



STATE GENERAL LABORATORY



REPUBLIC OF CYPRUS

STATE GENERAL LABORATORY

Annual Report 2017

Abridged Version



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Excellence. The foundation to a better quality of life.

INTRODUCTORY NOTE

by the Director of the State General Laboratory

Dear readers,

I am delighted to present to you the Annual Report of the State General Laboratory (SGL), which illustrates the wide scope of activities that the management team and the staff have completed with a deep sense of responsibility, during 2017.

The assessment of the work of the SGL for 2017 demonstrates a steady and continuous effort to implement national strategic objectives to protect public health, the environment, citizens' safety and consumer interests.

The SGL, both as a Public Service Department and at the same time as an accredited scientific research center, through the continuous development of innovative and modern methodologies and approaches, in the framework of its strategic objectives and priorities, managed to further upgrade its services, and in parallel to evolve scientific knowledge and to improve its experience in the areas of its competence.

2017 was another year with many challenges to which the SGL managed to respond effectively, as well as to the requests of the competent authorities in different Ministries and Municipalities, to meet the requirements of official controls in the areas of safety and quality of food, the environment (including drinking water), consumer products, and forensic chemistry, by conducting a significant number of controls targeted at prevention. At the same time, it managed to absorb national and European funds for applied research. The improved coordination and utilisation of all possible forms of cooperation and financial resources have emerged as key elements to meet the official control requirements.

Furthermore, in the framework of the Public Sector Administrative Reform and the new Public Finance Management System, the SGL prepares both its strategic planning and its budget on the basis of its activities. For this purpose, it calculates its performance indicators for better, timely monitoring, implementation and final evaluation of its performance.

The most important events, among others, that marked the work of the SGL in 2017 are:

- a) its active participation in the realisation of the "Cyprus Chairmanship Committee of Ministers of the Council of Europe (November 2016 - May 2017)" with the successful co-organisation in Cyprus of two European scientific symposiums / workshops,
- b) the award of two of its posters, among the best, during the "Eurachem International Scientific Workshop",
- c) the start of its participation in new EU research projects (e.g. Human biomonitoring, Detection and identification of biological toxins, Identification of the authenticity of traditional and local products of Cyprus and the North Aegean-Greece),
- d) its active contribution to the dietary risk assessment at European and national level,

- e) the expansion of official controls to cover new parameters and categories of products,
- f) the extension of the scope of its accreditation as regards international standard EN ISO / IEC 17025: 2005 to new methods and new parameters,
- g) its contribution to the effective response of nutritional or other emergencies/crises, the tackle of antibiotic resistance, the standardisation of Cyprus traditional products, etc., and
- h) the continuation of official controls for identifying and withdrawing inappropriate food and other consumer products from the Cyprus market, as well as their introduction into it.

The SGL is now a scientifically mature accredited organisation that contributes to the socio-economic development of the country and the improvement of the quality of life of the Cypriot citizen. At the same time, it can and should contribute to further highlighting the role of Cyprus in the scientific activities of the European Union; that is why it continues its efforts in identifying itself as a "Center of Excellence".

To this end, a significant factor will be the construction of the new building of the SGL, with the inclusion in the state budget of 2018 of a relevant financial allocation for the completion of the building until 2023.

In order to carry out its work and achieve its goals, the SGL has the constant support of the Director General of the Ministry of Health and the Minister of Health, whom we thank, as well as the other collaborating authorities and partners.

Through its vision, the goals achieved and the actions undertaken, with the dedication, diligence and accountability of its staff, to which I express my deepest gratitude, I consider 2017 as a year of success for the SGL with a positive impact on society and the economy of the country.

I hope that this publication will provide a source of valid information for all competent authorities and more generally for all citizens in order to build a relationship of mutual trust and loyal cooperation based on scientific objectivity and transparency.



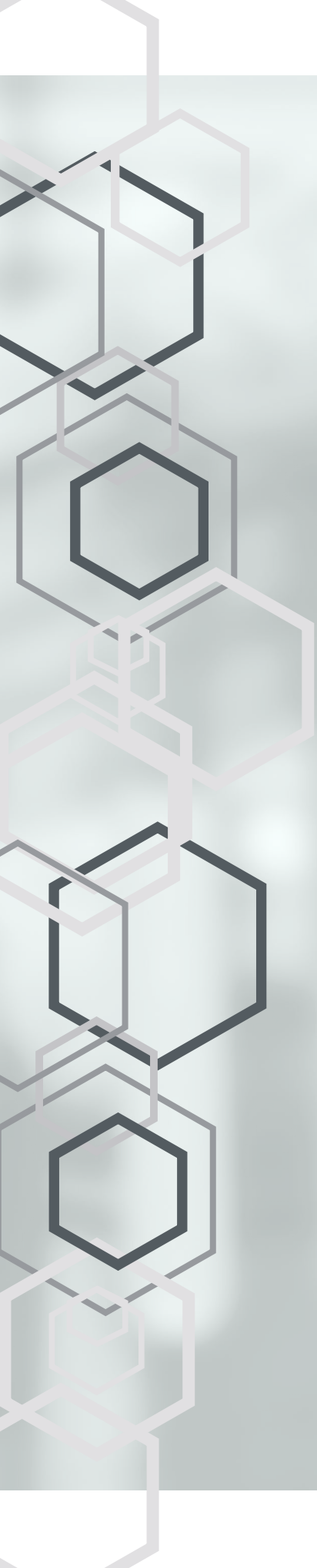
Dr Stelios Yiannopoulos
Director of SGL

Excellence. The foundation to a better quality of life.



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ABOUT THE SGL

GENERAL SCOPE AND RESPONSIBILITIES

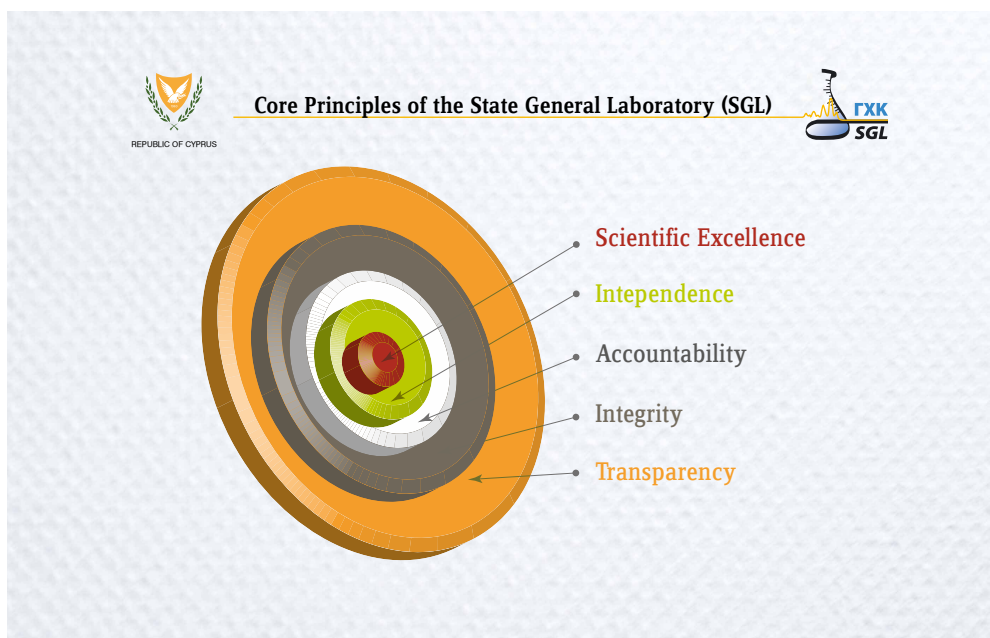
The State General Laboratory of Cyprus (SGL) is one of the five independent Departments of the Ministry of Health. It is the main official laboratory for the chemical / biological / microbiological / toxicological and radiological control and the official **National Control Centre** for foodstuffs, water, environment, pharmaceuticals, cosmetics, various consumer goods, controlled drugs and other police exhibits. This wide scope of responsibilities is covered under 21 specialised laboratories and five Units.

All laboratories under the SGL are accredited according to the European Standard EN ISO/IEC 17025:2005 in the areas of its competence.

It is also the National Reference Laboratory for several food safety sectors.



The activities of the SGL, a non-conflict of interest organisation, governed by the principles of scientific excellence, independence, integrity, accountability and transparency, ensure compliance with the Public Service Law, as well as the fulfillment of citizens' expectations.



Under the support and configuration of National Policy, within the framework of its responsibilities, the SGL's staff serves on many National Council Boards (Food, Pharmaceuticals, Cosmetics, Plant Protection Products and Biocides, Veterinary Medicines, Chemicals,) as well as the Cyprus National Addictions Authority, the Food Safety Council, and also in National Committees (e.g. Environment and Children's Health, School Canteens, Natural Mineral Water, Environmental Impact, Reduction of Drugs Supply, Drugs Legislation, National Centre of Information on Narcotics, Veterinary Drugs Register, ECOLABEL, UN-Children Rights on Health).

It is also the National Representative in the **Advisory Forum** of the European Food Safety Authority (EFSA) and the **National Focal Point** of EFSA, and the World Health Organization (**WHO**)-Europe on **Environment and Health**.

Through this active involvement, the SGL contributes to the revision, modernisation and harmonisation of legislation, and the formulation of policies / strategies related to its competences, not only at a national but also at European level. Its constant contribution to the revision of food legislation and the legislation on Drugs and Psychotropic Substances for the integration of new synthetic drugs has been significant.

VISION AND MISSION

The **vision** of the SGL is to substantially contribute to the improvement of quality of life by providing reliable and high quality services through the organisation's continuous development and excellence.

Based on this vision, the SGL has been continuously widening its **mission** to include:

The provision to the Authorities and the citizens of high quality services and independent opinions, through innovative administration procedures and technology.

The SGL's motto, "Excellence. The foundation to a better quality of life", has been guiding the organisation, based on its vision and mission, towards the following strategic objectives:

1. To safeguard public health and the environment, citizen's safety and consumers' rights mainly through prevention.
2. To facilitate fair trade and competitiveness.
3. To respond promptly and reliably to new obligations, emerging problems and crisis incidents.
4. To promote applied research to prevent or solve emerging / existing problems.
5. To contribute to the legislative process and policy making.
6. To strengthen networking and enhance expertise.
7. To scientifically support the judicial and police authorities.

