



ΓΧΚ
SGL

Γενικό Χημείο του Κράτους
State General Laboratory



Abridged Version ANNUAL REPORT 2013



MINISTRY OF HEALTH
CYPRUS
OCTOBER 2014

MINISTRY OF HEALTH

State General Laboratory

**Abridged Version
of the Annual Report
2013**

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PREFACE

Dear all,

2013 has been a year of challenges and high objectives for all Government Departments due to budget constraints and re-structuring. The State General Laboratory (SGL) had therefore to develop new approaches and strategies to fulfill its objectives despite difficulties.

Focused on its vision, mission and strategic objectives, SGL succeeded not only to meet the high expectations but also to gain recognition from authorized bodies such as the World Bank.

The wide spectrum of monitoring and surveillance programs that were carried out in co-operation with the Competent Authorities, its active participation in developing EU legislation, its prompt and reliable response in urgent matters reflect its high scientific impact in food quality and safety, environment and consumer protection, police investigation and the administration of justice.

In times of financial crisis, investing in research is key to development and progress. The SGL, indeed, has taken up opportunities to invest in applied research, to collect data for risk assessment, to prevent and solve problems in the areas of its competence. At the same time SGL expanded its networking with EU Organizations/ Authorities to enhance its capacity and expertise.

This abridged version of the annual report gives a glance on the main activities and successful work of the SGL during 2013. This successful work is a result of collective work of all staff members who I warmly thank for their dedication and perseverance to accomplish a great deal of targets. However, we are conscious that past successes do not guarantee for future ones and we therefore need to maintain vigilance and enhance efforts to ensure that we fulfill public expectations.

I do hope that this present short edition of the Annual Report of the SGL will be a source of valid and transparent information reflecting the impact of its important work based on scientific integrity and targeting towards excellence.



Director of SGL

Dr. Popi Nicolaidou-Kanari

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State General Laboratory

1. INTRODUCTION

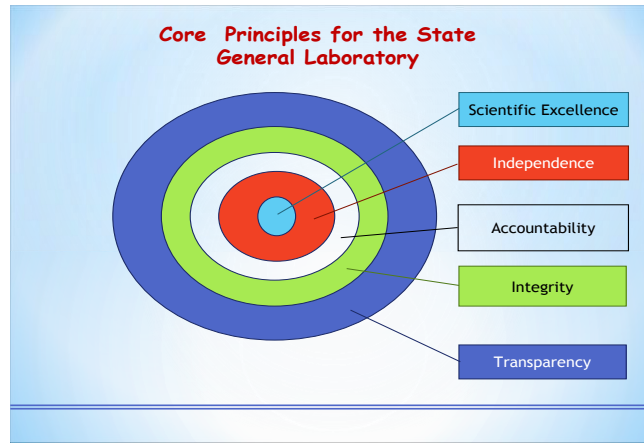
1.1 General Scope and Responsibilities

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. It is also the National Reference Laboratory of several Food Safety sectors.

The SGL is accredited according to the European Standard EN ISO/IEC 17025:2005 in many areas of its competence.

Within the framework of its responsibilities the SGL co-operates with all Ministries, Municipalities, Governmental and other Organisations. Its staff serves on many of National Council Boards (Food, Pharmaceuticals, Cosmetics, Plant Protection Products and Biocides, Veterinary Medicines, Chemicals, Food Safety) and also in National Committees (e.g. Environment and Children's Health, School canteens monitoring, Natural Mineral Water, Environmental impact, Reduction of Drugs Supply, Drugs Legislation, National Centre of Information on Narcotics). It is also the National Contact Point of the European Food Safety Authority (EFSA) and for the World Health Organization (WHO) on Environment and Health.

The activities of SGL, an organization with no conflict of interest, governed by the principles of scientific excellence, independence, integrity, transparency and pro-activeness ensure the fulfillment of the Public Services Law, as well as meeting the citizens' expectations.



1.1.1 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 while driving towards continuous development and excellence.

Having as moto: *"Excellence for Better Contribution to the Quality of Life"* the SGL's strategic objectives, focused on its vision and mission, are:

- Safeguarding Public Health and Environment
- Consumer safety and protection
- Facilitating fair trade and competitiveness
- Responding promptly and reliably to new obligations, emerging problems and crisis incidents
- Promoting applied research to prevent or solve emerging/ existing problems
- Contributing to the legislative process and policy making
- Strengthening networking and enhancing expertise
- Scientifically supporting the judicial and police authorities

1.1.2 Development Policy and Strategy

The development policy and strategy of the SGL is based on its vision and mission while setting priorities aiming 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 Cyprus,
 - its sustainability, as a high quality and state-of-the-art centre of integrated services, expertise and applied research whose scientific contribution can be highlighted as among the best in Europe,
 - ensuring quality, reliability and accountability through its accreditation by EN ISO/ IEC 17025:2005 and maintaining the consciousness of quality at all levels,
 - its collaboration with all public sectors and respective EU organizations and Committees,
 - promoting new approaches and elaboration of its services, while keeping abreast with European and International developments and requirements,
 - its continuous development and implementation of:
 - new preventive and targeted national control programs
 - a holistic and interdisciplinary approach, which reflects to the design of monitoring, surveillance, control and research programs with added-value and synergistic efficacy
 - risk assessment for food and water safety (chemical, microbiological, biological)
 - enhancing productivity by implementing modern technologies and multi residue control methods by fully utilizing the manpower, equipment and the available financial resources,

- attracting young scientists with high academic qualifications through implementation of applied research projects to solve existing problems and prevent emerging risks,
- strengthening International networking and collaboration with universities, European research centers and relevant bodies to promote exchange of scientists, joint research projects, technology transfer and other common actions towards development,
- its contribution to academic activities by investing in the capacity building of post-graduate students who undertake research projects at the SGL in collaboration with European and Cyprus universities,
- investing on staff training and expertise,
- the dissemination of information and knowledge through educational programs to the relevant stakeholders and to the public at large.

1.2 Reliability and Efficiency

The efficiency and reliability of a dynamically evolving Institution are fundamental conditions of its stability and growth. The simultaneous application of two quality management systems in order to guarantee a more integrated approach is a result of long lasting efforts at the SGL. The SGL since 2002 has been accredited with the international standard EN ISO/IEC 17025:2005 by the Greek Accrediting Body (ESYD) and is also one of the first services in Cyprus and the rest of Europe that started in 2005 the implementation of the Common Assessment Framework (CAF), a system through which an Organization carries out a self-evaluation and benchmarking.

Furthermore, the SGL is preparing for the transition of its accreditation, in 2014, by the national accreditation body - "The Cyprus Organization for the Promotion of Quality (CYS-CYSAB)" - within the context of the Regulation (EC) No. 765/2008.

To achieve the reliability and efficiency objectives the SGL has focused on the:

- Quality Assurance-Accreditation System
- Implementation of Quality Management System
- Implementation of the Common Assessment Framework (CAF)
- Development of Eco-Management and Audit Scheme (EMAS) which covers environmental factors.

