

# F.M.I. ENVIRONMENTAL COMMISSION ENVIRONMENTAL MONITORING REPORT



#### **Introduction**

This document aims at a thorough evaluation of the atmospheric and acoustic impact of an enduro international-level event like SixDaysEnduro 2021, both for the classical aspects related to the environmental pollution of the paddock area, and for the impact resulting from the special trials and transfers of motorcycles.

For this purpose, have been performed acoustic and atmospheric investigations during the ISDE 2021 (International Six Days Enduro) held during the first week of October,  $2021 \ 30.09 - 04.10 \ 2021$ , in between two regions, Lombardy and Piedmont in north Italy.

The event, as shown in the attached planimetry, took place on a trail that unfolds from the Paddock area, inside the Rivanazzano Terme airport (PV) acting as headquarters, on two different tracks: the first one involving the Lombardy region and covering the first three days of the event and the second one, starting at the headquarters (Rivanazzano Airport) and heading south-west toward the Piedmont region, involves the 4th and the 5th days.



Figure 1 - Race trail scheme, days 1-2-3.



Figure 2 – Race trail scheme, days 4-5.

On the sixth day of the event, a special final cross test took place at Cassano Spinola Cross Track, about 25 km south-west of the airport headquarters in Rivanazzano Terme.



Figure 3 – Pilots competing during the final cross test

The peculiar aspect of this session of environmental investigations, has been to verify the acoustic levels in very specific locations, related both to the paddock area, and both to the traffic of the participating motorcycles moving from the paddock area to the special trial locations "Cross Test", "Extreme Test" and Final cross test at Cassano Spinola Cross-Track.

At the same time, was performed a prolonged air quality monitoring around the paddock area, by the Airport Control Tower.

The performing of the mentioned activities involved FMI Environmental Commission components, specialized factory on environmental monitoring (Ambios Srl and Icostech Srl) with acoustic specialists; all the activities was in coordination with FMI CID Commission (International Sustainability Commission), ISDE organizer and local authorities.



Figure 4 - ISDE FMI presentatation on 29/08/2021

#### Acoustic and atmospheric monitoring campaign

The meaning of the acoustic investigations was to assess the acoustic impact on the landscape of all phases of an enduro race, between paddock area, transfer of motorcycles and special trials, to provide every professional insider a wide and complete database for the required evaluations on the acoustic impact of such an event, during the authorization phases.

The investigation activities conducted on the first week of October 2021, was divided in different procedures, listed below:

- Remote acoustic monitoring with control unit located nearby the paddock area, on top of the Airport Control Tower, to provide a detailed acoustic picture of the area during the whole event .

- Air-quality monitoring with one dedicated control unit by the same location as the sound level control unit covering the entire duration of the event (from September 30th to October 4th, 2021).

- Acoustic monitoring on five spots placed on the race track with support of federal sound level metres and competent acoustic technician Dr. Germano Dealessandri ICOSTECH srl. The exact locations of those instruments are given in the following figures.

- In addition to the environmental sound level control units placed all along the track and the special trials, FIM technicians have been performed sound tests directly on each single motorbike attending the event, according to F.I.M. technical rules.

Thanks to FIM technical inspector, has been possible to analyse static sound level tests on 634 motorbikes, with an average value of 109.5 dBA (limits 114 dBA), in the annex picture, is shown percentage of various constructors' participants, (courtesy of Mr. Peter Radoczi).



Figure 5 – Bikes constructors.



Figure 6 – Paddock area closed park.



Figure 7 – Starting position

The first monitoring spot was placed close to the paddock area and to the race starting point, the spot is located on top of the airport control tower. The air-quality control unit is also located in the same spot as RUM1, in order to evaluate the heavier condition of air pollution.



Figure 8 – Monitoring spot locations.



Figure 9 - Air-Quality and sound level monitoring equipment - RUM1 - ATM

The second spot RUM2 is located in Volpedo, near the "Stellara" cross test, about 6,5 km from the headquarters starting point, inside of a residential establishment, on the second floor of a civil building in a balcony facing towards the cross test.



Figure 10 - RUM2 Sound level monitoring Unit

The third measurement spot RUM3 is located in Ponte Nizza, near "Ponte Nizza service time check location" about 10 km south-east from the "Stellara" Cross test, c/o agritourism "Due Camini".

Installed on the first floor of a service building, it offers a wide picture of the sound level generated by the passing motorcycles during transfers from a cross test to another compared with normal condition in absence of bike competition.



