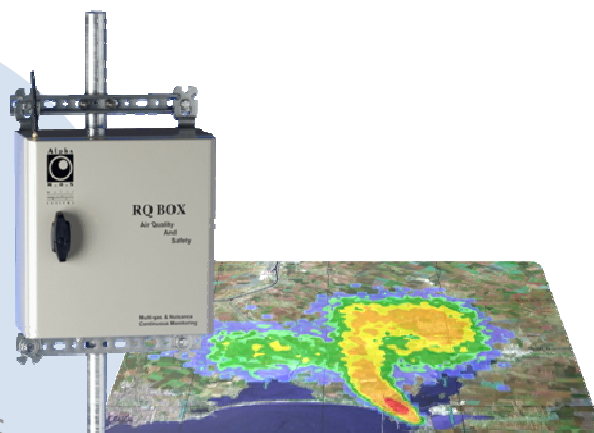
ODOURS

VOC

H₂S

NH₃

MERCAPTANS



RQ Box e-nose

- ✓ Odor diagnosis
- ✓ Continuous emission measurement
- ✓ Dynamic 4D odor mapping
- ✓ Real-time alerts
- ✓ Control of odor treatment facilities



SINGLE- OR MULTI-SITE(S), LOCAL OR REMOTE MONITORING

www.env.alpha-mos.com





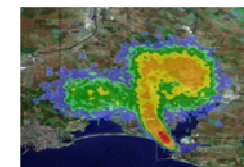
RQ Box Solutions

RQ Box At A Glance

3/4

Why use RQ Box?

- ▶ Know at all time the levels of emissions
- ▶ Have at all times the history of emissions
- ▶ Dynamically visualize emissions dispersion in the surroundings
 - Know at all times if the surrounding residential areas are impacted
 - Instantly assess the level of nuisance
- ▶ Rely on instrumental measurements
 - Communicate justifiable information and respond to odor complaints
 - Make decisions upon reliable data





RQ Box Solutions

RQ Box At A Glance

4/4

Why use RQ Box?

- ▶ Be automatically alerted when concentration limits are exceeded
 - Flashing light, alert siren, etc.
- ▶ Save water, additives and energy in odor treatment systems
 - RQ Box automatically activates the system when needed
 - RQ Box automatically adjusts the amount of additive to the measured odor level
- ▶ Assess the odor abatement factor of the treatment plants
- ▶ Get the necessary information to adapt production methods
 - Better understand the origin and the nature of odors





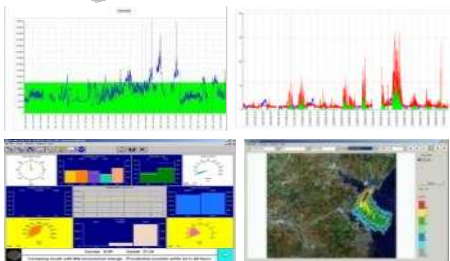
RQ Box

Overall Architecture

MONITORING CENTER



RQ NET SOFTWARE
DISPERSION SOFTWARE
WEATHER SOFTWARE



RF MODEM
(RF Receiver)