1.3 Applied Research

Applied research is an important pillar of the continuous scientific and technological development of the State General Laboratory (SGL). Research carried out contributes towards problem solving and problem preventing as well as supporting policy decisions and legislation. The main areas of research cover especially food safety, water, environment and health, food authenticity and geographical origin, 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. The results of these research activities have been published in international well established scientific journals and magazines, as well as in the SGL's website and in the local press for keeping updated both the scientific community and the public at large.

In 2013, the SGL started or continued the following studies/projects:

1.3.1 European Union Research Programs

- "Water Quality Management in the Agro-Food Industries- Leonardo Da Vinci" - (HYDROCULTURE) (2011-2013)
- "Aggregate and Cumulative Risk Assessment of Pesticides: an on-line Integrated Strategy" - ACROPOLIS (FP7) (2010 - 2013)
- "Total Diet Study" for the estimation of the exposure/ intake of the population to Chemicals and Nutrients (FP7) (2012-2016)
- Electronic Transmission of Chemical Occurrence Data to EFSA (2011-2013)

- Pilot project on the implementation of FoodEx2 as part of the Standard Sample Description for the electronic transmission of harmonized chemical occurrence data to EFSA (2012-2013)
- 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"- third support/LOT1 (children) (2013-)
- 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"- third support/LOT2 (adults) (2013-)

1.3.2 Research Programs funded by the Research Promotion Foundation

- Metabolic, Isotopic, Antioxidant and Elemental profiling to characterize Cypriot wines of specific geographical and varietal origin (2011-2013)
- Development of gluten free bakery products with high protein and dietary fiber content by exploiting domestic plant sources (HEALTH/NUTRITION/0609(BIE)/08) (2011-2013)
- ADAQUA - Advance aquatic tools for sustainable pollution risk management in river basins of Cyprus (2011-2013)
- Development of a molecular method for the detection of allergens in foods (2011-2014)
- Synthesis and Characterization of Amphiphilic Linear and Hyperbranched Copolymers for Fabrication of Polymeric Membranes which will be used for the filtration and clarification of water (2011-2013)
- Identification of the variety of wine and grape origin using DNA methodology (2012-2014)

1.3.3 Research Programs funded by the Ministry of Health

- Control of phthalate esters in children's toys

- Survey of the Nutritional Claims on food products in the Cyprus market
- Determination of Corticosteroids in food of animal origin (Milk and Meat)
- Determination of pesticides residues in honey
- Control of Chemicals and Physical/ Mechanical Properties of Children's Toys
- Caffeine levels in several types of coffee, beverages, energy drinks and refreshments consumed in Cyprus
- Monitoring and Surveillance of the levels of Polycyclic Aromatic Hydrocarbons (PAHs) or of Nitrates levels, in washed and unwashed vegetables
- Monitoring the presence of the pathogenic bacterium Cronobacter spp. (Enterobacter sakazakii) in formulae for infants under 6 months of age
- Determination of Allergenic fragrances in cosmetics
- Isotopic mapping of drinking water of Cyprus
- Gluten control in foods for the protection of people with celiac disease
- Investigation of the presence of Cyanides in drinking water
- Monitoring of the "Ezousa's" underground water

1.4 Cooperation

European/International Cooperation - Promotion of Applied Research

The SGL expands its European/International cooperation so as to maintain its developmental progress and to enhance capacity building and exploit sources of external funding. Through this cooperation, there is an exchange of knowledge and experience with other Member States. At the same time the SGL takes the opportunity to show the activities and skills of a small

Member State and its adaptability to cope with new requirements and challenges.

In 2013, the SGL actively participated in the following meetings/Bodies/networks/programs/studies:

- European Reference Laboratories (EURL-NRL)
- Comitology expert groups and Standing Committees
- European Food Safety Authority (EFSA)
 - Advisory Forum Body and Focal Point
 - Communication and IT Groups and
 - Emerging Risks Network (EMRISK)
 - Expert groups eg. Networking group for pesticide residues monitoring, Nanotechnology, Chemical Occurrence Data, Non Plastic Food Contact Materials, Bisphenol A, etc.
- Program "Hydroculture-Leonardo da Vinci" (August 2011-July 2013) (The use and operation of water: a) Geothermal, b) Aquaculture, c) Desalination Systems, and d) Irrigation systems etc).
- Program "Action Customs 2013" (European Network of Customs Laboratories (GCL) for harmonization and joint actions).
- Working Groups of the Programs and Actions of the Program 'Customs 2013', namely the (Action-2 Meursing Code, Action-6 ECICS-2 and Customs Laboratories Steering Group (CLSG).
- European network of Forensic Science Institutes for drugs, arson, gunshot residues and explosives (ENFSI).
- Network of Official Medicines Control Laboratories of the Council of Europe (EDQM-OMCL) in co-operation with the European Medicines Agency (EMA) and other subcommittees of the Network
- Research study to develop an improved method of measuring *Listeria monocytogenes* in cooperation with the European Reference Laboratory (EURL, ANSES France)
- Collaborative study on standardization (ISO) of the detection method of staphylococcal enterotoxins under the coordination of the competent EURL (ANSES, France).

Furthermore, in 2013, the SGL continued participation and presentations of scientific papers in international conferences, in EU committees, in the working groups of EFSA, and in the Programming Committees of the 7th Framework Programme for Research (COST, EUREKA, CORNET) and the Horizon2020 (Food, Agriculture, Fisheries) etc.

1.5 Objectives fulfilled in 2013

- Expansion of the control, monitoring and surveillance programs
Full implementation of the monitoring/surveillance/control programs (in all 64) covering a total of 26,636 samples with 457,165 parameters in 2013 (compared to 2012 where 30,535 samples were analyzed with 521,642 parameters tested). Despite the lower number of analyzed samples in 2013, due to financial constraints, the SGL tried to conduct even more targeted controls and cover new parameters based on prioritization.
- Human resources and infrastructure development
- Advancement of Laboratory equipment (a total of €468,500 was spent in purchasing state-of-the art equipment or renewal of old equipment)
- Enhancing risk assessment capacity through a training program from BfR experts
- Further development of the capacity of the Information Technology Section and its ability to respond to EFSA programs and requirements e.g. programs CFP/EFSA/DATEx/2011/01 and NP/EFSA/DCM/2012/02/02
- Contribution and support of the national policy
- European/ International Cooperation and Promotion of Applied Research
- Participation in European and other Applied Research Programs on problem solving/ preventing and policy making
- Dissemination of knowledge/ information/ Publications
- Prudent Budget Utilisation.

