



ΓΧΚ  
SGL

Γενικό Χημείο του Κράτους  
State General Laboratory



Abridged Version  
**ANNUAL REPORT**  
**2014**



MINISTRY OF HEALTH  
CYPRUS  
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**MINISTRY OF HEALTH**

**State General Laboratory**

**Abridged Version  
of the Annual Report  
2014**

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## **PREFACE**

*Dear all,*

*It is with great pleasure that I present to you the annual report of the State General Laboratory (SGL) which shows in detail the various activities that the management and the staff, with a deep sense of responsibility, completed during 2014.*

*Focused on its vision, mission and strategic objectives, SGL worked hard to face challenges arising from globalization, free movement of foodstuffs within EU, climatic changes, new technologies, illegal production, sale of new synthetic drugs and many more.*

*SGL accomplished a great number of targets. The high quality services rendered by SGL through the monitoring and surveillance programs and its active participation in the National and EU regulatory process reflect a progressive route towards excellence.*

*In times of financial constraints, the utilizing of all possible opportunities and the investment in research are the driving forces to development and progress. Once again, SGL succeeded in preventing, solving problems and strengthening capacity on risk assessment through applied research in the area of its competence which was financially supported by national as well as EU funds.*

*For the accomplishment of its objectives, SGL would like to thank the Permanent Secretary of the Ministry of Health and the Minister of Health himself, as well as the collaborating Departments within all Ministries, for their close co-operation.*

*I would also like to congratulate and thank all the staff members of SGL who, with their collective work, dedication and enthusiasm, succeeded in responding to urgent and vital matters, fulfilled to a great extent the stakeholders' expectations and increased confidence.*

*For the SGL, valid and timely information given to the Competent Authorities, Parliament, Mass Media and Citizens through its Annual Report, Website and Reports of analytical results, is essential. This is an integral part of its multidisciplinary effort to protect public health, environment and safety of consumers, for a better quality of life, aiming at prevention.*



*Dr. Popi Nicolaidou-Kanari  
Director of SGL*

**«Excellence for Better  
Contribution to the  
Quality of Life»**



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# State General Laboratory

## 1. INTRODUCTION

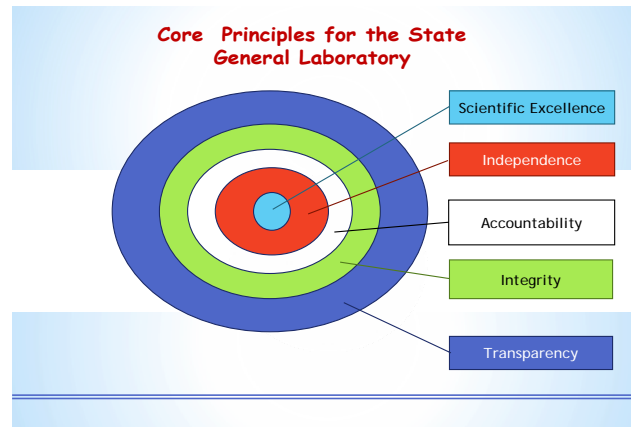
### 1.1 General Scope and Responsibilities

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 Service 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, while implementing the model of Common Assessment Framework Program (CAF) with benchmarking towards excellence,
  - its collaboration with all public sectors and respective EU organizations and Committees,
  - promoting new approaches at management and technical level, 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, in 2014 the SGL prepared for the transition of its accreditation, 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 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 and quality, food authenticity and geographical origin, water, environment and health, as well as narcotics. Research is carried out primarily with EU funds but also with national funds by the Research Promotion Foundation and the Ministry of Health. 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 mass media for keeping updated both the scientific community and the public at large.

In 2014, the SGL started or continued the following studies/projects:

#### **1.3.1 European Union Research Programs**

- "Total Diet Study Exposure" for the estimation of the exposure/ intake of the population to Chemicals and Nutrients (FP7) (2012-2016)
- "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- )

- Re-coding of the food descriptors of EFSA Chemical Occurrence Database and Food Consumption Database entries according to the FoodEx2 food classification and description system (2014-2015)
- Pilot project on the implementation of SSD2 in the frame of the electronic transmission of harmonized data collection of analytical results to EFSA (2014-2016)
- Horizon 2020-EU project: "Assessing the health risks of combined human exposure to multiple food-related toxic substances" (adopted in 2014 and officially started in May 2015)
- New psychoactive substances (NPS): "Building knowledge and evidence based training through research" (17/11/2014-5/2016)

#### **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" (2011-2014)
- "Molecular methodology development for the detection of allergens in foods" (2011-2014)
- "Identification of the varietal origin of wine and must using DNA-based methodology" (2012-2014)
- "RoCyWines: Scientific factors related to consumers health as new tools for Confirmation of Authenticity of Cypriot/ Romanian Wines" (2014-2016)
- "METAWATER: New metagenomics and molecular based tools for European Scale Identification and control of emergent microbial contaminants in irrigation water" (2014-2017)

### 1.3.3 Research Programs funded by the Ministry of Health

- Survey of the levels of saturated, unsaturated and trans fatty acids in fats and oils and other foodstuffs
- Analysis of Controlled Drugs and New Psychotropic Substances in seized materials
- Determination of Pesticide Residues in tea and dry herbs
- Method development for the determination of priority substances in sediments and treated domestic wastes
- Determination of heavy metals Pb/Cd/Hg/As in honey, chocolate, and cocoa with ICP/MS
- Determination of Acrylamide levels in food with LC-MS/MS
- Risk assessment of the exposure of employees to high concentrations of Legionella in sewage effluents at communal sewage treatment plants
- Detection of staphylococcal enterotoxins in halloumi and other locally produced cheeses
- Caffeine levels in several types of coffee, beverages, energy drinks and refreshments consumed in Cyprus (2013-2/2014)
- Incidence and levels of colours in frequently consumed food and drinks (2014-2015)
- The application of Isotopic Data base of alcohols for controlling the authenticity of alcoholic beverages consumed from Cypriots
- Monitoring of the "Ezousa's" ground 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 2014, the SGL actively participated in the following meetings/Bodies/networks/programs/studies:

