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14th International HCH and Pesticides Forum

AIR QUALITY MEASUREMENT TASKS IN RELATION TO THE DECONTAMINATION WORKS OF MANUFACTURING WASTE OF THE HEXACHLOROCYCLOHEXANE PESTICIDE IN THE TOWN OF SABIÑÁNIGO

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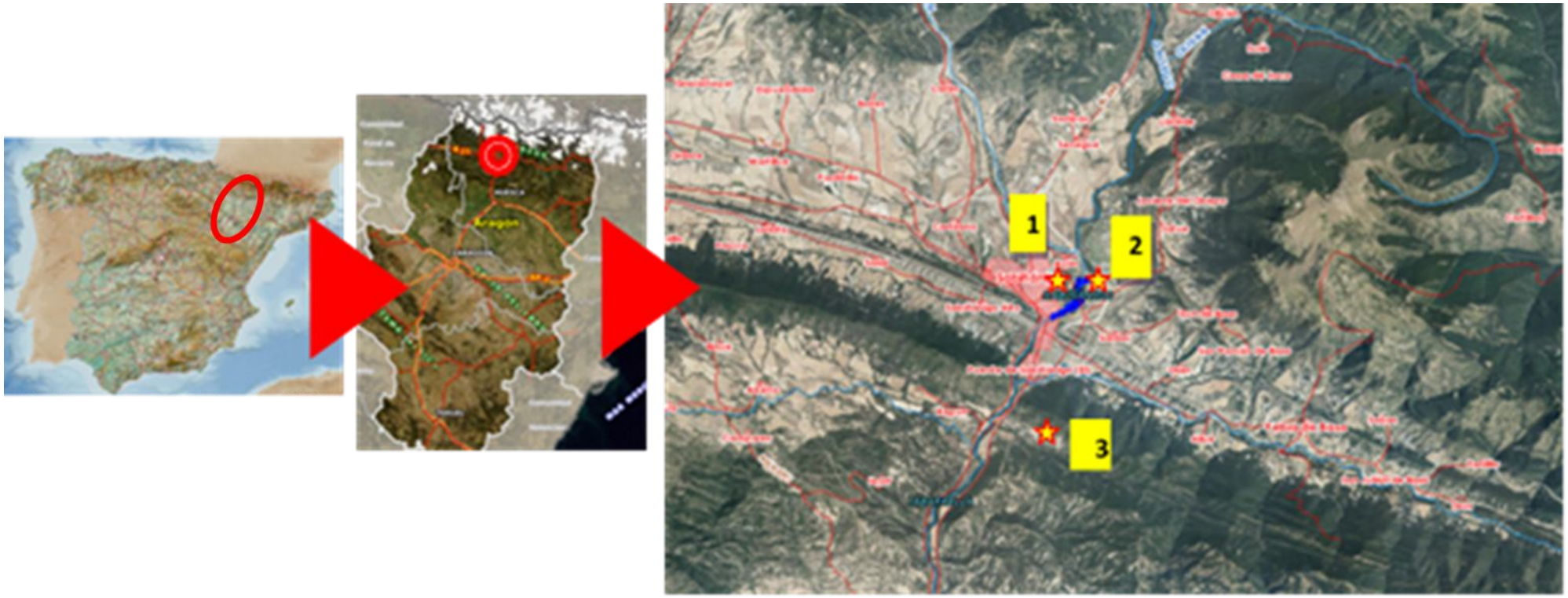
AUTONOMOUS COMMUNITY OF ARAGON

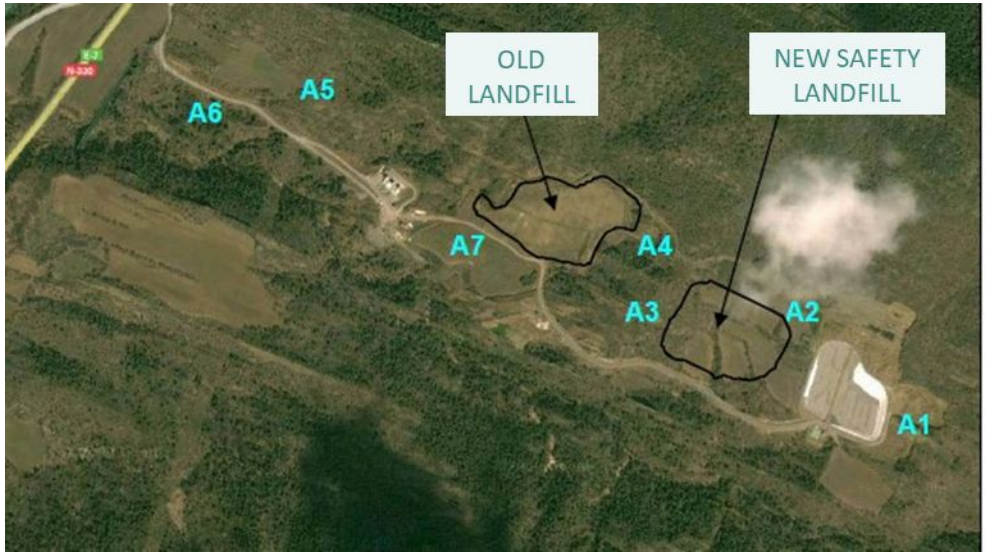
- The Aragon Government, with the Lindane Integral Decontamination Unit from its public company (SARGA), monitors Air Quality with a focus on the three sites affected by Lindane manufacturing waste from two landfill sites, Sardas (2) and Bailín (3), and one production site, the Inquinosa Factory (1).