1.6 Achievements-Implementation of activities and programs

During 2013 the SGL achieved the following:

- A successful assessment by the World Bank which was held under the framework of the reorganization of the Ministry of Health
- With the designation "Small Nation but Big Steps" the international journal "Food Contact World" emphasized on the SGL's work and its effective control programs in relation to the official controls on "food

contact materials" which were presented at the International conference on Plastics

- An award by the "Foundation for the Management of European 'Lifelong Learning' Programs", as one of the organizations that very successfully participated in the project named "Water Quality and Management in the Agro-Food Industries - Hydroculture" of the "Leonardo Da Vinci" program.
- Great effectiveness in detecting non-compliant food and other consumer products preventing their entry into the Cyprus and EU market (e.g. nuts, fish) by using appropriate effective control programs at critical control points (eg. imports check points)
- Expansion of the official controls to cover new parameters, despite the budget constraints:
 - Allergens in children's cosmetics and in foods
 - New carcinogenic mycotoxins in foods
 - New substances of pesticides in fruits, vegetables, wines and products of animal origin
 - Priority substances in treated domestic wastes
 - Determination of polymerized triglycerides in used cooking oil in fast food restaurants
 - Nutritional Value of fish
- Prompt and effective response to crises that occurred in 2013 such as :
 - Immediate response to method development for the determination of horse meat in meat products and consequent analyses of samples from the market/imports
 - Analysis of environmental pollution samples in dams and lakes and timely results to the Competent Authorities
 - Analyses of samples for the detection of prohibited carcinogenic substance (Carbadox) and antibiotics in feed/ meat
 - Identification of new synthetic drugs traded for the first time in the EU
 - Authenticity control and control for adulteration with methyl alcohol in alcoholic drinks
 - Analyses of seawater/ fish from the oil spill in Apostle Andreas area

- Responding to an EU crisis investigation for HAV virus on a number of samples of imported frozen berries, with negative results
- Active contribution through scientific results for supporting Cyprus in having the cleanest EU marine waters in 2013 under the framework of the EU program "Blue Flag", with the systematic microbiological monitoring of marine waters performed at the SGL
- Completion of its 2nd self-assessment report within the context of the Common Assessment Framework (CAF)
- Successful participation in the workshop "Strategic Management", organized by the Cyprus Academy of Public Administration (CAPA), PWC and CIIM which resulted in building management skills and the development of relevant performance indicators
- Organizing workshops for Police and Customs officers and the Anti-Drugs Council on the amended/revised legislation on new synthetic drugs (amendments were initiated by SGL)
- Participation in sending important analytical data to the European Food Safety Authority (EFSA) that were included in its relevant opinions for reassessment of food additives and food contaminants (such as aspartame, mercury, lead, arsenic)
- Sending important analytical data to the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) on drugs
- Active participation in the regulatory process in the fields of its competence, both in national but mostly at EU level.

Furthermore, the SGL had successfully concluded several research programs such as the:

- «Electronic Transmission of Chemical Occurrence Data to EFSA»
<http://www.efsa.europa.eu/en/supporting/pub/457e.htm>

- «Pilot project on the implementation of FoodEx2 as part of the Standard Sample Description for the electronic transmission of harmonised chemical occurrence data to EFSA»
<http://www.efsa.europa.eu/en/supporting/pub/461e.htm>
- "Aggregate and Cumulative Risk Assessment of Pesticides: an on-line Integrated Strategy - ACROPOLIS" (FP7)
(The completion of the said project let for the submission of a new research program under the "Horizon 2020" regarding the EU's overall assessment of the toxic effects of chemical mixtures)
- "ADAQUA" - Advance aquatic tools for sustainable pollution risk management in river basins of Cyprus

1.7 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 dedicated staff. Re-evaluation of its targets and priorities may sometimes be necessary depending on new challenges and emerging issues it has to tackle.

Based on the above, the SGL has set the following future goals:

- Enhancing its scientific role at an EU level
- Responding to increasing monitoring and control requirements in the fields of its competence while continuously improving its services
- The completion of its reorganization that has been pending since 2011
- The construction of a new building for the SGL that can reflect its high scientific level as a center of expertise and excellence at national, regional and European level
- Further strengthening:

- the coordination and collaboration between the competent authorities for more efficient and effective official controls,
 - the Food Safety Council's (FSC) and Anti-Narcotics Council activities,
 - the required risk assessment studies and better exploitation of the results of official controls,
 - applied research mostly through utilization of EU funds (the SGL has already absorbed €85,730 from the EU and €185,140 from the Research Promotion Foundation, for applied research in 2013, and since 2004, a total of € 5,442,892).
- The expansion and support of:
 - targeted educational programs for all stakeholders including those in the private sector
 - its networking with European Centers of Excellence and Research Institutes/ Organizations
 - The continuous improvement of its credibility, its transparency and its responsiveness to crises to maintain the confidence of every Cypriot and European citizen towards the SGL.

2. MAIN AREAS OF ACTIVITY

The wide range of the SGL responsibilities and competences is covered by the following four wide areas:

- **Foodstuffs**
- **Environment**
- **Consumer Products**
- **Forensic Science and Toxicology**

2.1 Foodstuffs

2.1.1 Quality and Safety of 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 (National Reference Laboratory, NRL), for a large field of food analyses and applies an Integrated Multiannual National Control Plan consisting of individual programs for surveillance, monitoring and control programs, 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 analysis, characterization, standardization and authenticity of traditional or local food.
- The right information, through its laboratory data, to help consumers form correct nutritional/eating habits

The effectiveness of the national control programs on foodstuffs (chemical, microbiological and biological), 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 programs.

There are in total fifteen (15) specialized food laboratories which support and guarantee the extensive analytical control of the highest standards.

Surveillance and control is carried out based on annual and multi annual programmes in the areas of Quality/ Authenticity and Safety of Foodstuffs:

2.1.1.1 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 fibre, fatty acids, cholesterol, w3-w6 fatty acids etc)
- **Milk and Dairy Products** (moisture, fat, proteins, ash, salt)
- **Determination of Milk Identity** (cow's, sheep's, goat's) in Dairy products
- **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)
- **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)** (Use of spectroscopic and isotopic techniques: NMR, IR-MS, ICP, FTIR-NIR, and chemometrics)
- **Cyprus Food Composition Tables** (macro & micro components: moisture, proteins, fat, carbohydrates, salt, total dietary fibre, fatty acids, cholesterol, w3-w6 fatty acids, calcium, magnesium, iron, zinc etc)
- **Food Customs control and other samples (eg. Chocolates, biscuits, cake mixtures, Food Supplements 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.

2.1.1.2 Safety of Foodstuffs

- **Food Additives (Preservatives** (Sulphur dioxide, Benzoic/Sorbic acid, Propionic acid, Nitrates/Nitrites, Natamycine), **Natural and Water soluble synthetic colours** (Tartrazine, Carmoisine, Poncean 4R, Allura Red AC, Carmines etc), **Synthetic colours** (Sudan I,II, III,IV, Para Red), **Sweeteners/Caffeine** (Acesulfame potassium, Aspartame, Saccharin,

Cyclamates, Caffeine), **Flavouring Enhancers** (Glutamic acid), **Food Flavourings** (Cumarin), **Methanol in spirits** (e.g. zivania, vodka, whisky, brandy, gin).