- European Reference Laboratories (EURL-NRL)
- EU Comitology expert groups and Standing Committees
- European Food Safety Authority (EFSA)
  - Advisory Forum (AF)
  - Focal Point
  - AF - Communication WG
  - Expert groups/ Networking groups for: eg. Emerging Risks (EMRISK), Pesticide residues monitoring, Nanotechnology, Non Plastic Food Contact Materials, Food Consumption Data, Chemical Occurrence Data etc.
- Program "Customs 2020" (European Network of Customs Laboratories (GCL) for harmonization and joint actions) - Working Groups of the Program (Actions 1 to 6)
- 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 2014, the SGL continued participation in:

- International conferences and presentations of scientific papers, in EU committees, and in the Programming Committee of the "Horizon2020" (Food Security, Sustainable Agriculture, Marine, Maritime and Inland water research and Biomonitoring) for research, etc.
- Both, the evaluation of EU research proposals for funding and the evaluation of research projects for approval and publication in refereed journals/ international publications
- The Scientific Committee of the Ministry of Health for the development of a Strategy for research, and the approval of applications for applied research within the various departments of the Ministry
- The Working Groups of the Council of EU for the formation/ modification of the European legislation.

## **1.5 Objectives fulfilled in 2014**

- Expansion of the control, monitoring and surveillance programs:  
Full implementation of the monitoring/surveillance/control programs (in all 71) covering a total of 31,026 samples with 531,839 parameters in 2014 (compared to 2013 where 26,636 samples were analyzed with 457,165 parameters tested). The fact that the number of analyzed samples in 2014 is much higher than in 2013 shows that, despite the financial constraints, the SGL together with the Competent Authorities try 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 €330,000 was spent in purchasing state-of-the art equipment or renewal of old equipment, plus a sponsorship of €340,000 received from OPAP-Cyprus, for an equipment for the detection of new synthetic drugs and other chemical substances)
- Enhancing risk assessment capacity through participation in EFSA's project "EU Menu" and the Horizon2020 research program "EuroMix")
- Further development of the capacity of the Information Technology Unit (IT) and its ability to respond to EFSA's programs and requirements e.g. programs OC/EFSA/DCM/2013/05 and CFT /EFSA/DCM/2013/02
- Contribution and support of the national policy in areas of its competency
- European/ International Cooperation and Promotion of Applied Research

- Participation in European and other Applied Research Programs on problem solving/ preventing and policy making
- Communication/Dissemination of knowledge & information/ Publications
- Prudent Budget Utilization.

## 1.6 Achievements-Implementation of activities and programs

During 2014 the SGL achieved the following:

- Great effectiveness in detecting non-compliant food and other consumer products preventing their entry into the Cyprus and EU market (e.g. nuts, vegetables, 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:
  - Biophenols in olive oil
  - Glycosides (stevioside and rebaudioside A) (stevia) in light refreshments and Monitoring the concentration of 'Stevia' in 'Stevia' leaf during plant development
  - Aroma roasting on nuts for customs purposes
  - Denatuls (isopropanol, methyl ethyl ketone and bitrex) in denatured products e.g. bioethanol
  - Animal DNA for fraud in meat products
  - Genetically Modified Organisms in feed
  - New substances of pesticides in food
  - New substances of anabolic steroids in food supplements
  - Priority substances in treated domestic wastes
  - Determination of toluene, benzene, chloroform and xylene in markers
  - New synthetic drugs and hemp
- Prompt and effective response to food, mostly environmental and other crises that occurred in 2014, such as:
  - Conducting Risk assessment:
    - in specific communities of the island where drinking water exceeded the acceptable values of sulphates, sodium and chlorides/ evaluation of the impact from long-term consumption of drinking water was also carried out

- in the case of two communities in the area of Larnaca where deviations from the parametric aluminum value of drinking water were repeatedly observed
- in drinking water used for bottling and sale as drinking water, in which high concentration of nitrates was observed - based on the "precautionary principle" SGL recommended avoiding the use of it
- Proposal for corrective measures/ actions in cases such as drinking water:
  - which has exceeded the acceptable concentration: of manganese in small communities/ the aluminum/ and the abnormal odor in some bottled waters
  - for the presence of Polycyclic Aromatic Hydrocarbons (PAHs) in the communities Alhambra, Agia Barbara and Pera Chorio Nisou
- Contribution in the investigation on possible pollution of Germasogeia dam from the neighbouring premises fire
- Analysis of environmental pollution samples in dams and lakes and timely results to the Competent Authorities
- Identification of new synthetic drugs traded for the first time in the EU and hemp which cultivation for the first time has allowed
- Active contribution through scientific results for supporting Cyprus in having one of the cleanest EU marine waters in recent years, under the framework of the EU program "Blue Flag", with the systematic microbiological monitoring of marine waters performed at the SGL
- Effective ammunition control by the National Guard with the SGL's laboratory and scientific support
- By signing the protocol of cooperation between the SGL and the Competent Authority of Medical devices (MD) of the Ministry of Health, commenced the MD market surveillance for its compliance with the relevant national and EU legislation

- 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, veterinary residues and other food contaminants
- From December 2014, in cooperation with the national "Research and Education Institute of Child Health", SGL is implementing the first official national pan-cyprian dietary survey according to EFSA requirements, which will cover all ages from infants to 74 year old including pregnant women: "The National Dietary Survey of the Cyprus population (Lot 1 & Lot 2)". The target of the survey, which is in the framework of the "EU MENU" project of EFSA and will last till 2020, is the harmonized collection of food consumption data in the EU Member States for calculating the exposure of the population to chemical and other hazards through food
- Development of the deterministic model «Improrisk» for the food risk assessment at individual level of the population under the framework of the above project. Specifically the SGL conducted risk assessment for the Cypriot population (adolescents) to lead, cadmium and mercury and the results were presented at various conferences
- Participation in sending important analytical data for the assessment and the publication in refereed journals of the results of the multiannual pan-European research projects: a. Human Biomonitoring in Europe, b. Improvement of the quality of indoor air in European schools, and c. Aggregate and cumulative risk assessment of pesticides (triazoles) in food
- Active participation in the regulatory process in the fields of its competence, both in national but mostly at EU level

Furthermore, the SGL participated in **eight** research programs, (four of which funded by the Research Promotion Foundation and the other four funded by the EFSA), elaborated **11** pilot research programs funded by the Ministry of Health, and successfully concluded the following **three** research programs:

- Metabolic, Isotopic, Antioxidant and Elemental profiling to characterize Cypriot wines of specific geographical and varietal origin
- Identification of the varietal origin of wine and must using DNA-based methodology
- Molecular methodology development for the detection of allergens in foods

## 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 €120,000 from the EU and €125,000 from the Research Promotion Foundation, for applied research in 2014, and since 2004, a total of € 5,767,892).
- 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 54 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 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) on **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, Determination of denatuls (isopropanol, methyl ethyl ketone and bitrex) in denatured products e.g. bioethanol.