BACKGROUND AND WORK

- In relation to the measurement of particulate matter, measurements were available from the Argalario safety cell (Sondica Airport, Bilbao) - 2005.

- In Aragon, the measurement of air quality in relation to HCH waste began in 2009 at the Bailín landfill site, with the works of Phase B. The works included in the Environmental Impact Statement. Order 1 March 1995. Articulated in three stages: STAGE-1, STAGE-2,STAGE-3



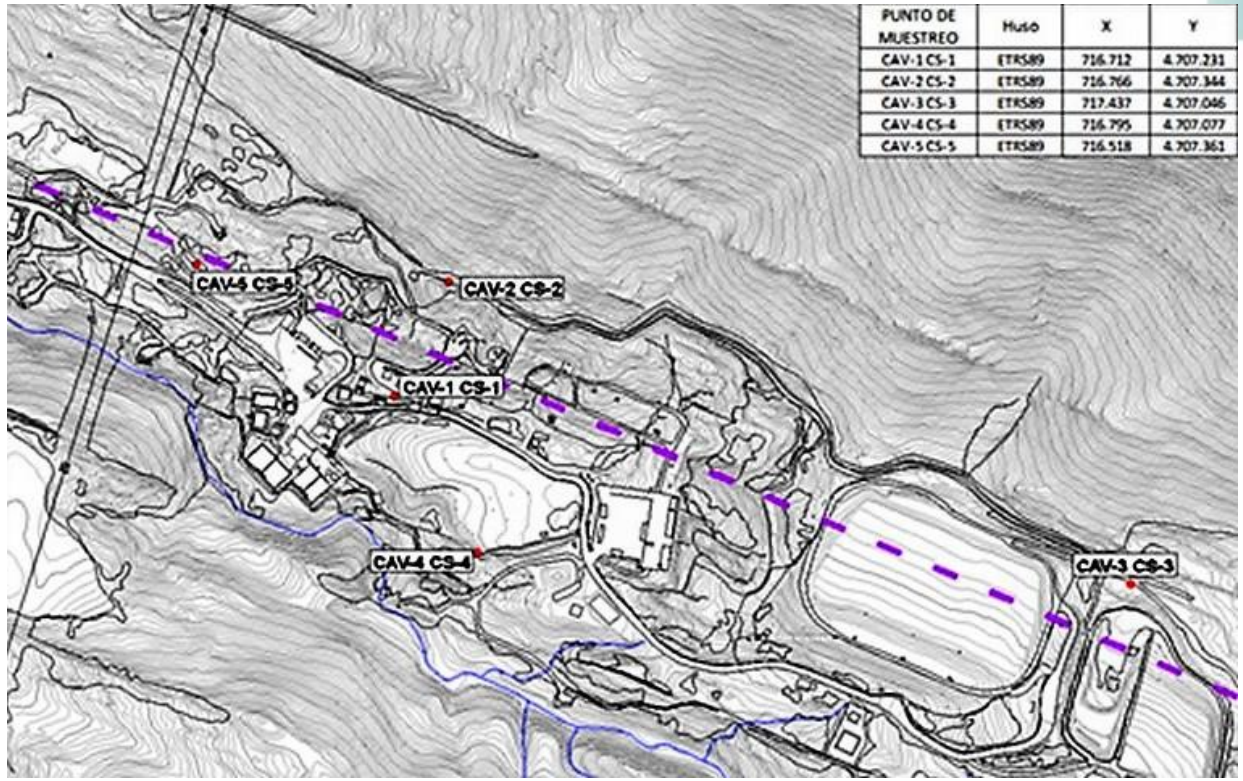
MEASUREMENT WORK STAGES

PHASE -B: FROM **PHASE -A** THE WASTE ISOLATION PROJECT AT THE BAILIN LANDFILL HAD BEEN CONFIRMED AS INSUFFICIENT WITH LEACHATE EMISSION AMONG OTHER CONSIDERABLE NEGATIVE EFFECTS ON GROUNDWATER AND THE DETECTION OF DNAPL. THIS NEW PHASE B, DIVIDED INTO THREE STAGES, IS THEREFORE INITIATED.

- **STAGE-1:** CONSTRUCTION OF THE NECESSARY INFRASTRUCTURE FOR A NEW SAFETY CELL. THE AIR QUALITY WAS TO BE MEASURED IN SEMI-CONTINUOUS MODE, CONDITIONED BY THE ENVIRONMENTAL AUTHORITY.

- **STAGE-2:** WASTE TRANSFER. WITH HCH WASTE MOBILISATION, AT LEAST TWO POSITIONS (W-E) WERE TO BE MEASURED, ACCORDING TO THE MAIN WINDS.

- **STAGE-3:** PROJECT IN DRAFTING. PENDING EXECUTION



MEASUREMENT WORK STAGES

STAGE 1 IN A.A.I., IT WAS INDICATED TO MEASURE SEMI-CONTINUOUSLY.

- 2009. 110,000 m^3 were excavated and mobilised.
- 23 Campaigns. Distributed over the 200 days of work, in 7 different positions.
- The limit values applied were included in D1999/30/CE and RD1073/2002. **PM10<50 µg/m^3** and State Decree 833/1975 for **Settleable Particles** (repealed), values are applied in other communities Valencia, Andalusia and which coincide with the repealed limits of **300 mg m /day.[2]**
- For **HCH**, the occupational exposure threshold for worker protection **(< 500 µg/m^3 =0.5 mg/m^3**) was included.

