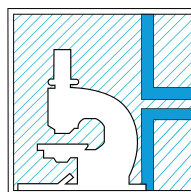




chemical and microbiological analyses

## **Environmental and Research Laboratories since 1982**



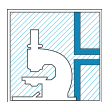
**L.A.V.**



## MICROBIOLOGICAL AND CHEMICAL ANALYSES SINCE 1982

L.A.V. s.r.l. is a company set up in 1982 with the intention of conducting chemical and microbiological analyses in the environmental sector. The company was founded from the combination of professional skills and experiences originating in different realms and fields, but which were complementary to each other for responding to the public's and the state's growing interest in health and the environment. The Laboratory has developed complementary services of environmental monitoring, and technical and legislative consulting. Through continuous investments in new technologies, training and collaborations with research institutes, L.A.V. s.r.l. Has constantly updated its services to stay in step with legislative evolution and its clients' needs. The company currently offers a broad range of services, together with constant, qualified technical support that positions its services among the best on the market in terms of price: quality ratio. The Laboratory provides the necessary assistance prior to carrying out testing and monitoring, in order to improve efficacy of its proposals. Consultancy regarding the data provided then follows. Professionals in the company, chemists, engineers, biologists, naturalists, and industrial experts, address increasingly complex topics, working synergetically to provide testing, monitoring and consultancy services in the environmental, hygiene and occupational safety sectors.





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## SOIL AND SEDIMENTS



### Soil and excavated rocks

Sampling and analysis of soil and excavated rocks pursuant to table 4.1 of the [Presidential Decree 120/2017](#)

- |                              |                       |                  |
|------------------------------|-----------------------|------------------|
| › Skeleton and fixed residue | › Lead                | › Total Chromium |
| › Arsenic                    | › Cooper              | › Chromium VI    |
| › Cadmium                    | › Zinc                | › Asbestos       |
| › Cobalt                     | › Mercury             | › BTEX (*)       |
| › Nickel                     | › Hydrocarbons C > 12 | › PAHs (*)       |

(\*) To be conducted in the event that the excavation area is 20 metres from large road infrastructures and constructions that may have affected the characteristics of the site by falling atmospheric emissions. The analytes to look for are the ones listed in columns A and B, Table 1, Annex 5, Part Four, Chapter V, of Legislative Decree no. 152 of 3 April 2006



## Soil and Subsoil

Sampling and testing of soil to for any pollutant contamination (residential and industrial limits) shown in table 1 of annex 5 to chapter V of Part IV of [Leg. Decree 152/2006](#) and in [Ministerial Decree 46/2019](#): regulation regarding reclamation, environmental recovery and containment, emergency, operational and permanent interventions of areas allocated to agricultural production and animal husbandry.

- › Hydrocarbons C<12, C>12
- › Asbestos
- › Chlorinated Compounds
- › Organostannic Compounds
- › Metals
- › Polycyclic Aromatic Hydrocarbons
- › Pesticides
- › Polychlorinated Biphenyls
- › Dioxins, Furans and Dioxin-like Polychlorinated Biphenyls ( PCBs)
- › Phenols and Chlorophenols

## Marine Sediments

The LAV Laboratory provides a qualified service of managing MARINE SEDIMENT characterisation activities in accordance with Ministerial Decree 173/2016 that introduced the modes and technical criteria for the immersion of seabed excavation matter in the sea.

The LAV Laboratory offers full technical support in managing this activity: intervention planning; sampling; testing and monitoring plan management.

- › Granulometry
- › Mineralogy
- › Metals and trace elements
- › Organostannic Compounds
- › Hydrocarbons C>12
- › Polycyclic Aromatic Hydrocarbons
- › Pesticides
- › Polychlorinated Biphenyls
- › Dioxins, Furans and Dioxin-like Polychlorinated Biphenyls ( PCBs)
- › Ecotoxicology Analysis

## Mobile Laboratory

LAV Mobile Laboratories are vehicles internally equipped with laboratory testing equipment, sophisticated scientific equipment and devices required to manage samples, all designed to conduct “on-site” chemical tests”. The mobile laboratories can quickly provide the necessary answers to companies working on reclamation, land classification, soil contamination status verifications or emergency environmental interventions, allowing them to make the right decisions with considerable saving of both time and financial resources.