### 2.1.1.2 Safety of Foodstuffs

- **Food Additives (Preservatives)** (Sulphur dioxide, Benzoic/Sorbic acid, Propionic acid, Nitrates/Nitrites), **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), **Antioxidants** (Ascorbic acid), **Methanol in spirits** (e.g. vodka, whisky, 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,  $\beta$ -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 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) papaya, oilseed rape, flax).
- **Meat fraud** (Detection of animal DNA of species not listed in the ingredients of food sample and raw materials beef, pork, chicken-poultry, horse)
- **Allergens** (Detection of allergens presence in foodstuffs (milk, soya, egg, fish, crustacean, peanut, mustard, celery, hazelnut, almond, walnut, pistachio, gluten, sesame, lupin, mollusks and cashew)
- **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 and other Pharmaceutical substances as Levodopa, as well as the substance 1,3-DMAA (1,3-Dimethylamylamine) in Food Supplements)

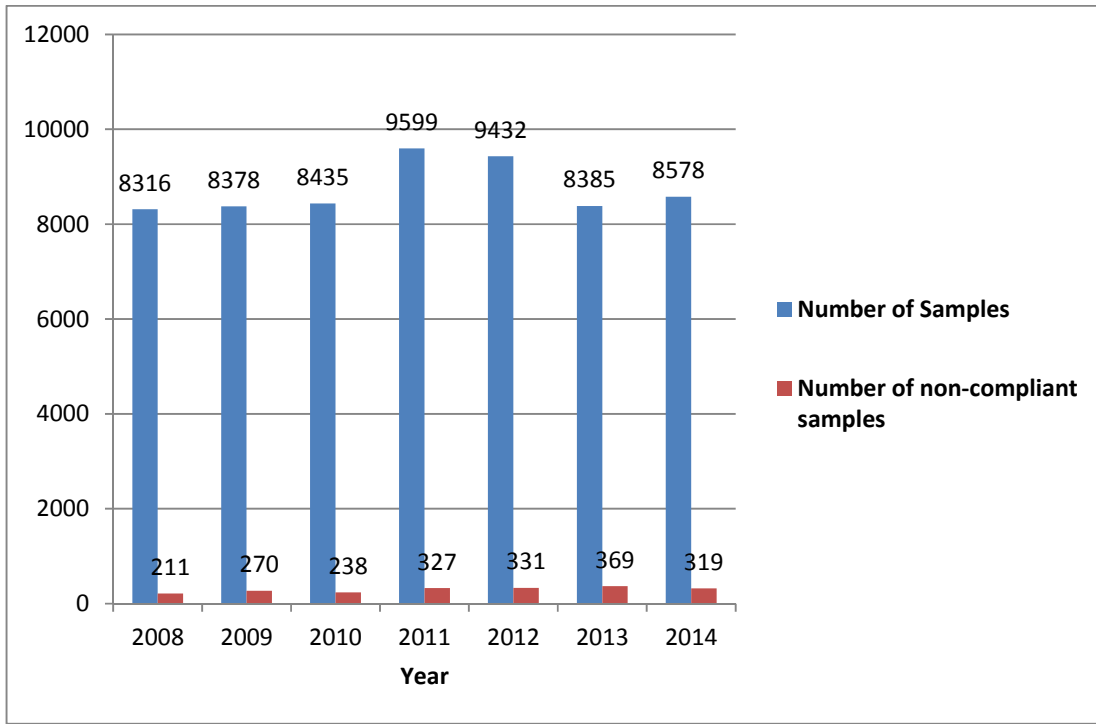
- **Novel Foods/ Nutrition and Health Claims of Foodstuffs** (according to EU Regulations 258/97 and 1924/2006 respectively)

### **2.1.2 Risk assessment in the areas of foodstuffs and water**

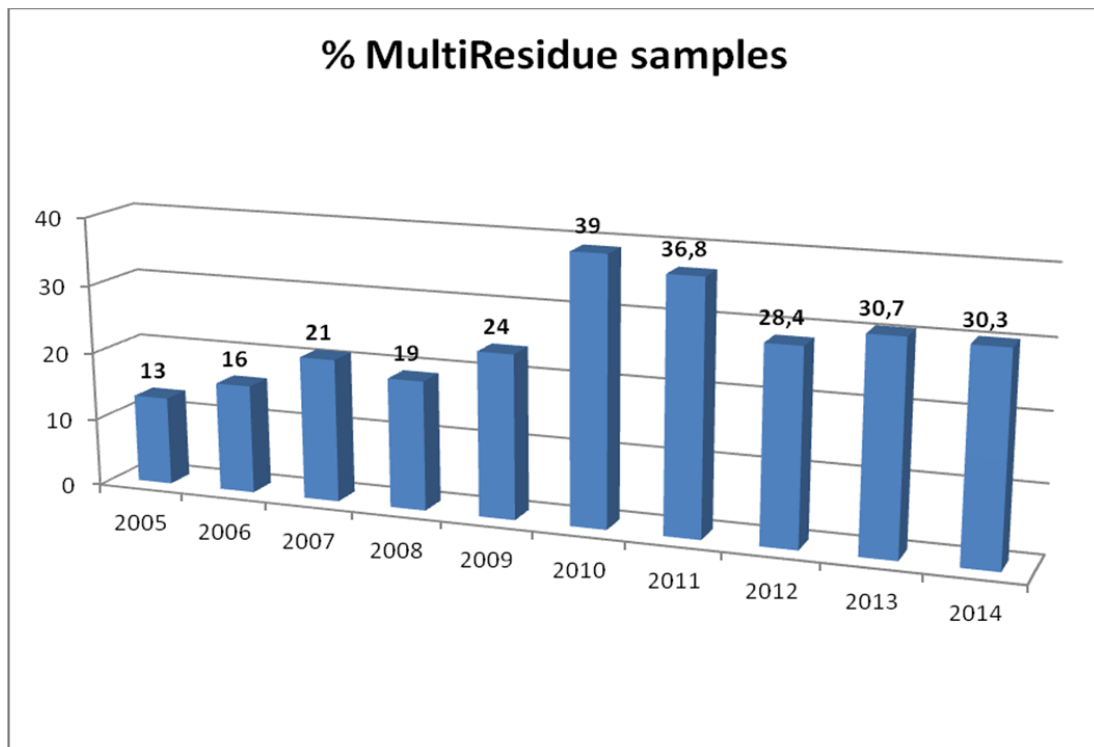
The SGL provides risk assessment for the exposure of the population to chemical substances, microbiological or other hazards from food consumption (Regulation No. 178/2002). Risk assessment is carried out by the SGL within its remit and its participation in the National Food Safety Council.