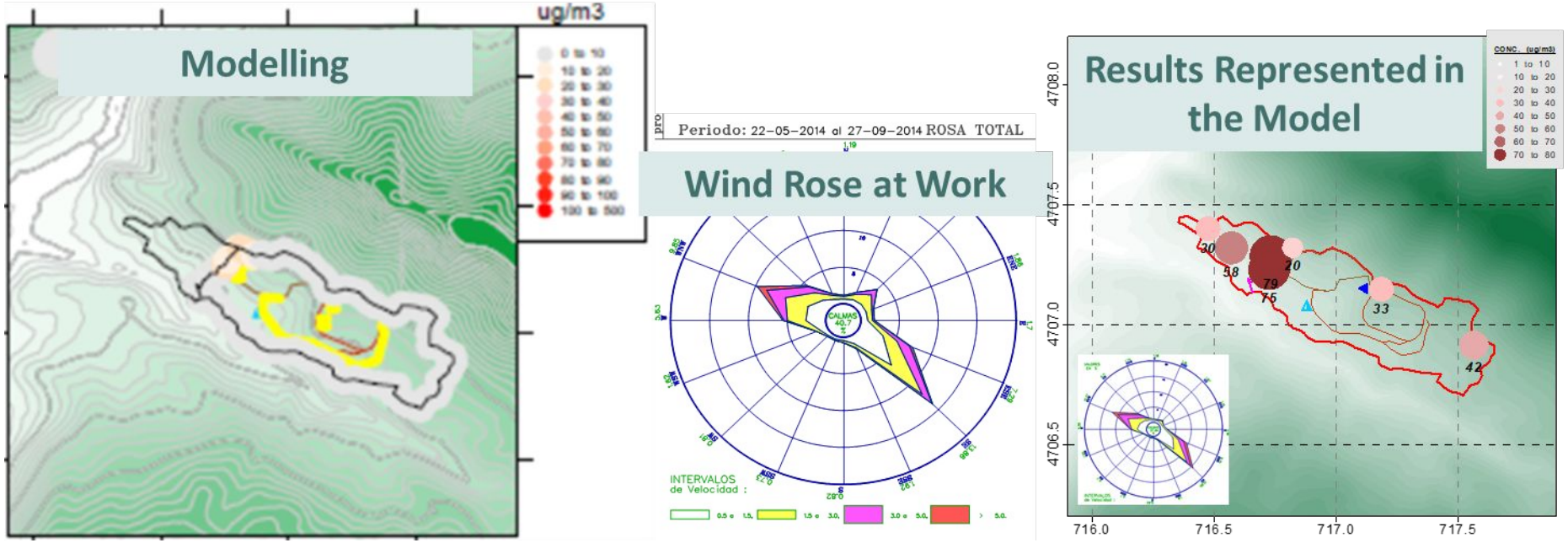
STAGE 2 IN A.A.I., MEASURED ONCE A MONTH IN TWO POSITIONS

- 2014. 210,000 $m^{3,}$ were excavated and mobilised, of which 63,000 m^3 were HCH.
- 34 Campaigns. Distributed over 180 working days, in 2 preferential wind positions (W-E). Measured at three additional points on the site (a preliminary study was carried out for the situation).
- The limit values applied were included in D1999/30/EC and RD102/2011. **PM10<50 µg/m^3** and State Decree 833/1975 for **Settleable Particulates** (repealed), applying the values of **300 mg m /day.[2]**
- For **HCH** continued with occupational exposure threshold for worker protection **(< 500 µg/m^3 =0.5 mg/m^3). At this stage < 60 µm^2 /day, off-site soil protection.**

MEASUREMENTS WORK STAGES

AT STAGE 1- The average values were below the specified ranges, according to the limit thresholds for PM10, Settleable Particulates, and below the value adopted for HCH (<0.5 mg/m).[3]

STAGE 2- Environmental Monitoring was developed around an aerology study and dispersive model, inclusion of a continuous laser particulate matter counter and two meters located in the preferred directions (W-E) of the site.