Mobile vehicles can operate with full autonomy in areas not reached by the electrical grid as they all possess electricity generators.

The analyses are carried out by skilled, qualified technical staff.





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WATER



## Drinking Water

Sampling and testing of drinking water, in accordance with the limits set by Legislative [Decree 31/2001](#) on the criteria for the quality of water destined for human consumption.

In addition to chemical (metals, hydrocarbons, acrylamide etc...) and microbiological (Escherichia coli, Enterococci, Legionella, etc...) testing as provided for by law, LAV can also conduct contaminants research, including:

- › PFCs (perfluorocarbon compounds, such as: PFAS; PFOS; etc..)
- › Antibiotics
- › Hormones

## Groundwater

Sampling and testing of groundwater for any pollutant contamination shown in table 2 of annex 5 to chapter V of Part IV of Leg. [Decree 152/2006](#)

- › Total Hydrocarbons as n-hexane
- › Solvents
- › Chlorinated Compounds
- › Nitrobenzenes
- › Metals
- › Polycyclic Aromatic Hydrocarbons
- › Pesticides
- › Polychlorinated Biphenyls
- › Dioxins, Furans and Dioxin-like Polychlorinated Biphenyls ( PCBs)
- › Phenols and Chlorophenols

## Surface Water

Chemical and microbiological testing to determine the status of surface water, in accordance with [Legislative Decree 172/2015](#)

- › Environmental quality standard in the water column and in the biota for substances included on the priority list (Table 1/A)
- › Environmental quality standard in sediments in marine-coastal and transitional bodies of water (Table 2/A)
- › Environmental quality standard in marine-coastal and transitional bodies of water for the purpose of selecting trend analysis sites (Tab. 3/A)
- › Surface water status, water body quality status classification methods (Table 1/B)

## Wastewater

With its high-quality testing protocols, LAV carries out sampling and testing of wastewater for any pollutant contamination shown in table 3 of annex 5 to chapter V of Part IV of [Leg. Decree 152/2006](#)

- › Wastewater limits in surface bodies of water
- › Wastewater limits in public sewers
- › Wastewater limits on the ground

