



Algoritmos

Algoritmos y Mediciones Ambientales SpA.

www.algoritmospa.com



MISSION

"To provide our clients with accurate and suitable information regarding the environmental variables that we are commissioned to obtain through scientific measurements, mathematical models, sampling and chemical analysis".



VISION

"To be a leader company at an international level, in obtaining and analyzing environmental information through scientific measurements and cutting-edge mathematical models"



VALUES

"Punctuality, precision, commitment, care for resources, leadership, accept responsibilities and seek for solutions".

SERVICES

- Air Quality
- Continuous Monitoring of Emissions (CEMS)
- CEMS Validation
- Stationary Sources
- Atmospheric modeling

- Land and water quality monitoring
- Acoustics and Industrial Hygiene
- Environmental laboratory
- Calculation of Electromagnetic Fields
- Hydrodynamic Modeling



AIR QUALITY MONITORING >>

Algoritmos y Mediciones Ambientales SpA. Offers the air quality monitoring service for which the Company provides engineers and technicians with vast experience in measurement.

The service platform currently developed covers the following variables:

- Continuous monitoring of meteorological variables.
- Continuous and discrete monitoring of particulate material (PM10 and PM2,5).
- Continuous monitoring of gases (CO,NO2, SO2,O3,HCT and OBC).
- Sampling of Sedimentables Particulate Material MPS.
- Chemical analysis to discrete samples of MP-10,MP 2,5 and MPS.
- Height Meteorological Monitoring (Echosounder).

It should be noticed that all the projects that are currently being developed by Algoritmos y Mediciones Ambientales SpA are subject to the current Environmental Regulations.

The services provided include: Sale, lease, Implementation, Maintenance, Operation, Calibration and Rental of Air Quality Stations (EMRP), Online Data Service (VDV), Validation and Data Processing, Baseline Studies and Environmental Monitoring of RCA among others. The facilities and equipment currently used meet the requirements defined in the current Environmental Regulations, by the environmental agency USEPA (United States Environmental Protection Agency) and by the WMO (World Meteorological Organization) for measurements of meteorological variables.



It is important to highlight that, Algoritmos y Mediciones Ambientales SpA. Has ISO 9001: 2008 certification, process carried out by IRAM Company.

STATIONARY SOURCES

Algoritmos y Mediciones Ambientales SpA. offers the service of sampling, measurements and analysis of pollutant parameters emitted by stationary sources, for which it has engineers and technicians of vast experience in measurements, also authorized as Environmental Inspectors.

This area has SEREMI R.M accreditation as a laboratory for measuring particulate matter and gases, SMA as ETFA, as well as personnel accredited by the same institutions for the supervision and operation positions.