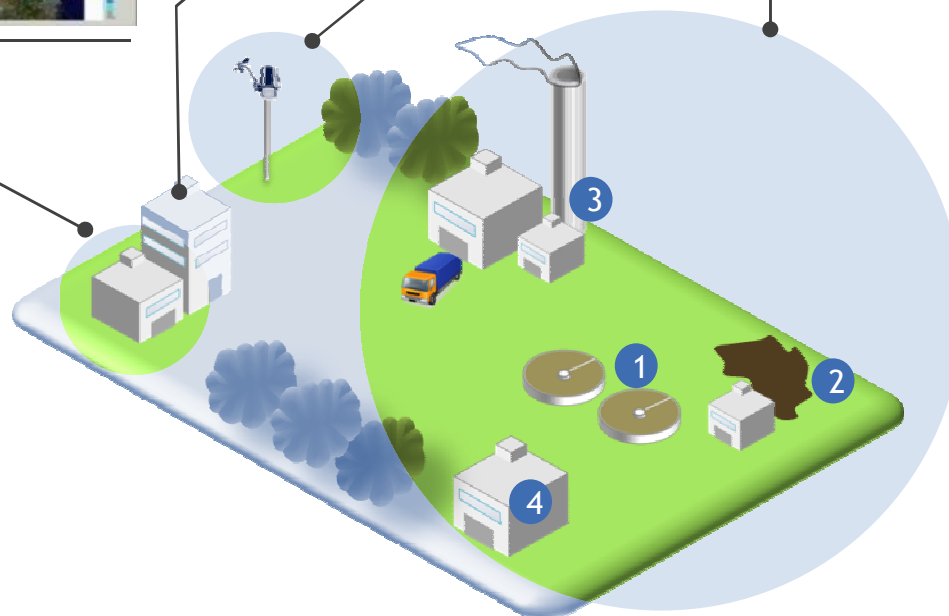


WEATHER
STATION

RQ BOX ANALYZER



SOURCES TO BE MONITORED



FIELD-INSTALLED MEASURING DEVICE



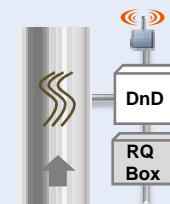
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SURFACE SOURCES



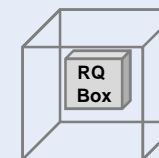
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SURFACE SOURCES



3

CHANNELED SOURCES



4

VOLUME SOURCES



RQ Box

Field-installed measuring device

1/5

RQ Box Analyzer



« Air Quality » Box

- ▶ 6 detectors
- ▶ Air pumping system
- ▶ Dust filter
- ▶ 868 MHz RF communication (European band)
- ▶ Servomechanism electronic card





RQ Box

Field-installed measuring device

2/5

DnD System



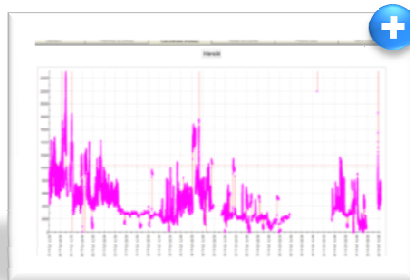
« Dry and Dilute » System

- ▶ Sampling device
- ▶ Heated transfer line
- ▶ Drying and dilution device
- ▶ RQ Box power supply with safety shutdown system

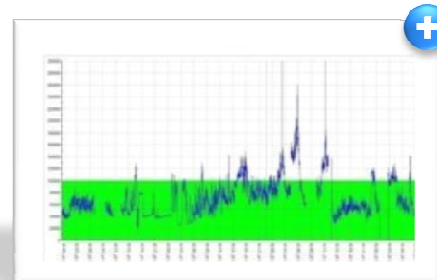


RQ Net Software

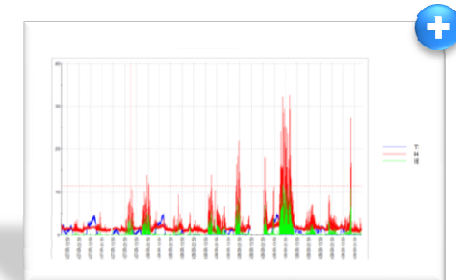
- ▶ RQ Box data acquisition and processing
 - Continuous monitoring for each emission source
 - Odor, VOC, NH_3 , H_2S or mercaptans
 - Results presentation in graphs, control charts or tables
 - Calculated frequency of occurrence of out-of-tolerance values by period