To fulfill its mission, the SGL operates at many levels:

- It ensures quality, reliability and accountability through its accreditation by EN ISO / IEC 17025:2005 and by embedding the value of quality at all levels of the organisation, while implementing the model of the Common Assessment Framework Programme (CAF) with benchmarking towards excellence.
- It promotes new approaches at the managerial and technical levels and elaboration of its services, while keeping abreast of European and international developments and requirements.
- It collaborates with all public sectors and respective EU Organizations and Committees.

- It continuously develops and implements:
 - new preventive and targeted national control programmes,
 - a holistic and interdisciplinary approach, which reflects upon the design of monitoring, surveillance, control and research programmes with added-value and synergistic efficacy, and
 - risk assessment for food and water safety (chemical, microbiological, biological).
- It enhances productivity by implementing modern technologies and multivariate control methods by fully utilising the manpower, equipment and available financial resources.
- It attracts young scientists with high academic qualifications through the implementation of applied research projects while utilising local and EU funds to solve existing problems and prevent emerging risks.
- It strengthens international networking and collaboration with universities, European research centers and relevant bodies to promote the exchange of scientists, joint research projects, technology transfer and other common actions towards development.
- It contributes to academic activities by investing in capacity building of post-graduate students who undertake research projects at the SGL in collaboration with European and Cyprus universities.
- It invests on staff training and expertise.
- It disseminates information and knowledge through educational programmes to the relevant stakeholders and to the public at large.
- It provides expertise and advice and works as a technical consultant/advisor for public authorities or as third member.
- It facilitates the execution of a wide range of laboratory tests as well as the solution of complex scientific and technical issues, through its modern laboratory equipment and its well-trained staff.

THE SGL IN NUMBERS IN 2017

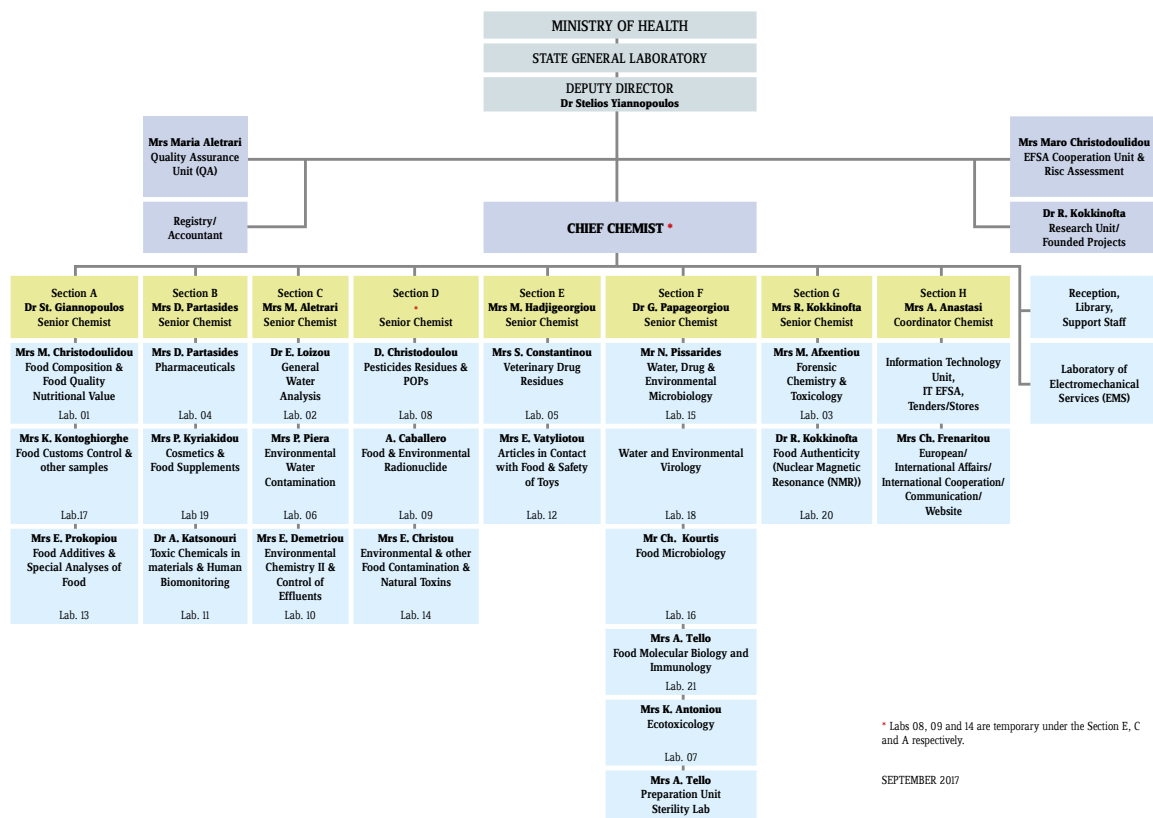


ORGANISATIONAL STRUCTURE

The SGL has its own organisational structure, the Director and the Heads of Sectors comprising the management team, as shown in the 2017 Organisational Chart below. The SGL's wide range of analytical work is covered by 21 Laboratories that fall under eight sections which are being supported by the following five Units:

- Cooperation with EFSA and Risk Assessment Unit
- Quality Assurance Unit
- Research and Funded Projects Unit
- Information Technology Unit
- European / International Issues, International Cooperation & Communication Unit.

The following services assist the SGL in its day-to-day operation and implementation of its work: Registry, Stores, Library, Secretariat, Accounts and Electromechanical Services.

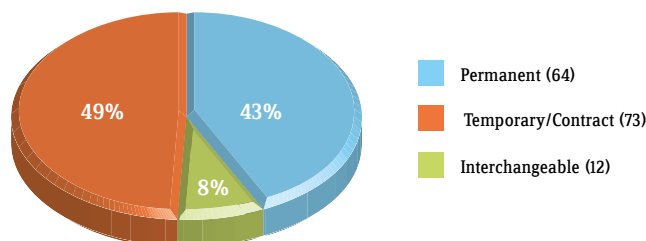




HUMAN RESOURCES

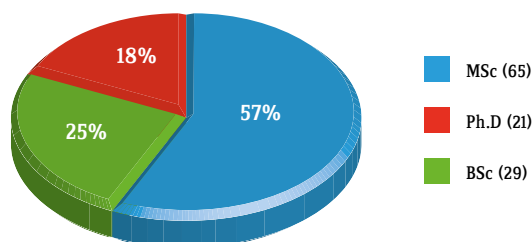
During 2017, the SGL's staff comprised 171 persons in total:

- 64 Chemists, Microbiologists / Biologists, four clerks and five persons from other departments as well as 22 support staff, in permanent positions.
- 46 Laboratory technicians with high academic qualifications (such as Chemists and Microbiologists / Biologists) as well eight clerks were employed on contract.
- 27 Chemists / Microbiologists / Biologists, including a Data Base expert and an Executive Assistant for managing research programmes were employed on contract for the completion of the research projects.



SGL's staff at all levels - 2017

It is also worth noting that out of the 113 scientists, 86 (75%) held at least one postgraduate degree and several of them had a PhD.



SGL's Scientific Staff - 2017

RESEARCH

APPLIED RESEARCH

Applied research is an important pillar of the continuous scientific and technological development of the SGL. Research carried out contributes towards problem solving and prevention as well as supporting policy decisions and legislation, while boosting socioeconomic growth. The main areas of research cover especially food safety and quality, food authenticity and geographical origin, water, environment and health, as well as narcotics.

Research is carried out primarily with EU funds but also with national funds by the Research Promotion Foundation and the Ministry of Health. During 2017, the SGL utilised €416,632 from national and EU funds for research programmes.

The results of these research activities have been presented in international conferences and published in international, well-established, scientific journals and magazines, as well as on the SGL's website and in the local mass media for keeping updated both the scientific community and the public at large.

In 2017, the SGL started or continued the following **25 research projects** / studies:

a) EU Research programmes funded by the European Food Safety Authority (6)

1. **"Support to national dietary surveys** in compliance with the EFSA Guidance on General principles for the collection of national food consumption data in the view of a pan-European dietary survey"- **LOT1 (children)** (2013 - 2018).
2. **"Support to national dietary surveys** in compliance with the EFSA Guidance on General principles for the collection of national food consumption data in the view of a pan-European dietary survey"- **LOT2 (adults)** (2013 - 2018).
3. **Pilot project on the implementation of the SSD2 Food Classification System**, in the frame of the electronic transmission of harmonised data collection of analytical results (veterinary residues) to EFSA (2015-2017).
4. **EFSA Multi-Annual Focal Point Grant Agreement** (2015-2018).
5. **"Risk characterisation of Ciguatera food poisoning in Europe"** signed under Framework Partnership Agreement GP/EFSA/AFSCO/2015/03 for the "Evaluation of ciguatoxins (ctxs) in seafood and the environment for the risk assessment of ciguatera fish poisoning (cfp), with the consequent obtainment of reference material" (2016-2020).
6. **Strategic Partnership with Cyprus on Data Quality** - GP/EFSA/DATA/2016/01 - GA 02) (Pilot Project) for the improvement of the process of collecting and sending data from Member States

to EFSA in terms of their quality, which is measurable, and their governance at national level (2017-2018).

b) EU Research Programmes funded by the Research Promotion Foundation, FP7, Horizon2020, Interreg (6)

1. **"METAWATER:** New metagenomics and molecular based tools for European-scale identification and control of emergent microbial contaminants in irrigation water" (2014 - 2017).
2. **"EuroMix: Horizon 2020 EU project:** Assessing the health risks of combined human exposure to multiple food-related toxic substances" (2015 - 2019).
3. **"European Human Biomonitoring Initiative (HBM4EU)"**. The aim of the project is to provide scientific support for the safe management of chemical substances and the protection of human health by using biomonitoring studies to understand the exposure of humans to chemicals and the resulting health effects. The results are used in policymaking, in the assessment of existing measures and in the design of new policies (2017-2021).
4. **"Implementation Plan", Horizon - Customs 2020.** The objective of the EU Customs Laboratories experts (CLET) is to collect and exchange specific analytical experiences of EU Customs Laboratories (CLEN) at EU level (2017-2019).
5. **"EuroBiotox"** - European programme to establish validated procedures for the detection and identification of biological toxins (2017 - 2022).
6. **"AGROFOOD"** (2017-2019): The aim of the project is to highlight traditional and local products of Cyprus and the North Aegean through identification of their authenticity, and enhance their competitiveness.

c) National Research Programmes

- i. Pilot research programmes funded by the Ministry of Health (11).
 1. Determination of sweeteners in beverages and other foodstuff, energy reduced or with no added sugar.
 2. Survey of sugar content on foodstuffs consumed mainly by children (i.e. fruit yoghurt, breakfast cereals, deserts etc.).
 3. Optimisation of the New Psychotropic Substances Detection Method.
 4. Evaluation of cosmetic products safety for children and adolescents.
 5. Method validation for the determination of gross alpha and gross beta activity in drinking water using low-level alpha and beta Gas Proportional Counter.
 6. Determination of compounds which are included in the Directive 2013/39/EE by the use of LC-MS-MS.