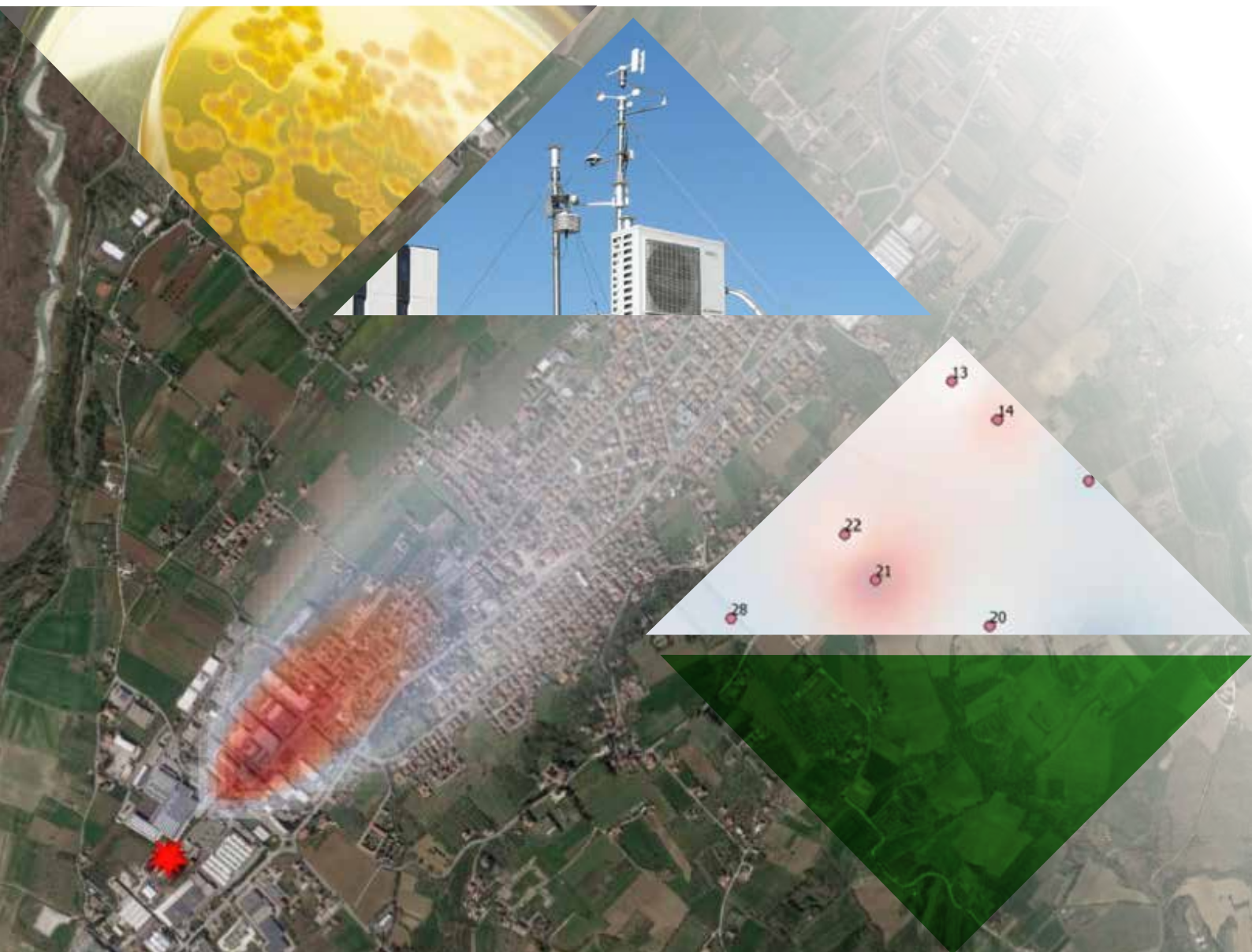






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AIR



## Atmospheric Emissions

LAV has thirty years' experience in characterisation sampling and testing of atmospheric emissions originating from multiple industrial processes.

Our laboratories have modern sampling lines that are maintained at full efficiency, to meet the requirements of each relative standard and [UNI EN ISO 17025](#).

Our Experts are constantly updated on legislation, technical regulations and courses, so that they can carry out their work in complete safety. An incomplete list of the parameters that can be monitored is provided below:

- › Capacity
- › Oxygen, Carbon Dioxide, Nitrogen and Sulphur Oxides
- › Particulate Matter
- › Fraction PM10, PM2.5 respirable dust
- › SOV
- › Total Organic Carbon
- › Metals
- › Inorganic Acids
- › Aldehydes
- › Amines
- › Sulphur Compounds
- › PAHs
- › PCDD/PCDF
- › PCB

Mathematical models of pollutant dispersion and deposition can also be formulated.

## Work Hygiene

LAV laboratories have several years' experience in characterising chemical, physical and microbiological agents in working environments. Data obtained from monitoring can be processed into technical reports, to make them easier to use.

### Chemical Agents

Aerodispersed chemical agent monitoring campaigns, planned and conducted in compliance with the contents of the Standard [UNI EN 689:2019](#).

The obtained data can be processed on specific spreadsheets, to evaluate observance of personal exposure limits for individual SEG (Similar Exposure Groups) in observance of the requirements contained in the Standard UNI EN 689:2019.

