

## Abridged Version of the ANNUAL REPORT- 2012





**MINISTRY OF HEALTH**  
**State General Laboratory**

**Abridged Version  
of the Annual Report**

**- 2012 -**

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## **PREFACE**

*Dear all,*

*The year 2012 showed once again that the role and the impact of the State General Laboratory (SGL) in the areas food quality and safety, environment and consumer protection, police investigation and the administration of justice is crucial. The growth curve of SGL has been steep and the increase in efforts and dedication of its staff has been matched by the acceleration in the output of its scientific work, rising to the coverage of 521.642 parameters for 30.535 samples that have been analysed. Volume of analysed samples and parameters covered is only one aspect of SGL's workload. The growing complexity of the challenges that it has to face requires new methodologies, more multidisciplinary approaches and the diligent engagement of all stakeholders.*

*Challenges arising from new technologies, globalization, climate changes, the emergence of new chemical substances call for a continuous alert and monitoring and also applied research. With the objective to prevent, emerging or reemerging risks and solve problems, the SGL has succeeded once again to absorb National as well as European Union's funds for applied research.*

*In 2012, during the Cyprus Presidency of the Council of the EU, the SGL has proved that Cyprus has the capacity and must play a vital role at the borders of the EU, and play an active and proactive role at an EU level. It has also proved that the SGL is a serious partner of all EU bodies in its remit e.g. DG SANCO, DG RESEARCH, EFSA, EMCDDA.*

*The annual report of 2012 largely focuses on four main areas that demonstrate the activities and impact of SGL. None of the activities included here would be possible without the co-operation of all National Competent Authorities and other stakeholders, and of course the continuous support of the Permanent Secretary, Mr Dionysis Mavronicolas, and the support of the former Ministers Dr. S. Mallas and Dr. A. Agrotou.*

*The successful work of the SGL during 2012 is a result of collective work of all the staff members who I warmly thank for their dedication and focus to fulfill SGL's objectives. However, we are conscious that past success is no guarantee for the future and we need to maintain vigilance and enhance efforts to assure that we fulfill public expectations for the future.*

*With vision and strategy, SGL analyses the experience gained through the years and anticipates the future challenges so as to plan its resources, in financially difficult years, and prioritise its*

*future work programme. Our vision, not only to maintain but also improve our high standard services, remains for the staff of the SGL a source of pride.*

*I hope that this edition will be a useful source of precise information not only for the Competent Authorities in all Ministries but also for all citizens and a tool to promote mutual confidence and co-operation based on transparency and scientific integrity.*



*Director of SGL*

*Dr. Popi Nicolaidou-Kanari*

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# State General Laboratory

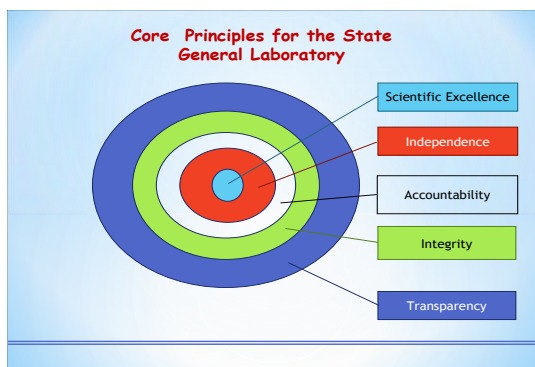
## 1.1 INTRODUCTION

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.

### 1.1.1 General Scope and Responsibilities

The activities of SGL 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.



To accomplish its mission, the SGL operates on many levels:

- Ensuring quality, reliability and accountability through its accreditation by EN ISO/ IEC 17025:2005 and developing the consciousness of quality at all levels
- Cooperation with all public sectors and respective EU organizations and Committees

- Promoting modernization and enrichment of its services, keep abreast with European and International developments and requirements
- Continuous development of new preventive and targeted national control programs
- Development and implementation of a holistic and interdisciplinary approach, which reflects to the design of monitoring, surveillance, control and research programs with added-value and synergistic efficacy.
- Improving knowledge and experience in risk assessment of foods and water (chemical, microbiological, biological)
- Enhancing productivity by implementing new and multi residual control methods by fully utilizing the manpower, equipment and the available financial resources.
- Attracting young scientists with high academic qualifications through implementation of research programs for continued development.
- 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.
- Contribution to academic activities by investing in the development of post-graduate students who undertake research projects at the SGL in collaboration with European and Cypriot universities.
- Investing in modern technologies and ongoing staff training.
- Dissemination of knowledge to the general public and the relevant stakeholders through educational programs

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, Agricultural, Medicines, Food Safety) and also in National Committees (e.g. National Centre of Information on Narcotics, National Committee on Environment and Children's Health).