7. Control of industrial products from the Cypriot market for chemical safety or flammability.
 8. Development and evaluation of methodology for the determination of mycotoxins - Ergot Alkaloids in cereals (rye and flour) and their products by LC-MS/MS technique.
 9. Monitoring and surveillance of the levels of Polycyclic Aromatic Hydrocarbons (PAHs) in traditionally smoked meat and fish and their products by HPLC-FLD.
 10. Application of molecular methods to water samples from state hospitals for the detection of Legionella species.
 11. Determination of specific migration of Al, Ba, Co, Cu, Fe, Li, Mn, Zn from plastic materials and articles in acetic acid food simulant.
- ii. Continued its participation in the ongoing project "Monitoring of the enrichment of Ezousa ground water".
- iii. "Prospects for the cultivation of stevia in Cyprus": A new three-year research programme which has been launched in collaboration with the Agricultural Research Institute of the Ministry of Agriculture, Rural Development and Environment, for the determination of glycosides and the development of a methodology for the antioxidant properties of stevia leaves (2017-2019).

DEVELOPMENT POLICY AND STRATEGY

In the context of the Administrative Reform of the Public Sector, the SGL has modified its strategic plan and connected it with its activities for implementation. At the same time, it has revised its performance indicators which have now been linked to the more effective monitoring of budget implementation, in connection with its strategic planning.

The development policy and strategy of the SGL is based on its vision and mission and it sets the organisation's priorities which aim towards:

- its development as a Centre of Excellence and Regional Reference Centre in the areas of its competence (food quality and safety, pharmaceuticals, consumer products, environmental protection and crime investigation),
- its significant contribution, as a counsellor of the State, in responding promptly and in a reliable manner to crises and problems that cover areas under its remit, having an active, scientifically robust and meaningful role in the implementation of the National Strategy,
- its contribution, through its scientific work, to the economic and social development of the country, and

- its sustainability, as a high quality and state-of-the-art centre of integrated services, expertise and applied research whose scientific contribution can be classified among the best in Europe.

COOPERATION

NATIONAL COOPERATION

In order to achieve its objectives, the SGL cooperates at **national level** with almost all Ministries and competent Authorities, municipalities, governmental and other organisations, universities and institutions. It also offers paid services to individuals.



EUROPEAN / INTERNATIONAL COOPERATION

The SGL also expands its **European and international cooperation** so as to improve even further its scientific progress, to enhance capacity building and exploit sources of external funding. Through this cooperation, there is an exchange of knowledge and experience with other EU Member States and countries. At the same time, the SGL has the opportunity to demonstrate the activities and skills of a small Member State and its adaptability to cope with new requirements and challenges.

In 2017, the SGL actively participated in the following **European Bodies/ meetings / networks / programmes/ studies**:

- **European Food Safety Authority (EFSA)**
 - Advisory Forum (AF)
 - Focal Point (FP)
 - Communication Experts Network (CEN)
 - Working group on Food Consumption and Exposure Data
 - Expert networking groups for Pesticide Residues Monitoring, Emerging Risks Exchange Network (EMRISK)
 - Scientific Networks: Chemical Occurrence Data, Nanotechnologies in Food & Feed, Food Contact Materials, Veterinary Medicine Products Residues, Microbiological Risk Assessment, Risk Assessment of GMO's (Food & Feed), etc.
- European Reference Laboratories (EURL-NRL) meetings.

- Collaborative studies on standardisation of methods (ISO) under the coordination of the competent EURLs.
- EU Comitology expert groups and Standing Committees.
- **"Customs 2020" Programme:**
 - EU Customs Laboratories European Network (CLEN) for harmonisation and joint actions, and Working Groups of the Programme (Actions 1 to 6).
 - EU Customs Laboratories Expert Team (CLET) on a programme to collect and exchange specific analytical experiences at EU level.
 - EU Customs Working Groups (CLEN) Project Group on Compliance Assessment, Use of Precision Data and Statistics.
- EU Customs Laboratories Working Groups dealing with new psychoactive substances.
- European Network of Forensic Science Institutes (ENFSI) for drugs, arson, gunshot residues and explosives.
- Expert Working Group on Analytical Methods of the European Chemicals Agency (ECHA).
- Network of Official Medicines Control Laboratories of the Council of Europe (EDQM-OMCL) in cooperation with the European Medicines Agency (EMA), and other subcommittees of the Network.



Furthermore, in 2017, the SGL:

- **Continued participation** in the following:
 - The evaluation of EU research proposals for funding and in the Programming Committee of the "Horizon2020" (Food Security, Sustainable Agriculture, Marine, Maritime and Inland Water Research and Bio-monitoring) for research, etc.
 - The Scientific Committee of the Ministry of Health for the development of a strategy for research, and the approval of applications for applied research within the various departments of the Ministry.
 - The integration, enrichment and extension of the "European Bank for the Isotopic Characteristics of Wines" (as scientific coordinator of Cyprus and Greece), coordinated by the EU's Joint Research Centre (JRC) in implementation of Regulation (EC) 555/2008.
 - The Working Groups of the Council of the EU for the formation / modification of the European legislation.
- **Coorganised in Cyprus** the following European/ international symposiums/ network meetings:

- **Third Symposium for the Official Medicines Control Laboratories on "Combating Counterfeit and Other Illegal Medicines"**, in the context of the "Cyprus Chairmanship Committee of Ministers of the Council of Europe (November 2016 - May 2017)". The symposium covered new challenges on combatting counterfeit and other illegal medicines. Special focus was given on recent developments in the pharmaceutical legislation and regulation of medicines with respect to falsified medicines, new phenomena in falsifications of medicines, advance techniques for the detection of falsifications and the challenge of getting more countries on board the "Medicrime Convention" (28-29 March 2017).



- **"15th meeting of the Official Cosmetics Control Laboratories (OCCL) Network"**, within the context of the "Cyprus Chairmanship Committee of Ministers of the Council of Europe (November 2016 - May 2017). Experts on cosmetics presented and discussed their activities concerning policy and technical issues and set up their future plans (30-31 March 2017).



In terms of **international cooperation**, the SGL continued participation in the following:

- The Codex Alimentarius, the FAO and the WHO discussions in areas of its competence.
- WHO's "Environment and Health Process", as the National Contact Point of the Ministry of Health.
- The International Association of Forensic Toxicologists (TIAFT) working groups.
- The International Network of Analytical Laboratories for the Measurement of Environmental Radioactivity (ALMERA).

- International conferences with presentations of scientific papers.
- The evaluation of research papers (reviews) for their approval for publication in international reputable journals or books.

The SGL also participated actively in the **Eurachem Scientific Workshop on "Uncertainty in Qualitative and Quantitative Analysis"**, organised by the Pancyprrian Union of Chemists (PUC) on the occasion of the Eurachem Week, in conjunction with the Eurachem General Assembly 2017 (29-30 May 2018).

FINANCIAL RESOURCES AND BUDGET

Expenditures incurred by the SGL in 2017 amounted to €7,607,853 (93% implementation) (93% of the Ordinary Budget and 93% of the Development Budget).

RELIABILITY AND EFFICIENCY

The efficiency and reliability of a dynamically evolving Institution are fundamental conditions for its stability and growth. As a result of long lasting efforts, the SGL has been able to simultaneously apply two quality management systems in order to guarantee a more integrated approach:

- a) **International standard EN ISO / IEC 17025:2005:** Since 2002 the SGL has been accredited with this standard by the Greek Accrediting Body (ESYD), and since 2015 it has been accredited by the National Accreditation Body ("The Cyprus Organisation for the Promotion of Quality (CYS-CYSAB)") - within the context of Regulation (EC) No. 765/2008,

and

- b) **Common Assessment Framework (CAF):** It is also one of the first services in Cyprus and the rest of Europe that started in 2005 the implementation of CAF, a system through which an organisation carries out self-evaluation and sets benchmarks for its performance.



To achieve the efficiency and reliability objectives it has set, the SGL has focused on the following:

- **Quality Assurance - Accreditation System**
- **Implementation of Quality Management System**
- **Implementation of the Common Assessment Framework (CAF)**

- **Development and implementation of the Eco-Management and Audit Scheme (EMAS) which covers environmental factors**

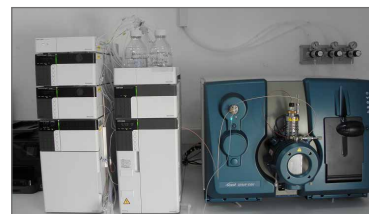
OBJECTIVES FULFILLED IN 2017

- **Expansion of the control, monitoring and surveillance plans:**

Full implementation of the monitoring/surveillance/control programmes (in all 61) covering a total of **26,479** samples with **493,906** parameters in 2017 (compared to 2016 where 26,331 samples were analysed with 544,495 parameters tested). The fact that the number of parameters is slightly lower than in 2016, is due to:

- a) the change of sampling methods in some categories (eg. Cannabis),
- b) the implementation of stricter legislation, and
- c) the reduction of incidences (eg. Cocaine), and crises (nutritional, environmental, etc.) as a result of more targeted controls by the SGL in cooperation with the competent Authorities.

The SGL continues to use multi-residual methods that analyse more parameters with fewer samples while giving a more representative picture of the sample's situation and more effective control at a reduced cost, and to cover new parameters on a prioritisation basis.



- **Human Resource development through trainings and educational programmes (15)**
- **Infrastructure development and advancement of laboratory equipment** (a total of €430,000 was spent in purchasing state-of-the-art equipment or renewal of old equipment. In addition, an amount of €370,000 was spent by the Ministries of Justice & Public Order and Transport, Communications & Works for the purchase of Narcotest equipment).
- **Enhancement of dietary risk assessment capacity** with the use of its own deterministic model, "ImproRisk", to assess the risk from several substances (such as Lead, Cadmium, Mercury, Nitrates and Aflatoxin B1, and in 2017 acrylamide and polyaromatic hydrocarbons (PAHs) on food - the results were satisfactory and in line with EFSA's respective risk assessments for Cyprus), and through the participation in EFSA's project "EU Menu".
- **Further development of the Information Technology (IT) Unit's capacity** and ability to technically respond to: a) EFSA programmes (technical support for four EFSA programmes), b) EFSA requirements (data transmissions), c) enhancement of the LIMS system to improve the quality of the data, and d) contribution to the Cyprus "OPEN DATA" platform.