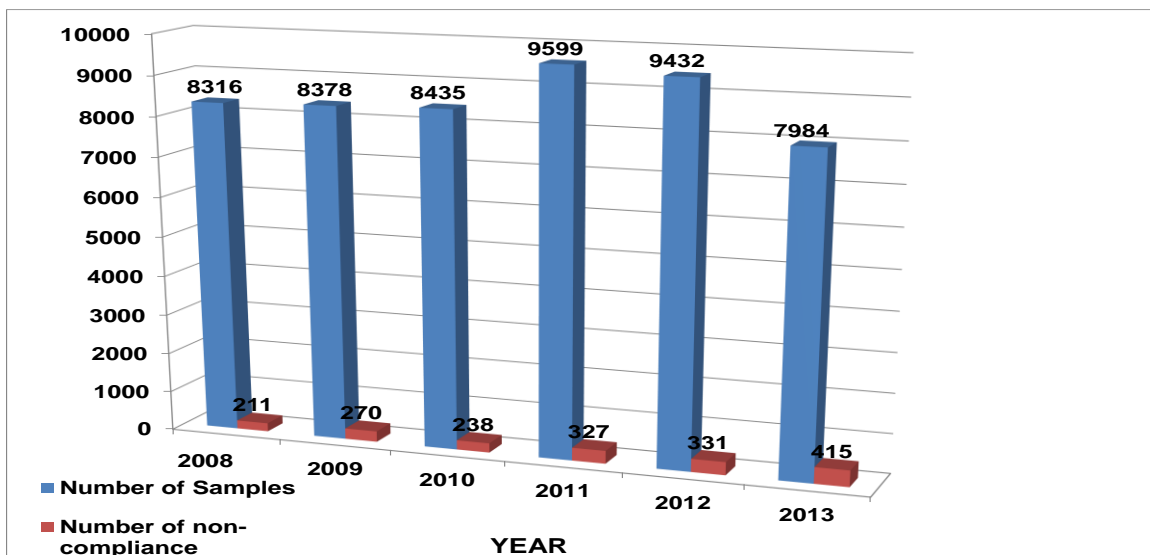
- **Pesticide residues** mainly in fruit and vegetables, cereals, pulses, baby foods, biological products, products of animal origin and oils, wines and honey (Organophosphorous, Organochlorines, Carbamates, Pyrethroids, Amides, Strobilurines, Dinitroanilines, Triazoles, Benzimidazoles, Neonocotinoides, Dithiocarbamates, Phenylureas, Benzoylureas and others)
- **Veterinary drug residues in meat and animal products** (Tetracyclines, Sulphonamides, Penicillins, Cephalosporines, Aminoglycosides, Quinolones, Chloramphenicol, Nitrofurans, Nitroimidazoles, Coccidiostats, Anthelmintics, Tranquillizers, Zearanol, 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, 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 disruptors** (Overall & specific migration of substances: Polyadipates, Cadmium, Lead, Formaldehyde, Phthalates, Primary Aromatic Amines, Melamine, Styrene, Bisphenol A etc)
- **Genetically Modified Organisms** (Detection of GMOs in food and raw materials soya, maize, rice, honey)
- **Allergens** (Detection of allergens presence in foodstuffs (milk, soya, egg, fish, crustacean, peanut, mustard, celery, hazelnut, almond, walnut, pistachio, gluten, sesame, lupin)
- **Microbiological quality control of foodstuffs** (Salmonella spp., Listeria monocytogenes, Campylobacter spp., Cronobacter spp., Shiga toxin - producing E. coli, coagulase-positive staphylococci, Bacillus cereus, Enterobacteriaceae, Escherichia coli, Clostridium perfringens, aerobic colony count, yeasts and moulds, noroviruses, hepatitis A virus)
- **Food supplements** (Anabolic Steroids, Stimulants, Vitamins, Heavy metals, PDE-5 analogs, pharmaceutical substances for Weight loss, as well as the substance 1,3-DMAA (1,3-Dimethylamylamine) in Food Supplements)

- Novel Foods/ Nutrition and Health Claims of Foodstuffs (according to EU Regulations 258/97 and 1924/2006 respectively)

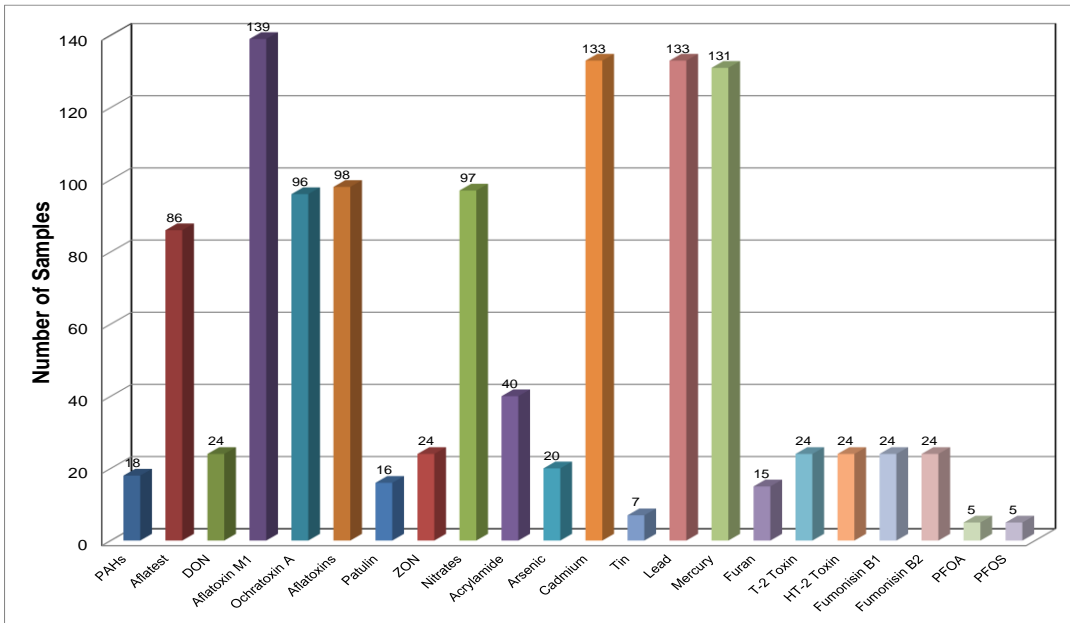
2.1.2 Risk assessment in the areas of foodstuffs and water

The SGL provides risk assessment for the exposure of the population to chemical substances, to microbiological or other hazards from food consumption (Regulation No. 178/2002). Risk assessment is carried out by the SGL within its remit and its participation in the National Food Safety Council.

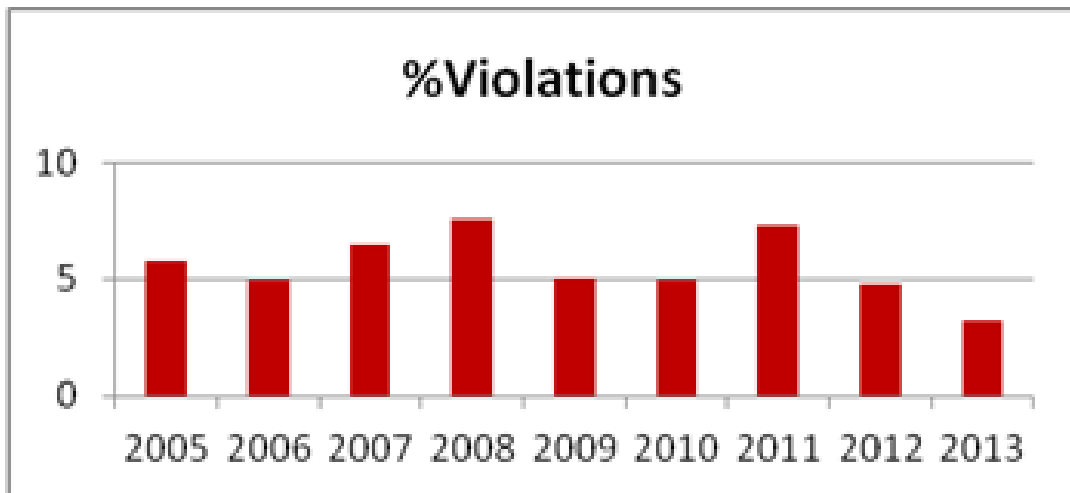
Some histogrammes as examples:



Temporal Chemical and Microbiological Control on Foodstuffs (2008-2013)



Number of samples analyzed for several food contaminants during 2013



Trends of non-compliant samples over the years 2005-2013, monitoring of Pesticide Residues in Food of plant origin (fresh and dry)

2.2 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 European Commission prepared a proposal for the 7th EU Environment Action Programme to 2020 which 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 is actively participating in the National Strategy for the Adaptation of Climate Change, in the Action Plan on Environment and Health, as well as in sustainable development. In addition, SGL participates in the national committee which deals with the Directive for priority substances that are being discussed at the Council of the EU. It contributes significantly to pollution prevention and effective treatment having developed a number (17) of monitoring programs that meet the environmental "acquis communautaire" and enable the early identification of accidental or malicious contamination.

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 bio-monitoring to detect the environmental impact to human health.

Seven (7) specialized 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, utilizes its state-of-the-art infrastructure and expertise aiming at the:

- 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 bio-monitoring 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 endocrine disrupters in water.

Surveillance and control is carried out based on annual and multi annual programmes in the following areas:

- Water
- Effluents
- Atmospheric Air
- Environment and Health

2.2.1 Water

Drinking Water, Bottled Water and Natural Mineral Water

- **Ionic and organoleptic control, Heavy metals** (Conductivity, pH, Chlorides, Sulfates, Nitrates, Nitrites, Sodium, Boron, Ammonium, Fluorides, Total Organic Carbon), Heavy metals (Lead, Cadmium, Chromium, Nickel, Arsenic, Selenium, Antimony, Mercury, Manganese, Copper, Aluminium, Iron, Barium).
- **Organic pollutants** (THMs, Pesticides, VOCs, PAHs, Organic micropollutants),
- **Radioactivity levels** (Gamma Radionuclides, Gross α/β - activity),
- **Microbiological control** (Total coliforms, *Escherichia coli*, *Enterococci*, *Pseudomonas aeruginosa*, Total Bacterial Count at 22 & 37°C, Sulphite reducing clostridia, *Clostridium perfringens*, *Legionella species*)

- **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 Underground 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, Manganese, 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 micropollutants, PCBs)
- **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)

Seawater/ Coastal Sea Water

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

Swimming pools water

- **Microbiological Control** (Total coliforms, *Escherichia coli*, Total Bacteria Count 37°C, *Staphylococci* species, *Pseudomonas aeruginosa*)

Monitoring of the Ezousa underground water

- **Chemical Control** (Nitrates, Total Phosphorous, Free ammonia, 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))

2.2.2 Effluents

Domestic effluents-Treated Water

Water scarcity, increased needs due to population growth but also the lifestyle and climate changes make the safe reuse of recycled water from liquid municipal waste, extremely important for the water balance of Cyprus. Important prerequisite for the use of recycled water is the 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 neutralize the wariness and the bias of the citizens in the use of recycled water.

The quality control of the 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)
- During 2013 four methods have been developed for the determination of 24 of the priority substances (pesticides, polycyclic aromatic hydrocarbons, metals).
- **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))

Industrial wastes

- **Chemical Control** (Basic parameters: BOD₅, COD, suspended solids)

2.2.3 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: 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)

2.2.4 Environment and Health

According to the World Health Organization, many diseases are associated with human exposure to environmental factors that are also introduced into the food chain. These diseases are often chronic (e.g. cancer, allergies, asthma, neuro-developmental abnormalities, disorders of the reproductive system) and influence healthy ageing. During the last years the SGL, recognizing that the study of the relationship between environment and health can lead to better public health policy and prevention of many diseases, developed related actions in response to commitments arising from:

- The European Strategy on Health and Environment
- The European Action Plan 2004-2010 for Health and Environment
- The WHO-Europe Action Plan (CEHAPE) and the Declaration of the 5th & 6th Ministerial Conference, (Budapest 2004, Parma 2010)
- The National Action Plan on Environment and Child Health (CY CEHAP 2007-2010), and
- Other national priorities.

The actions carried out in 2012, funded by European projects of applied research, were related to the study of:

- the degree of exposure of the general population to chemical pollutants (human biomonitoring), and
- the quality of indoor air.

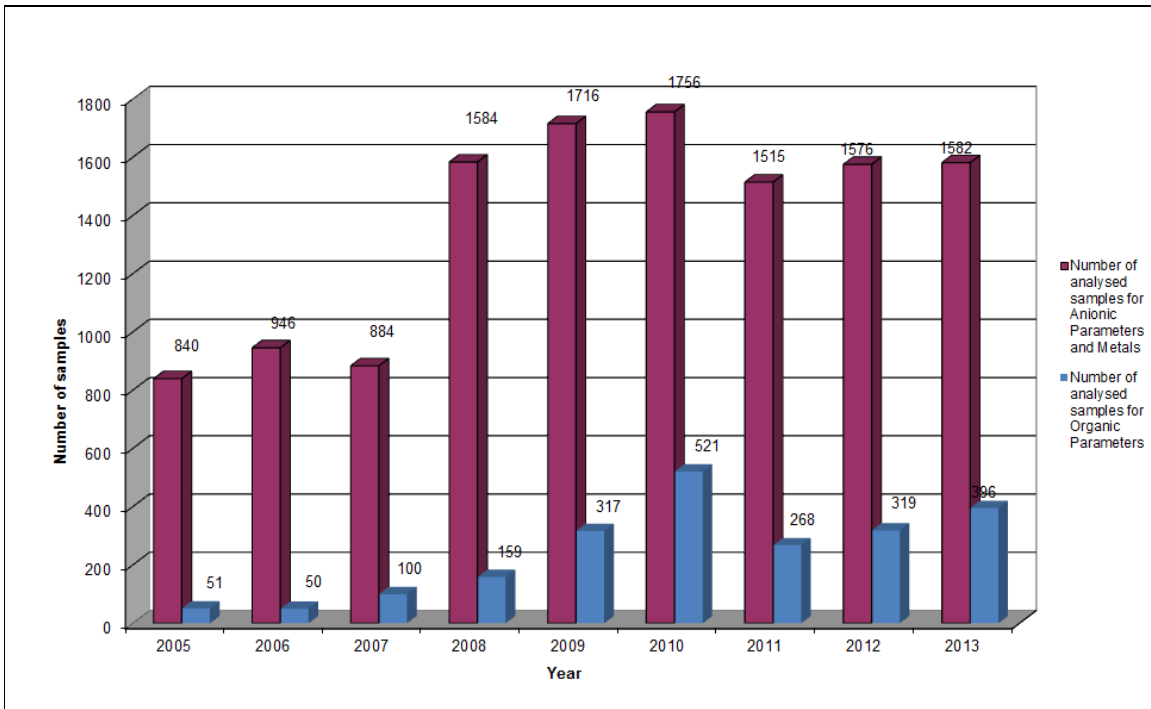
Human Biomonitoring

Human Biomonitoring (HBM) is an important evidenced base policy-support tool for the protection of human health, since it provides a direct measure of the levels of environmental chemicals in the human body. In combination with other findings, human biomonitoring can be used to assess whether the level of exposure of the public to environmental pollutants is acceptable or whether measures need to be taken.

