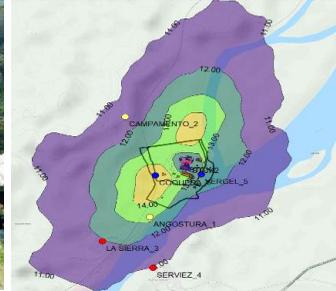


PHYSICAL DIMENSION

Air, Emissions, Noise, and Vibrations



SAG S.A. has a permanent team of professionals and specialists from different disciplines who offer a comprehensive portfolio of services related to this component.

Strengths of SAG SA's physical team:

10 years of experience in:

- Air Quality Monitoring
- Monitoring of Contaminants PM10, PM2.5, NO2, and SO2 accredited by IDEAM
- Air Quality Modeling

3 years of experience in:

- Analytical Monitoring of Offensive Odors
- Emissions:
 - Preparation of Inventories
 - Isokinetic Sampling
 - Procedures for Emission Permit Applications
- Noise:
 - Emission Sources
 - Environmental Noise Modeling

2 years of experience in:

- Vibration Monitoring



Outstanding Experience in:

- Air Quality Monitoring
- Contaminant Monitoring
- Air Quality Modeling
- Preparation of Emission Inventories
- Isokinetic Sampling
- Procedures for Permit Applications
- Noise Emission Sources
- Environmental Noise Modeling

SERVICES



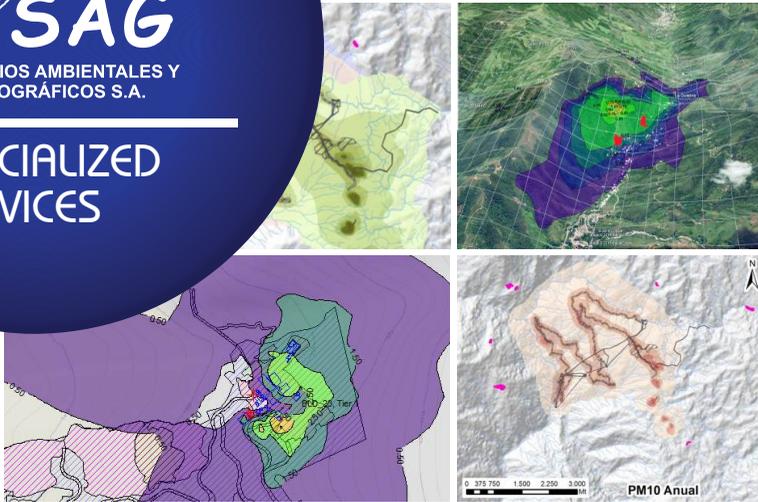
AIR: AIR QUALITY MONITORING

- Monitoring of Contaminants PM10, PM2.5, NO2, and SO2 accredited by IDEAM
- Air Quality Monitoring, Compliance with contaminants according to MADS Resolution 2254 of 2017.



SERVICIOS AMBIENTALES Y GEOGRÁFICOS S.A.

