

EMPOWER PEOPLE WITH ACTIONABLE ENVIRONMENTAL INTELLIGENCE

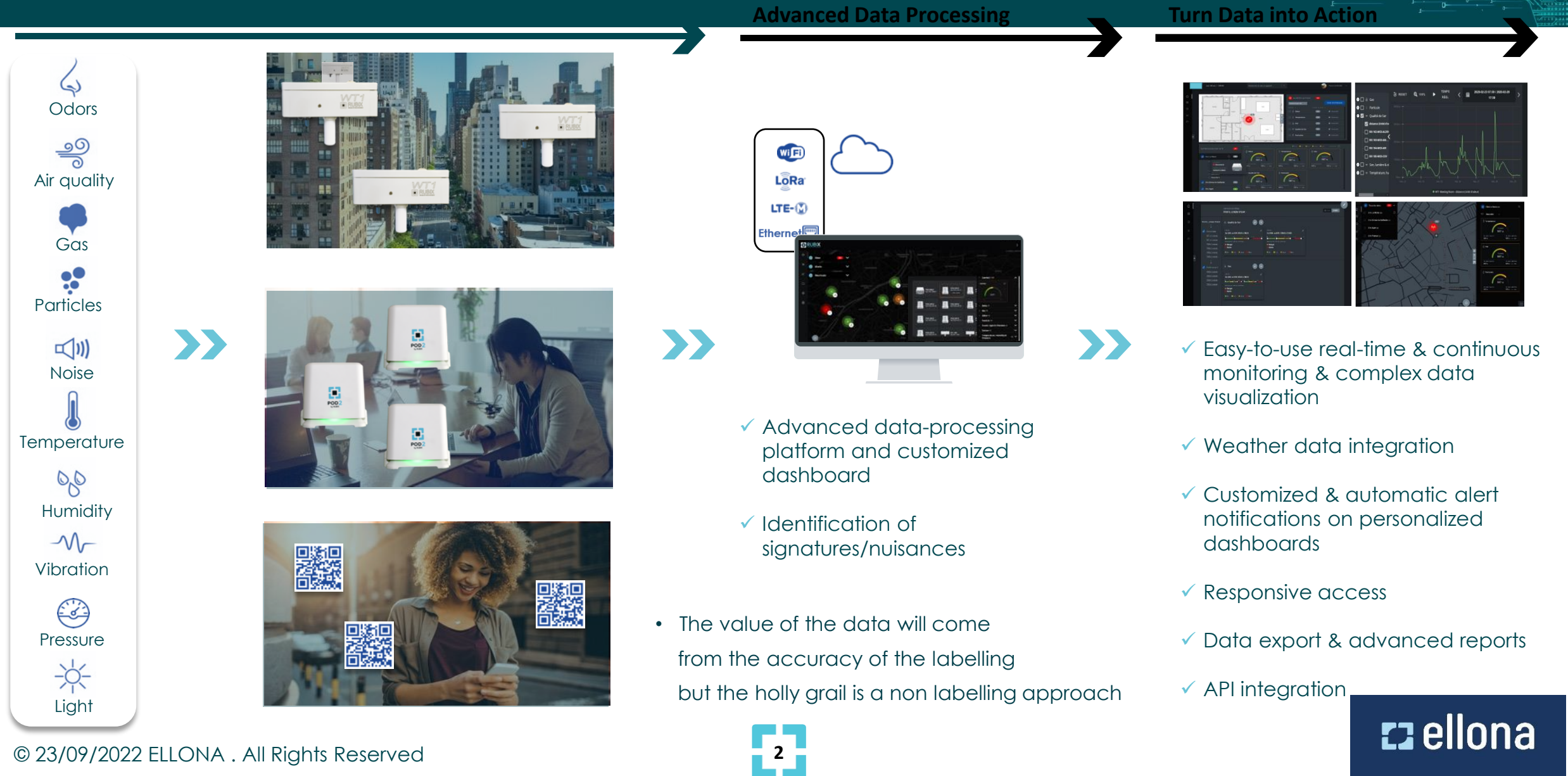


On line monitoring of Odour Intensity emissions and odour sources identification by using a new generation of gas and odours analysers (IOMS)

PULP AND PAPER PLANT

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Our Solutions: Unique Combination of Expertise for Indoors and Outdoors



1. Environment



- In Canada, a large Pulp & Paper company, was interested in better assessing on line gas and odours emissions of their operations, aiming at identifying the possible source and situation of possible olfactive nuisances on the neighbours.
- The paper company is surrounded with communities living close by as well as a cookie and chemical factories that can also be source of olfactive nuisances. Furthermore, the city council has communicated the need for effective odour control to avoid the need to relocate the plant.
- The Company does not have the tools to quantify or to identify the sources of the olfactive pollution aside of regular round of the facilities by local personnel.
- The main objective was the implementation of unified continuous odour monitoring system around the pulp and paper company and optimize the operation online considering historical issues:
- Dynamic air pollution sources : complex topography and architecture of the site (nearby elevated railroad, highways, dense group of own and external channelled sources
- Emissions of odorous substances: some are recurrent on site and feedback by local operators from the plant
- Citizen complaints due to some source nuisances that has to be identified.