In 2014, the SGL conducted risk assessment for the Cypriot population (adolescents) to lead, cadmium and mercury using the "in-house" deterministic model «Improrisk» for the food risk assessment at individual level of the population.

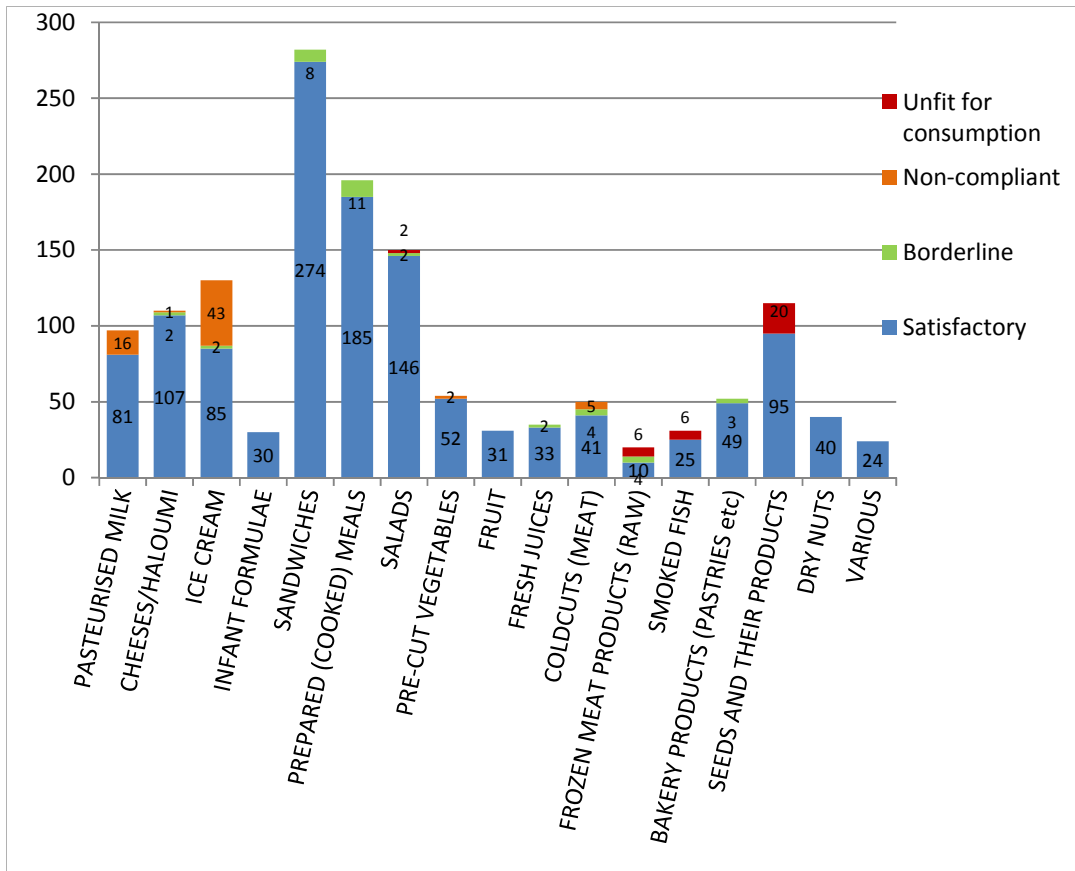
**Some Foodstuffs histogrammes as examples:**



*Temporal Chemical and Microbiological Control on Foodstuffs (2008-2014)*



*Percentage of samples with multiple pesticides in plant origin samples over the years 2005-2014*



**Microbiological Quality of Foodstuffs - 2014**

## 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 of 17 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 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

- **Physicochemical parameters** (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, Cyanides)
- **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'}). Also Thamnotox test using *Thamnocephalus platyurus* is applied on tap water and water from Water Refineries {LC50-TU50 measured at 24Hrs}

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

- **Chemical Control** (pH, Conductivity, Sodium, Potassium, Calcium, Magnesium, Chromium, Zinc, Copper, BOD5, COD, Mercury, Cadmium, Lead, Nickel, Boron, Barium, Iron, 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, Dissolved Organic Carbon (DOC) and Nitrates)
- **Microbiological Control** (Total coliforms, *Escherichia coli*, *Enterococci*)
- **Determination of Toxicity** (Microtox Test using *Vibrio fischeri* (EC20-TU20 measured at 5', 15' and 30'), Daphtox Test using *Daphnia magna* (EC50-TU50 measured at 24 and 48 hours), Algaltox test using *Pseudoklebsiella subcapitata* (EbC50-TU50 measured at 72))
- **Environmental Biomonitoring** (Spectrophotometric determination of Chlorophyll a)
- **Radioactivity levels** (Gamma Radionuclides, Gross a/b-activity)

### 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

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

### Monitoring of the Ezousa underground water

- **Chemical Control** (Nitrates, Total Phosphorous, Ammonium, 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)

## 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, 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  
During 2014, the method for the determination of **pesticides in treated domestic wastes** by GC/MS, was expanded by adding three new substances. Two new methods were also developed, one for the determination of two polar pesticides in treated domestic wastes by HPLC/UV and another for the determination of Polyaromatic Hydrocarbons in sediments
- **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)

### 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  $\beta$ - 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 related strategies and action plans in European, International and National level as well as from other national priorities.