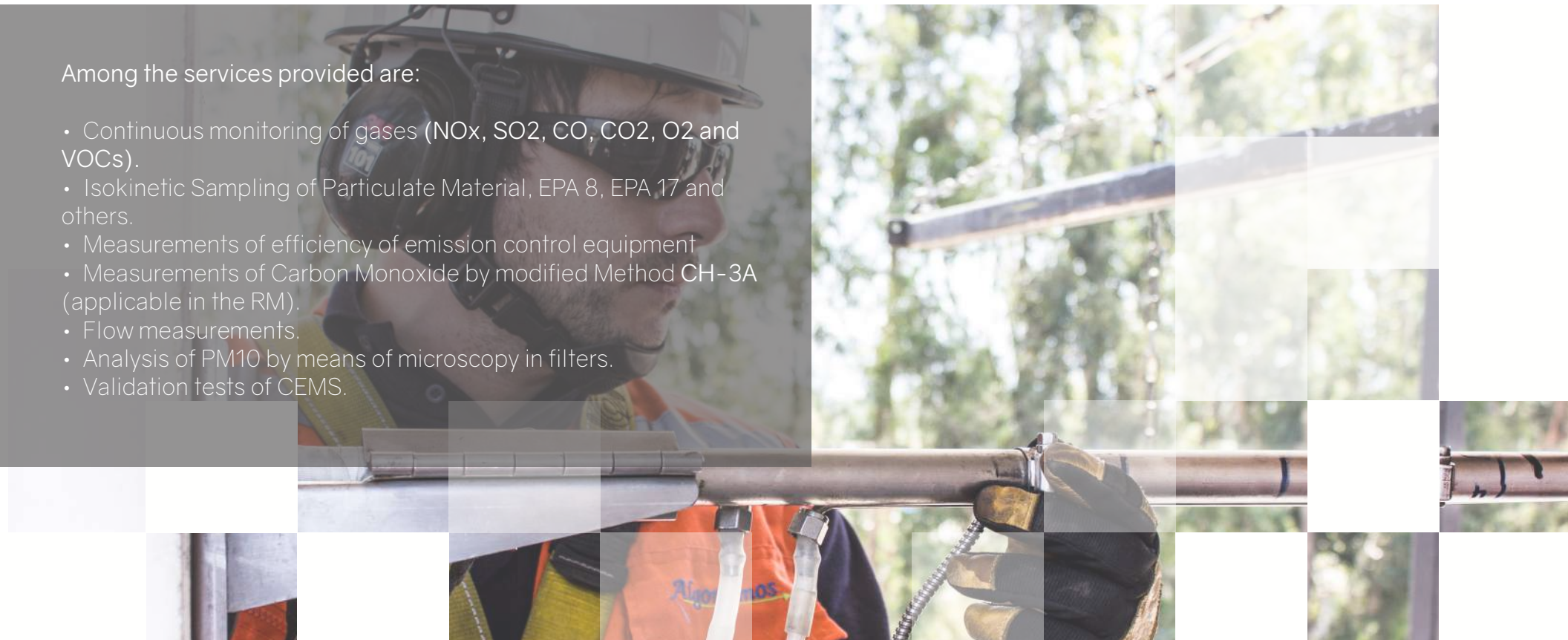
Measurements of:

- Metals according to methodology CH-29.
- Determination of steam generation in boilers.
- Determination of ammonia according to CTM-027.
- Determination of halogens and halides according to CH 26A methodology.

In addition, the monitoring area of stationary sources has the technical capacity to implement new EPA standard methodologies, according to the needs of our customers, among which are important companies in the field of Thermoelectric, Mining, Pharmaceutical Industries, Food, among others.

Among the services provided are:

- Continuous monitoring of gases (NO_x, SO₂, CO, CO₂, O₂ and VOCs).
- Isokinetic Sampling of Particulate Material, EPA 8, EPA 17 and others.
- Measurements of efficiency of emission control equipment
- Measurements of Carbon Monoxide by modified Method CH-3A (applicable in the RM).
- Flow measurements.
- Analysis of PM₁₀ by means of microscopy in filters.
- Validation tests of CEMS.



CONTINUOUS MONITORING OF EMISSIONS (CEMS) >>

Algoritmos y Mediciones Ambientales SpA. has an specialized area in the measurement of emissions in real time for pollutants originated in the generating units. Offering the services of: Sale, lease, Installation, Maintenance, Operation, Validation of Continuous Emissions Monitoring Systems (CEMS) and subsequent Data Processing as established in the current environmental regulations. In addition to providing continuous and permanent advice to our clients for the fulfillment of their environmental commitments, such as: Environmental Qualification Resolutions (RCA), Prevention and Environmental Decontamination Plans (PPDA), Protocol for validation of Continuous Emissions Monitoring Systems (CEMS) and its respective annexes, both for foundries, thermoelectric plants, celluloses, incineration plants, co-incineration and co-processing.

Our CEMS are equipped with state-of-the-art equipment, among which are: Gas Analyzers, Particles, Flow Meters, Humidity, Probes, Sample Conditioning System. Likewise, the parameters commonly monitored by the CEMS include: Nitrogen oxide (**Nox**), Sulfur dioxide (**So2**), Carbon monoxide (**CO**), Carbon dioxide (**CO2**), Oxygen (**O2**), Total hydrocarbons (**HCT**), Particulate Material (**MP**), Gas Flow (**Q**), Pressure (**P**) Temperature (**T°**), which are rolled into an Information Storage System (PLC) to be then deployed and managed in real time through a **DAHS** (Data Acquisition and Management System).