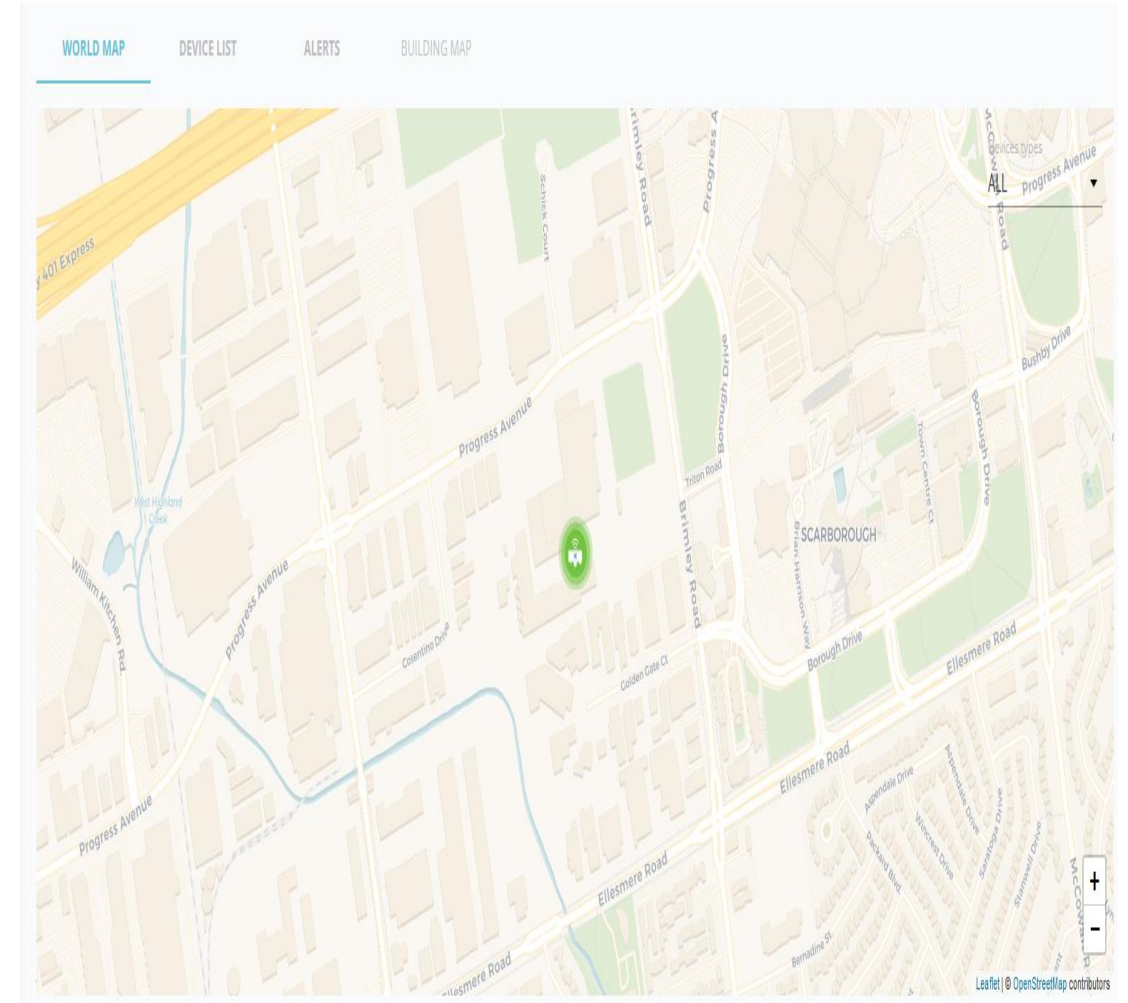
Implementation of unified continuous odour monitoring system in a Canadian Pulp & Paper Plant

Object: Pulp & Paper Company

Historical issues:

- Dynamic air pollution sources;
- Multiple sources (Pet food, cookies ..)
- Emissions of smelling substances;
- Citizen complaints;

New requirements from local council to control and improve situation with odour Nuisances and wishes to identify the possible sources.



WT1: a unique monitoring / identification solution

The WT1 can detect & identify the outdoor sources of nuisances by fingerprinting. It monitors separately or simultaneously various parameters :



Gases – All major toxic gases in ppb / ppm
(Electrochemical, PID, NDIR)



Odors – over 200 types of odors and odors intensity
in uo_E/m^3
MOS sensors



Particles – From 0,3 μm to 40 μm in 24 slices



Sounds – over 1 500 different sounds



Noise levels (dBA)

Soil (PH, RH,) , Liquid (PH, NKP,)



Pressure / Temperature / vision

H_2S , MERCAPTANS, NH_3 , 4 MOS, PID



1. Objectives



- Dynamic Olfactometry (EN 13725:2022- ASTM E679:2019) is the standard and well established technique for odour concentration measurements, however it is not always adapted for big industrials sites which need continuous monitoring and fast results to take the appropriate remediation action. Additionally, these sites need to have odour sources identification solutions to ensure proper remediation actions or to protect themselves from non-legitimate claims.