At the moment, the EU Member States (including Cyprus) are exploring with the European Commission the potential for a more sustainable bio-monitoring

system that is able to support the environmental health policy at European and national level.

The coordinating role at national level and the representation of Cyprus in that activity is carried out by the SGL.

The SGL participated in relevant actions carried out since 2004, funded by European projects of applied research, which were related to the:

a). Harmonization of **Human Biomonitoring** in Europe (the degree of exposure of the general population to chemical pollutants).

Human Biomonitoring (HBM) is an important evidence based 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 2014, an evaluation of the European results of these projects was conducted as well as relevant publications were presented in international peer-reviewed journals. More info on: <http://www.democophes.org/> and <http://www.eu-hbm.info/>

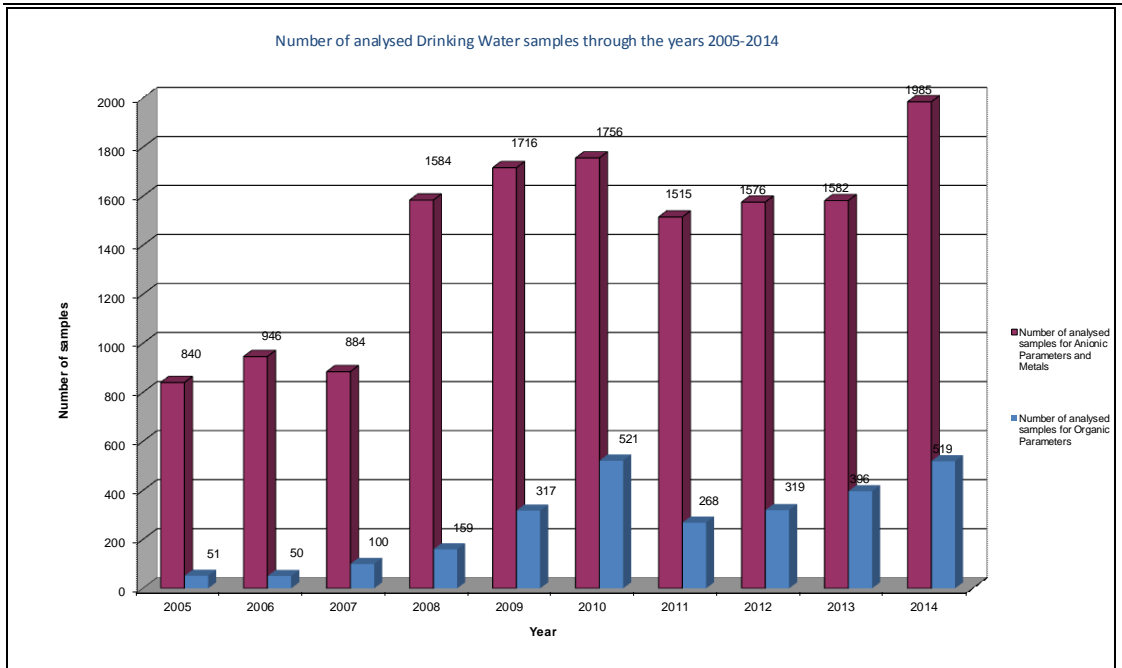
and

b). **Quality of indoor air**

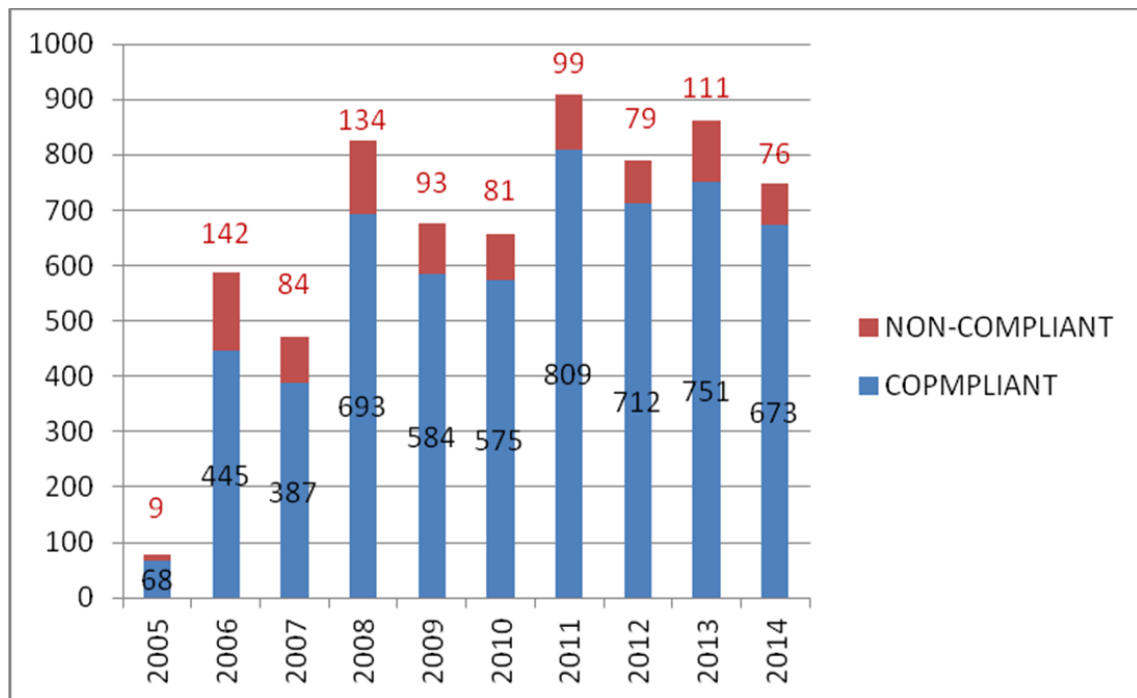
Poor indoor air quality has respiratory and other adverse health effects. Students are a particularly vulnerable population group and they spend more time in school than in any other place outside the house. Studies show that several air pollutants within a school environment can negatively affect health, growth and yield of the child. Pollutants can come from the air or produced indoors by building materials and other products or activities.