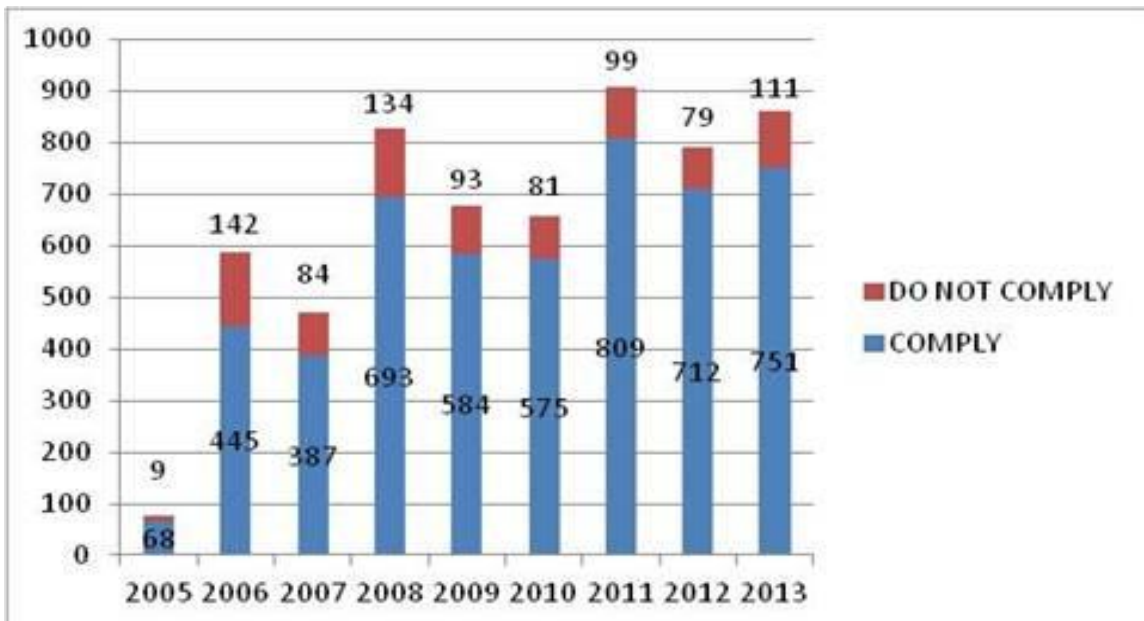
The SGL was a partner in the two large European projects, ("COPHES" - funded by DG-Research FP7 and "DEMOCOPHES" - funded by DG-Environment LIFE+ and national funds of participating countries), which concern the development of a common methodology for biomonitoring. With these projects which were finished in 2013, the common methodology was tested in parallel in 17 European countries, including Cyprus. In that first concerted European HBM study, the exposure of the European population to specific chemical contaminants emerged for the first time, allowing for comparison between countries.

The evaluation, exploitation and dissemination of the resulting data started in 2013, with a significant contribution to supporting policies and highlighting key concepts of designing European biomonitoring studies and quality assurance of the results, as provided for comparisons between countries. Significant relevant publications were presented in international peer-reviewed journals.

Some histogrammes as examples:



Number of analysed Drinking Water samples through the years 2005-2013



Microbiological compliance towards national regulations of swimming pool waters (2005-2013)

2.3 Consumer Products

The laboratory testing of Consumer products (pharmaceuticals, cosmetics, dangerous substances in textiles, adhesives, such as faux bijoux and toys and Customs samples, is executed by four specialized laboratories of the SGL.

2.3.1 Pharmaceuticals

The control of pharmaceuticals, along with the foodstuffs control, was one of the first priorities of the SGL, since its founding 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 and/or official compendial method.

The SGL has also participated in the drafting of the Counterfeit Medical Products Convention (Medicrime Convention) of the European Council. The Convention was signed by the Republic of Cyprus, in October 2011 in Moscow.

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

During 2013 the laboratory enlarge its scope of activities with new methods/technics such as the determination of the active pharmaceutical ingredient Clenbuterol and a group of antibiotics for human and veterinary use with LC-MS-MS as well as the determination of residual solvents in active pharmaceutical ingredients (statins and Antibiotics) by the Head-Space GC/MS technique.

2.3.2 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, presence of Phthallic Esters, Glycols (Ethylene glycol, Diethylene glycol), Fluoride, Oxidative dyes, Bleaching agents (such as Hydroquinone, Hydroquinone - monomethyl ether, 29 Hydroquinone-monomethyl ether) Lidocaine, Benzocaine, Heavy metals, NDELA, Free Formaldehyde, Para-Phenylenediamine (PPD), Allergens, Hydrogen Peroxide). Additional during 2013 the laboratory developed a method for the determination of Triclosan in cosmetics.

Microbiological Control (Presence/absence of Escherichia coli, Presence/absence of Staphulococcus aureus, Total aerobic microbial count, Total yeast and molds count)

2.3.3 Children's Toys

The main purpose of the control of children's toys is to protect children and babies from the exposure to chemical risks ie. chemicals (heavy metals, phthalates, etc.) found in children's toys, as well as risks from poor mechanical and physical properties. Especially children can be endangered from either 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, colored pencils and watercolours)