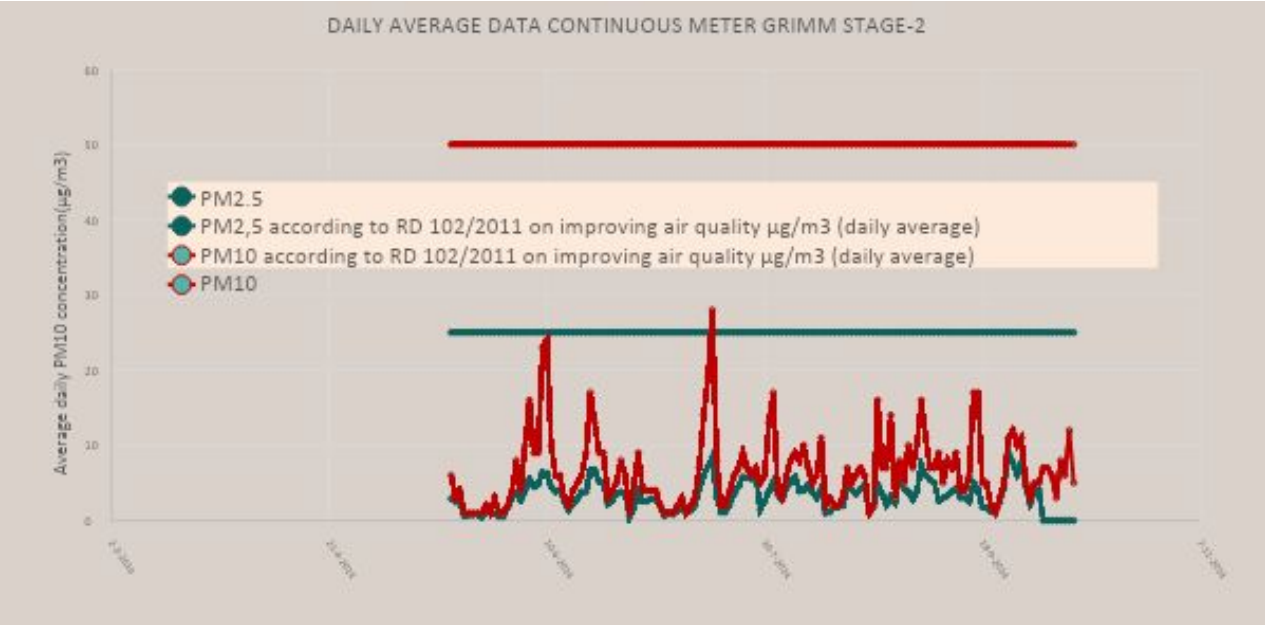


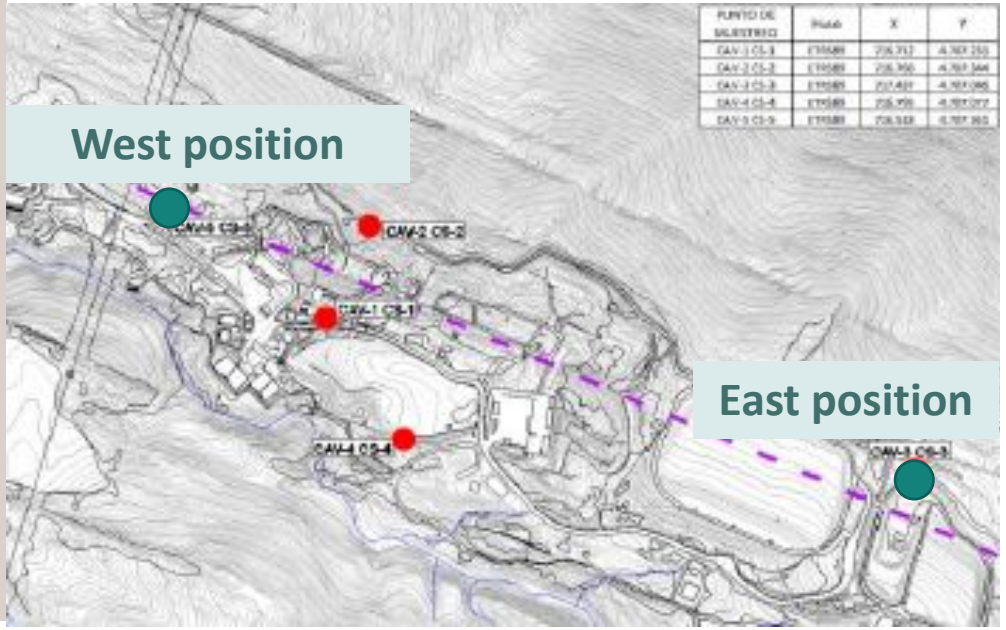
MEASUREMENTS WORK STAGES

AT STAGE 2 - THE MEAN VALUES WERE BELOW THE THRESHOLDS:

(WEST <30 µg/m^3 - 0.0056 µg/m^3 (HCH) and EAST <48 µg/m^3 - 0.0040 µg/m^3 .

THE SOIL TESTS OUTSIDE THE WORK ENVIRONMENT AND MEASUREMENTS WERE BELOW 60 µg m^2 /day AND AVERAGE VALUES IN SOIL, ACCORDING TO THE Royal Decree of affection and declaration of contaminated soils (RD 9/2005) <1 mg/kg (industrial use) and <0.1 mg/kg (urban).