### **1.1.2 Vision and Objectives**

The vision of the SGL is to contribute to further improving quality of life by providing reliable and high quality services as well as to continuing development and excellence.

Having as slogan: "*Excellence for Better Contribution to the Quality of Life*" the SGL's specific objectives focus on:

- Safeguarding Public Health and Environment
- Consumer safety and protection
- Protection of the public interest
- Facilitation of fair trade and competitiveness
- Timely response to new obligations and emerging problems
- Promoting applied research to prevent or solve emerging issues
- Contribution to the legislative process and policy making
- Strengthening its networking and enhancing its expertise
- Prompt identification of pollution
- Scientific support of jurisdictional and police authorities

### **1.1.3 Development Policy and Strategy**

The Development policy of the SGL is based on its vision for continuous contribution to a better quality of life and a safer, cleaner and healthier environment. Through this policy the SGL demonstrates its modern role and sets out priorities for the 21<sup>st</sup> century aimed to:

- Catalytic contribution to the economic and social development of Cyprus
- Significant contribution as counsellor of the state in dealing with crises and problems, under its competence, having an active and meaningful role in the implementation of the National Strategy
- Innovative and productive function as a high quality and modern centre of integrated services and applied research whose scientific contribution can be highlighted as among the best in Europe and a significant pool of expertise.
- Be developed as 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).

### **1.1.4 Future Goals**

The SGL, tries to substantially respond to the continuous scientific developments, the new requirements of the EU and the various emerging issues and amends its targets and priorities according to the new challenges while having its conscientious and dedicated staff as a driving force for the accomplishment of these targets.



The required laboratory tests are expanding to cover more sensitive methods for certain parameters according to new legislative requirements.

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

- The continuous improvement of its services and the best possible response to increasing control requirements in the fields of its competence.
- The completion of the reorganization and consolidation of the sustainability of the SGL with permanent scientific staff.
- The laboratory support of the National Guard to initiate a control ammunition system (to launch this new and effective control in 2013).
- The support of the Ministry of Foreign Affairs for the implementation of the Chemical Weapons Convention signed by the Republic of Cyprus.
- The promotion of the reconstruction of the new building of the SGL by alternative solutions and the SGL as Center of expertise/know-how at national, regional and European level.
- Further strengthening:
  - ^ the coordination between the competent authorities and the utilization of all possible forms of cooperation for more efficient and effective official controls,
  - ^ the Food Safety Council (FSC) activities,
  - ^ the required risk assessment studies and better exploitation of the results of official controls,
  - ^ applied research with simultaneous absorption of EU funds (The SGL has already absorbed € 250,000 from the EU and € 90,000 from the Foundation of Research Promotion, for applied research for 2012 and since 2004, a total of € 4,400.000).
- The expansion and support of:
  - ^ targeted educational programs for all stakeholders including the private sector,
  - ^ its networking with European Centers of Excellence and Research Institutes/Organizations.

## 1.2 Objectives achieved/ fulfilled in 2012

- Full implementation of the monitoring/ surveillance/ control programs (in all 90) covering a total of 30,535 samples with 521,642 parameters in 2012 indicating the increase of productivity compared to 2011 where 36,233 samples were analysed but with 402,070 parameters tested.
- Expansion of the control, monitoring and surveillance programs
- Human resources and infrastructure development
- Laboratory equipment advancement (a total of €589,100 was spent in purchasing state-of-art equipment or renewal of old equipment)
- Enhancing risk assessment activities
- Further development of the capacity of the Information Technology Section and its ability to respond to EFSA programs and requirements e.g. CFP/EFSA/DATEX/2011/01 program
- Contribution and support of the national policy
- European/ International Cooperation and Promotion of Applied Research (the SGL has succeeded over the years to absorb about 4.5 million through EU funds for applied research projects on problem solving/ preventing and policy making since 2004)
- Enlightenment and Dissemination of knowledge/ information
- Budget Implementation

## 1.3 Reliability and Efficiency

The efficiency and reliability of a dynamically evolving entity are fundamental conditions of stability and growth. The simultaneous application of two quality management systems in order to guarantee a more integrated approach is a result of longitudinal efforts of 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.