2.3.4 Other Consumer's Products

The SGL collaborates with the Cyprus competent authority (the Department

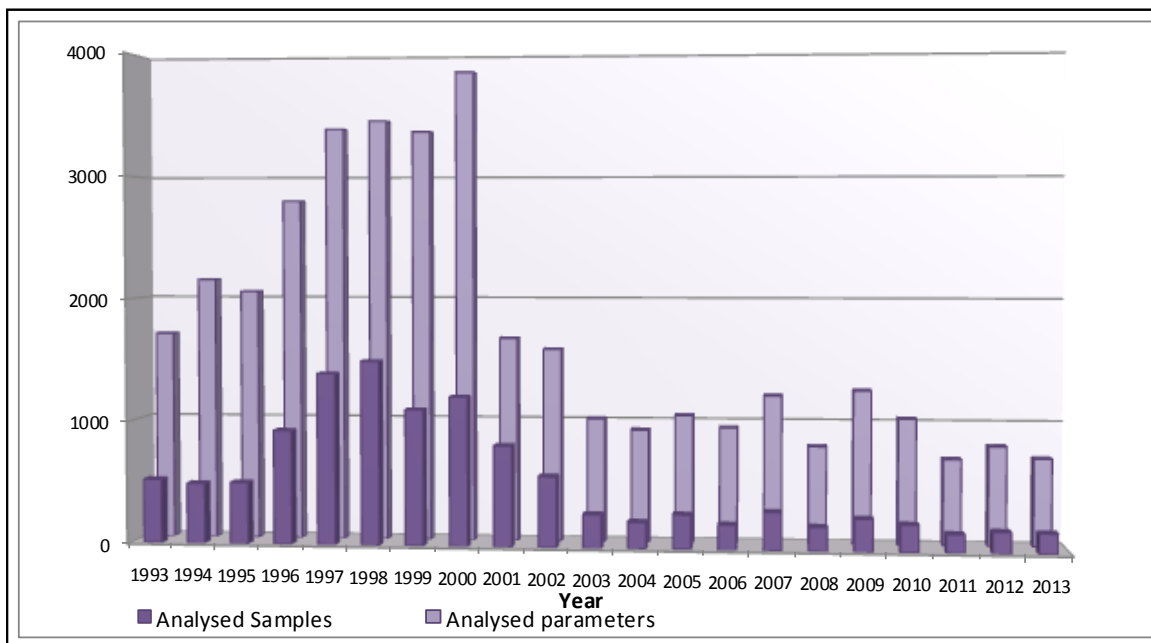
of Labor's Inspection of the Ministry of Labor, Welfare and Social Insurance) for the implementation of the Chemical Substances Law of 2010 and the European regulation REACH for controlling the quality and content of dangerous chemicals of various consumer products available in the Cypriot market.

In 2013, the following consumer products have been analyzed for their safety:

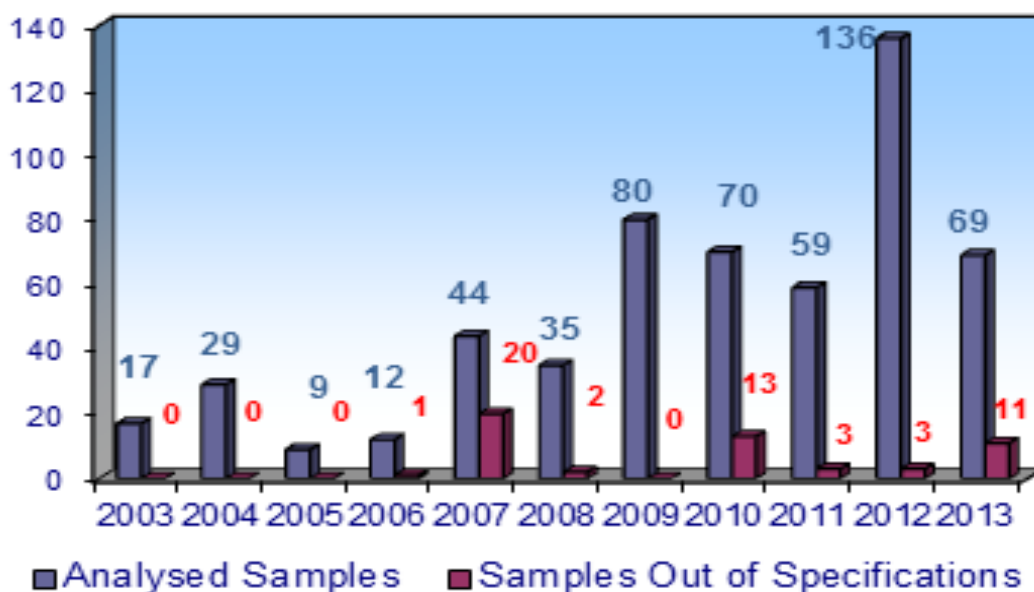
- **Adhesives (Super glues and tyre-repair kits)** for solvents such as Benzene, Toluene and Chloroform
- **Felt-tip pens and markers** for Organic solvents
- **Textiles** for Azocolorants (26 aromatic amines in total)

Other consumer products that have been analyzed in the laboratory, were: **Jewellery, Glass Frames and other metal items in direct and prolonged contact with skin**, for Nickel migration and **Shoes and silica gels** for Dimethyl fumarate (DMFu)

Some histogrammes as examples:



Pharmaceutical Samples/ Parameters analyzed per year (from 1993-2013)



Samples out of specifications and total number of analyzed cosmetic samples (2013)

2.4 Forensic Chemistry and Toxicology

The Laboratory of Forensic Chemistry and 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's for the administration of justice.

2.4.1 Forensic Chemistry

Controlled drugs (Cannabis, Heroin, Cocaine, and New Synthetic Drugs: Synthetic Cannabinoids, Cathinones, Benzofurans etc).

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-Chlorobenzalmalononitrile (CS), Capsaine (OC), Nonivamide, etc).

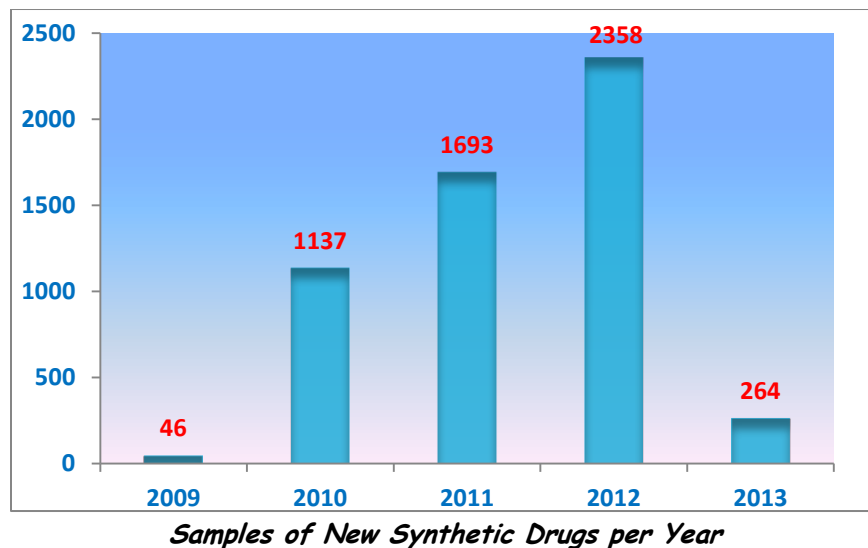
2.4.2 Forensic Toxicology

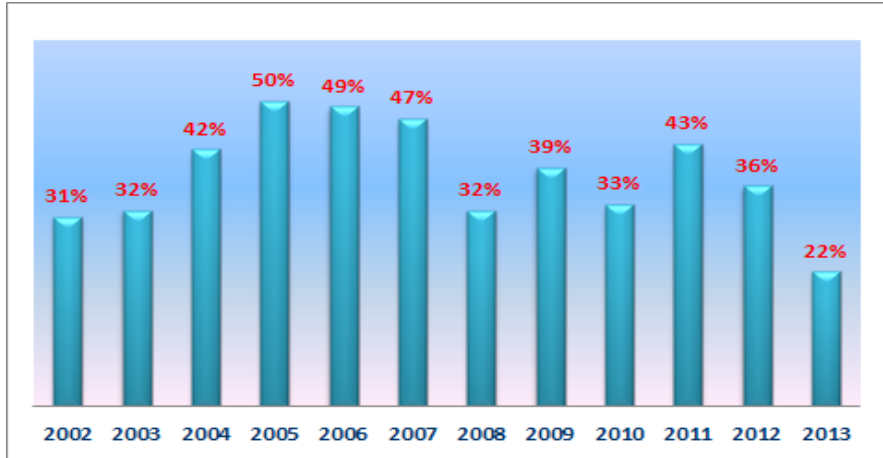
Qualitative Control Controlled Drugs, Benzodiazepines, Antidepressants, Pesticides, and Various drugs according to each case.