### Microbiological Agent

Identification of aerodispersed and surface microbiological contamination (bacteria, fungi, Legionella, etc)

### Physical Agents

Measurements of the following physical agents are taken using certified, technologically-advanced instruments:

- › Noise
- › Vibrations
- › Light
- › Electromagnetic Fields
- › Artificial Optical Radiation
- › Ionising Radiation
- › Microclimate
- › Radon



## Environmental Air Quality Monitoring

Environmental monitoring to characterise external air quality, for comparison with the reference values contained in Legislative [Decree 155/2010](#). The following parameters can be monitored:

- › Meteorological parameters (Temperature, Humidity, Precipitation, Wind Speed and Direction)
- › Total Particulate Matter
- › Fraction PM10, PM2.5 PM1 particulate matter
- › Nitrogen Oxide (NO<sub>x</sub>, NO<sub>2</sub>)
- › Carbon Monoxide (CO)
- › Ozone (O<sub>3</sub>)





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## Contaminated Sites

For the characterisation of contaminated sites, the LAV laboratories offer a wide range of services as required by the [SNPA 15/2018 Guidelines](#), such as:

- › Draining, sampling and SGS testing in compliance with the indications provided in Annex A.
- › Check using hood and trace GAS (Helium) of SGS seals installed previously (Leak Test). This check is conducted prior to Soil Gas sampling.
- › Estimation of CO<sub>2</sub> and COV isoflows from sites being characterised, using accumulation chambers in the field followed by GIS processing of the resulting data.
- › Sampling via DYNAMIC OPEN FLUX CHAMBERS of soil gases in compliance with the contents of Annex B.

Testing methods and the detection limits for each analyte are compliant with the contents of the SNPA 16/2018 Guidelines. A conversation with our specialised technicians is essential in order to find the best solution for correct monitoring.

## Flux Chamber



Should local hydrogeological situations not permit direct measuring of soil gas by using probes inserted into the ground, the interstitial gases can be monitored instead, using a flux chamber. Flux Chamber monitoring entails an estimation of the gas/vapour flow in terms of mass per surface unit in the unit of time ( $\mu\text{g}/\text{m}^2 \cdot \text{min}$ ). The flux chamber isolates a part of the area from external environmental conditions (wind, pollutants). Using this instrument is reliable for measuring Volatile Compounds at the earth-air interface.

Our flux chamber is open-dynamic. The open-dynamic flux chamber consists of injecting a constant carrier gas (Nitrogen 5.0) flow into the Flux Chamber through a distribution tube that ensures its even distribution inside the chamber. The chamber is placed on the ground and sealed by a 5cm-layer of damp sand or dry bentonite around its base. Before actual sampling, "draining" of at least 4 times the volume of the chamber is required, to eliminate the air and achieve perfect soil gas mixing conditions inside the chamber. The following parameters are recorded at regular intervals during draining: Internal and external chamber temperature, concentrations of  $\text{O}_2$  (%),  $\text{CO}_2$  (%),  $\text{CH}_4$  (%), COV (ppm), and  $\mu\text{P}$  (Pa) between inside and outside of chamber, and also atmospheric pressure.



Sampling is conducted using a hollow rod that extends along the entire height of the flux chamber, so that the entire volume can be sampled. It is connected to one of more sampling lines via the outlet. The utmost attention must be paid so that the incoming Nitrogen flow is always higher than the total sampling flow. The concentration of substances searched for in the soil gas can be monitored continuously using analytical field instruments (PID – FID – GC/MS) or by chemical desorption ampoules, thermal desorption ampoules, colorimetric ampoules, Tedlar bags, canisters, etc. An incomplete list of the substances that can be searched for using this sampling technique is as follows: Aliphatic Hydrocarbons, Aromatic Hydrocarbons, Halogen Hydrocarbons, Nitrogen Hydrocarbons, Sulphur Compounds, Aldehydes and Ketones, Mercury, Tetraethyllead, Phenols, Cresols, Ammonia, Amines, PAHs,  $\text{H}_2\text{S}$ , Pesticides, PCB.