- **Effective contribution and support for the national policy / strategy** in areas of its competence, among others, through its participation in relevant national Councils (10)-including "Food Safety Council", national Committees (10) and Technical Committees & Working Groups (5).



- **Communication / Dissemination of knowledge and information** via specific publications (leaflets (2) and press releases) / website / interviews to mass media (9)/ educational workshop for journalists/ lectures and presentations in workshops/ meetings (34).

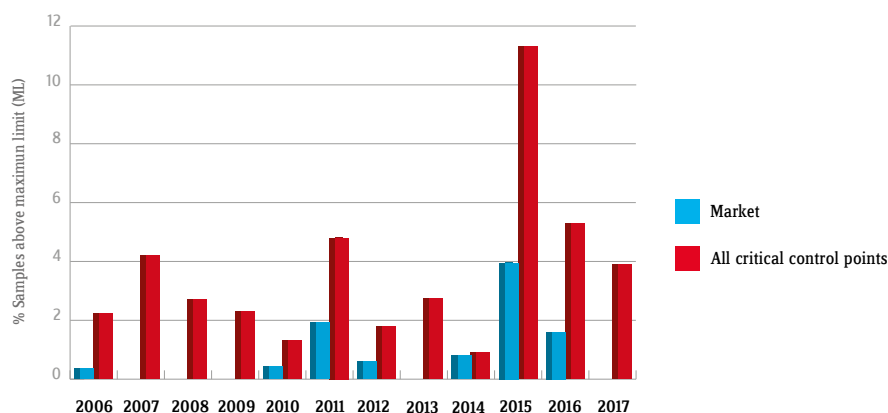
ACHIEVEMENTS - AWARDS

ACHIEVEMENTS-IMPLEMENTATION OF ACTIVITIES AND PROGRAMMES

During 2017 the SGL achieved the following:

A. Great effectiveness in detecting non-compliant:

- **foods**, preventing their entry from third countries and EU member states into the Cyprus and EU market (e.g. nuts, vegetables, fish), by using appropriate preventive and effective control programmes at critical control points (e.g. imports check points), and



Aflatoxin control of nuts (2006-2017)

- other **consumer products**, identifying and withdrawing inappropriate consumer products from the Cyprus market (e.g. glues, toys) and communicating them to the EU Rapid Alert System for dangerous non-food products (RAPEX).

B. Extension of the scope of its accreditation as regards international standard EN ISO / IEC 17025: 2005 to new methods and new parameters, and computerisation of its Quality Management System.

C. Expansion of the official controls to cover new parameters or categories, despite budget constraints on consumables, such as:

Foodstuffs area:

- Synthetic sweetener sucralose in soft drinks
- Synthetic antioxidants BHA, BHT and tBHQ in mayonnaise
- D-pinitol (a bioactive compound of carob) in Cypriot carob syrup
- New imported foodstuffs such as drinks, food for special medical purposes, flavoured drinks, food supplements from milk and whey permeates etc. for customs classification (Meursing code)
- Milk fat (butyric acid) in cases where milk protein is greater than 30% and milk fat less than 6% (e.g. in whey dietary supplements)
- Polycyclic aromatic hydrocarbons (PAHs) in smoked meat products, smoked fish and smoked fishery products
- β -agonists in animal liver
- Testosterone and Estradiol in animal blood
- Microbiological quality of frozen ravioli and spring rolls, packaged sesame and desiccated coconut, and spreads from supermarkets delicatessens
- Specific migration of metals (Al, Ba, Co, Cu, Fe, Li, Mn, Zn and Ni) from plastic materials and articles in an acidic food simulant
- Specific migration of Primary Aromatic Amines from plastic materials and articles of polyamide, in an acidic food simulator, by the technic LC-MS-MS
- Authenticity of fish (tuna and salmon) in terms of genus or species by using molecular methods
- Authenticity of carob and carob products by using FT-IR/NIR spectroscopy and chemometrics

Environment and Water area:

- Gross alpha activity airborne particulates in the atmosphere
- Ruthenium-106 (Ru-106) in airborne particulates in the atmosphere

Consumer Products area:

- Flammability test in children's nightwear and in toys intended to be entered by a child such as toy tents and play tunnels

- Banned preservative isopropyl-paraben in cosmetic products
- 1,2-dichloroethane in adhesives

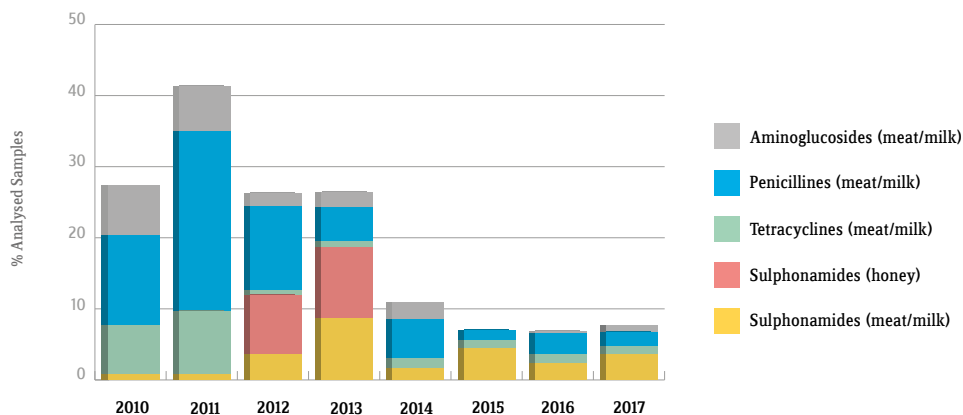
Forensic Chemistry and Toxicology:

- Detection of controlled drugs and other drugs in oral fluid
- Detection of six new synthetic drugs for the first time in Cyprus

D. Prompt and effective response to food, environmental and other crises / incidents that occurred in 2017, such as:

- Contribution to the combat of food fraud by controlling a number of samples such as honey and olive oils.
- Contribution to the obstruction of the sale of alcoholic beverages made from cheap substitutes, as authentic alcoholic beverages (e.g. rum).
- Contribution to the obstruction of the sale of rainbow trout (*Onchorhynchus mykiss*), as Atlantic salmon (*Salmo salar*), which is more expensive.
- Scientific support to the Police as regards the management of serious and major cases involving drugs.
- Contribution to the detection of the explosive substance TATP in a serious case related to drugs.
- Collection and transmission of information on new psychoactive substances to the European Monitoring Centre for Drugs (EMCDDA), for the purpose of risk assessment of new psychoactive substances.
- Contribution to the investigation of six murder cases.
- Response to 53 incidents of hospitals' Emergency and Intensive Care Departments.

E. Continuous contribution to tackling Antimicrobial Resistance (AMR), with the intensive control of products of animal origin for antibiotics residues.



Distribution of non-compliant samples of animal product origin for antibiotics over the years 2010-2017

F. Extension of the "Isotopic Mapping of Cyprus Food and Drinks" to create databases, in order to certify their authenticity which contributes to their registration and promotion and facilitates the control of the Cyprus market.

G. Continuous contribution, through the systematic microbiological monitoring of marine waters it carries out, towards the classification of Cyprus waters among the cleanest bathing waters in the EU in recent years, within the framework of Directive 2006/7/EK and the "Blue Flag" EU programme.

H. Strengthening and effective expanding of ammunition controls by the National Guard Laboratory, which has been set up and scientifically supported by the SGL since 2014, by: a. the completion of over 1,678 samples controls (2014-2017) and b. its successful accreditation as regards international standard EN ISO / IEC 17025: 2005.

I. Continuation of its participation in the project "Black Gold: Analysis of carobs and carob-based products", of the University of Cyprus which aims to boost carob production growth in Cyprus and to promote carob products with nutritional added value. In this context, two theses have been drafted at the SGL in 2017. Alongside, the SGL contributed to the preparation of the research proposal "Black Gold: When Science meets the Industry", which was submitted for funding by the Research Promotion Foundation.

J. Contribution to the standardisation of traditional carob products (e.g. carob syrup) and new products (e.g. alcoholic beverages) for the purpose of their registration as Protected Geographical Indication (PGI) products, through the study of their physical, chemical, isotopic and organoleptic characteristics and the gathering of evidence proving the link with their botanical and geographical origin.

K. Substantial contribution to EFSA actions, within the context of Dietary Risk Assessment in particular, in cooperation with EFSA. More specifically the SGL, using its "Improrisk" deterministic model for dietary risk exposure of the population at individual level, conducted dietary risk assessment for the Cypriot population (adolescents) exposure to chemicals (in 2017, to acrylamide and PAHs).

L. Continuation of the implementation, from December 2014 till February 2018, and in cooperation with the national "Research and Education Institute of Child Health", of the first official national dietary survey according to EFSA requirements. "The National Dietary Survey of the Cyprus population (Lot 1 & Lot 2)", covers all ages from infants to 74-year-old people, including pregnant women. The survey's objective, carried out in the framework of the "EU MENU" project of EFSA, is the harmonised collection of food consumption data in the EU Member States for calculating the exposure of the population to chemical and other hazards through food. Its ultimate goal is the use of these data in risk assessment studies for the Cypriot population exposure to various chemicals through food.



M. Publication of the Cyprus Pollen Atlas (CPA) in collaboration with the Department of Agriculture, which identified the morphology of the pollen of 120 Cyprus honey plants. Pollen analysis can confirm the botanical and geographical origin of bee products (i.e. honey and bee pollen). The CPA is available online at the SGL's as well as the International Honey Council's website.

N. Coordination at national level of the five-year Joint Research Programme called HBM4EU (1/2017 - 1/2021), the new European initiative on Human Bio-monitoring (HB). The SGL also has the role of the contact point at European level to prepare communication materials for the participants, as well as the partner for the preparation of a sustainable HB programme in Europe. In 2017, the SGL contributed to the preparation of 23 project deliverables.