From the date of publication of Decree 13/2011, Algoritmos y Mediciones Ambientales SpA. Permanently works to deliver efficient solutions to our clients, appropriately compliance with the requirements indicated by the Superintendencia de Medio Ambiente. SMA.





Validation is a Service focused on thermoelectric, foundries and industries in general, has an specialized area focused in environmental regulations and validation tests, which aims to provide integral advice to our customers in compliance with current regulations in our country. Specifically referred to the systems of continuous monitoring of emissions "CEMS", both for: gases, particulate material or flow.

Our validation areas provides the following services:

- CEMS installation and operation audits.
- Validations of CEMS of a referential nature to comply with the validation protocol Res. Exempt No. 57/2013.
- Preparation of Previous Validation Reports.
- Preparation of Notices of Execution of Validation Tests.
- Advice on the purchase of calibration gases, both for validation processes and for the operation of the CEMS.
- Validations of CEMS according to the validation protocol Res. Exempt No. 57/2013.
- Alternative CEMS monitoring according to Annex II of the validation protocol, based on Exempt Res. No. 438/2013.
- CEMS quality assurance tests according to Annex III of the validation protocol, based on Exempt Res. No. 583/2014.
- Relative accuracy tests for flow and gases.
- Correlation tests for particulate material.
- Calculation methodologies for green taxes.
- Estimation of green taxes.

IN THE BIST 3 YEARS

THIS ÁREA HAS DEVELOPED MORE THAN 30 PROCESOS OF VALIDATION

ENTIRELY SUCCESSFUL



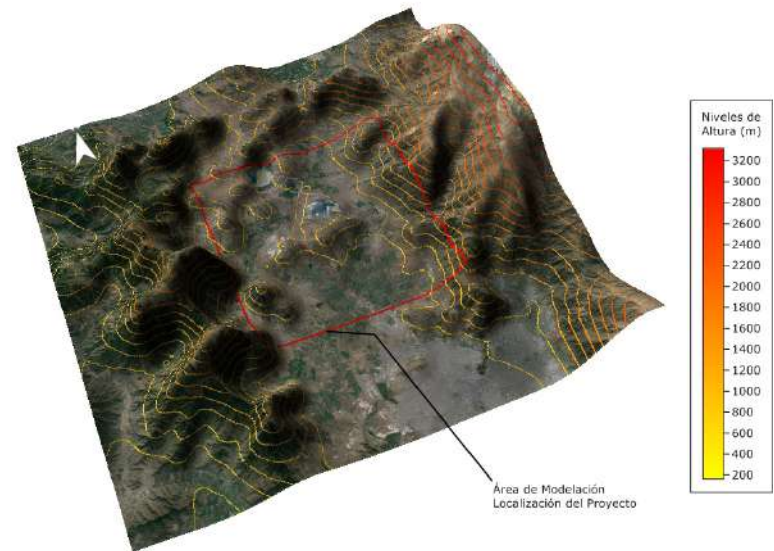
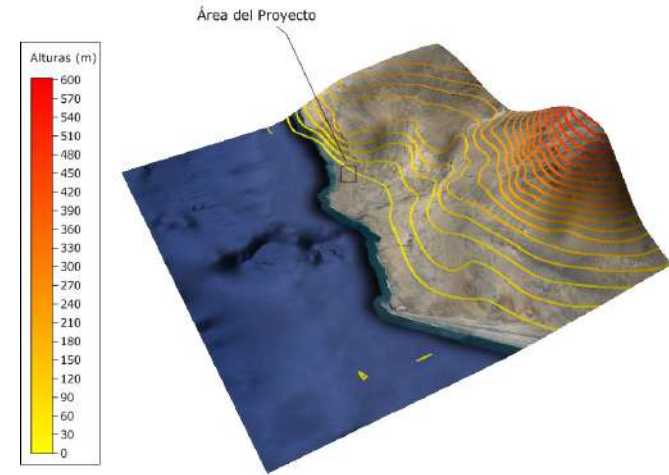
ATMOSPHERIC MODELING

Algoritmos y Mediciones Ambientales SpA. Has a specialized area that evaluates the impact on the air quality environment of new investment projects, in its different stages of execution, such as construction, operation and closure, for which it has the capacity and experience in the application of dispersion models such as recommended models and approved by the EPA, among which the CALPUFF model stands out, which incorporates to its main variables the topography, land uses and meteorology of the area to be evaluated.