Odor concentration plot



Control chart for odor flow rate

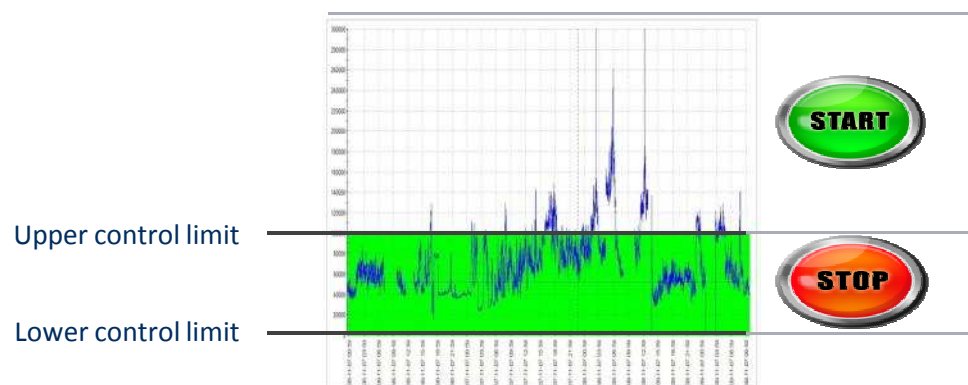


H_2S , NH_3 , VOC concentration plots

RQ Net Software

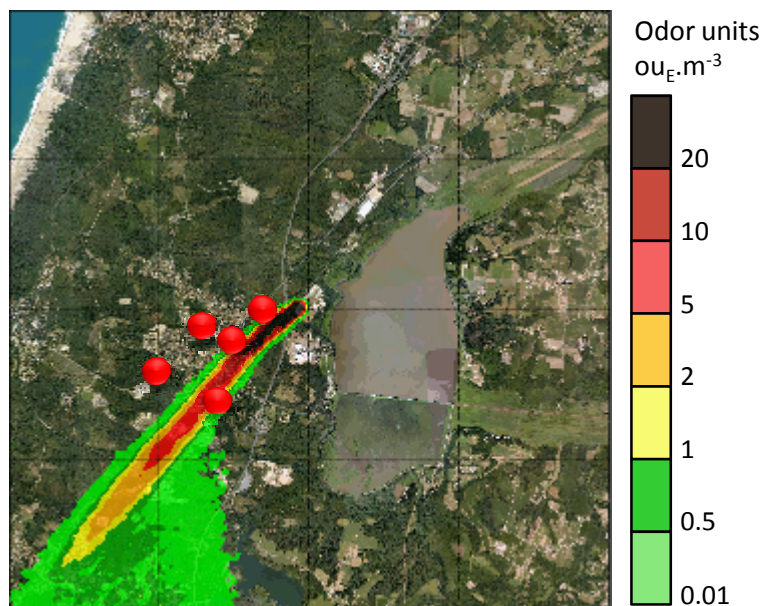
► Automatic control of external systems

- Activation of alert systems
 - Flashing lights, alert sirens, etc.
- Control of odor treatment facilities
 - Deodorizing process, ventilation, etc.
- Control charts with upper and lower limits



4D Dispersion Software

- Dynamic and continuous modeling of the odor/pollutant dispersion



- Data input for modeling:

- topographic data
- weather data
- odor/pollutant concentrations

- Past episodes analysis with the replay feature

● Concentrations at points of interest



Success Stories

SUEZ SITA - Donzère, France

Waste storage



SUEZ SITA - Donzère, France

Continuous monitoring of odors in correlation
with the perception of local residents



► Landfill site in France

- 150.000 tons of waste processed/year
- ISO 14001 certified

► Project objective: better understand the odor issues

- Investigate process operations to identify the odor sources
- Correlate perception of residents with instrumental measurements
- Improve communication with local residents



► Solution: 3 complementary approaches

■ RQ Box Solution

- 1 analyzer to monitor the waste storage area
- RF communication
- 1 weather station located on site
- 4D atmospheric dispersion modeling software