O. Publications (five in total) in reputable international journals of the results of research projects on the following subjects: a) the harmonized collection of analytical data and their electronic transmission to EFSA, b) the monitoring of pesticide residues in drinking water, surface and groundwater in Cyprus, c) the results of the official control of mycotoxins in nuts and cereals according to the requirements of the EU, d) the study of isotopic and elemental indicators of authenticity in Cypriot wines and e) the biodiversity and ochratoxin A profile of *Aspergillus* section *Nigri* populations isolated from wine grapes in Cyprus vineyards.

P. Participation in 25 research programmes: 11 programmes were funded by the EU (six by FP7, Horizon 2020, the Research Promotion Foundation and Interreg, and six by EFSA), 11 pilot research programmes were funded by the Ministry of Health and two from other national sources.

AWARD

Two scientific posters of the SGL's "Laboratory of Pesticide Residues and POPs" were awarded among the best three, during the Eurachem Scientific Workshop held in Nicosia in May 2017: a) Multi-residue analysis of pesticide residues in fruits and vegetables, and b) Study of the validation and calculation of measurement uncertainty in the determination of chlorides in food and water.



FUTURE GOALS

The SGL seeks to substantially respond to the continuous scientific challenges, the new requirements of the EU legislation and the various emerging issues while having as a driving force for the accomplishment of these targets its highly professional and dedicated staff.

Based on the above, the following future goals have been set by the SGL:

1. Response to increasing monitoring and control requirements in areas of its competence and continuous improvement of its services.
2. Continuous development of its human resources and completion of its reorganisation, which is pending due to the hiring freeze imposed by the Government, and consolidation of its scientific excellence with permanent scientific staff.
3. Provision of timely, reliable, scientifically based information to the competent Authorities, the Parliament, the media, various stakeholders and the public at large.
4. Expansion and support for the following:
 - Targeted educational programmes for all stakeholders, including the private sector, with the aim of protecting public health through prevention and improving the socioeconomic development of the country.
 - Networking with European centers of excellence and research institutes and organisations, with the aim of enhancing its scientific role at the EU level.
 - Establishment of the SGL as a Centre of expertise and excellence at a national, regional and European level.
5. Further strengthening of the following:
 - Coordination and collaboration between competent Authorities for more efficient and effective official controls.
 - Food Safety Council's (FSC) activities, especially with the continuous improvement of its "Improrisk" deterministic model for the food risk assessment of the population at individual level, as well as with the required risk assessment studies and better exploitation of the results of official controls.
 - Cyprus National Addictions Authority activities.
 - Applied research mostly through utilisation of EU funds (Since 2004 the SGL has already absorbed a total of €8.6 millions).
6. Completion and exploitation of the results of the first official national pancyprian dietary survey in the framework of the "EU MENU" project of EFSA; its data are to be used in risk assessment studies for the Cypriot population exposure to various chemicals through food.

7. Strengthening of the cooperation with relevant competent Authorities to initiate the construction of the SGL's new building. A new building will reflect its high scientific level as a center of expertise and excellence at the national, regional and European level.
8. Upgrading and extending of the existing Laboratory Information Management System (LIMS).
9. Continuous improvement of its credibility, transparency and responsiveness to crises with the aim of preserving the confidence that every Cypriot and European citizen has in the SGL.

MAIN AREAS OF ACTIVITY

The wide range of the SGL responsibilities and competences is covered by the following four wide areas: **Foodstuffs**, the **Environment**, **Consumer Products** and **Forensic Chemistry & Toxicology**.

FOODSTUFFS

Ensuring safe, healthy and quality food is a very important component of protecting public health. The SGL carries out regular official controls and surveillance on foodstuffs, covering all parts of the food production chain, "from the field or farm to the consumer's table". For this purpose, it carries out various national control programmes with the cooperation of the competent Authorities. Controls are of a preventive nature and focus mainly on basic foods that are consumed frequently or may raise a specific problem, and on foodstuffs expected to be consumed by vulnerable groups of the population such as children and pregnant women. The SGL goes one step beyond the analysis. It evaluates the degree of exposure to toxic substances and to related risks, therefore providing scientifically sound advice to competent Authorities for risk management through appropriate measures.

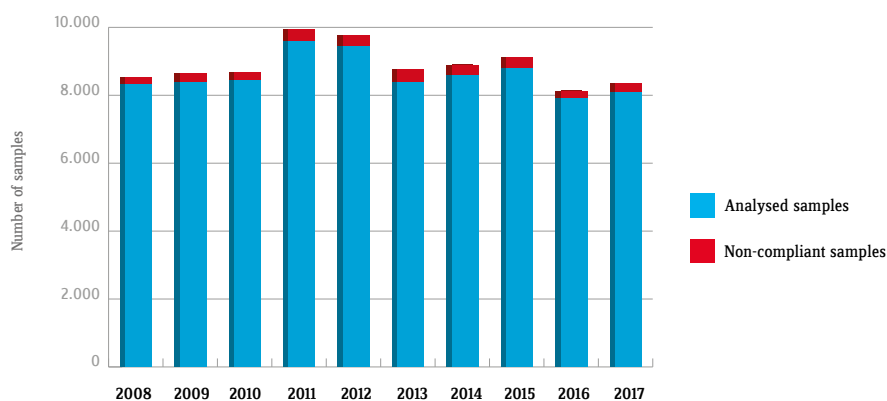


The SGL has been designated as the National Reference Laboratory (NRL) for a large area of food analyses and applies an Integrated Multiannual National Control Plan consisting of individual programmes for surveillance, monitoring and control programmes, as well as applied research, focusing on:

- The prevention, investigation and problem-solving throughout the food chain for long-term food safety.
- The effective implementation of the "acquis communautaire".
- Risk assessment, nutritional data and food composition in order to achieve stable supply of safe and wholesome food and healthy choices to consumers.

- The right information, through its laboratory data, to help consumers form correct nutritional/ eating habits.
- The analysis, characterisation, standardisation and authenticity of traditional or local food.

The effectiveness of the **33** national control-monitoring-surveillance programmes on foodstuffs (chemical, microbiological / biological, radiological and physical safety) managed to prevent the trade of non-compliant food both in the national and EU market and to provide useful information for the compilation of future control programmes.



Foodstuffs Control (Chemical, Microbiological, Biological, Radiological, Physical Safety) (2008-2017)

There are 16 specialised food laboratories in total which support and guarantee the extensive analytical control of the highest standards.

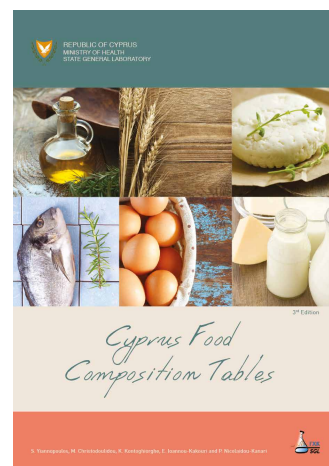


Surveillance and control is carried out based on annual and multiannual programmes in the areas of quality / authenticity and safety of foodstuffs:

Quality / authenticity of foodstuffs

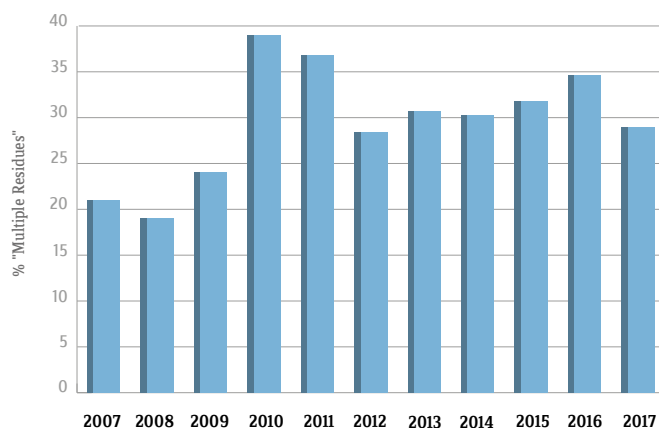
Nutritional value, composition, adulteration and authenticity of foodstuffs:

- **Nutritional value and composition of foodstuffs** (Moisture, Proteins, Fat, Carbohydrates, Salt, Total Dietary Fiber, Fatty acids, Cholesterol, ω 3- ω 6 fatty acids etc.)
- **Milk and dairy products** (Moisture, Fat, Proteins, Ash, Salt).
- **Determination of milk identity** (cow's, sheep's, goat's) on dairy products, including cheeses bearing the Protected Designation of Origin (PDO) label.
- **Honey** (Sugars: fructose / glucose/ sucrose, Hydroxy-methyl-furfural, Diastase activity, Electrical conductivity, Iso-glucose).
- **Olive and vegetable oils** (Acidity, Peroxide number, UV absorbance, ECN42, Fatty acid profile, Chlorophyll).
- **Detection of animal DNA** (Detection of horse DNA in meat products)
- **Fish products** (Histamine, total volatile base Nitrogen)
- **Authenticity and geographical origin of foodstuffs** (e.g. alcoholic beverages, wines, honey, juices, vinegar, carob and carob based products (use of spectroscopic and isotopic techniques: SNIF-NMR, IR-MS, ICP, FTIR- NIR, and chemometrics), and fish (tuna and salmon) in terms of genus or species (use of molecular methods))
- **Cyprus Food Composition Tables** (macro & micro components: Moisture, Proteins, Fat, Carbohydrates, Salt, Total Dietary Fiber, Fatty acids, Cholesterol, ω 3- ω 6 fatty acids, Calcium, Magnesium, Iron, Zinc etc.)
- **Food customs control and other samples** (e.g. chocolates, biscuits, cake mixtures, food supplements, drinks, flavoured drinks, food for special medical purposes, and any agricultural products of chapters 17-21 of the Combined Nomenclature which are imported from third countries), (parameters: Moisture, Total Fat, Butyric Acid Methyl Ester, Milk fat, Protein, Milk protein, Cocoa, Caffeine, Theobromine, Starch/ Glucose, Sucrose/Isoglucose), juices and baby foods (sugars), nuts (Polyphenoloxidase, Peroxidase, Moisture, Salt), seaweeds (Brix, Salt, Moisture, Swelling properties), determination of aroma complex HPLC (Unsaturated Ketones & Heterocyclic substances) in dry/roasted nuts, determination of denaturants (Isopropanol, Methyl Ethyl Ketone and Bitrex) in denatured products e.g. bioethanol.