SPECIALIZED SERVICES



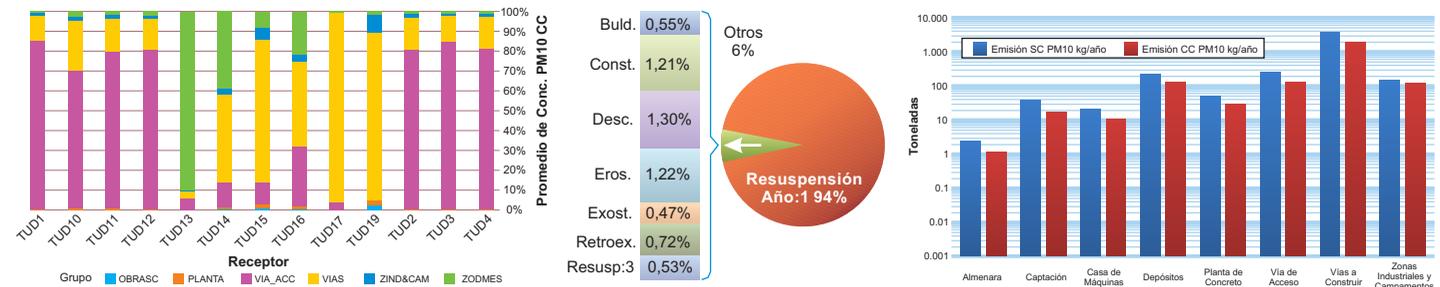
AIR: AIR QUALITY MODELING

- Determination of Chimney Height: Application of MADS Good Engineering Practices through a Protocol for controlling and monitoring atmospheric pollution generated by fixed sources and determining the appropriate chimney height.
- Methods for nearby structures, Nomogram, and air quality modeling methods.
- Specialization of impacts through modeling.
- Delimitation of the influence area.



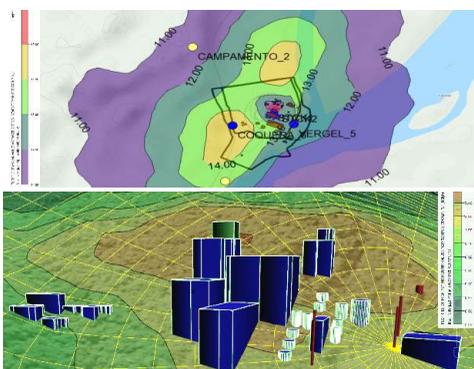
AIR: ANALYTICAL MONITORING OF OFFENSIVE ODORS, H₂S - NH₃

Monitoring of substances that generate offensive odors (NH₃ - H₂S) with analytical equipment according to MADS Resolution 1541 of 2013 and the protocol of MADS Resolution 2087 of 2014.



EMISSIONS: EMISSION INVENTORY DEVELOPMENT

Preparation of atmospheric emission inventories required by environmental authorities and in ANLA TdRs: According to MADS guidelines in the Protocol for Atmospheric Pollution Control and Surveillance generated by Fixed Sources, spatial and temporal disaggregation of inventories and identification of main contributing sources and processes.



EMISSIONS: EMISSION PERMIT APPLICATIONS

- Technical consultancy in the application and renewal of atmospheric emission permits.
- Modeling of fixed sources.
- Resource demand and atmospheric emission permits.



SERVICIOS AMBIENTALES Y GEOGRÁFICOS S.A.

SPECIALIZED SERVICES



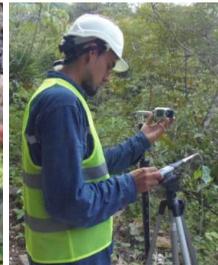
EMISSIONS: ISOKINETIC SAMPLING

Verification of compliance with permissible emission standards for fixed sources, according to Resolution 909 of 2008 and the requirements of the Protocol for the Control and Surveillance of Atmospheric Pollution Generated by Fixed Sources version 2.0 of the Ministry of Environment, Housing, and Territorial Development.

- EPA Method 1: Determination of monitoring points
- EPA Method 2: Determination of velocity in ducts with pitot tube
- EPA Method 3: Determination of molecular weight
- EPA Method 4: Determination of moisture content
- EPA Method 5: Determination of particulate matter in fixed sources
- EPA Method 6: Determination of sulfur dioxide in fixed sources
- EPA Method 7: Determination of nitrogen oxides in fixed sources