WORKS AND MEASUREMENTS 2015-2022

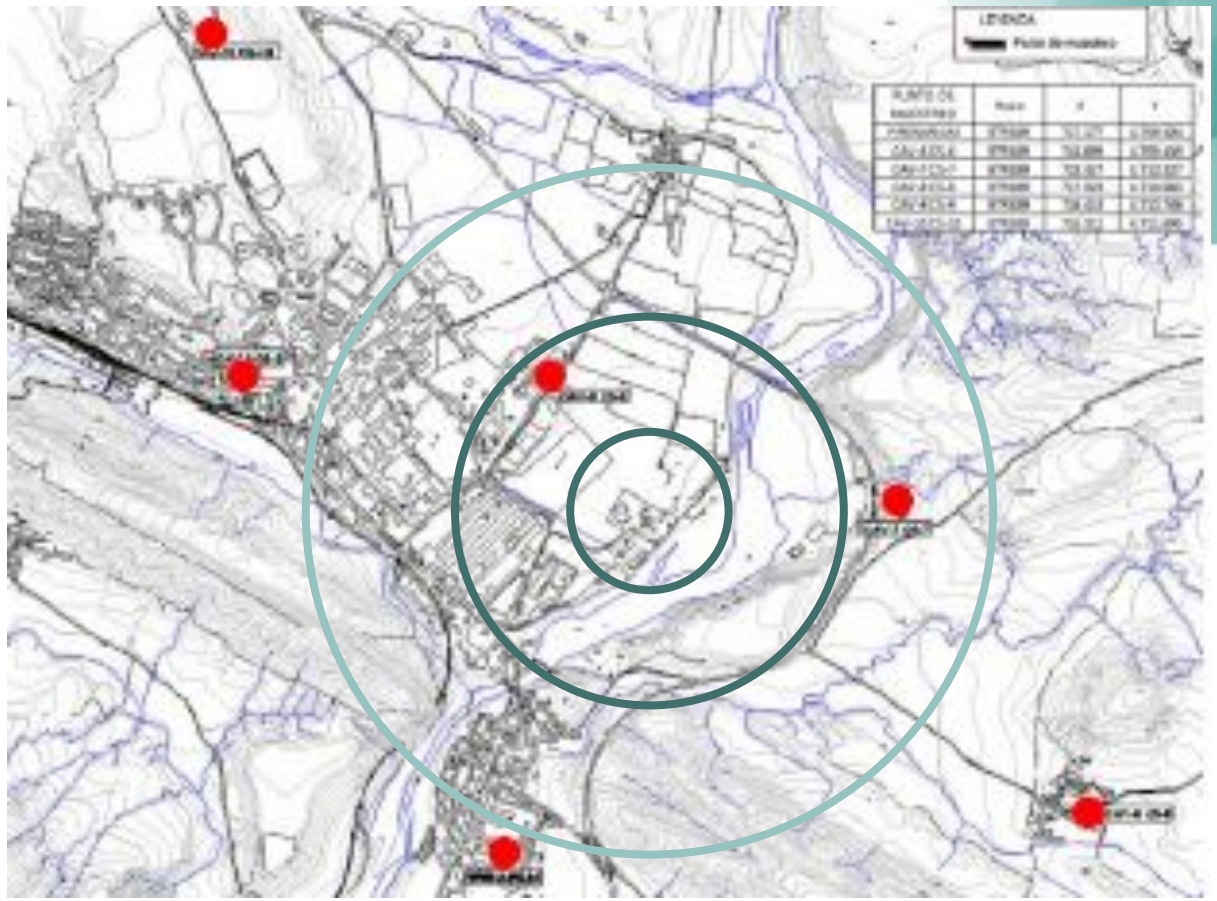
G.A. WISHED TO HAVE A DISPERSIVE MOELO OF SABIÑÁNIGO SIMILAR TO BAILIN. "REPRESENTATIVE MONITORING NETWORK".

INCREASE THE NUMBER OF CAMPAIGNS AND MEASUREMENT HISTORY AVAILABLE, PRIOR TO SINGLE ACTIONS ON SARDAS AND INQUINOSA

INCREASE THE MEASUREMENT IN DIFFERENT SCENARIOS IN VARYING CLIMATIC CONDITIONS AND LOADS WITH PARTICULATE MATTER AND IN HCH WORK.

INCREASE THE SURFACE AREA REPRESENTED. NOT ONLY MEASUREMENTS AT THE WORK FOCUS, BUT ALSO AT DISTANT POINTS ACCORDING TO BUFFER 2 KM.

AS IN BAILIN USE CONTINUOUS GAUGES IN COMBINATION WITH GRAVIMETERS AND TWO-, THREE-DAY WEATHER FORECASTING MODELS.