Safety of foodstuffs

- **Food additives: Preservatives** (Sulphur dioxide, Benzoic/Sorbic acid, Propionic acid, Nitrates/ Nitrites), **natural and watersoluble synthetic colours** (Tartrazine, Carmoisine, Ponceau 4R, Allura Red AC, Carmines etc.), **synthetic colours** (Sudan I, II, III, IV, Para Red), **sweeteners** (Acesulfame potassium, Aspartame, Saccharin, Cyclamates, Steviol Glycosides, Sucralose), **antioxidants** (BHA, BHT, tBHQ, Ascorbic acid), **flavouring enhancers** (Glutamic acid), **food flavourings** (Coumarin), **caffeine**
- **Methanol in spirits**
- **Pesticides residues** mainly in fruit and vegetables, cereals, pulses, baby foods, biological products, products of animal origin and oils, wines and honey (Organophosphorous, Organochlorines, Carbamates, Pyrethroides, Amides, **Strobilurines**, Dinitroanilines, Triazoles, Benzimidazoles, Neonocotinoides, Phenylureas, Benzoylureas, Dithiocarbamates, Chlormequat, Mepiquat and other pesticides including highly polar pesticides)

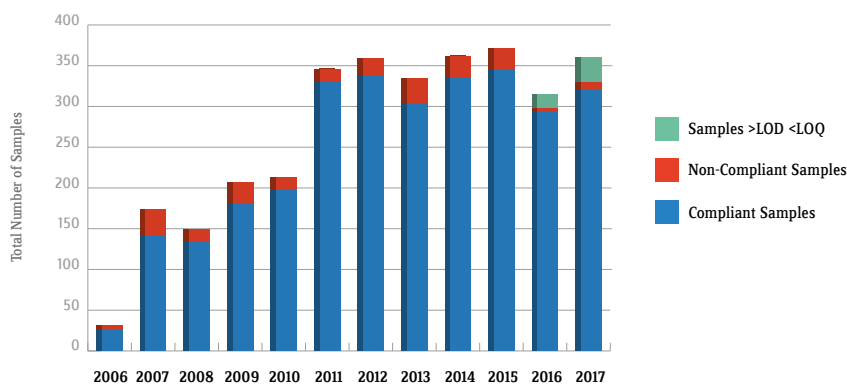


Percentage of plant origin samples with "multiple pesticides residues" over the years 2007 - 2017

- **Veterinary drug residues in meat and animal products** (Tetracyclines, Sulphonamides, Penicillins, Cephalosporines, Aminoglycosides, Quinolones, Chloramphenicol, Nitrofurans, Carbadox, Olaquinox, Dyes, Nitroimidazoles, Coccidiostats, Anthelmintics, Tranquillizers, Zearanols, NSAIDs, β -Agonists, Hormones, Anabolic substances, Thyreostats, Gestagens, Corticosteroids)
- **Environmental and other contaminants in foodstuffs and natural toxins** (Aflatoxins B1, B2, G1 and G2, Aflatoxin M1, Ochratoxin A, Zearalenone, Deoxynivalenol, Fumonisin B1 and B2, Toxins T2 and HT2, Patulin, Citrinin, Alternaria Toxins [AOH, ALT, AME, TEN, TEA], Tropane Alkaloids [Atropine, Scopolamine], Ergot alkaloids, Enniatins and Beauvericin, Chemical Elements [Al, Cr, Mn,

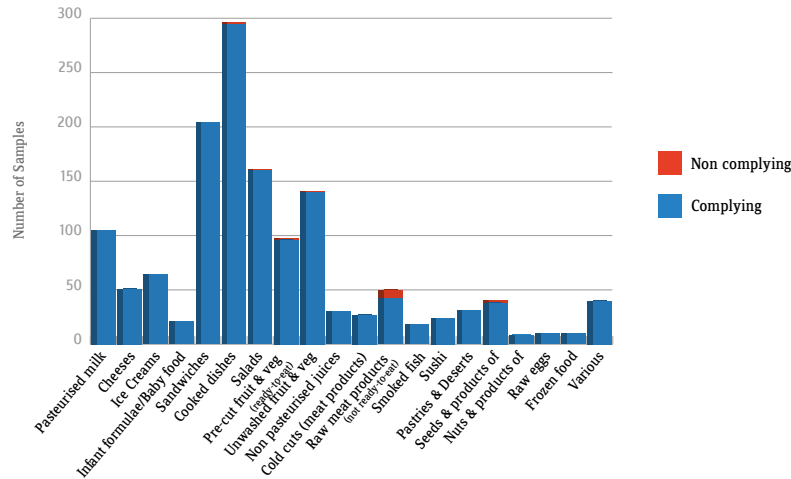
Fe, Co, Ni, Cu, Zn, Se, Sn], Heavy Metals [Pb, Cd, Hg, As, etc.], Nitrates/Nitrites, Polycyclic Aromatic Hydrocarbons-PAHs, PFOA and PFOS, Furan, Acrylamide, 3-MCPD, Ethyl Carbamate, etc.)

- **Radioactivity levels in foodstuffs** (Gamma Radionuclides, Sr-90)
- **Materials and products in contact with food and various substances, including endocrine disrupters** (Overall & specific migration of substances: Polyadipates, Cadmium, Lead, Aluminum, Barium, Cobalt, Copper, Iron, Lithium, Manganese, Zinc, Nickel, Formaldehyde, Phthalates, Primary Aromatic Amines, Melamine, Styrene, Bisphenol A etc.)
- **Genetically Modified Organisms** (Detection of GMOs in food and feed containing soya, maize, rice, honey, papaya, oilseed rape, flax)
- **Meat fraud** (Beef, pork, chicken-poultry, horse, turkey, fish)
- **Allergens** (Milk, soya, egg, fish, crustacean, peanut, mustard, celery, hazelnut, almond, walnut, pistachio, gluten, sesame, lupin, mollusks and cashew)



Control of allergens in foodstuffs over the years 2006 - 2017

- **Microbiological quality of foodstuffs** (*Salmonella spp.*, *Listeria monocytogenes*, *Campylobacter spp.*, *Cronobacter spp.*, coagulase-positive staphylococci, staphylococcal enterotoxins, *Bacillus cereus*, *Enterobacteriaceae*, *Escherichia coli*, Shiga toxin - producing *E. coli*, *E. coli* O157, *Clostridium perfringens*, aerobic and anaerobic colony count, yeasts and moulds, noroviruses, hepatitis A virus)



Microbiological control per foodstuff category (2017)

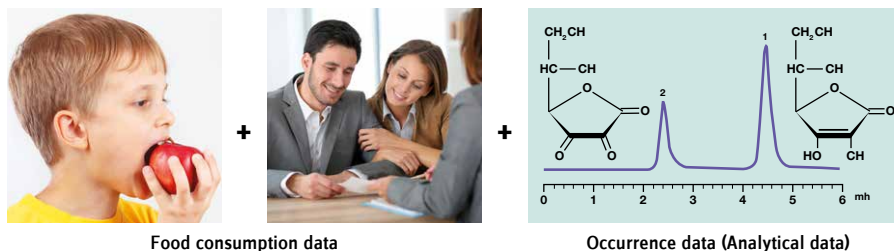
- **Food supplements** (Anabolic Steroids, Stimulants, Vitamins, Heavy metals, PDE- 5 analogs, pharmaceutical substances for Weight loss (Sibutramine HCl, Synephrine, Hydrochlorothiazide, Caffeine, Phenolphthalein, Triamterene, 2,4-Dinitrophenol), 1,3-DMAA (1,3-Dimethylamylamine) and other Pharmaceutical substances as Levodopa in Food Supplements)
- **Novel Foods / Nutrition and health claims of foodstuffs** (according to EU Regulations 258/97, 2283/2015 and 1924/2006 respectively)

Dietary Risk assessment

The SGL carries out risk assessment for the dietary exposure of the Cyprus population to chemical substances (Regulation No. 178/2002), within its participation in the National Food Safety Council. The Risk Assessment capacity is continuously enhanced with SGL's participation in EFSA's Advisory Forum, Focal Point and EFSA's Networks.

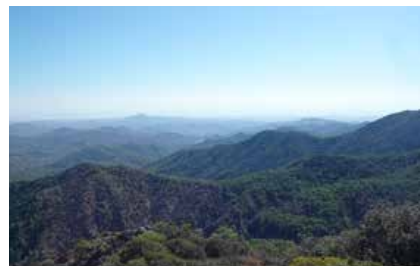
In 2017, the SGL continued the dietary exposure assessment of the Cyprus population to chemicals (Acrylamide and PAHs in particular), using the deterministic exposure assessment model "ImproRisk" that was developed by the SGL.

Exposure assessment from food consumption



ENVIRONMENT

The EU strategy for the Environment and Sustainable Development is a framework for a long-term vision of sustainable development, where economic growth, social cohesion and environmental protection go hand in hand and are mutually supporting. To this end, the 7th EU Environment Action Programme (2012-2020) includes a comprehensive environmental policy to be implemented according to the principles of sustainability, prevention, the principle of "the polluter pays" and the reparation of the pollution at source. The substantial contribution to the implementation of such policy is one of the key objectives of the SGL.



The SGL contributes significantly to pollution prevention and effective treatment having developed 19 control-monitoring-surveillance programmes that meet the EU environmental legislation and enable the early identification of accidental or malicious contamination. Surveillance and control is carried out based on annual and multiannual programmes in the areas of **Water, Effluents** and **Atmospheric Air**.

It has a unique infrastructure to cover chemical, microbiological, biological, eco-toxicological and radiological aspects of environmental monitoring and pollution control of water as well as human biomonitoring to detect the environmental impact to human health.

Seven specialised laboratories provide a wide range of highly sophisticated analytical services, which keep abreast with the latest worldwide scientific and technological trends.



The SGL, as a vital supporting service of the environmental authorities, utilises its state-of-the-art infrastructure and expertise aiming at the following:

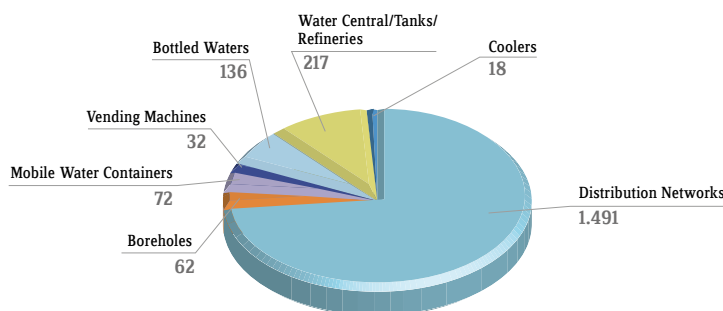
- Continuous support, development and implementation of the environmental policy and legislation by providing reliable laboratory results and expertise.