TRAINING PROCEDURE MONITORING



Collection

1. step



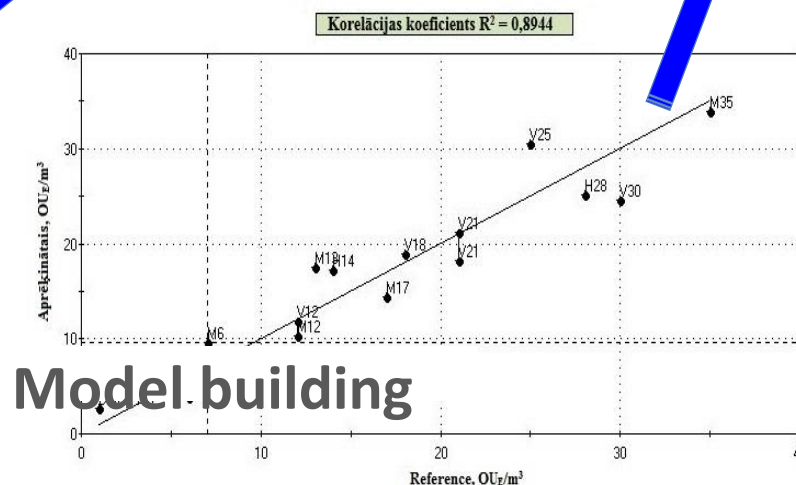
Feeding

2. step

3. step
Sniffing



4. step



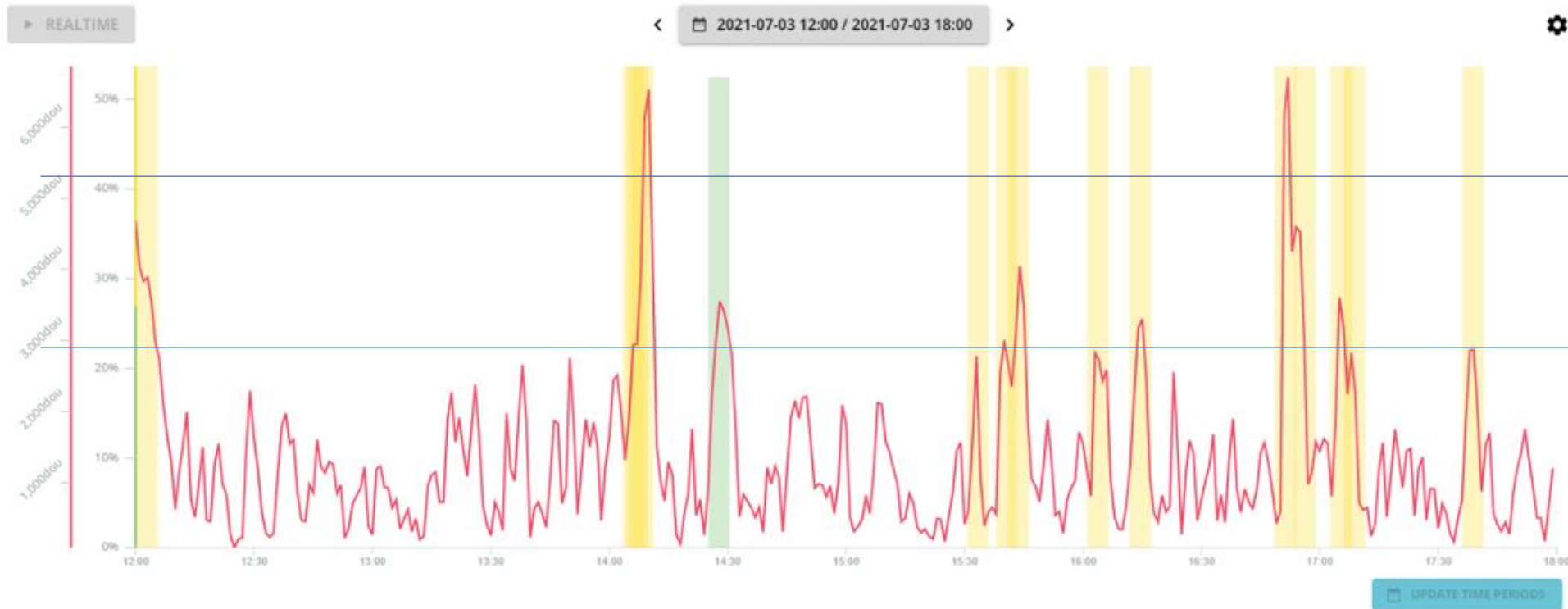
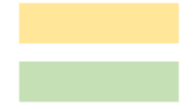
Assessment
& Cross validation

5. step



Expected Outcome

qualified Source
Non-qualified Source



Alerts and Notifications

- Yes/No
- Relative Intensity
- Duration
- Known source Y/N
- Recurrency



Mitigation,
Remediation
or Prevention

- Odor survey : collect feedback from local operators

[illegible]

- QR code survey : focus on olfactive events



- Individual & subjective feedback via QR code
- Personalized surveys

Year	Production host	Before OTU		After OTU		
		Before gas treatment OU/m3	Description of the odour	After gas treatment OU/m3	After gas treatment, measurement variation range OU/m3	Description of the odour
2021	<i>Bacillus</i>	13000	Feed (for animals), mold cheese, vinegary, fermented	15000	8300-27000	Sweet, fermented, rotten biowaste
2020	<i>Bacillus</i>	14000	Rotten, foot sweat, cheese fee, tart	6400	4000 - 10 000	Tart, sour
2019	<i>Bacillus</i>	23000	-	7600	-	-
2019	<i>Aspergillus</i>	16000	Sharp, popcorn, cream candy, burnt sugar	230-1200	230-1200	Tart, yeasty, fresh yeast, soured whole milk, buckthorn
2019	-	15000	Malty, bready	-	280-620	Yeasty, burnt, sour milk, fermented
2016	<i>Bacillus</i>	18000	Yeasty, burnt mash,	3800 (middle unit); 6300 (southern unit);	2700 - 4800	Tart, sour, tar, moldy, strawberry