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)

## 1.4 Implementation of activities and programs 2012

- ENFSI (European Network of Forensic Science Institutes) Working Group for controlled Drugs Meeting, (Paphos, 8-10 May 2012)

Main Events organized by SGL during the Cyprus Presidency of the Council of the EU:

- Human Biomonitoring (HBM) - Linking Environment to Health, (Larnaca, 22-24 October 2012)
- Building Trust through Authentic Food and Safety (BuTrAFoS), (Limassol, 29-31 October 2012)
- Workshop of Community Reference Laboratories on Pesticides (EURL-FV/CF/SRM, (Limassol, 12-13 November 2012)
- ACROPOLIS-New methods of risk assessment on pesticides residues, (Larnaca, 15-16 November 2012)
- Food Safety Agencies Meeting, (Paphos, 3-4 December 2012)
- Annual meeting of the Advisory Forum of EFSA (Paphos, 5-6 December 2012)

Furthermore, the SGL had also an active contribution to the Cyprus Presidency Conferences organized by the Ministry of Health of Cyprus namely "Healthy Ageing", and by the Pharmaceutical Services namely "Meeting on Counterfeit pharmaceutical products and Health Enforcement Agencies".

## 1.5 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 2012, the SGL started or continued the following studies/ projects:

### **1.5.1 European Union Research Programs**

- Demonstration of a study to coordinate and perform human biomonitoring on a European Scale - Direct Measure of the Levels of Environmental Chemicals in the Human Body (European projects COPHES"/ "DEMOCOPHES", (2010-2012))
- The Improvement of the Quality of Indoor Air in European Schools and to prevent the effects on Children's Health (European project "SINPHONIE" (2009-2012))
- Water Quality Management in the Agro-Food Industries- Leonardo Da Vinci - (HYDROCULTURE, (2011-2013))
- Electronic Transmission of Chemical Occurrence Data to EFSA (2011-2012)
- NP/EFSA/DCM/2012/02/02 -"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" (2012-2013)
- EFSA - Focal points activities agreement (2011) (continued)

### **1.5.2 Research Programs funded by the Research Promotion Foundation**

- Anthocyanins in Cypriot and Slovenian Fruit Juices as a tool for their Authenticity confirmation (2010-2012)
- Study on Antioxidants and Allergens in Authentic Cypriot and Romanian wines (2010-2012)

- 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 (2011-2013)
- ADAQUA - Advance aquatic tools for sustainable pollution risk management in river basins of Cyprus (2011-2013)
- Development of Molecular Biology Techniques for the Detection of Allergens in Food.
- 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)
- Certification of the Varietal Origin of Wine and Must using DNA-Based Methodology (2012-2014)

### **1.5.3 Research Programs funded by the Ministry of Health**

- Publication of "Cyprus Food Composition Tables" (3<sup>rd</sup> edition)
- Salt in our Diet: Snacks and Ready to eat meals
- Nutritional value of Cyprus aqua cultured fish vs open sea fish
- Adulteration of Cypriot Traditional Cheese "Halloumi" with milk powder and caseinates
- Study of the Authenticity of Alcoholic beverages by using Spectroscopy and Chemometrics
- Authenticity of Cypriot Traditional Cheese "Halloumi"
- Determination of Sulphur Dioxide (preservative, allergens) in Food and Drinks
- The Identification of Glycosides (stevioside and rebaudioside) of

the leaf of "Stevia" and the Monitoring of its concentration changes during the plant's development, with the prospect of cultivating of the new sweetener "Stevia" in Cyprus.

- Expansion of the scope of the Pesticides residues control/ Multi Residues Analysis of Pesticides in local Cyprus Wines
- Investigation of Heavy Metals (Lead, Cadmium, Mercury) in Food of Animal Origin (Liver)
- Control of Chemicals (toxic metals and phthalate esters) and Physical/ Mechanical Properties of Children's Toys
- Control of phthalate esters in children's cosmetics
- Research for the detection and quantification of tree nuts in food by Real Time PCR method
- Method Development for the Detection of Noroviruses in Fresh Vegetables
- Investigation of the Drinking Water Quality of Vending Machines
- Investigation of the Presence of Cyanides in Drinking Water
- Control of Genotoxicity in Surface and Treated Waste Water
- Investigation of the Risk of Legionnaires' disease in sewage Treatment Plants

#### **1.5.4 Others**

- Monitoring of the Ezousa underground water

### **1.6 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 leverage and exploit sources of

external funding. Through this cooperation, the SGL transfers the knowledge and experience from other countries and takes the opportunity to show the activities and skills of a small member state and its adaptability of the new requirements and challenges.