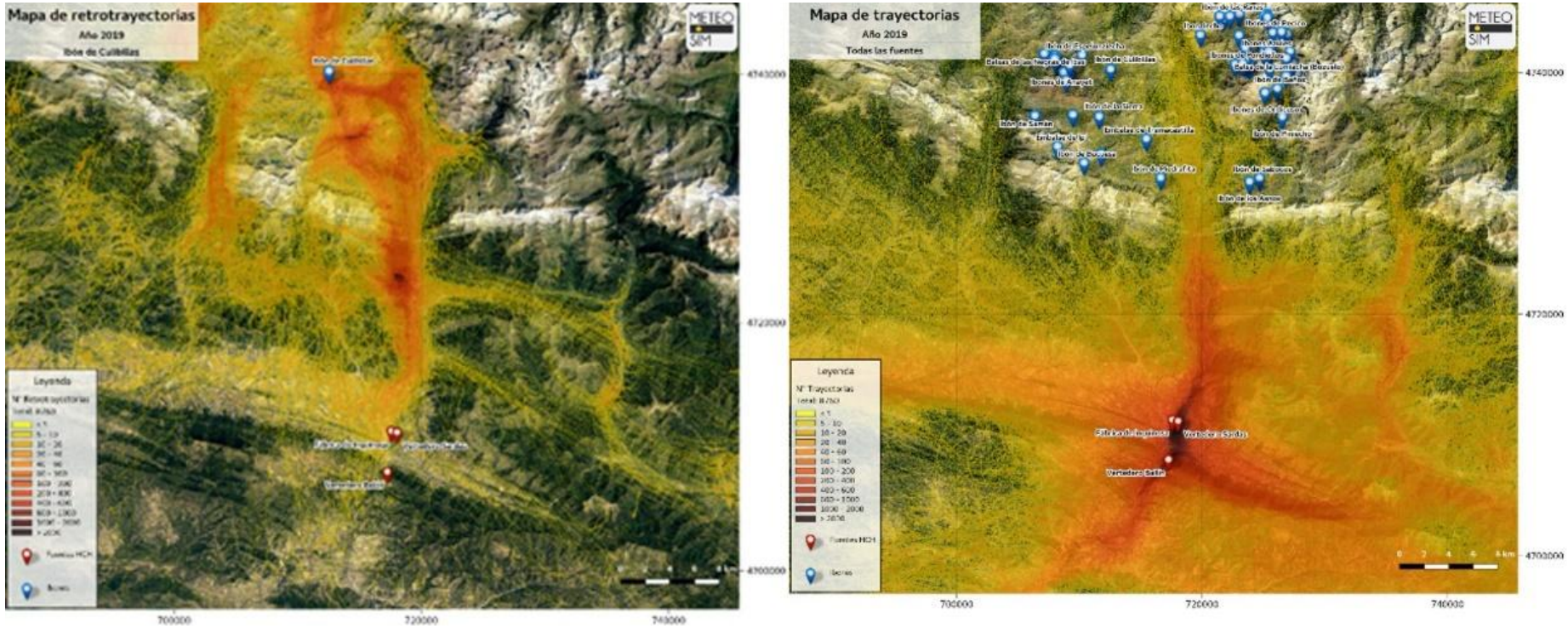


WORKS AND MEASUREMENTS 2015-2022

PROVISION OF A MODEL AND COMPUTER APPLICATION: COMBINE MEASUREMENT TASKS BY PROVIDING A PREDICTIVE METEOROLOGICAL MODEL ON THE DISPERSIVE MODEL AND JOINING IT WITH REAL-TIME CONTINUOUS-MODE MEASUREMENTS (LASER TECHNOLOGY): Evaluate multiple scenarios, according to focal points.

Estimate and evaluate the path a pollutant will take according to model and flow (trajectories).

To estimate and evaluate according to meteorological records and events over an area or point, the origin of the affecting air mass and or to anticipate how the dispersion will be or has been (back trajectories).



EQUIPMENTE USED

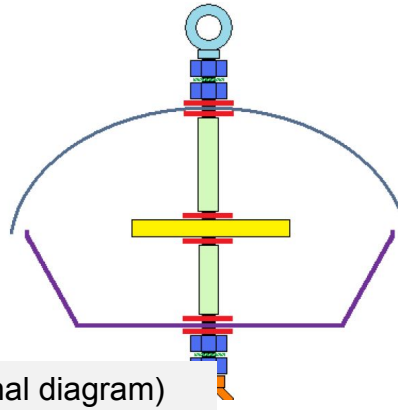
EQUIPMENT USED FROM 2015 TO 2022 G.A.: UPDATE STANDARD UNE-EN 12341:1999 TO UNE-EN 12341:2015. AND EQUIPMENT USED IN PHASE B WORK STAGES. CONTINUES WITH THE USE OF THE SEDIMENTARY PARTICLE CATCHER STATE DECREE 833/1975, already repealed, but in force in the autonomous communities.

Particle meter-counter laser technology and Particle collection equipment for high volume and low volume