Methodology

1. STAGE & TASKS

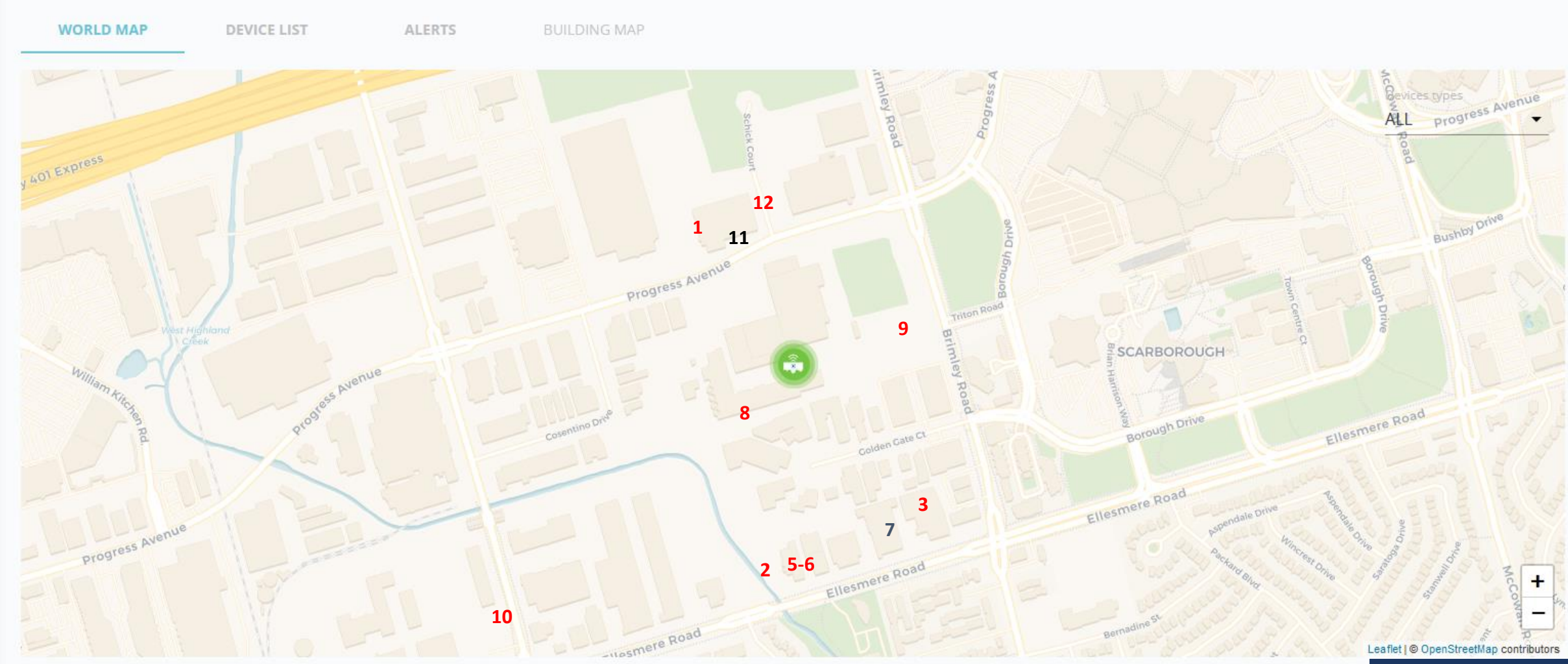


- 1 – Development of the location , specific Odor Baseline
- 2 – Definition of thresholds, alarms and notifications based on the feedback of the co workers
- 3 – Characterization of observed odor level spikes
- 4 – Identification analysis of emitting sources
- 5 – Odor correlation analysis with operational activities
- 6- Blind cross validation

Localisation of the site - Identification of main sources



PULP & PAPER MONITORING Identification of main sources



Visualization of the deployment of WT1 at the 2 locations



Location 1: forced draft fans looking West

Location 2: exhaust vacuum



Project Deployment

1. Deployment

Week 0

Installation on 25/01/22

2. Initial Observations and Readings

1 Week

3. Odor Distance Model Creation

Based on Total perceived odors (1-2weeks)

4. Odor Distance Baseline build up

1 day

5. Odor Distance Measurements

1-2 Weeks

Based on Total perceived odors

Alarms and Notifications

6. Odor Distance Characterization

1-2 weeks

Input: observations close to the source, always same place, type of odor (paper, cookies, pungent). 2 times/ day

Output: model may characterize the different sources (TBD)