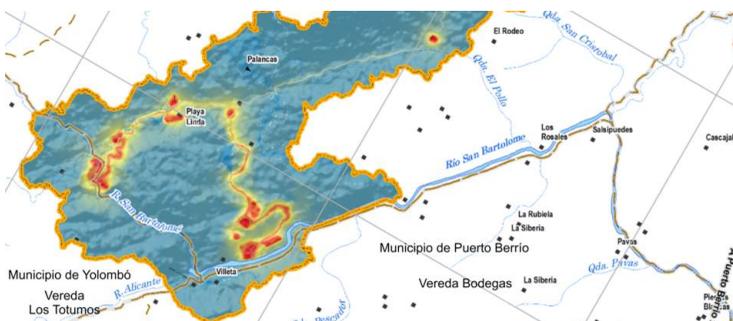
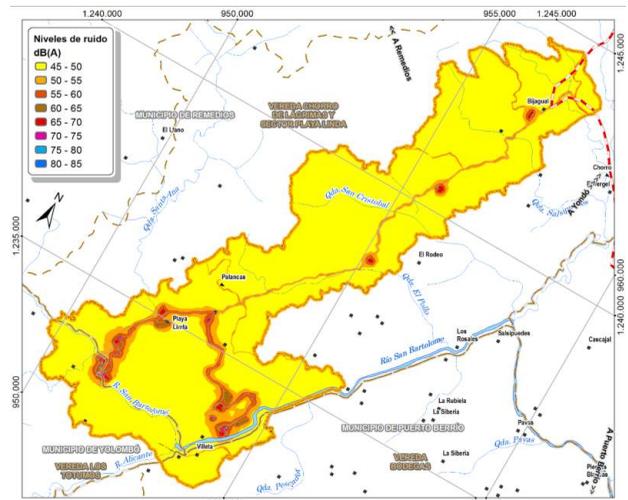
NOISE: EMISSION SOURCES AND ENVIRONMENTAL NOISE

Monitoring of Environmental Noise and Noise Emission for characterization and monitoring of the environment according to MADS Resolution 0627 of 2006.

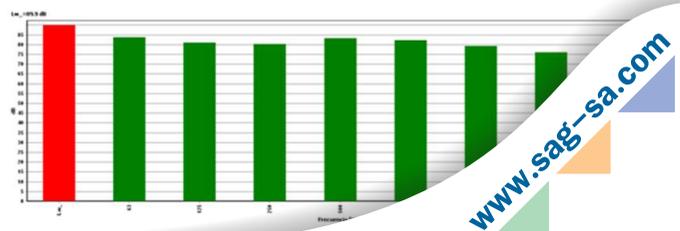


NOISE: ENVIRONMENTAL NOISE MODELING

- Conceptualization of noise emission sources: Preparation of Noise maps using specialized software for industrial sources and road traffic (roads) - incorporation of background noise concepts.
- Estimation of impact magnitude.
- Increase in sound pressure level: Estimation of increases in environmental noise levels due to construction and project operation activities according to ANLA TdRs.
- Spatialization of impacts through modeling.
- Influence area delimitation: Spatialization of impacts due to increased noise levels and delimitation of the influence area by Environmental Noise according to ANLA TdRs.
- Contributions from noise sources: Identification of the main noise sources through spectral disaggregation at receptors.



Maquinaria	Bandas de octava (Hz)							Nivel total (dB(A)) 10m	
	63	125	250	500	1k	2k	4k		8k
Retroexcavadora	81	80	80	83	82	79	76	73	89.2
Planta diésel	80	74	57	54	53	48	45	37	81
Total	83.6	81	80.1	83.1	82.1	79.1	76.1	73.1	89.9