Figure 11 - RUM3 Sound level monitoring spot

The fourth measurement spot, RUM4, located outside of a residential building "Agritourism Cascina Serzego", gathers sound level data from the cross test "Val di Nizza" and the motorbike transfers.



Figure 12 – RUM4 Acoustic monitoring spot

The last measurement spot (RUM5) is located just up against the "Cà dell'Aglio" Cross test, outside a residential building "Agritourism Cà dell'Aglio".

The sound level control unit recorded data emitted by the nearby cross test, during the 4th day of the event (September 2nd, 2021).



Figure 13 – RUM5 Acoustic monitoring spot

The different positions are representative of various sound level impact situation, receptors directly exposed to the special test area, receptors exposed to bikes transfer, receptors not directly exposed, but located in surrounding areas, with comparation of ISDE impact versus normal anthropic noise.

The instruments certificates are in possession of Engineer Strani Giancarlo. The standards met by the equipment are:

- for measurement system the class 1 of standards EN 60651/1994 e EN 60804/1994;
- for filters the standard EN 61260/1995;
- for microphones the standards EN 61094-1/1994, EN 61094-2/1993, EN 61094-3-4/1995;
- for the calibrator the standard CEI 29-14.

System calibration has been performed before and after the execution of the measures, in accordance to the standard IEC 942/1998, noticing a variation of 0,1 dB.

The atmospheric investigations were performed using a Waspmote Libelium control unit (Plug&Sense model, Serial ID 52891CE819623C26), which allows the detection of some meteorological data and concentrations of some pollutants.

The atmospheric control unit is equipped with the following sensors:

- $\,$  > Carbon Monoxide (CO) gas sensor for CO detection with nominal range of 0 30 mg/  $m^3$  and instrument sensitivity di 0,1 mg/  $m^3$
- » Nitric Oxide (NO) gas sensor for NO detection with nominal range of 0 240  $\mu$ g/m<sup>3</sup> and instrument sensitivity of 1  $\mu$ g/m<sup>3</sup>
- » Nitric Dioxide (NO<sub>2</sub>) gas sensor for NO<sub>2</sub> detection with nominal range of 0 410  $\mu$ g/m<sup>3</sup> and instrument sensitivity of 2  $\mu$ g/m<sup>3</sup>
- » Sulfur Dioxide (SO<sub>2</sub>) gas sensor for SO<sub>2</sub> detection with nominal range of 0 580  $\mu$ g/m<sup>3</sup> and instrument sensitivity of 2  $\mu$ g/m<sup>3</sup>
- » Particle Matter Sensor (PM 2.5, / PM10), sensor for small dust detection which allows the classification, based on particle dimension, up to  $2000 \ \mu g/m^3$ .

Besides the mentioned parameters, the trend of temperature, relative humidity and atmospheric pressure is continuously transmitted on dedicated server. For the recordings of the said parameters it was used a Waspmote 4G control unit with calibrated sensors, GPS unit, 4G data transmission card and solar cell battery powered.

### Acoustic and air-quality monitoring results

The sound level monitoring measurements during the racing days, shows above all most significant values during the morning – early afternoon of Sunday the 25th of April, in line with the start of the race; the values still remain under the acoustic threshold of the area.

In the following tables it is shown how the RUM1 (paddock area) registered on average higher values, because of the proximity and the sound level of the paddock area.

RUM 2 is showing a high value registered on days 3-4-5, in line with the "Stellara" special cross test, held on those days.

	30/08 (DAY1)		31/09	(DAY2)	01/09 (DAY 3)		
	Leq Day	Leq Night	Leq Day	Leq Night	Leq Day	Leq Night	
RUM1	65,7	53,9	67,1	53,5	63,7	53,3	
RUM2	48,2	35,2	43,2	33,4	73,3	33,8	
RUM3	54,6	43,2	53,8	41,3	55,2	42,8	
RUM4	53,1	43,4	48,8	41,1	46,1	43,2	
RUM5	47,0	47,6	43,1	43,8	44,6	46,1	

Table 1 - Values registered during days 1-2-3 (Lombardy region)

	02/09	9 (DAY 4)	03/09 (DAY5)			
	Leq Day	Leq Night		Leq Day	Leq Night	
RUM1	65,1	53,4		67,8	53	
RUM2	73,5	32,7		70,4	32,4	
RUM3	49,7	44,9		48,5	42,4	
RUM4	51,4	46,8		51,5	44,4	
RUM5	47,6	46,6		48,2	44,5	

Table 2 – Values registered during days 4-5 (Piedmont region)

In the following picture, as example, is shown the sound level situation on RUM2 during the different phases of competition; in the annex reports are included all the recorded details for all the position investigated. Figure 15 shown an example of real time history and sound level frequency distribution, on RUM1 position, during the day 3<sup>rd</sup> September.