7. Odor Identification, Relative Quantification and Characterization

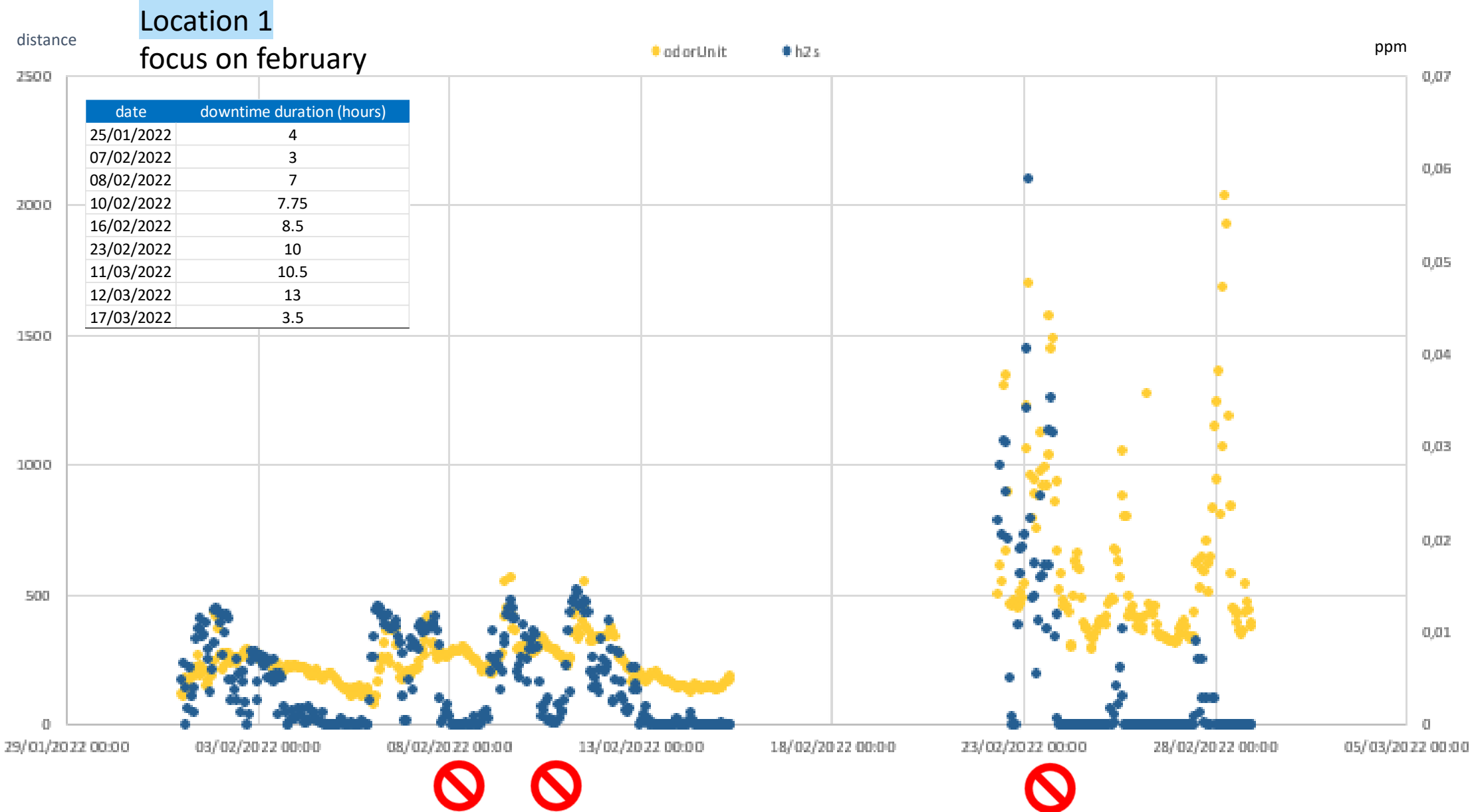
Ongoing

1. Environment

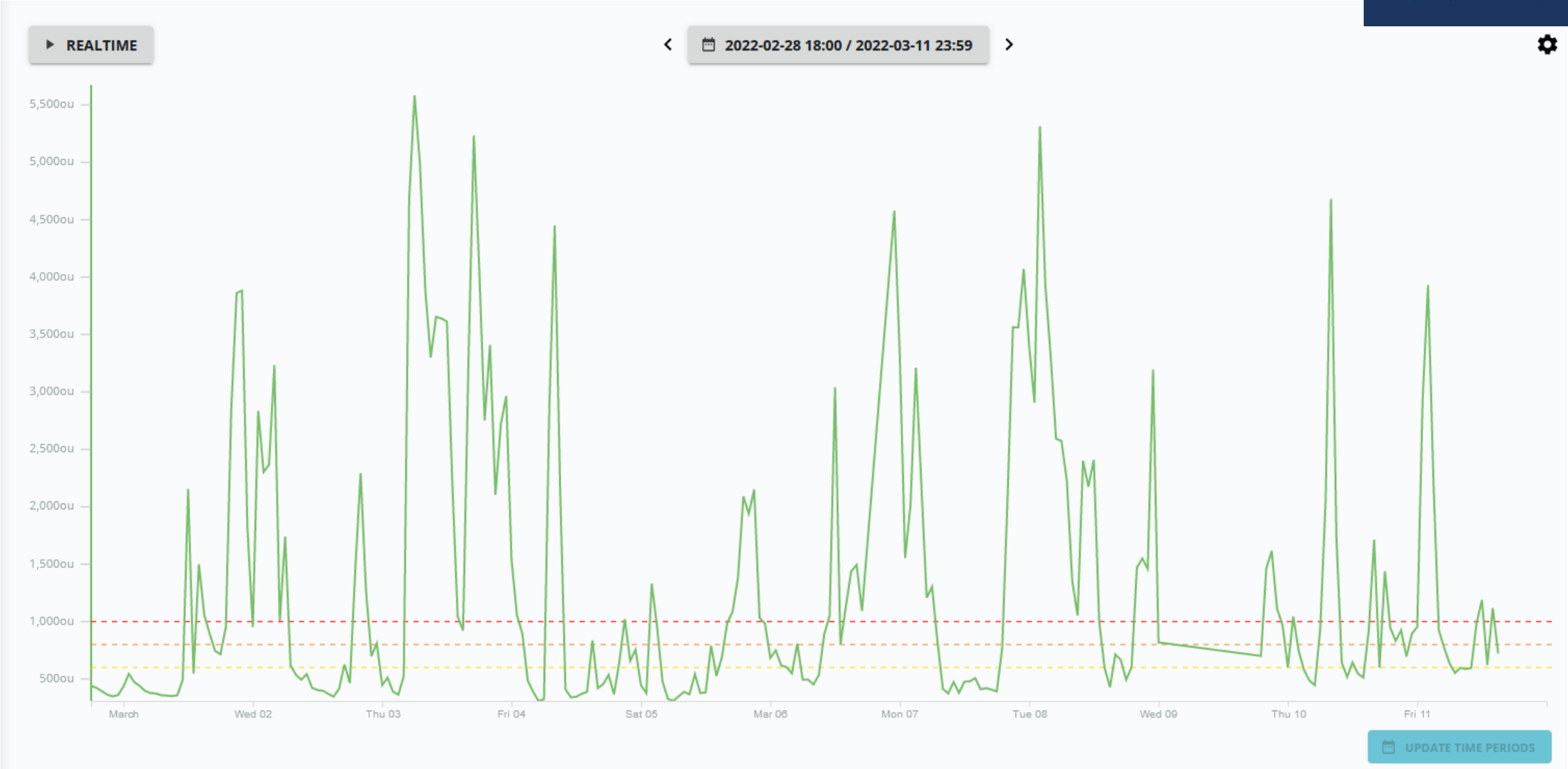


- 1 – Plant Odor levels automatic identification (real-time)
- 2 - Characterization of Perceived odors (Pungent – Rotten Egg – Wet Paper)
- 3 - Identification of emitting sources
- 4 – Triggering of alerts and alarms for remediation purposes
- 5 – Odor level data collection for correlation analysis with operational activities
- 6 – Field Observations/ Complaints follow-up