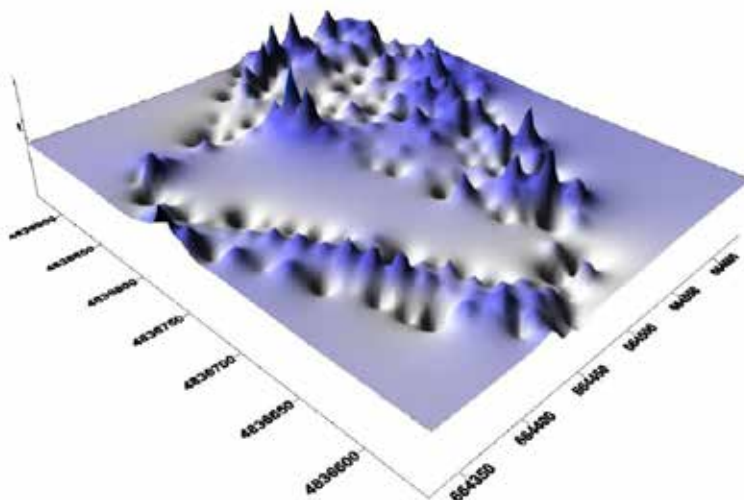
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## Landfill Sites - Diffuse Emissions

Mapping via landfill bed outgoing biogas accumulation chamber. This type of mapping is carried out using a portable flow meter, which measures emissions from the ground based on the accumulation chamber principle, using static not stationary technique. The instrument in question has CO<sub>2</sub>, CH<sub>4</sub>, H<sub>2</sub>S and VOC sensors and continuously measures gas concentrations inside a specific accumulation chamber to obtain an immediate evaluation of the increase rate of said gases. Compared to other methods, the flow meter described can determine flows of CO<sub>2</sub>, CH<sub>4</sub>, H<sub>2</sub>S and VOC from the ground regardless of whether the land characteristics and flow regime are known or not. In fact, no empirical coefficients linked to the land's characteristics are used to determine flow



## Indoor Monitoring

Indoor monitoring to determine chemical, physical and microbiological agents, with production of specific monitoring protocols.

Monitoring can be carried out in rooms or air delivery installations (UTA) to assess function and efficacy of the maintenance service.

Technical inspections can also be conducted on primary air distribution plants.







## Olfactometry

- › Active air sources (pyramid-shaped hood)
- › Passive liquid and solid air sources (open dynamic Flux chamber, Wind Tunnel)
- › The samples for olfactometric sampling are collected in Nalophan bags using a vacuum sampling pump that introduces the air sample directly into the bag without any risk of cross contamination.
- › Continuous odour monitoring systems can be installed, such as electronic noses and automatic odour and other specific substance sampling systems.

A conversation with our specialised technicians is essential to find the best solution for correct monitoring.





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WASTE



## Characterisation

Waste must be characterised in order to classify it. This means determining its characteristics through laboratory testing and the collection of all information regarding the process that generates it, the raw materials used and/or the substances that it has come into contact with, and also the relative safety sheets.

- › Hydrocarbons
- › Metals
- › Solvents
- › Perfluorooctanesulfonic acid (PFOS)
- › Polycyclic Aromatic Hydrocarbons (PAHs)
- › Heating Value (LHV and HHV)
- › Dioxins
- › Persistent Organic Pollutants (POPS)
- › Asbestos
- › Polychlorinated Biphenyls (PCB)







## Final Destination

Characterising waste is not only essential for categorising and identifying the correct waste management, but also to allocate any dangerous characteristics in the case of hazardous waste and to check the suitability of the final disposal or recovery plant, as set out in Ministerial Decree 5/2/98 as amended and in [Legislative Decree 121/2020](#).