Particle meter-counter laser technology

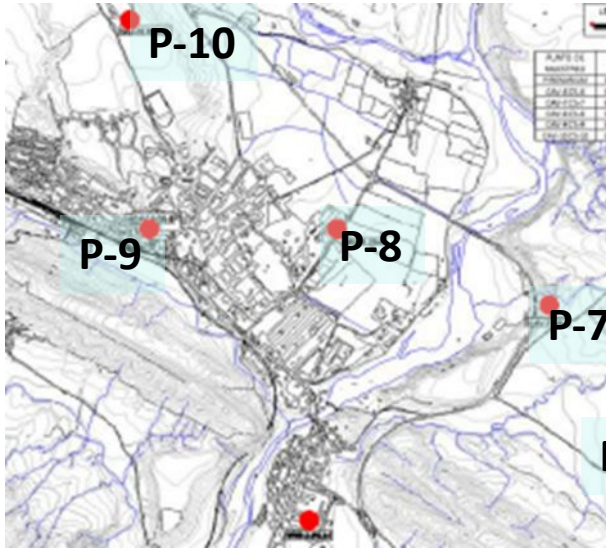
EQUIPMENT USED WORKS PHASE B.: STAGE-1 AND STAGE-2 MEASUREMENT WORKS

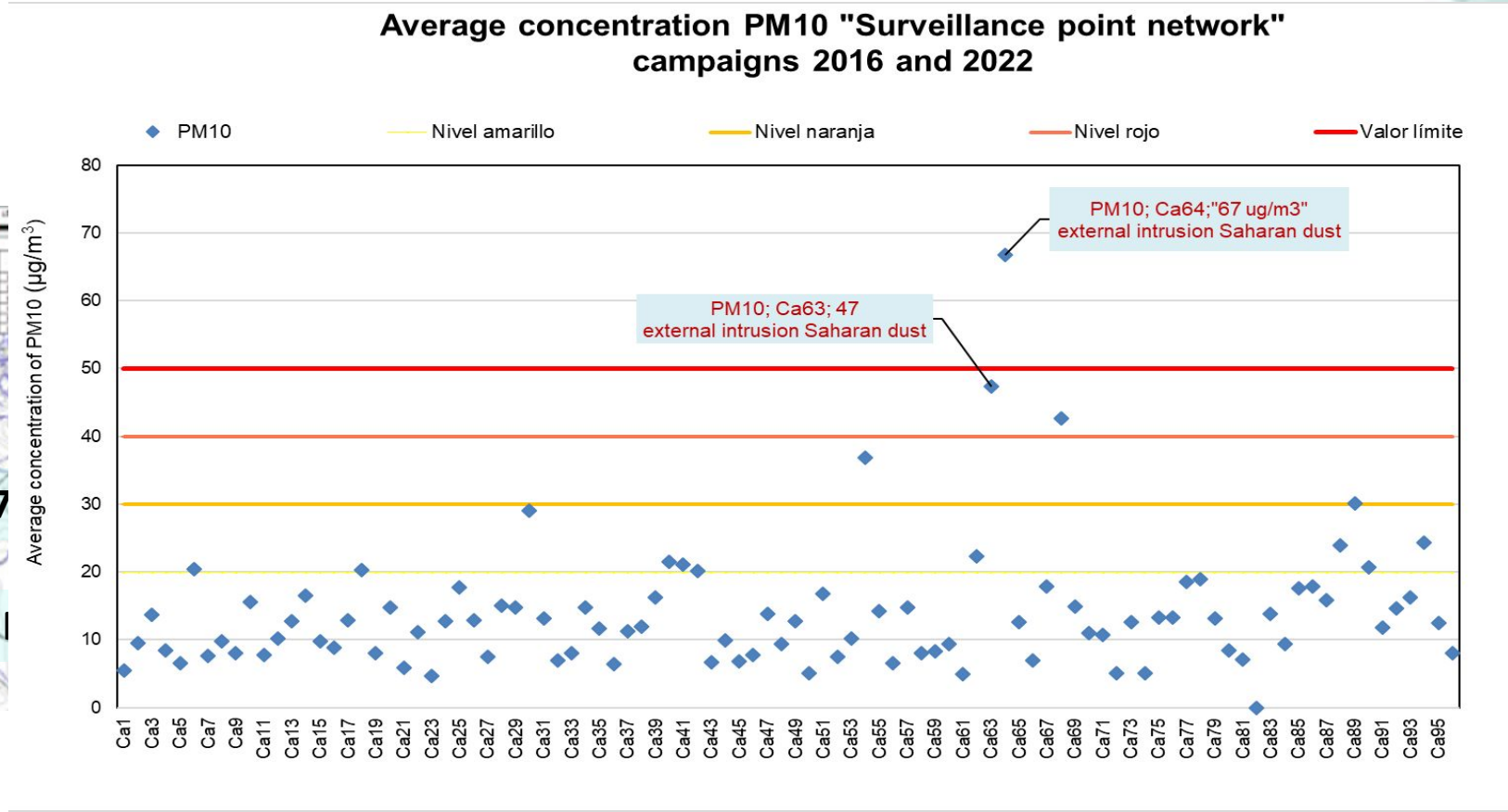
Particle collection equipment for high volume and Deposition particle collector (sedimentable)



passive gas sampler, (with internal diagram)