Events - downtime



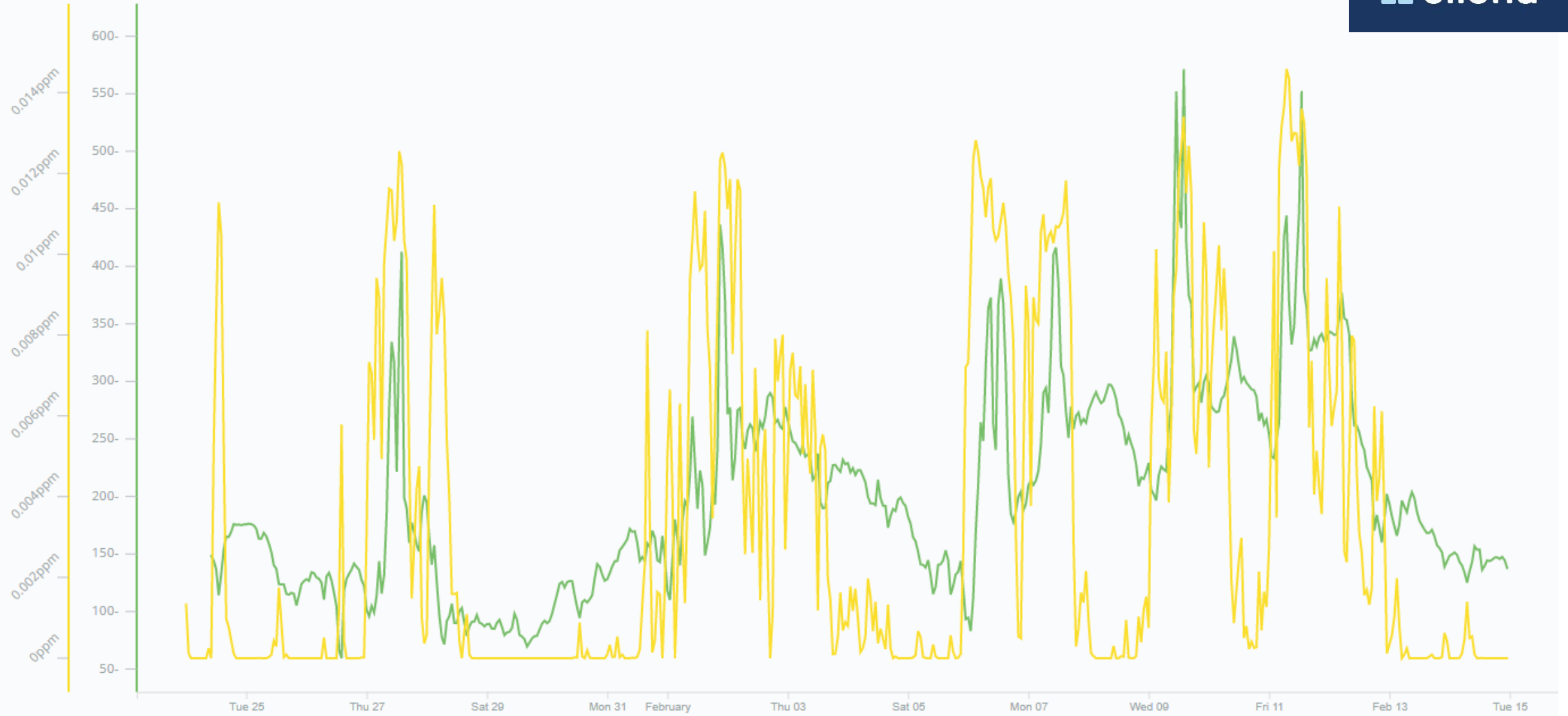
Online monitoring- (Ellona Odor Distance Units)