Figure 14 - RUM2 values recording



Figure 15 - RUM1 sound level spectrum

To achieve a thorough picture of the atmospheric impact of the race, it has been considered the following pollutants, CO, NO e NO<sub>2</sub>, SO<sub>2</sub>, PM<sub>10</sub> e PM. The complete averages of the registered values are listed in the following table:

Measurement Spot <b>RUM1+ATM</b>	ATI	MOSPH	IERIO		OOR MEA	SUREMI	ENTS			
Location:		ISDE 2021, Rivanazzano Terme Airport (PV) - Headquarter								
		ENVIRONMENTAL AIR QUALITY MONITORING								
Control Unit Sei	rial ID:	Waspmote 4G - 52891CE819623C26								
Test Period:	29/08/2021 - 04/09/2021									
Weather Conditi	ons:	Avg. T	emperat	ture	Avg. Humidity	Ļ	Avg. Air Pressure			
			21,3		49,30%		100296			
Measurement pe	erformer: Ir	ng. Strani	Gianca	arlo		Start:	29/	29/08/21 h.15:59		
		~~~			TIOCATIC		( <del>+</del> )	00/2111.	10.20	
et Alter Alter Al	Francesco Baracco Francesco Baracco Restoranto Aspon Pon Pon	Paddock St Days ISDE 202 Organization Agross Rivans	x orto di ra-Rivanazzar porto hera azzano	NO BARA						
		AVER	RAGE	REGIS		UES				
	N	0	3,11	µg/m³	PM <sub>2</sub> , <sub>5</sub>	7,67	µg/m³			
	NO	$O_2$ 1	19,07	µg/m³	PM <sub>10</sub>	23,64	µg/m³			
	S	02	0,83	µg/m≚	CO	0,58	mg/m <sup>×</sup>			

Figure 16 – Air quality detection in RUM1 + ATM

The average of the monitored pollutants during the week of the race is significantly lower than the legal limits imposed by national regulation (D. Lgs. 155/2010) and in-line with typical values of urban agglomerates close to arterial roads of rather importance.

## **Conclusions**

During the 2021 ISDE competition in the area of Lombardy and Piedmont regions, it has been performed a prolonged and extensive campaign of sound level and air-quality measurements, with the aim of acquire instrumental evidence of the impact on those environmental compartment of an international event, like ISDE 2021.

Thanks to the support of the FMI environmental stewards, of the ISDE organizer and specialized factories, it was possible to collect a wide and detailed data set of environmental values for an important event like Six Days Enduro. The prolonged monitoring activity on six different measurement locations, for the complete period of race, permitted to obtain a wide data set distributed on a large territory. All the measurements, both in paddock area, along the main transfer roads and near the extreme and cross test special trails, allowed to determine the "acoustic footprint" of a similar event; this specific procedure has been tested by FMI Environmental Commission for the first time during the "Assoluti Italiani Enduro" race on Piediluco (middle Italy) on beginning of may 2021.

In general way is possible to assess that an international enduro competition don't modify in relevant way the acoustic situation of the area considering the transferring circuit of the participants; it has been reported a certain sound level emission, close to receptors directly exposed on the special test areas, even if this disturb is limited in the time.

Also, the air quality during the complete event doesn't present particular modification during the competition week; in any case the values reported, are in the specific Italian law limits; as normal, have been detected significative PM concentration values around Rivanazzano airport, in particular during the starting phase of the different teams.

A special thanks to CID Director Eng. Kattia Juarez and her team during the complete week of competition, federal FMI environmental stewards and FMI technical inspector, technician Schillaci Andrea of Ambios Srl, Dr. Germano Dealessandri of Icostech Srl, ISDE organization staff, for their continuous support.

This great effort of FMI Environmental Commission permits to analyse in exhaustive way the environmental impact of an international competition like Six Days Enduro 2021; all the information collected make an important data base on enduro impact, useful for the organization in the future, but also as guide for motorcycle sustainability, that must be the future target also in our sport.



Attachments

RUM1 – RUM5 Monitoring reports