The European project SINPHONIE, funded by the European Commission, studied the indoor air quality in European schools and the impacts on health, in order to develop guidance with best practices. The guidelines for healthy school environment as drafted by the SINPHONIE, in 2014 are available on the: [www.sinphonie.eu](http://www.sinphonie.eu)

**Some Environment histogrammes as examples:**



***Number of analysed Drinking Water samples through the years 2005-2014***



***Microbiological conformity towards national regulations of swimming pool waters (2005-2014)***

## 2.3 Consumer Products

The laboratory testing of Consumer products (pharmaceuticals, medical devices, cosmetics, textiles, adhesives, stationery, chemical mixtures household, 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).

### 2.3.2 Medical Devices

In 2014, after the signature of the Cooperation Protocol between the SGL and the Competent Authority of Medical Devices of the Ministry of Health, the market surveillance for the application of relevant national and EU legislation on Medical Devices started. The SGL checked samples of gloves and condoms for mechanical strength.

### 2.3.3 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), Triclosan, Methylchloroisothiazolinone/Methylisothiazolinone (MCI/MI).

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

### 2.3.4 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)

### 2.3.5 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 (N.78(I)/2010) and the European Regulation (EC) No. 1907/2006 (REACH) for controlling the quality and content of dangerous chemicals of various consumer products available in the Cypriot market.

In 2014, the following consumer products have been analyzed for their safety:

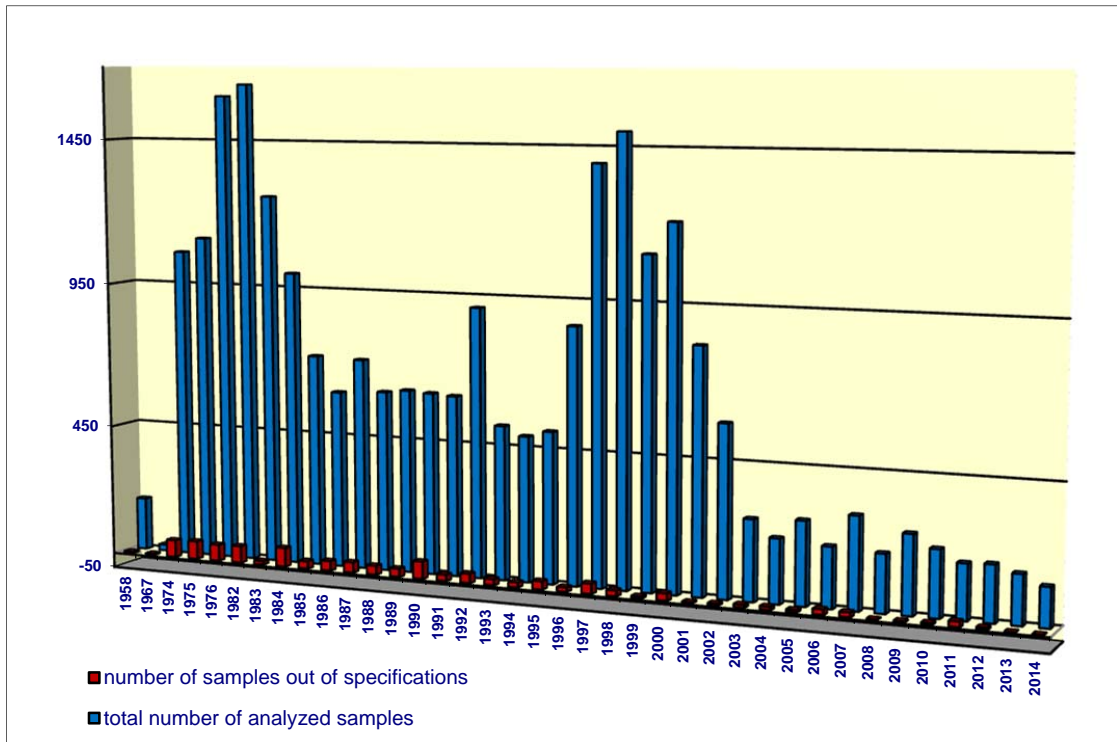
**Textiles** for Azocolorants,

**Adhesives** (rapid-acting and cosmetic use) for chloroform, toluene and benzene,

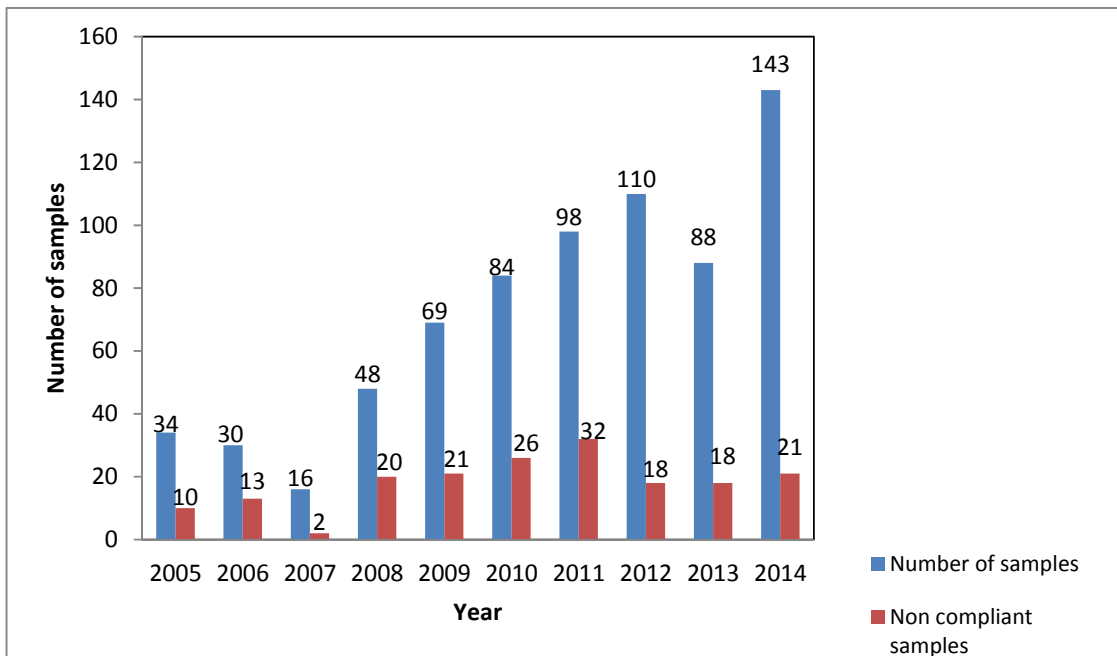
**Felt-tip pens and markers** (water soluble and indelible) for chloroform, toluene, benzene and xylenes,