In 2012, 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.
- Study by EFSA "Gathering consumption data on specific consumer groups of Energy drinks".
- 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 2012, the SGL continued participation and presentations of scientific papers in international conferences, in EU committees, working groups of the EFSA, and the Programming Committees of the 7th Framework Programme for Research (COST, EUREKA, CORNET) etc

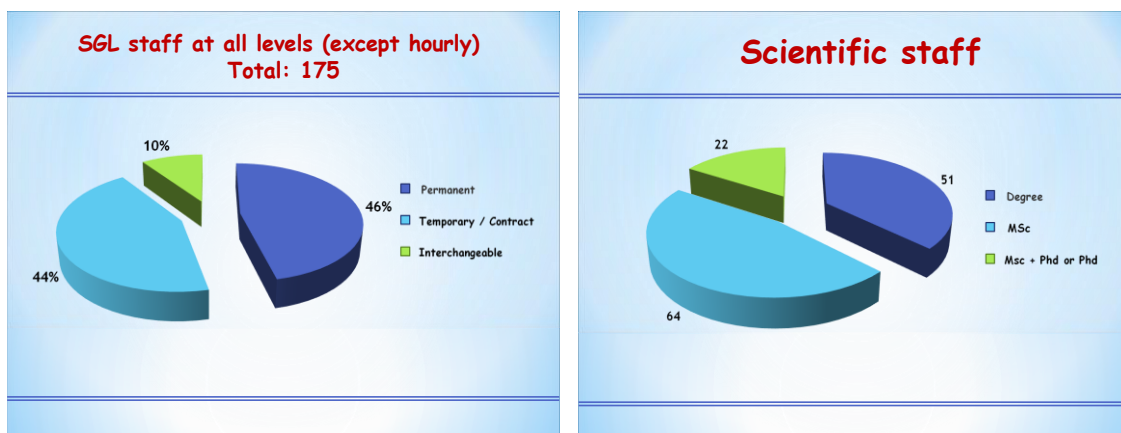
## 1.7 Organisation

### 1.7.1 Organisational Structure

The SGL's wide range of analytical work is covered by 21 Laboratories under eight sections as well as 3 Units namely the Cooperation with EFSA/Risk assessment unit, the Research and International Cooperation Unit and the QA Unit. All its work is supported by a registry, stores, library, secretariat, accounts and electromechanical services.

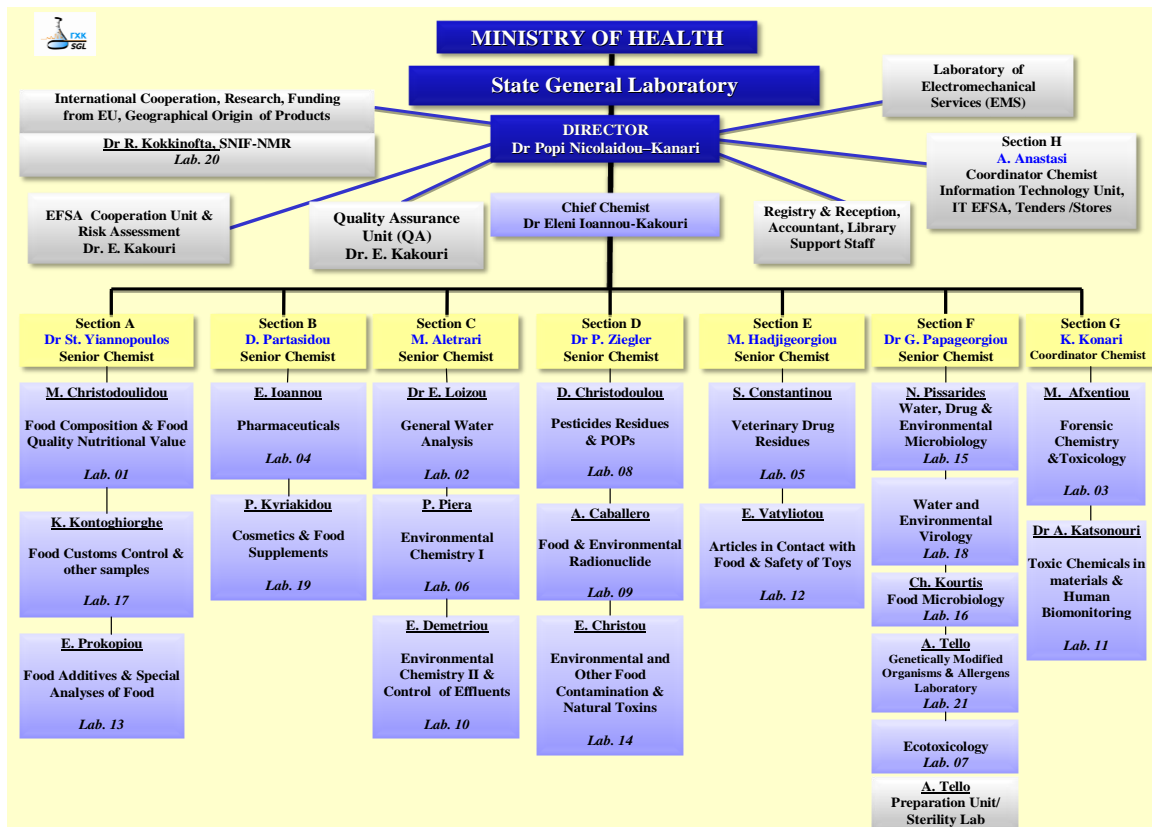
During 2012, the staff comprised 71 chemists and microbiologists, (excluding the post of the Director), in permanent positions, 6 clerks and 22 support staff. In addition to these a total of 40 laboratory technicians (Chemists and Microbiologists) were also employed on contract as well 7 clerks. For the completion of the research projects an additional 30 Chemists/Microbiologists/Biologists and 1 Data Base expert were employed on contract.