Following mainly the guidelines established in the Guide for the use of Air Quality Models in the SEIA, which recommends the use of WRF (Weather Research and Forecasting) for the generation of its meteorology both surface and height.

The main services provided are the following:

- Emissions Inventory for all types of sources and activities.
- Weather Forecast Modeling WRF (Weather Research and Forecasting).
- Modeling of air quality using the CALPUFF model.
- Modeling of air quality for secondary pollutants by photochemical models.
- Soil sampling for granulometry and moisture analysis.
- Vehicle flow count.
- Climate and meteorology baseline.
- Air Quality baseline.
- Analysis and development of emissions compensation reports.
- Evaluation of the application of emission control measures.
- Environmental prefeasibility of the location of sources of pollutants emissions (analysis of optimal location according to the dispersion of emissions)
- Identification and evaluation of synergistic scenarios given the interaction of different emissive activities in the same location.



ACOUSTICS AND INDUSTRIAL HYGIENE AREA

Algoritmos y Mediciones Ambientales SpA. Has highly trained professionals to carry out each of our services. Calibrated and certified instruments are available for carrying out your measurements and sampling.

Activities:

- Measurement and evaluation of noise
- Outdoor sound propagation modeling
- Vibrations Measurement and evaluation
- Measurement and sampling of industrial hygiene
- Engineering in noise and vibration control

These activities are carried out under current national regulations and international reference standards, related to each service.

MODELING OF SOUND PROPAGATION IN EXTERIORS

Algoritmos y Mediciones Ambientales SpA. model the sound propagation generated by noise sources according to the international standard ISO 9613-2 Noise Attenuation in the Open Field, using the SoundPlan acoustic modeling software v.7.4. This Software allows us to determine the contribution of each noise source in certain points within the different phases of a project, be it installation or construction, operation and / or closure or abandonment. On the other hand it allows the inclusion of various environmental factors, such as contours and type of location.



ENGINEERING IN NOISE AND VIBRATION CONTROL

This service includes conceptual and detailed engineering of various solutions for noise and vibration control. Within the solutions for noise control, acoustic enclosures, acoustic barriers, exhaust mufflers (reactive or reactive / resistive), splitter for ventilation and vent silencers are designed. With regard to the vibrations control, the type of necessary shock absorber is specified, on the other hand, stiffness values necessary to achieve the desired transmissibility can be recommended.

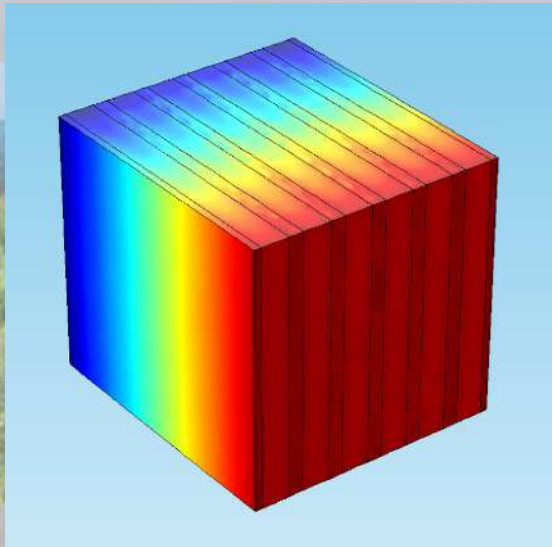
Acoustic barriers engineering includes a study of pre-feasibility, design and installation in order to mitigate the noise generated by vehicular traffic on roads or industries that affect urban and residential areas.

The acoustic screens are transparent acrylic (PMMA) with minimum thickness of 15 mm, and are mounted on a concrete base and subject to the structure by metal profiles.

The design and characteristics (location, dimensions, attenuation level and materiality) of the solutions are developed with the purpose of controlling noise and vibrations in industrial equipment and / or in the medium of propagation.