**Chemical household preparations** to determine pH.

**Some Consumer Products histogrammes as examples:**



***Pharmaceutical Samples analyzed/samples out of specifications (1958-2014)***



***Official control of Toys over the years 2005-2014***



## 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** ( $\alpha$ -Chloroacetophenone (CN), 2-Chlorobenzalmalononitrile (CS), Capsaine (OC), Nonivamide, etc).

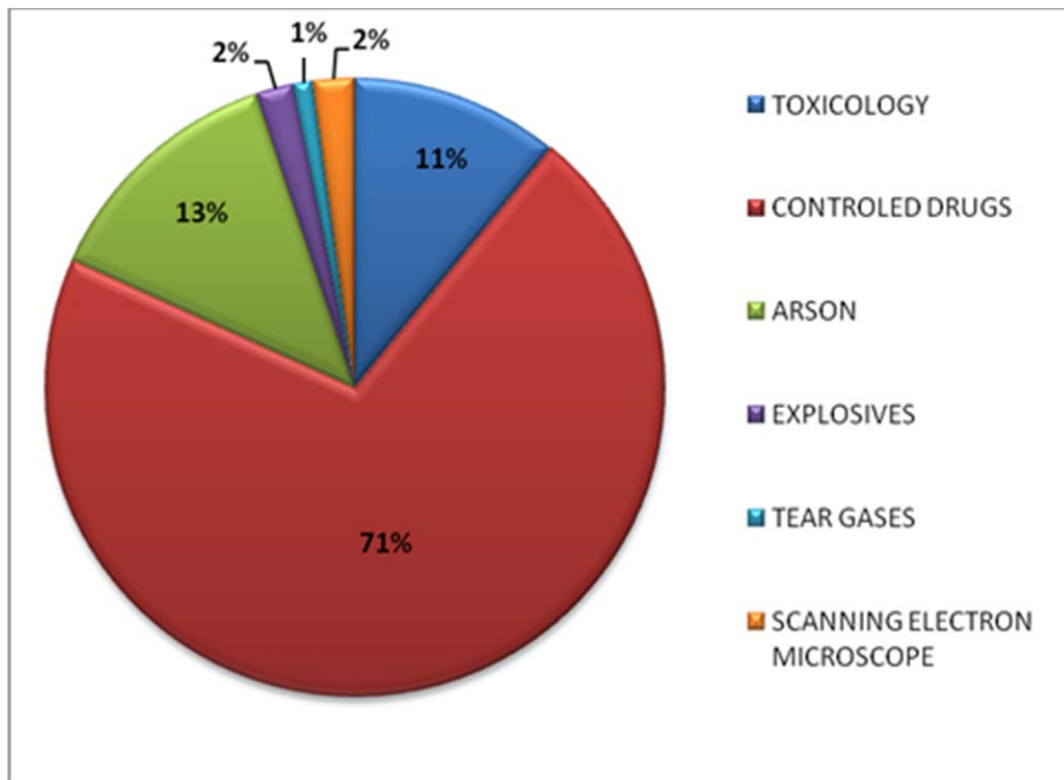
### 2.4.2 Forensic Toxicology

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

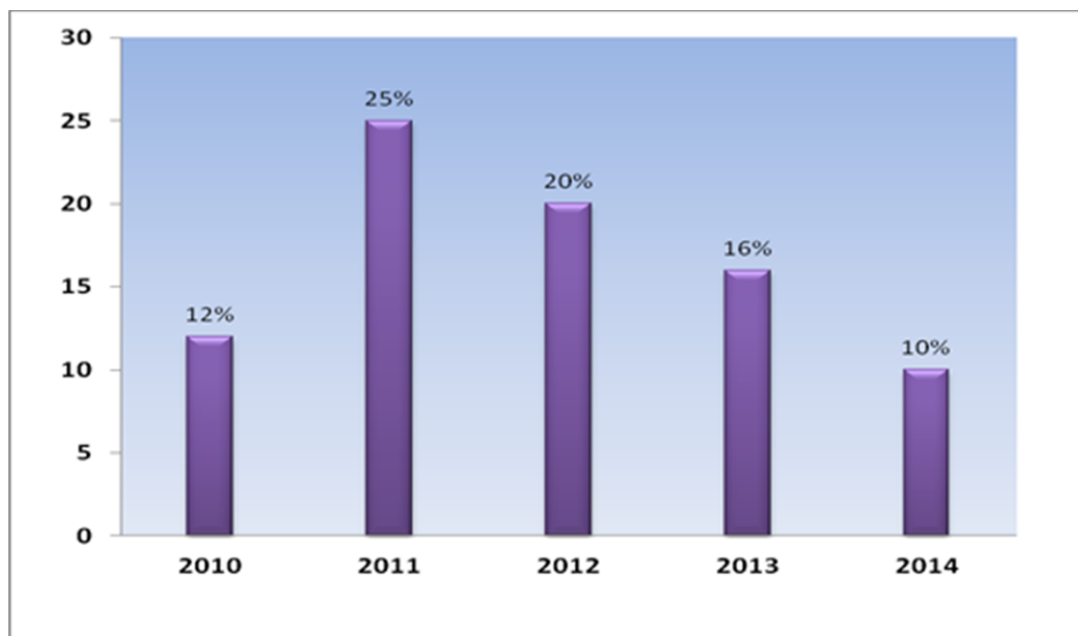
**Quantitative Analysis:** Alcohol in blood, urine or eye fluid, and various drugs according to each case.