The staff of the SGL (permanent, interchangeable, temporary and contract) worked in 2012 with enormous diligence, professionalism, consistency and responsibility and fully responded to the challenges of the Cyprus Presidency of the Council of the EU (2012) contributing to a successful Presidency that received compliments and gained respect.





## 1.7.2 Organogramme



## 1.8 Financial Resources/Budget

Expenditures incurred by the SGL in 2012 amounted to €9,086,018 (implementation of the 91,39%) (88.6% of the Ordinary Budget and 98.88% of the Development Budget). During the period 2010-2012, the SGL's revenue from EU programs was €786.836 (€432.968 from EU research programs and €353.868 from the Cyprus Research Promotion Foundation).

## 1.9 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

## 1.9.1 Foodstuffs

### 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 generates various national control programmes with 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 a long-term food safety.
- The effective implementation of the "acquis communautaire".
- Risk assessment and nutritional data and composition in order to achieve stable supply of safe and wholesome food and healthy choices to consumers.
- The analysis, characterization, standardization and authenticity of the traditional or local food.

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 following areas:

### 1.9.1.1 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,  $\omega$ 3- $\omega$ 6 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)

-**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,  $\omega$ 3- $\omega$ 6 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).

### 1.9.1.2 Safety of Foodstuffs

- **Food Additives (Preservatives** (Sulphur dioxide, Benzoic/Sorbic acid, Propionic acid, Nitrates/Nitrites, Natamycine), **Natural and Water soluble synthetic colours** (Tartrazine, Carmoisine, Ponceau 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))

-**Pesticide residues** mainly in fruit and vegetables, baby foods, Biological products, products of animal origin and oils and wines (Organophosphorous, Organochlorines, Carbamates, Pyrethroids, Amides, Strobilurines, Dinitroanilines, Triazoles, Benzimidazoles, Neonocotinoides, Dithiocarbamates and others)

-**Veterinary drug residues in meat and animal products** (Tetracyclines, Sulphonamides, Penicillins, Cephalosporines, Aminoglycosides, Quinolones, Chloramphenicol, Nitrofurans, Nitroimidazoles, Coccidiostats, Anthelmintics, Tranquillizers, Zearanol, NSAIDs,  $\beta$ -Agonists, Hormones, Anabolic substances, Thyreostats, Gestagens, Corticosteroids)

-**Environmental and other contaminants in foodstuffs, and Natural Toxins** (Aflatoxins B<sub>1</sub>, B<sub>2</sub>, G<sub>1</sub> and G<sub>2</sub>, Aflatoxin M<sub>1</sub>, Ochratoxin A, Zearalenone, Deoxynivalenol, Fumonisin B<sub>1</sub> and B<sub>2</sub>, Toxins T<sub>2</sub> and HT<sub>2</sub>, 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 migratory and endocrine disrupters** (Overall & specific migration of substances of Polyadipates, Cadmium, Lead, Formaldehyde, Phthalates, Primary Aromatic Amines, Melamine, Styrene, Bisphenol A)

- **Genetically Modified Organisms** (Detection of GMOs in food and raw materials (soya, maize, rice))

- **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)

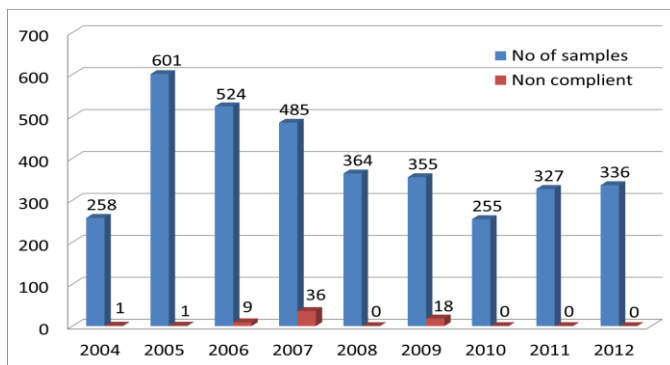
- **Food supplements** (Anabolic Steroids, Stimulants, Vitamins, Heavy metals, PDE-5 analogs, Weight loss substances)