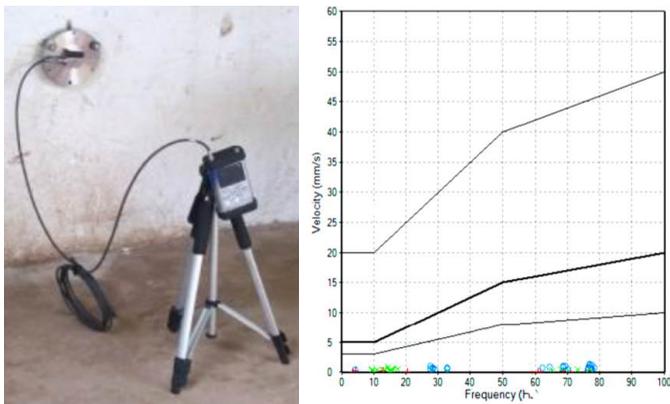
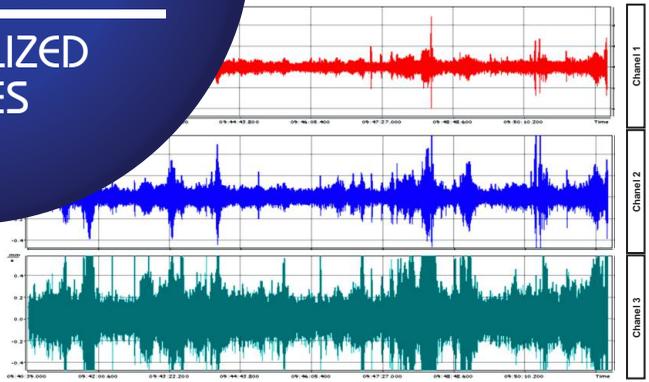


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GEOGRÁFICOS S.A.

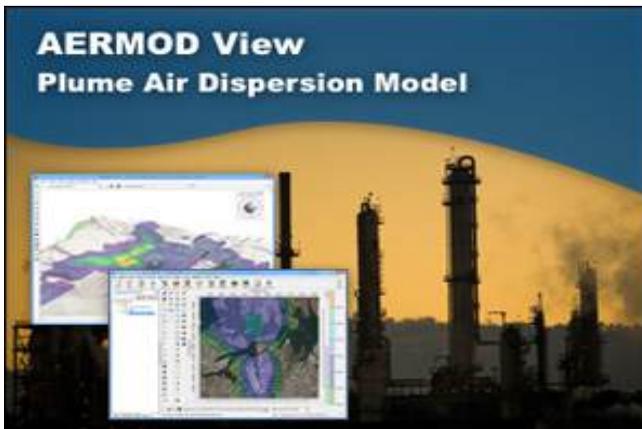
SPECIALIZED
SERVICES



VIBRATIONS: VIBRATION MONITORING

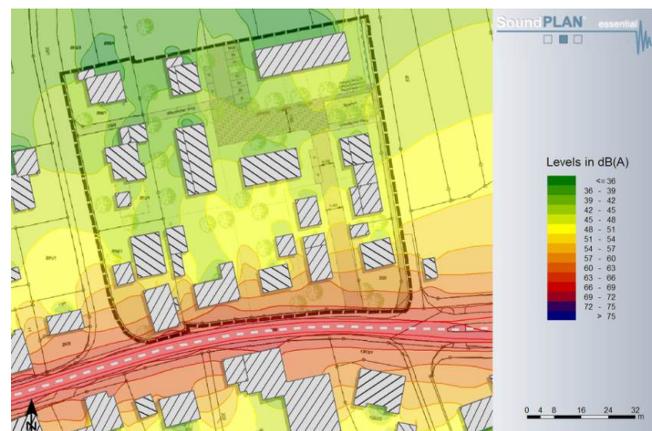
Vibration sampling according to ANLA TdRs (DIN 4150 standards - DIN 2001a, DIN 2001b, DIN 2001c) to characterize natural emissions and areas near planned locations of facilities or activities generating vibrations.

MODELING PROGRAMS



AERMOD View is an air dispersion modeling simulator that analyzes the concentration and deposition of atmospheric pollution generated by various sources. It offers, in a single interface, internationally recognized models: ISCST3, ISC-PRIME, and AERMOD. / Current version 9.9.0 includes updated AERMOD 19091 model license annually.

SoundPLANessential 5.0 includes calculation standards CNOSSOS-EU and from other countries such as NMPB-08, RSL90, ISO 9613, among others, continuously updated according to developer releases



HUMAN RESOURCES

SAG S.A. in this area has a team led by a Chemical Engineer and specialist in Environmental Planning and Integrated Natural Resource Management, with the permanent support of a Sound Engineer and an Environmental Engineer.