● WT1 1182 - Odor Unit (ou) ×

▶ REALTIME

< 2022-01-24 00:00 / 2022-02-15 00:00 >

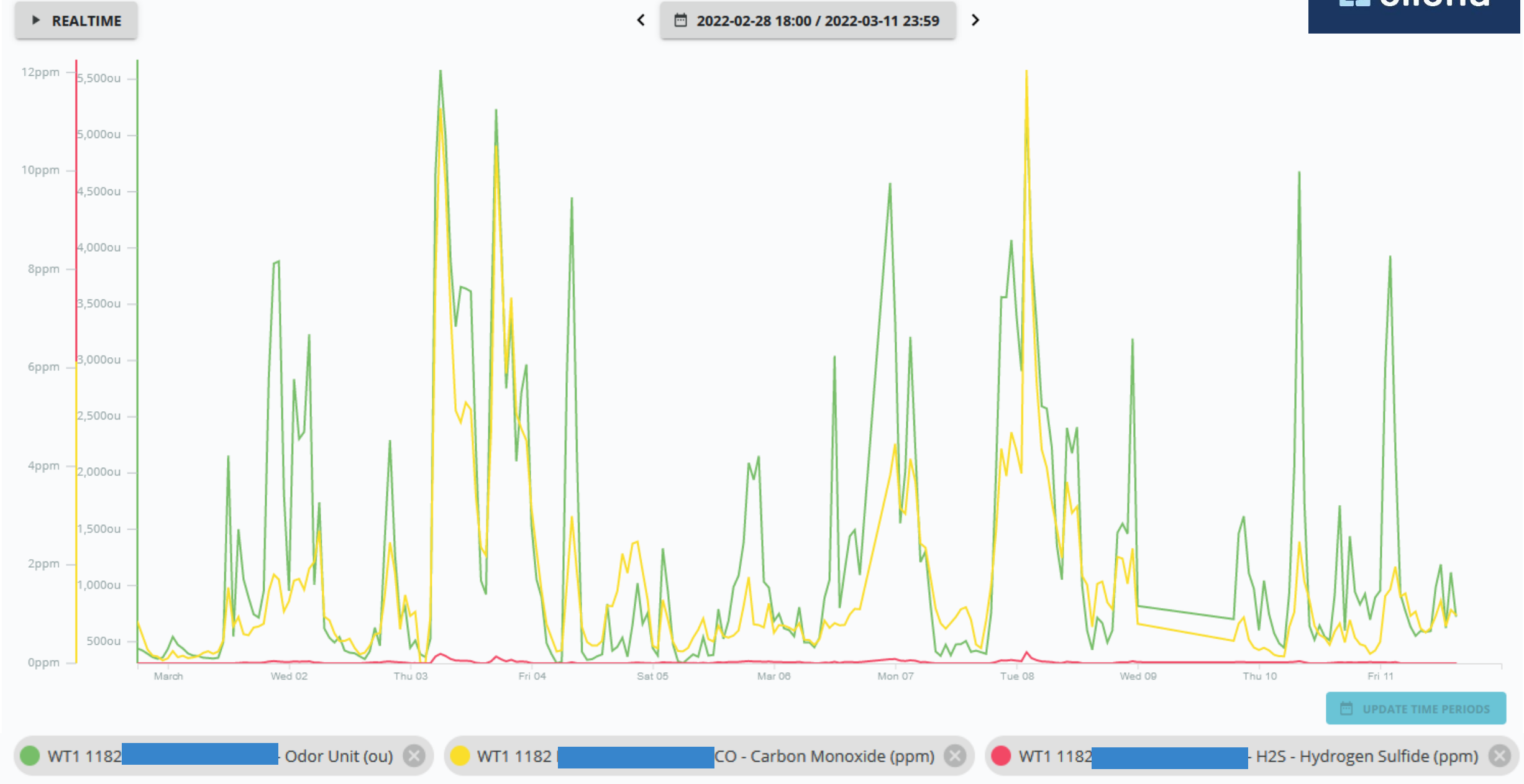


WT1 1182 [] - Odor Unit (-) x WT1 118 [] H2S - Hydrogen Sulfide (ppm) x

UPDATE

a

Online monitoring- (Ellona Odor Distance Units)



Odor survey : feedback collected from local operators

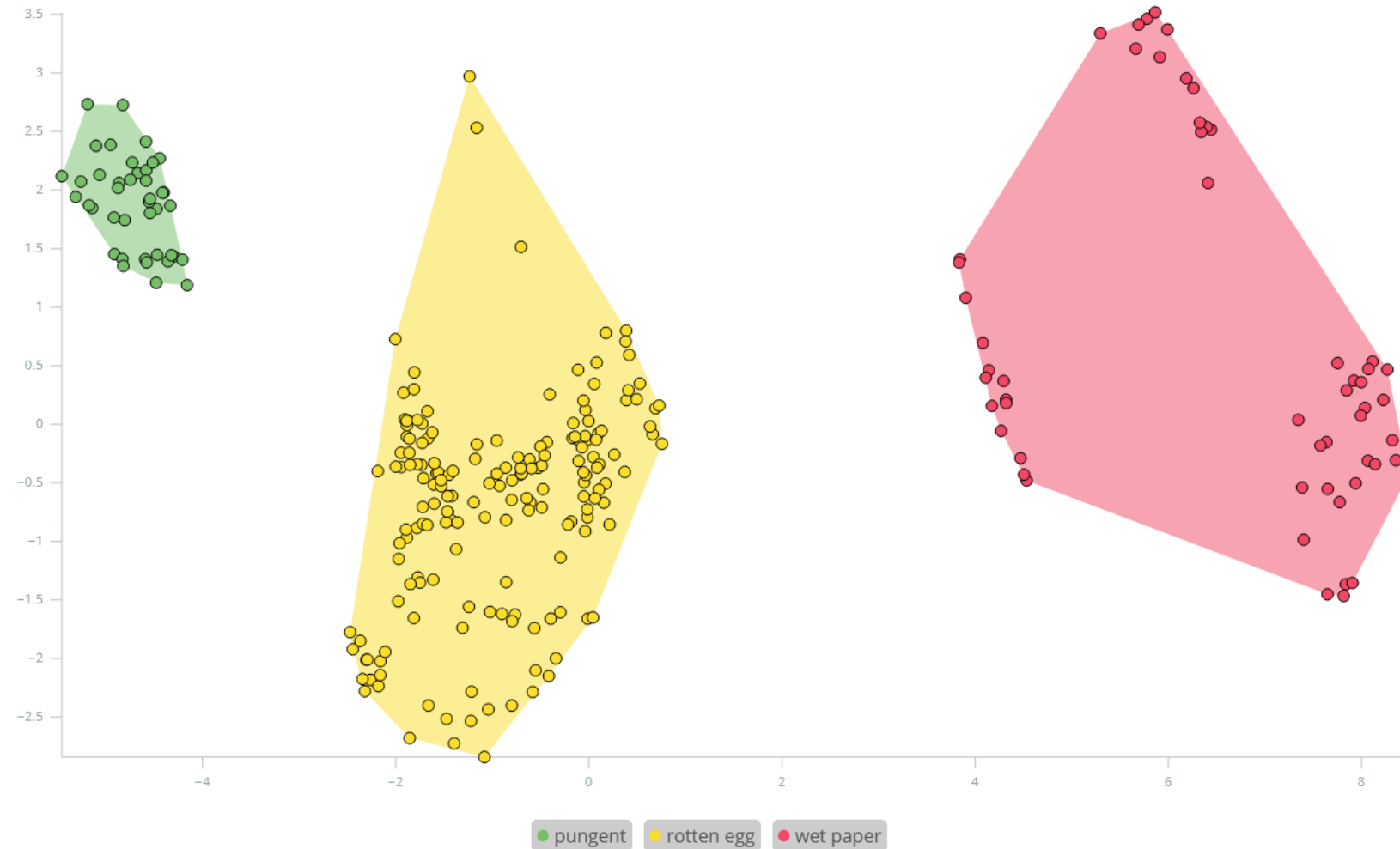
	site (gps location)	date (xx/xx/20xx)	local time France	Note	Hedonic tone (pleasant/ un pleasant)	Intensity 0 -odorless to 5 high
1	Arry Marketing (350 progress ave)-- on side walk	28/02/2022	21:40-21:45	very light paper smell	pleasant	0
2	Aclick Inc (290 Ellesmere)-- front walkway	01/03/2022	21:40-21:45	paper board	NA	1
3	Ferro Technics Inc (1568 Brimley Rd)	02/03/2022	13:10-13:12	paper board		1
4	Brimley- borough drive (area between)	02/03/2022	21:40-21:45	paper board	pleasant	1
5	Start Auto Tech (1302 Ellesmere Rd)	03/03/2022	13:10-13:15	paper board	pleasant	0
6	Start Auto Tech (1302 Ellesmere Rd)- opposite side of the road	03/03/2022	13:05-13:10	Cookies	pleasant	1
7	1340 Ellesmere Rd	03/03/2022	9:40-9:45	paper board	unpleasant	1
8	333 progress ave (near cooling tower)	04/03/2022	13:10-13:11	paper board	pleasant	1
9	Brimley Triton intersection	04/03/2022	20:40-20:45	paper board	pleasant	0
10	2045 Midland Ave (all the way in the parking lot)	07/03/2022	13:10-13:15	paper board	pleasant	0-1
11	Andy's Truck trailer and tire service	09/03/2022	12:55-13:00	NA	NA	0
12	Christie brown -- parking lot (370 progress ave)	10/03/2022	10:15-10:20	paper board	pleasant	1