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

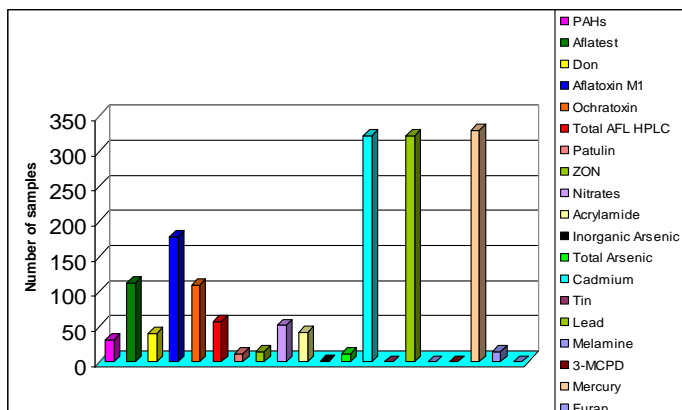
### 1.9.1.3 Risk assessment in the areas of foodstuffs and water

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 the framework of its competencies and its participation in the National Food Safety Council.

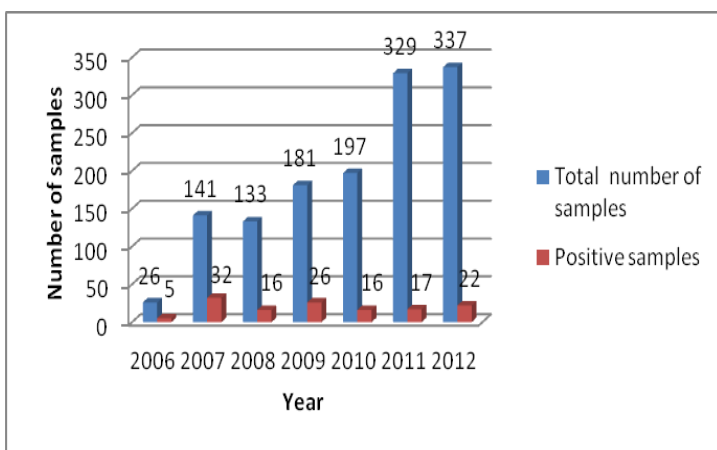
Some histogrammes as examples:



*Monitoring of Histamine in Fish from 2004 to 2012*



*Number of samples analyzed for several food contaminants during 2012.*



*Over time results (2006-2012) for the detection of allergens in food*

## 1.9.2 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 and contributes significantly to pollution prevention and effective treatment having developed a number (18) of multidimensional monitoring programs that can meet the application of 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

### **1.9.2.1 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  $\alpha/\beta$ - 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'})

### **Surface and Underground Water (Dams, rivers, freshwater, underground water, boreholes, salt lakes)**

**Chemical Control** (pH, Chromium, Zinc, Copper, BOD5, COD, Mercury, Cadmium, Lead, Nickel, Boron, Barium, Iron, Manganese, Cobalt, Arsenic, Total Phosphorus, Free Ammonium, Total Ammonium, Nitrites, Total residual chlorine, Suspended solids, TOC, VOCs, Pesticides, PAHs, Organic micropollutants, PCBs)

**Microbiological Control** (Total coliforms, *Escherichia coli*, *Enterococci*)

**Determination of Toxicity** (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)

**Environmental biomonitoring** (Spectrophotometric determination of Chlorophyll A, Determination of genotoxicity: AMES Test: Screening test for chemical substances which cause genotoxic effect on DNA of the *Salmonella spp*)

**Radioactivity levels** (Gamma Radionuclides, Gross  $\alpha/\beta$ -activity)

### **Seawater/ Costal 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, BOD<sub>5</sub>, 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))

### 1.9.2.2 Effluents

#### Domestic effluents-Treated Water

Water scarcity, increased needs due to population growth (permanent or not) 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, BOD<sub>5</sub>, 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)

**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: BOD<sub>5</sub>, COD, suspended solids)

### **1.9.2.3 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  $\beta$ - activity)

### **1.9.2.4 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, diseases of the reproductive system) and influence healthy ageing, a topic which was one of the health priorities of the Cyprus Presidency of the Council of the European Union (second half of 2012).