- Development of effective mechanisms for the early detection of pollution. The ultimate goal is to contribute to the prevention and the long-term safety and sustainability of the water resources.
- Investigation of the links between environment and health and, in particular, the effects of pollution on health, which aim at the prevention and reduction of potential health hazards originating from environmental factors, as well as support of political decisions. Emphasis is also given to the quality of indoor air and the effects of toxic substances on children. In addition, human biomonitoring is being developed in order to investigate the real levels of toxic substances in the human body.
- Furthermore, new programmes are being developed that focus on new potentially dangerous substances and emerging hazards, such as pharmaceuticals in waste water.

Water

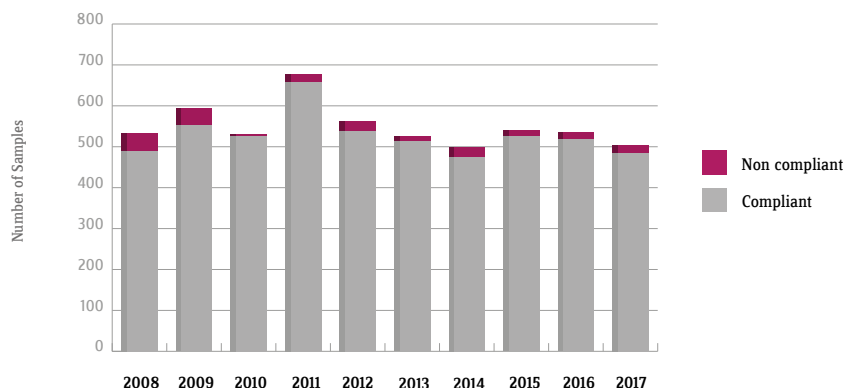
Drinking Water, Bottled Water (including Natural Mineral Water)

- **Physicochemical parameters / Anions / Cations** (Conductivity, pH, Chlorides, Sulphates, Nitrates, Nitrites, Sodium, Boron, Ammonium, Fluorides, Total Organic Carbon, Cyanides), heavy metals (Lead, Cadmium, Chromium, Nickel, Arsenic, Selenium, Antimony, Mercury, Manganese, Copper, Aluminium, Iron, Barium)



Physicochemical control of various types of drinking water - 2017

- **Organic pollutants** (THMs, pesticides, VOCs, PAHs, organic micropollutants)
- **Radioactivity levels** (Gamma Radionuclides, Gross α/β - activity, Uranium radioisotopes)
- **Microbiological control** (Total coliforms, *Escherichia coli*, *Enterococci*, *Pseudomonas aeruginosa*, Total Bacterial Count at 22 & 37°C, Sulphite reducing clostridia, *Clostridium perfringens*, Legionella species)



Microbiological control of bottled water over the years 2008 - 2017

- **Determination of toxicity** (Tap water: Microtox Test using *Vibrio fischeri* (EC10-TU10 measured at 5', 15' and 30' / Water from water refineries: {EC20-TU20 or (depending on the stage of the process) EC10-TU10 measured at 5', 15' and 30'}). Also Thamnotox test using *Thamnocephalus platyurus* is applied on tap water and water from water refineries {LC50-TU50 measured at 24Hrs}

Surface and Ground Water (dams, rivers, freshwater, underground water, boreholes, salt lakes)

- **Chemical control** (pH, Conductivity, Sodium, Potassium, Calcium, Magnesium, Chromium, Zinc, Copper, BOD5, COD, Mercury, Cadmium, Lead, Nickel, Boron, Barium, Iron, Maganese, Cobalt, Arsenic, Total Phosphorus, Free Ammonium, Total Ammonium, Chlorides, Sulfates, Fluorides, Silicates, Total Hardness Carbonates, Bicarbonates, Nitrites, Total Alkalinity, Total residual chlorine, Suspended solids, Total Organic Carbon (TOC), VOCs, Pesticides, PAHs, Organic micro-pollutants, PCBs, Dissolved Organic Carbon (DOC) and Nitrates)
- **Microbiological control** (Total coliforms, *Escherichia coli*, *Enterococci*)
- **Determination of toxicity** (Microtox Test using *Vibrio fischeri* (EC20-TU20 measured at 5', 15' and 30'), Daphtox Test using *Daphnia magna* (EC50-TU50 measured at 24 and 48 hours), Algaltox test using *Pseudoklebsiella subcapitata* (EbC50-TU50 measured at 72))
- **Environmental biomonitoring** (Spectrophotometric determination of Chlorophyll a)
- **Radioactivity levels** (Gamma Radionuclides, Gross a/b-activity, Uranium radioisotopes)

Monitoring of the Ezousa underground water

- **Chemical control** (Nitrates, Total Phosphorous, Ammonium, TOC, Kjeldhal-N, BOD5, COD, total Nitrogen, Suspended solids, Arsenic, Lead, Cadmium, Mercury, Trichloroethylene, Tetrachloroethylene, pesticides residues, organic pollutants)
- **Microbiological control** (*Escherichia coli*, *Somatic coliphages*)
- **Determination of toxicity** (Microtox Test using *Vibrio fischeri* (EC20-TU20 measured at 5', 15' and 30'), Daphtox Test using *Daphnia magna* (EC50-TU50 measured at 24 and 48 hours), Algaltox test using *Pseudoklebsiella subcapitata* (EC50-TU50 measured at 72 hours)

Seawater / Costal Sea Water

- **Chemical control** (Chromium, Iron, Nickel, Copper, Cadmium, Zinc, Lead, Mercury)
- **Microbiological control** (*Escherichia coli*, *Enterococci*)
- **Radioactivity levels** (Gamma Radionuclides)

Swimming pool water

- **Chemical control** (Conductivity, pH, Total Residual Chlorine, Free Chlorine, Total Alkalinity)
- **Microbiological control** (Total coliforms, *Escherichia coli*, Total Bacteria Count 37°C, *Staphylococci species*, *Pseudomonas aeruginosa*)

Effluents

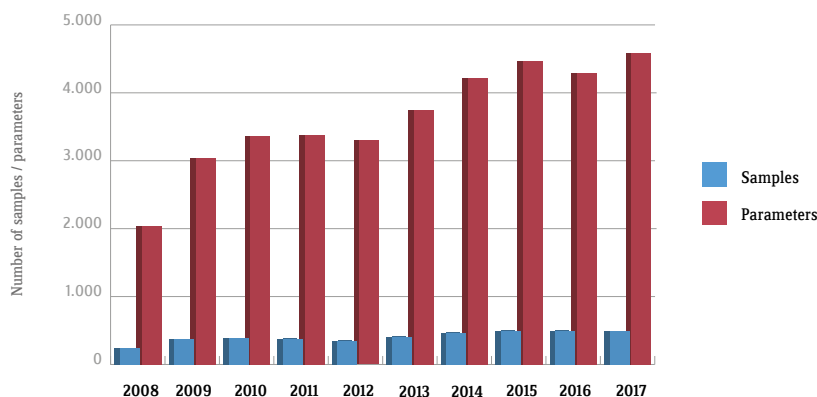
Domestic effluents - Treated water

Water scarcity and increased needs due to population growth as well as lifestyle and climate changes make the safe reuse of recycled water from liquid municipal waste extremely important for the water balance of Cyprus.

An important prerequisite for the use of recycled water is strict quality control to ensure the protection of human health and the environment from possible effects of the long term use as well as to address the concerns and bias of citizens towards the use of recycled water.

The quality control of recycled water includes both chemical and toxicity control:

- **Chemical control** (pH, conductivity, residual Chlorine, BOD5, COD, Suspended Solids, Chlorides, Nitrates, Sulphates, Boron, total Phosphorus, Kjeldahl-Nitrogen, metals (Calcium, Magnesium, Potassium, Sodium, Zinc, Copper, Lead, Cadmium, Mercury, Chromium, Nickel), Carbonates, Bicarbonates, pesticides and Polyaromatic Hydrocarbons (PAHs), in total 20 compounds, in treated domestic wastes. PAHs have also been determined in sediments using another method.



Chemical control of Treated Domestic effluents over the years 2008-2017

- **Determination of toxicity** (Recycled water of tertiary wastewater treatment plants: Microtox Test using *Vibrio fischeri* (EC50-TU50 measured at 5', 15' and 30'), Daphtox Test using *Daphnia magna* (EC50-TU50 measured at 24 and 48 hours), Algaltox test using *Pseudoklebsiella subcapitata* (EC50-TU50 measured at 72 hours))

Atmospheric Air

Quality of outdoor air

- **Chemical control** (Metals (Aluminium, Calcium, Iron, Potassium, Magnesium, Sodium, Zinc, Titanium, Vanadium, Chromium, Manganese, Nickel, Cobalt, Copper, Arsenic, Cadmium, Tin, Barium, Mercury, Lead), Anions (Fluorides, Chlorides, Bromides, Nitrates, Phosphates, Sulphates), Cations (Lithium, Sodium, Ammonium, Potassium, Magnesium, Calcium), Polyaromatic Hydrocarbons (PAHs) (Benzo(a)anthracene, Benzo(j)fluoranthene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, dibenzo(a,h)anthracene, Benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene))
- **Radioactivity levels** (Gamma Radionuclides, Gross β - activity, Gross alpha activity, Ruthenium-106)

Environment and Health

According to the World Health Organization (WHO), many diseases are associated with human exposure to environmental factors, such as toxic chemicals in the food chain, the environment and consumer products. These diseases are often chronic (e.g. cancer, allergies, asthma, neuro-developmental abnormalities, disorders of the reproductive system) and influence healthy ageing. In addition, the fiscal constraints of the European countries, socioeconomic inequalities, gender inequalities, extreme climatic events, the increase of non-communicable diseases, the ageing of the population and the unprecedented migration between and within countries, exacerbate these factors. There is therefore an urgent need to continue and strengthen efforts to address environmental factors that affect health.

Recognising that the study of the relationship between environment and health can lead to better public health policy and the prevention of diseases, the SGL implemented several actions in response to commitments arising from European, international and national strategies and action plans, as well as from other national priorities.