SAMPLING CAMPAIGN RESULTS



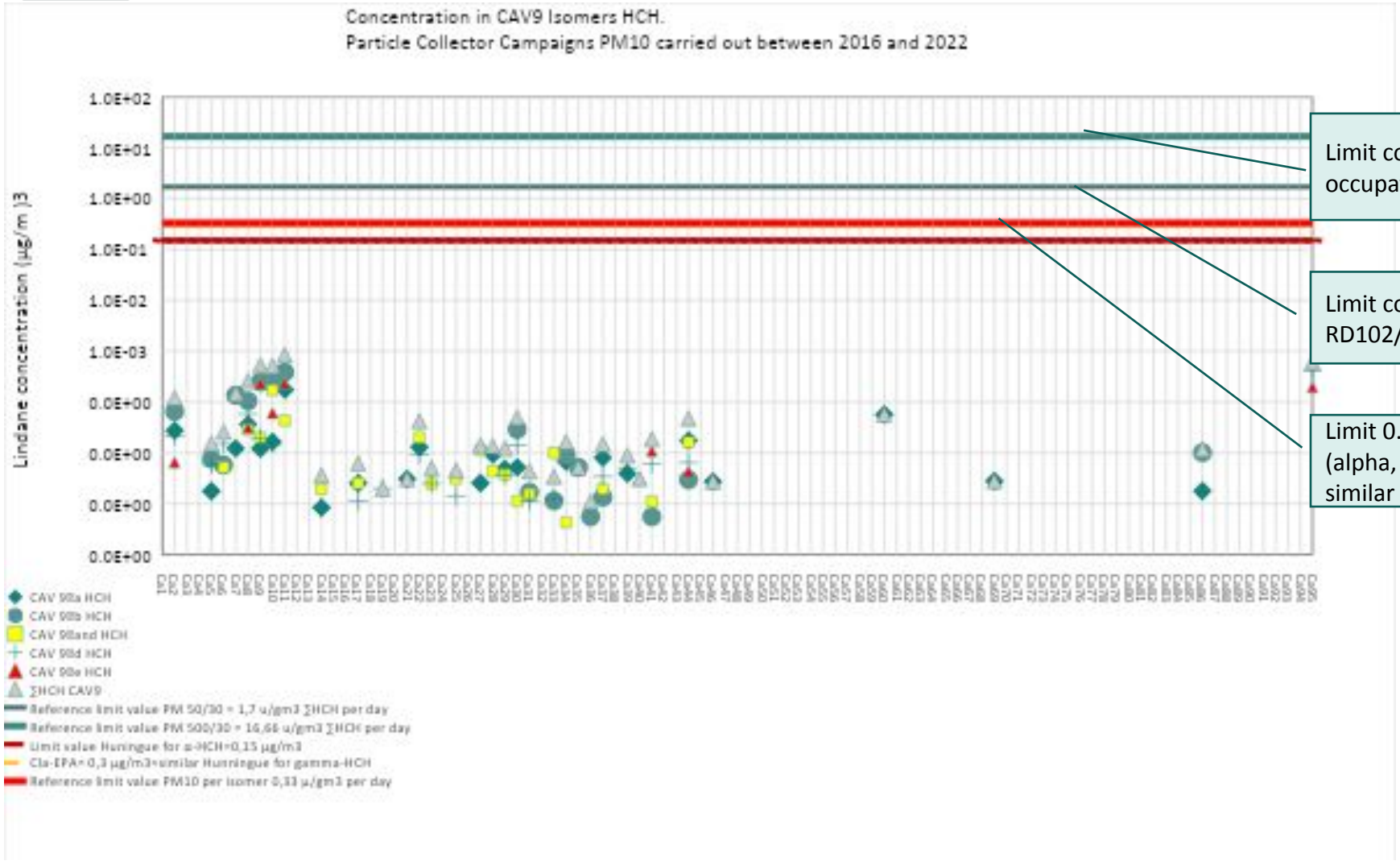


10 /day	CAV10 µg/m³	
E-01	3,7E-05	
E+00	1,1E-03	
E-03	8,4E-07	
E+00	6,4E-04	
E-01	8,8E-06	
E-01	1,4E-04	
E-01	5,5E-06	
E-02	**1,3E-05**	
E-02	7,2E-06	

VALUES AND LIMITS ?

Substance	Source	Parameter	Limit value
HCH isomer	NATICH ("National Air Toxics Information Clearinghouse: NATICH data base report on state and local agency air toxics activities"), USA, 1993.	Eight-hour mean concentration / and extended to 24 hours	0.3 µg/m^3 - 8.3 µg/m^3
		Average daily concentration	5 - 12 µg/m^3
γ-HCH (lindane)	Ontario, Canada, 2016 ("Ontario Ambient Air Quality Criteria")	Average daily concentration	5 µg/m^3
γ-HCH (lindane)	Government's Decision Moldova Nr. 30 from "On Measures for Centralizing Storage and Disposal of Obsolete Unused and Prohibited Pesticides"). 7th International HCH and pesticides Forum, Ukraine, 2005.	Maximum concentration allowed in the work area	50 µg/m^3
γ-HCH (Lindane)	**OSHA (Occupational Safety and Health Administration) in Argentina, R. F. Germany, UK, USA, and USSR.2000, Spain**	**Moving average of the eighth-hour concentration during the working day**	**500 µg/m^3**
α-HCH	Cal-EPA and Persistent Organic Pollutants Review Committee. November 2007. Study in rat liver and kidneys (0.025 mg/m3) and applying an uncertainty factor of 100	For population not occupationally exposed. Toxicity study in the liver and kidneys of rats after inhalation, no adverse effect level (NOAEL) of 0.025 mg/m3 And applying an uncertainty factor of 100 for humans, a reference concentration (RfC) of 0.00025 mg/m3 is obtained.	0.25 µg/m^3
ɣ-HCH	Guide to occupational concentration limit values. In Germany "MAK"-"BAT".	Mean airborne concentration for Lindane in the workplace. No general observation of adverse effects	100 µg/m^3

AIR QUALITY CONTROL IN REMEDIATION WORKS



Limit considering the thirtieth part of the value of occupational exposure to ɣ-HCH=500/30 = 16,66 µg/m^3

Limit considering the thirtieth part of the value to PM10 RD102/2011=50/30 = 1.67 µg/m^3

Limit 0.33 µg/m^3 for each main isomer determined (alpha, beta, gamma, delta, epsilon) = ∑HCH= 1.67 µg/m^3 similar to Cal-EPA =0.3≈0.33 µg/m^3

SUMMARY AND CONCLUSION

- FROM THE WORKS OF THE FASE B 2009 – 2014; A “Basic Surveillance Network” has been built to assess air quality in relation to the remediation work on sites affected by HCH residues. With new equipment with single location criteria, A **DISPERSIVE MODEL HAS BEEN ELABORATED**. It will be possible to project according to wide buffers (2km) dispersive plumes from the emission points

- **THERE ARE NO LIMIT VALUES**: Professionally exposed population limits are used. But there are almost 300 sites inventoried with the same problem of Lindane manufacturing waste. G.A. (as indicated in art.46 Decree 833/75 that develops Law 38/1972 on the protection of the atmospheric environment) has been using one-thirtieth of the value indicated for professional exposure in the work environment, for current environmental monitoring. That is, 16.6 µg/m^3 for the sum of isomers (3.3 µg/m^3 per isomer)

- UNCERTAINTIES ARE GENERATED ABOUT THE LIMITS IN THE AIR FOR REMEDIATION PROJECTS, ESPECIALLY BECAUSE IT IS EVIDENT THAT THEY DO EXIST IN WATER, SOIL AND ECOSYSTEMS. UNCERTAINTIES EXIST IN THE DEVELOPMENT OF REMEDIATION PROJECTS AND ACTIONS. **IT IS NECESSARY TO INCORPORATE SCIENTIFIC AND SOCIAL CONSENSUS** IN ORDER TO IMPLEMENT TECHNICALLY AND SOCIALLY VIABLE PROJECTS.

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THANK YOU FOR YOUR ATTENTION

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