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 5<sup>th</sup> & 6<sup>th</sup> 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 proved that a wide measurement of chemicals in people across Europe using a coordinated and harmonized approach is feasible and can contribute to the protection of the health of Europeans in the future. For the first time, comparable results have been obtained for certain chemicals of concern for health (mercury (hair) and cotinine, phthalate metabolites, cadmium, and bisphenol A (urine)) of almost 4000 mothers and their children in 17 European countries at the same time.

### **Quality of Indoor Air**

The quality of indoor air is an important factor that can potentially affect health, given that people in the present society spend on average 90% of their time indoors, where they are exposed to chemical and biological pollutants. This exposure can cause respiratory and other health problems, with children being particularly vulnerable.

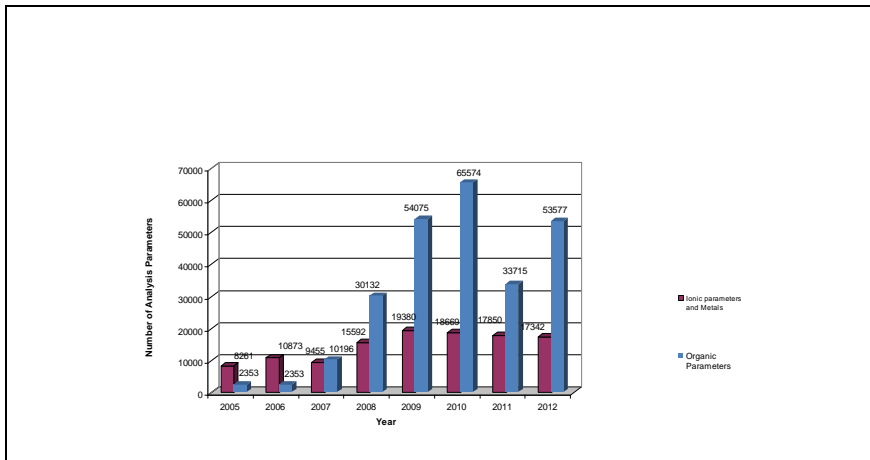
The SGL participated in the European project "SINPHONIE" (2009-2012), funded by the EU General Directory for Health and Consumer Safety (DG SANCO), aiming to improve the quality of indoor air in European schools and thus to prevent the effects on children's health. From the evidence found throughout Europe, recommendations for improving the quality of indoor air in schools have been prepared.

**Physical Control** (Relative humidity, Temperature, Ventilation rates)

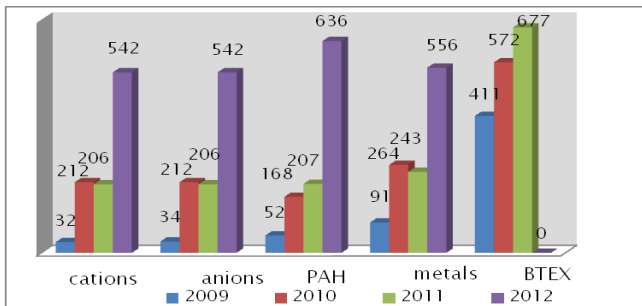
**Chemical Control** (Formaldehyde, Benzene, Trichloroethylene, Tetrachloroethylene,  $\alpha$ -Pinene, d-Limonene, PAH (BaP, naphthalene),  $\text{NO}_2$ ,  $\text{O}_3$ , Radon,  $\text{CO}$ ,  $\text{CO}_2$ ,  $\text{PM}_{10}/\text{PM}_{2.5}$ )

**Biological Control** (General microbial exposure, bacterial endotoxin, fungal ergosterol, Specific microbial (Penicillium, Aspergillus, Cladosporium sp., Streptomyces sp.), Indoor relevant allergens (dog & cat allergen, house dust mites)

Some histogrammes as examples:



*Number of Analyzed Parameters in Drinking Water through the years 2005-2012*



*Air Samples 2009-2012*

### 1.9.3 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 various specialized laboratories of the SGL.

### 1.9.3.1 Pharmaceuticals

The control of pharmaceuticals, along with the foodstuffs control, was one of the first priorities of the SGL, since it's 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)

### 1.9.3.2 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,

Hydroquinone-monobenzyl ether), Lidocaine, Benzocaine, SPF( Sun Protection Filters), Heavy metals, NDELA, Free Formaldehyde, Para-Phenylenediamine (PPD), Allergens, Hydrogen Peroxide).