Event from 3rd March -Unpleasant note

Level	Alert name	Type	Device	Site name	Time ↓	End time
Info	Monoxyde Carbone	co	WT1 1182		03/03/2022 9:14:44 AM	03/03/2022 9:49:34 AM
Warning	H2S	h2s	WT1 1182		03/03/2022 9:14:34 AM	03/03/2022 9:42:34 AM

Modelling of main odor groups – Next step: Identify and assign each group to a specific source

Preview calculus model



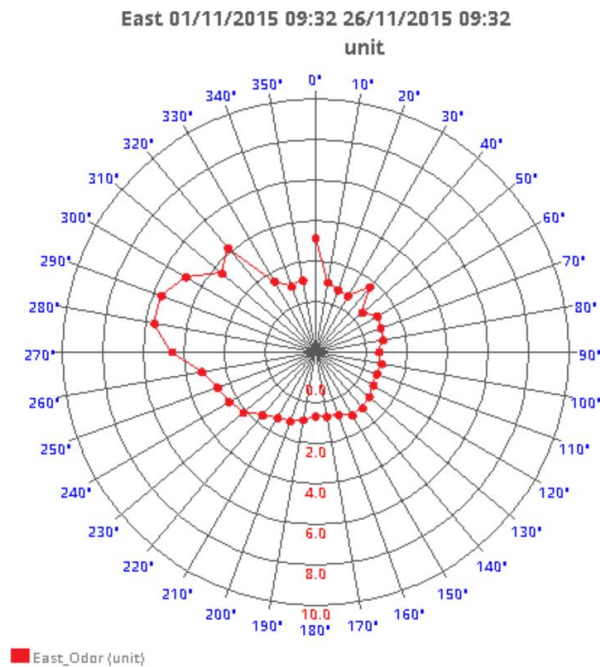
Continuous nuisance detection and characterization (Ellona Odor Distance Units)



SITE MONITORING

Site Control Panel

Operator can follow real time data and check previous monitored results



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- 1 – Odor Baselines are site/ source specific – some limited flexibility for re-use them
- 2 – On site observations are very valuable/ needed for the model build up
- 3 – Different odorous activities are present on the site (some Non-pulp and paper related – even when the plant was off)
- 4- Different unpleasant odors were identified/ intensity assessed (rotten egg- wet paper-pungent); including duration and persistence
- 5 – Wet paper Odor is the predominant one, pet food / rancid cookies’ odor the second and third
- 6 - 82 % of human observations were matched with platform readings in a blind mode
- 8 – Model is running and can be used on a continued base
- 9 – With the right observation input and source analysis it is possible to identify the sources (fingerprinting)
- 10 – Odor measurements can be currently related to specific operational activities

PULP & PAPER PLANT MONITORING OUTCOME



1. Reduce # complaints
2. Reduce use of biocides/ additives
3. Reduce use of energy
4. Protect the plant from non justified complaints
5. Differentiate yourself from near located emissions
6. Optimize processes (time of the day, weather, general pollution situation)
7. Reduce Equipment maintenance
8. Better relations with stakeholders (community, authorities, neighbors)
9. Extend lifespan of your total industrial operation in the area

Next Steps to connect Monitoring with Operational outcomes



- 1 – Finalize the cross validation of the model in a blind mode
 - 2 – Additional devices deployment (covering most relevant sources/ cardinal points)
 - 4 - Dispersion analysis – understand critical impact points
 - 6 - Related remediation plan (Pulp & Paper Co)
- With Automatic remediation/ actuation (e.g., via 4-20mA connector)



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