■ Daily local resident surveys to assess potential discomfort

- Surveys conducted by the customer: daily phone calls

■ Daily record of site operations

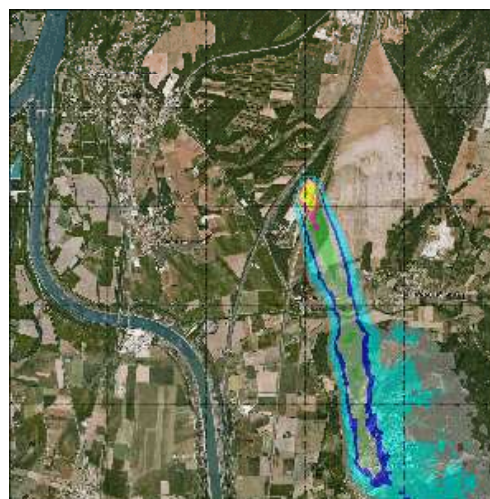


► Main results

- A 60-day correlation study for odor impact
- 100% correlation between instrumental measurements and residents perception

	GRANDE ARRENAUD		GRANDES GUYARDIES				DONZERE			
	M. ARAGONA	DEUTYAL D.C.	Mane DEUTY	MANUEL FIL	BERNARD Jean Claude	BERNARD Jean Pierre	GUYON Robert	REY Louis	Mane NOIRIER	MANUEL Coprative Evian
DATE APPEL TELEPH	04 75 00 54 92	04 75 00 44 40	04 75 00 50 70	04 75 00 50 40	04 75 00 50 24	04 75 00 54 17	04 75 00 42 12	04 75 00 47 00	04 75 00 55 00	04 75 00 55 00
18/07/2005	Abroad	Abroad	Fort à partir de 17h30	Abroad	Non	Abroad	Non	Non	Abroad	
18/07/2005			Fort à partir de 17h30							
23/07/2005	Lager à 10h	Non	Non	Non	Non	Non	Non	Non	Abroad	
23/07/2005	Non	Non	Non	Abroad	Non	Non	Non	Non	Abroad	
23/07/2005	Non	Non	Non	Non	Non	Non	Non	Non	Abroad	
23/07/2005	Non	Non	Non	Non	Abroad	Non	Non	Non	Abroad	
24/07/2005	Non	Non	Non	Non	Non	Non	Non	Non	Non	
25/07/2005	Abroad	Abroad	OLE 1 into fort 18h30	Non	Abroad	Non	Non	Non	Abroad	
26/07/2005										
27/07/2005	Non	Abroad	Non	Non	Non	Non	Non	OLE 2 7h à 9h (abroad: abroad)	Non	OLE 2 8h à 9h (abroad: abroad)

Daily record of neighborhood complaints



Odor dispersion plume (Fast-forward)

OU_E/m^3 **Odor Concentration**

OU_E = European Odor Units

20

10

5

2

1

0.1

Discrimination threshold

Clearly perceived by 50% of the population

Recognition threshold

Recognized by 50% of the population

Detection threshold

Detected by 50% of the population

No odor detected



Success Stories

SUEZ SITA - Donzère, France

4/5

► Conclusions

- Olfactory nuisance forecast, up to 2 hours in advance
 - Starting point for corrective actions at the source of odor
 - Possible integration with future odor control systems for optimized performance
- Improved communication with municipal authorities & local residents
 - Quantified data available for meetings
- Authorization for site extension
 - Proven control of emissions to the relevant authorities
- Increasing number of RQ Box installations within the Suez group





Contact



Alpha M.O.S

Multi Organoleptic Systems

Louis VIVOLA

*Environmental Department Manager
On Field Measurement Solutions*

20 Av. Didier Daurat • 31 400 TOULOUSE • France
Tel: (33)5 62 47 64 54 • Fax: (33)5 61 54 56 15 • Mobile: (33)6 34 49 19 41
E-mail: vivola@alpha-mos.com • www.alpha-mos.com

www.env.alpha-mos.com

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