More specifically the SGL:

- From 2004 to 2016, has been actively involved in five research programmes related to "Environment and Health" with funding from: the 6th and 7th EU Framework Programmes for Research (ESBIO, COPHES), the EU's Life + programme (DEMOCOPHES), the SINPHONIE programme of DG SANTE, the Research Promotion Foundation programme (Homes and Tobacco Free Vehicles), and the Cyprus Ministry of Health (Biomonitoring Programme for Young Children's Exposure to Cigarette Tobacco).
- From 2017, participates and coordinates at national level the project "Human Biomonitoring for Europe (HBM4EU)" (2017-2021), co-funded by "Horizon 2020" and the 28 participating countries. The main aim of the HBM4EU initiative is to coordinate and advance human biomonitoring in Europe and provide better evidence of the actual exposure of citizens to chemicals and the possible health effects to support policymaking.

The SGL in 2017, also:

- Participated in the "6th Inter-Ministerial Conference on Environment and Health - WHO Europe" where the "Ostrava Declaration" was adopted (June 2017).
- Started the coordination, at national level, of the implementation of the "Ostrava Declaration" on the Environmental Impact on Health.

CONSUMER PRODUCTS

The laboratory testing of consumer products (pharmaceuticals (for human and veterinary use), cosmetics, toys, textiles, adhesives, chemical mixtures for household use and air fresheners), and customs samples is carried out by five specialised laboratories of the SGL having developed eight control-monitoring-surveillance programmes in the framework of national and EU legislation.



Pharmaceuticals

The control of pharmaceuticals, along with the foodstuffs control, was one of the first priorities of the SGL, since its foundation in 1932. The SGL contributed over time to ensure the quality, efficacy and safety of pharmaceuticals traded in the domestic market or produced by the Cypriot pharmaceutical industry for export. Furthermore, the frequent laboratory control contributed to the qualitative development of the Cypriot pharmaceutical industry as well as to the trade improvement of pharmaceuticals.

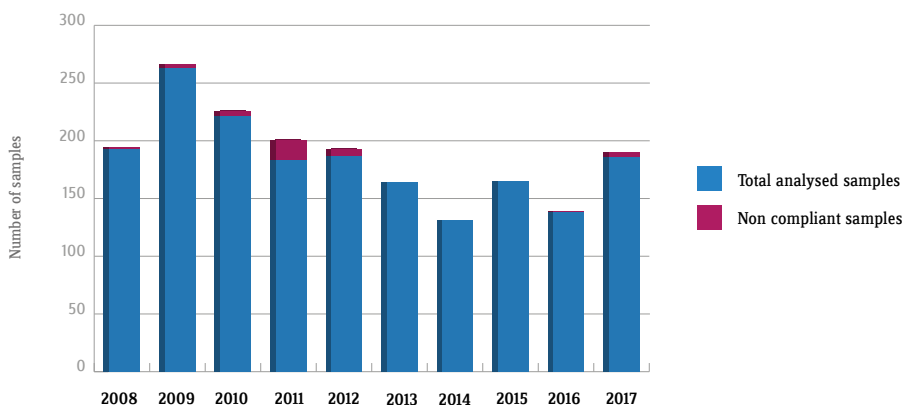
In order to protect public health, the SGL performs quality control of pharmaceuticals for human and veterinary use to evaluate their quality, safety and efficiency according to the specifications of the finished product dossier of the MHA (Manufacturers Authorisation Holder) and/or official compendial method.

- **Physicochemical and pharmaceutical specifications that are usually tested:**

Quality: identification, uniformity of weight, assay of the active ingredient, uniformity of content, pH, water determination, optical rotation, clarity and degree of opalescence of liquids, refractive index.

Efficiency: disintegration of tablets, capsules and suppositories, dissolution test for solid dosage forms.

Safety: related substances, impurities, degradation products, visible and sub-visible particles in parenteral preparations).



Physiochemical control of pharmaceuticals over the years 2008-2017

- **Microbiological control** (Sterility test, *Limulus amoebocyte* lysate endotoxin test, Bioassay, Presence/absence of *Escherichia coli*, Total aerobic microbial count, Total yeast and molds count).

Cosmetics

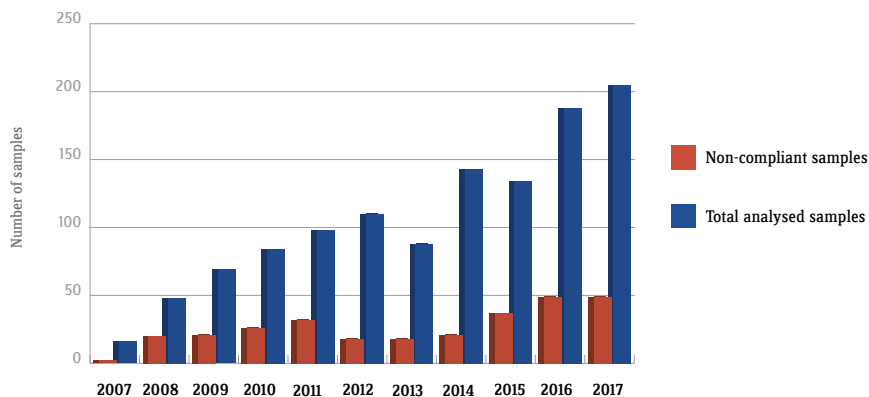
The SGL is also the official laboratory for the quality control of cosmetics, in collaboration with the Pharmaceutical Services of the Ministry of Health.

- **Chemical control** (Determination of preservatives (methyl-, ethyl-, propyl-, isopropyl-, butyl- and isobutyl- parabens, sorbic and benzoic acid), presence of Phthallic Esters, Glycols (Ethylene glycol, Diethylene glycol), Fluoride, Oxidative dyes, Bleaching agents (such as Hydroquinone, Hydroquinone - monomethyl ether, 29 Hydroquinone-monobenzyl ether) Lidocaine, Benzocaine, heavy metals, NDELA, Free Formaldehyde, Para-Phenylenediamine (PPD), Allergens, Hydrogen Peroxide, Triclosan, Methylchloroisothiazolinone / Methylisothiazolinone (MCI/MI), Acetone in acetone-free nail polish removers).
- **Microbiological control** (Presence/absence of *Escherichia coli*, Presence/absence of *Staphylococcus aureus*, presence/absence *Pseudomonas aeruginosa*, presence/absence of *Candida albicans*, total aerobic microbial count).

Children's toys

The main purpose of the control of children's toys is to protect children and infants from exposure to chemical risks i.e. chemicals (heavy metals, phthalates, etc.) found in toys, as well as from risks from poor mechanical/physical properties or flammability. Children may be at risk from poor quality materials or poor construction of toys which can result in injury or drowning of a child.

- **Mechanical properties** (Drop test, impact tests etc.)
- **Chemical control** (Phthalate esters, migration of certain elements from wooden and metallic toys with painted surfaces, plasteline, crayons, coloured pencils and watercolours)
- **Flammability test** in toys intended to be entered by a child such as toy tents and play tunnels.



Official control of children's toys over the years 2007-2017

Other consumer products

The SGL collaborates with the Cyprus competent authority (Department of Labour's Inspection of the Ministry of Labour, Welfare and Social Insurance) for the implementation of the Chemical Substances Law of 2010 (N.78(I)/2010), the European Regulation (EC) 1907/2006 (REACH) for the control of dangerous chemicals in various consumer products and the European Regulation (EC) 1272/2008 (CLP) for the classification, labeling and packaging of chemical substances and mixtures.

In 2017, the following categories of consumer products from the Cypriot market were analysed within the framework of the above regulations:

- **Adhesives** for chloroform, toluene, benzene and 1,2-dichloroethane
- **Felt-tip pens, markers and correction fluids** for chloroform, toluene and benzene
- **Air fresheners** for 1,4-dichlorobenzene and other restricted chemicals and allergens
- **Household chemical preparations** to determine pH
- **Various other products** for targeted investigations
- **Children's nightwear** for Flammability test

FORENSIC CHEMISTRY AND TOXICOLOGY

The Laboratory of Forensic Chemistry and Forensic Toxicology of the SGL is the only official laboratory in Cyprus conducting analyses of police exhibits in relation to: trafficking and use of drugs, arson, explosives materials and explosives residues, traffic accidents, malicious damage, unnatural deaths and poisoning cases, murder, robbery, rape, etc.

The scientific results of the SGL provide the basis for the Police to investigate cases and for the Attorney General for the administration of justice.



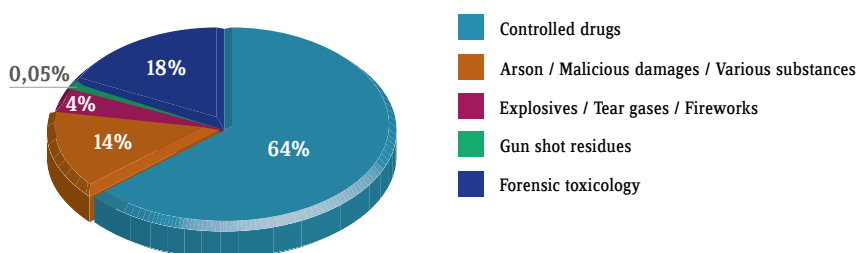
Forensic Chemistry

- **Controlled drugs** (Cannabis, Heroin, Cocaine, and New Synthetic Drugs: Synthetic Cannabinoids, Cathinones, Benzofurans etc.)
- **Tetrahydrocannabinol** in food products and cosmetics
- **Ignitable liquids** (Petrol, Diesel, Kerosene, thinners and other ignitable liquids)
- **Explosives and explosives residues** (Trinitrotoluene (TNT), Nitroglycerine (NG), Ethylene glycol dinitrate (EGDN), Cyclotrimethylenetrinitramine (RDX), Pentaerythritol tetranitrate (PETN), inorganic explosive mixtures and pyrotechnic compositions)
- **Scanning Electron Microscope** (gunshot residues, hairs, wood etc.)
- **Tear gases** (α -Chloroacetophenone (CN), 2-Chlorobenzalmononitrile (CS), Capsaine (OC), Nonivamide, etc.)

Forensic Toxicology

- **Qualitative analysis** (Controlled drugs, Benzodiazepines, antidepressants, pesticides, and various drugs according to each case).
- **Quantitative analysis** (Alcohol in blood, urine or eye fluid and various drugs according to each case).

The scientific results are utilised both by the Police and coroners to cast light on unnatural deaths. In certain cases, when samples are sent from the hospitals, the results provide profound information for the treatment of patients in intensive care units.



Analysed samples of Police exhibits by category - 2017



STATE GENERAL LABORATORY