VIBRATION MEASUREMENT AND EVALUATION

The vibration levels are measured and evaluated under international standards, the dominant directions and their temporal characteristics at the measurement point. Depending on the situation, additional measures can be taken to control transmissibility.



NOISE CONTROL ON ROADS VIA ACOUSTIC SCREENS

Algoritmos y Mediciones Ambientales SpA. Has professional experts in the study services of pre-feasibility, design and installation of acoustic screens to mitigate the noise generated by vehicular traffic on roads or industries that affect urban and residential areas. The acoustic screens are made of transparent acrylic (PMMA) with minimum thickness of 15 mm. Which are mounted on a concrete base and subject to the structure by metal profiles.

CALCULATION OF ELECTROMAGNETIC FIELDS

One of the main environmental aspects that should be considered in electrical transmission projects is the effect associated with the propagation of electromagnetic fields from substations and high voltage electrical transmission lines. Algoritmos y Mediciones Ambientales SpA. has professional experts in:

- Measurement of electromagnetic fields in installed projects
- Modeling of electromagnetic fields in projects not yet installed
- Determination of the environmental effect associated with electromagnetic fields
- Evaluation.



Algoritmos y Mediciones Ambientales SpA, performs sampling, measurement and analysis of water, soil and sediments, for which it has specialized technical personnel and Environmental Inspectors qualified by the **SMA**, guaranteeing the reliability of the results.

The sampling, measurement and analysis of water considers the following matrices: surface water, groundwater, drinking water, wastewater and marine environment.

Soil sampling and analysis considers surface sampling and at different depths.

In water and soil, the activities for taking samples include: evaluation of the sampling point to obtain the representativeness of the sample, suitable containers for sampling and transportation of the samples and relevant preservatives for each type of parameter to be appropriately analyzed.



The samplings of the different matrices of waters and lands are made based on all the norms and procedures established by the national authority, which are:

- NCh 409/2 Of. 2004 Drinking Water - Part 2: Sampling.
- NCh 411/2 Of. 96 Water quality - Sampling - Part 2: Guide on sampling techniques.
- NCh 411/3 Of96 Water quality - Sampling - Part 3: Guide on preservation and handling of samples.
- NCh ISO 5667/6 Water quality - Sampling - Part 6: Guide for the sampling of rivers or watercourses.
- NCh 411/9 Water quality - Sampling - Part 9: Guide for Sampling of marine waters
- NCh 411 / 11.Of98 Water quality - Sampling - Part 11: Guide for sampling of groundwater.
- NCh 411 / 10.Of. 96. Water quality - Sampling - Part 10: Sampling of wastewater - collection and handling of samples
- P-1002 Technical procedure for soil sampling based on Preparation of Soil Sampling Protocols: Sampling Techniques and Strategies, EPA, 1992, Soil Sample Protocol, Government of Chile, SAG, NCh 2060 Of.1996. Soils Sampling for fertility analysis.

Algoritmos y Mediciones Ambientales SpA. has a professional team specialized in:

- **Marine environment**
- **Macrofauna Laboratory**

ENVIRONMENTAL LABORATORY



Algoritmos y Mediciones Ambientales SpA. Has laboratories and the necessary infrastructure to fully develop its activities, with appropriate and climate-controlled rooms, equipment and instruments, among which stand out: Scales, Atomic Absorption Spectrophotometers, PH meter, Ion Analyzer, Absorption Spectrophotometers Molecular, Microwaves, Microbalances, Thermohygrometer, Antistatic Neutralizer, Desiccators, among others, so that each area operates in order, controlled and maintaining production and quality standards.

To carry out the different samples analysis, the Laboratory has standardized and updated methods of the Standard Methods for Examination of Water and Wastewater, EPA, Chilean Standards and Methods established by the Superintendencia de Servicios Sanitarios (SISS). It has qualified professionals and technicians who work at the forefront of the current regulations and methodologies, aiming to satisfy the needs of the clients.

The environmental analysis laboratory consists of the following operation sectors:

- WATER LABORATORY
- FILTER WEIGHING LABORATORY
- LABORATORY OF SOILS AND SEDIMENTS
- DIGESTION LABORATORY
- ATOMIC ABSORPTION LABORATORY