Quantitative Analysis: Alcohol in blood, urine or eye fluid, and various drugs according to each case.

The scientific results are utilized 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 the intensive care units.

Some histogrammes as examples:





Percentage of drivers involved in fatal accidents, whose blood alcohol was above the legislative limit

3. ANNEX

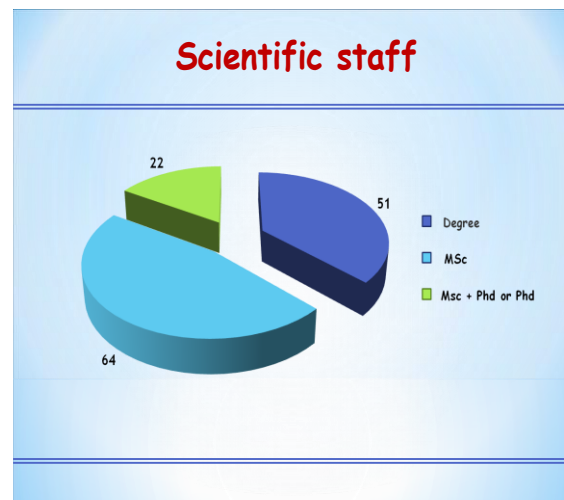
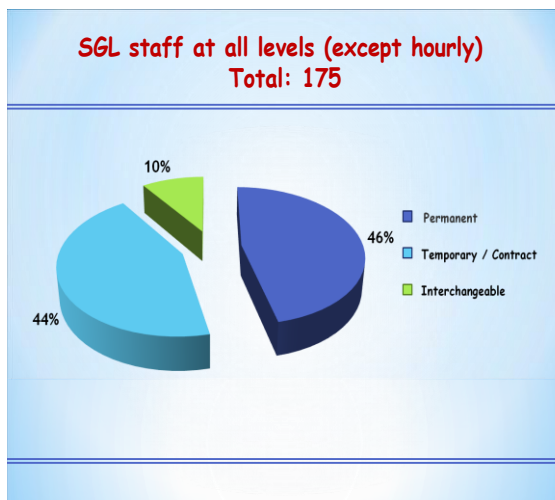
3.1 Organisation

3.1.1 Organisational Structure

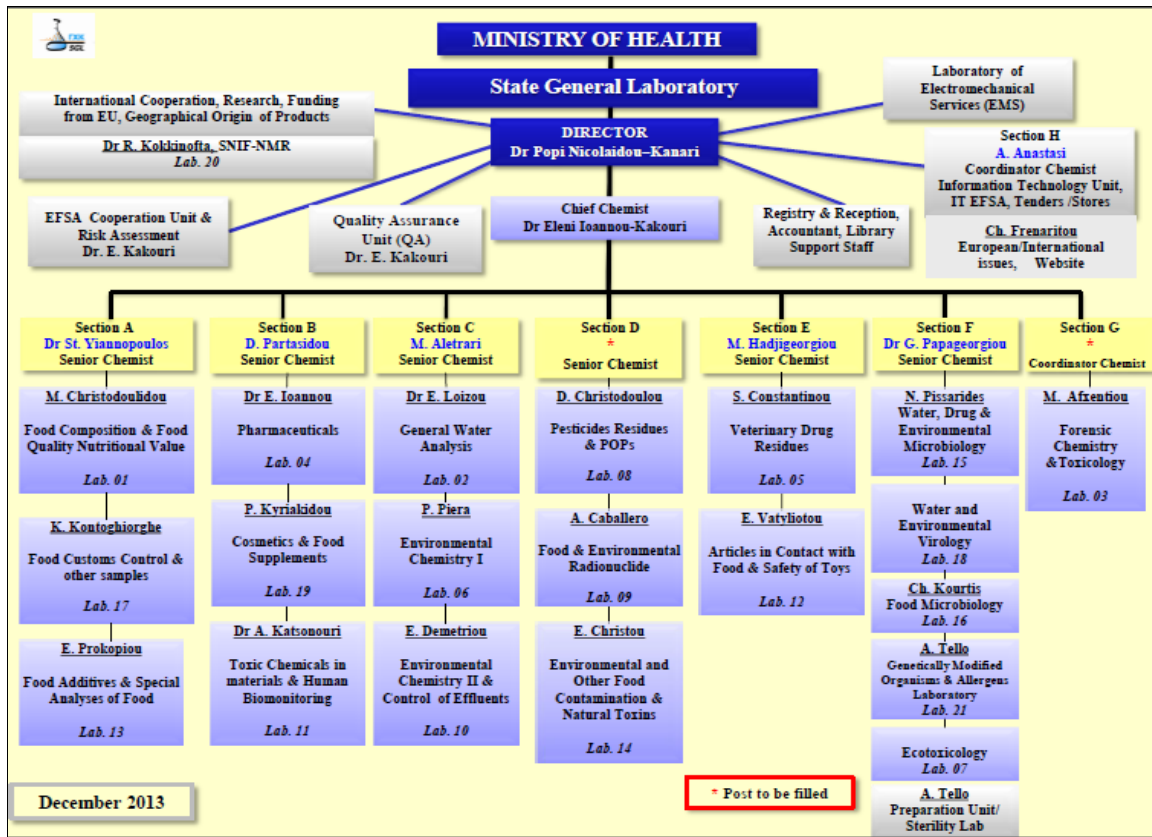
The SGL's wide range of analytical work is covered by 21 Laboratories under eight sections as well as 5 Units namely the Cooperation with EFSA/Risk assessment Unit, the Quality Assurance Unit, the Research and International Cooperation Unit, the IT Unit, and the European and International Issues Unit. All its work is supported by a registry, stores, library, secretariat, accounts and electromechanical services.

During 2013, the staff comprised 69 chemists and microbiologists, (excluding the post of the Director), in permanent positions, 6 clerks and 22 support staff. In addition to these a total of 47 laboratory technicians (Chemists and Microbiologists) with high academic qualifications were also employed on contract as well 7 clerks. For the completion of the research projects an additional 20 Chemists/ Microbiologists/Biologists, one Data Base expert and one Executive assistant for managing research programs were employed on contract.

The staff of the SGL (permanent, interchangeable, temporary and contract) worked in 2013 with enormous diligence, professionalism, responsibility and accountability.



3.1.2 Organogram



3.2 Financial Resources/ Budget

Expenditures incurred by the SGL in 2013 amounted to €8,794,770 (implementation of the 89,00%) (89.75% of the Ordinary Budget and 77.96% of the Development Budget). During the period 2011-2013, the SGL's revenue from EU programs was €718.865 (€387.560 from EU research programs and €331.305 from the Cyprus Research Promotion Foundation).