- › Leaching Test for Environmental Recovery (Min. Decree 5/2/98)
- › Leaching Test for acceptance to landfill (Leg. Decree 121/2020)



## Classification

Once the waste has been characterised, it is classified based on the criteria set out in:

- › Regulation EU 1357/2014 (which includes the list of characteristics that makes waste hazardous)
- › Decision 995/2014 (containing the list of waste)
- › Regulation EU 1272/2008 as amended (which contains the classification and labelling of substances and mixtures).





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SAMPLING



## Waste

Laboratorio L.A.V. Srl, accredited with the sampling of waste in accordance with Standard [UNI 10802](#), provides consultancy and sampling services for the harvesting of representative samples, in compliance with Sampling Plans in accordance with Standards [UNI EN 14899](#) and [UNI CEN/TR 15310-1](#).



- › Writing and application of Waste Sampling Plans in accordance with Standards [UNI EN 14899:2006](#) and [UNI CEN/TR 15310-1](#).
- › Sampling of liquid, granular, sticky, coarse, monolithic waste and muds in relation to their different physical state, in accordance with Standard [UNI 10802:2013](#).
- › Preparation of test shares and portions from laboratory samples, in accordance with standard [UNI EN 15002:2015](#).





## Underground Soil and Water

Accredited sampling of underground soil and water, in accordance with the UNICHIM Manual n. [196/2:2004](#), Our experts can guide you in drafting Sampling Plans, in choosing the various strategies and the various devices that can be used.



## Marine Sediments

Sampling and analysis of marine sediments in compliance with DM 173/2016.

Our experts will guide you in the drafting and writing of seabed Sampling Plans, in the positioning of sampling points and the taking of representative samples to be sent for chemical and eco-toxicological analysis.



## MPS and EoW

Consultancy, sampling and analysis of waste, fulfilling the requirements set out in various Decrees and Regulations, for the purpose of ending waste status "EoW", pursuant to article 184 ter of [Legislative Decree no. 152/2006](#).

Our experts will guide you in filling out the required documents and in providing technical support for representative sample taking.

## CERTIFICAZIONI



- › ACCREDIA accreditation in compliance with UNI CEI EN ISO IEC 17025
- › Quality Management System certification UNI EN ISO 9001
- › Environmental Management System certification UNI EN ISO 14001
- › Safety in the Workplace Management System certification UNI ISO 45001
- › Enrolment in the Emilia Romagna List of laboratories that conduct HACCP analyses for food companies.
- › Laboratory included on the national list of laboratories authorised to verify fertiliser compliance Decree 27 April 2011.
- › Exxon Mobil qualified laboratory.
- › Laboratory included on the list of qualified ENI suppliers.
- › Laboratory included on the list of laboratories qualified to carry out asbestos testing, pursuant to Ministerial Decree 14/5/96, Emilia Romagna Regional Administration.





AST was established in 2011 by means of a joint venture between two successful laboratories: LTS (one of the few independent laboratories for the analysis of food accredited in Turkey according to the standard ISO/ IEC 17025) and L.A.V s.r.l. Located in Rimini, Italy (one of the most successful Italian laboratories in testing and environmental monitoring, with more than twenty years of experience).

The laboratory AST is authorised to offer a wide range of services, including:

- › chemical and chemical-physical and toxicological testing of: soils, sludges, sediments, surface water, groundwater and process water, wastewater and waste
- › measurements of atmospheric emissions produced by industrial sites and combustion plants
- › measurement of emissions into the atmosphere to check air quality
- › measurement of chemical and physical agents in working and living environments (in accordance with safety in the workplace regulations)
- › measurement and evaluation of environmental noise

Nel 2012 è stata ottenuta la certificazione della direzione generale per la gestione ambientale del Ministero dell'ambiente e dell'Urbanizzazione e da Turkak (sistema nazionale per l'accreditamento dei laboratori) come laboratorio operante secondo la norma TS EN ISO/IEC 17025:2005 "Requisiti generali per la competenza dei laboratori di prova e di taratura"



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