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 Forensic Chemistry and Toxicology histograms as examples:



Percentage of samples received in 2014 per category



Percentage of drivers under the influence of drugs

### 3. ANNEX

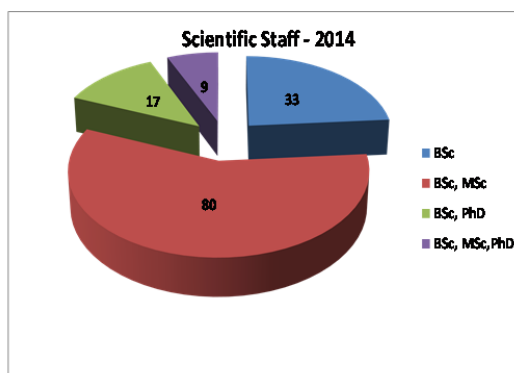
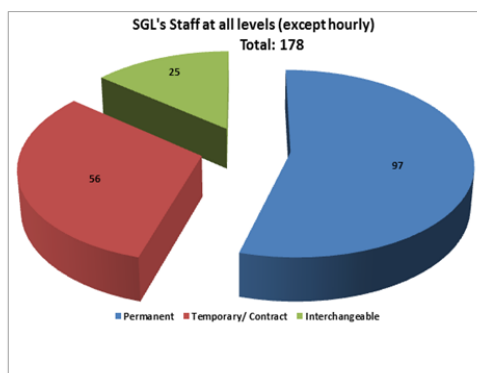
#### 3.1 Organisation

##### 3.1.1 Organisational Structure

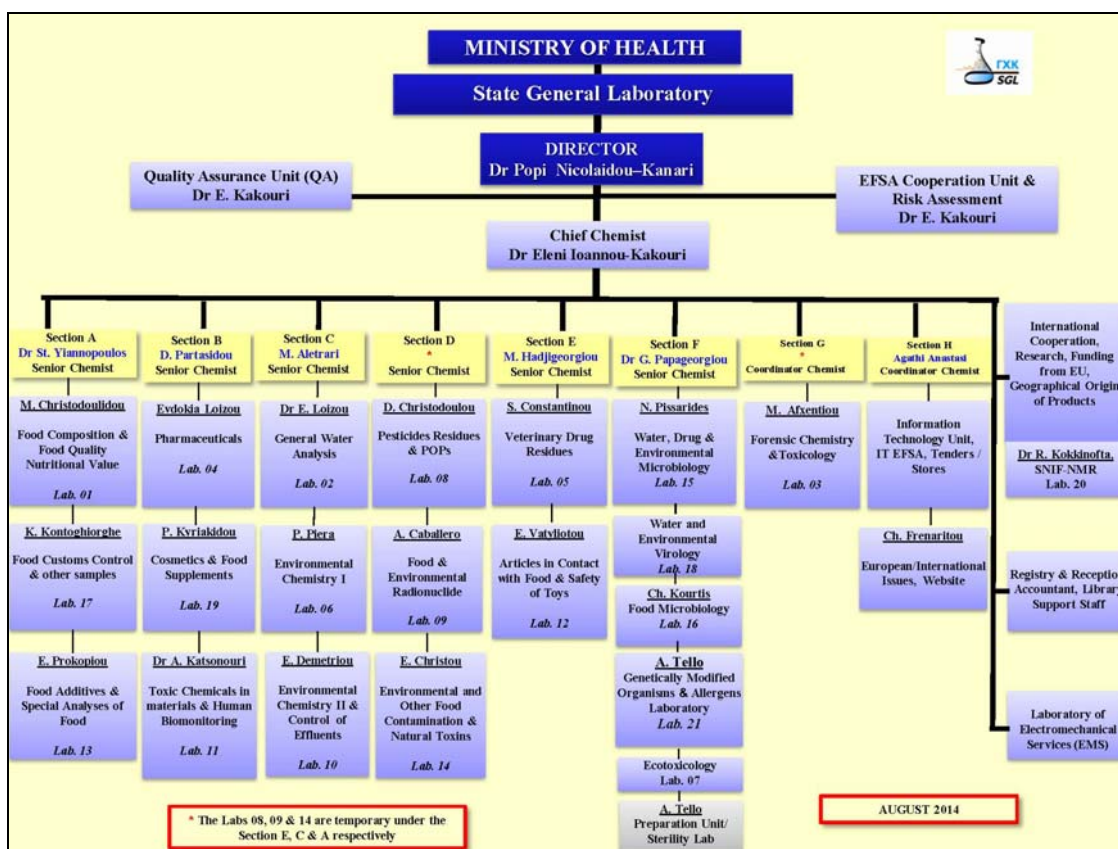
The SGL's wide range of analytical work is covered by 21 Laboratories under eight sections as well as 5 Units namely the Cooperation with EFSA/Risk assessment Unit, the Quality Assurance Unit, the Research and International Cooperation Unit, the IT Unit, and the Communication & European/ International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

During 2014, the staff comprised 67 chemists and microbiologists, (excluding the post of the Director), in permanent positions, 6 clerks and 24 support staff. In addition to these a total of 49 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 25 Chemists/Microbiologists/Biologists, including 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 2014 with enormous diligence, professionalism, responsibility and accountability.



### 3.1.2 Organogram



### 3.2 Financial Resources/ Budget

Expenditures incurred by the SGL in 2014 amounted to €7,898,423 (implementation of the 91.49%) (94.07% of the Ordinary Budget and 74.70% of the Development Budget). During the period 2012-2014, the SGL's revenue from EU programs was €899.473 (€556.267 from EU research programs and €343.206 from the Cyprus Research Promotion Foundation).



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