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

### 1.9.3.3 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 of 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)

**Chemical Control** (Phthalate esters, migration of certain elements from: wooden and metallic toys with painted surfaces, plasteline and crayons)

### 1.9.3.4 Other Consumer's Products

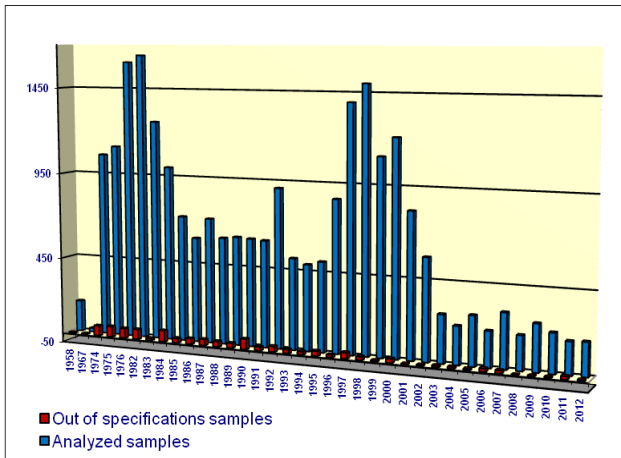
The SGL collaborates with the Cyprus competent authority (Department of Labor's Inspection) for the implementation of the Chemical Substances Law of 2010 and the European regulation REACH for controlling the quality and content of dangerous chemicals of various consumer products available in the Cypriot market.

In 2012, the following consumer products have been analyzed for their safety:

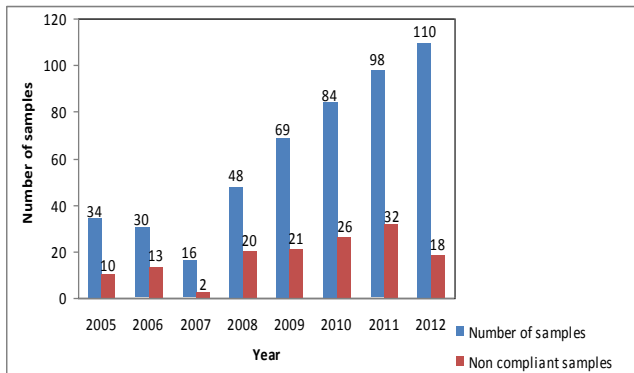
- **Adhesives (Super glues and tyre-repair kits)** for Benzene, Toluene and Chloroform
- **Felt-tip pens and markers** for Organic solvents
- **Textiles** for Azocolorants (26 aromatic amines in total)

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:



*Analyzed pharmaceutical samples VS out of specifications pharmaceutical samples (1958-2012)*



*Control of children's toys in the years 2005-2012*

### 1.9.4 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.

#### 1.9.4.1 Forensic Chemistry

**Controlled drugs** (cannabis, heroin, cocaine, new synthetic drugs namely synthetic cannabinoids and cathinones etc)

**Ignitable Liquids** (petrol, diesel, kerosene)

**Explosives and Explosives Residues** (Trinitrotoluene (TNT), Nitroglycerine (NG), Ethylene glycol dinitrate (EGDN), Cyclotrimethylenetrinitramine (RDX), Pentaerythritol tetranitrate (PETN), Smokeless powder)

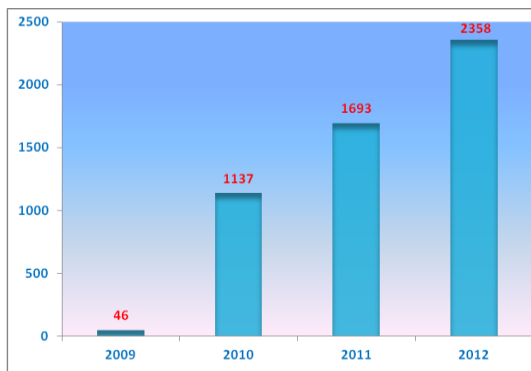
**Gunshot Residues**

**Tear Gases** ( $\alpha$ -Chloroacetophenone (CN), 2-Chlorobenzalmalononitrile (CS))

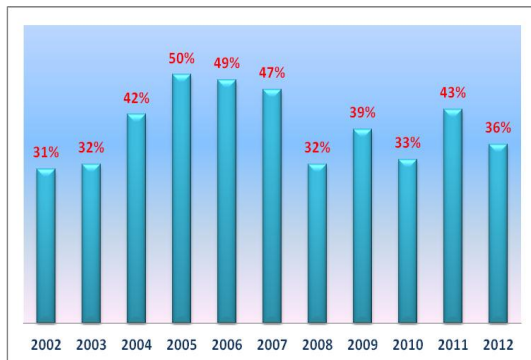
#### 1.9.4.2 Forensic Toxicology

**Qualitative Control** (Controlled Drugs, Alcohol, benzodiazepines, Antidepressants, Pesticides, Non steroid anti-inflammatory drugs (NSAID))

Some histogrammes as examples:



*Samples of New Synthetic Drugs per Year*



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