JAPAN INTERNATIONAL COOPERATION AGENCY
MINISTRY OF SUPPLY & INTERNAL TRADE
THE SYRIAN ARAB REPUBLIC

BASIC DESIGN STUDY REPORT ON THE PROJECT FOR IMPROVEMENT OF LABORATORIES FOR FOOD QUALITY CONTROL IN THE SYRIAN ARAB REPUBLIC

MARCH 1995

OVERSEAS MERCHANDISE INSPECTION CO.,LTD.

JAPAN INTERNATIONAL COOPERATION AGENCY
MINISTRY OF SUPPLY & INTERNAL TRADE
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Overseas Merchandise Inspection Co.,Ltd.
(OMIC)

PREFACE

In response to a request from the Government of the Syrian Arab Republic, the Government of Japan decided to conduct a basic study on the project for improvement of laboratories for food quality control in the Syrian Arab Republic and entrusted the study to the Japan International Cooperation Agency (JICA).

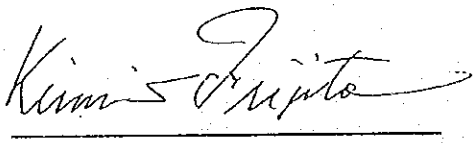
JICA sent to Syria a study team headed by Mr. Takahiko Sugiyama, Development Specialist of JICA, from November 26 to December 19, 1994.

The team held discussions with the officials concerned of the Government of Syria, and conducted a field study at the study area. After the team returned to Japan, further studies were made, and as this result, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Syrian Arab Republic for their close cooperation extended to the team.

March 1995



Kimio Fujita
President
Japan International Cooperation Agency

March 1995

Mr. Kimio Fujita
President
Japan International Cooperation Agency
Tokyo, Japan

Letter of Transmittal

We are pleased to submit to you the basic study report on the project for improvement of laboratories for food quality control in the Syrian Arab Republic.

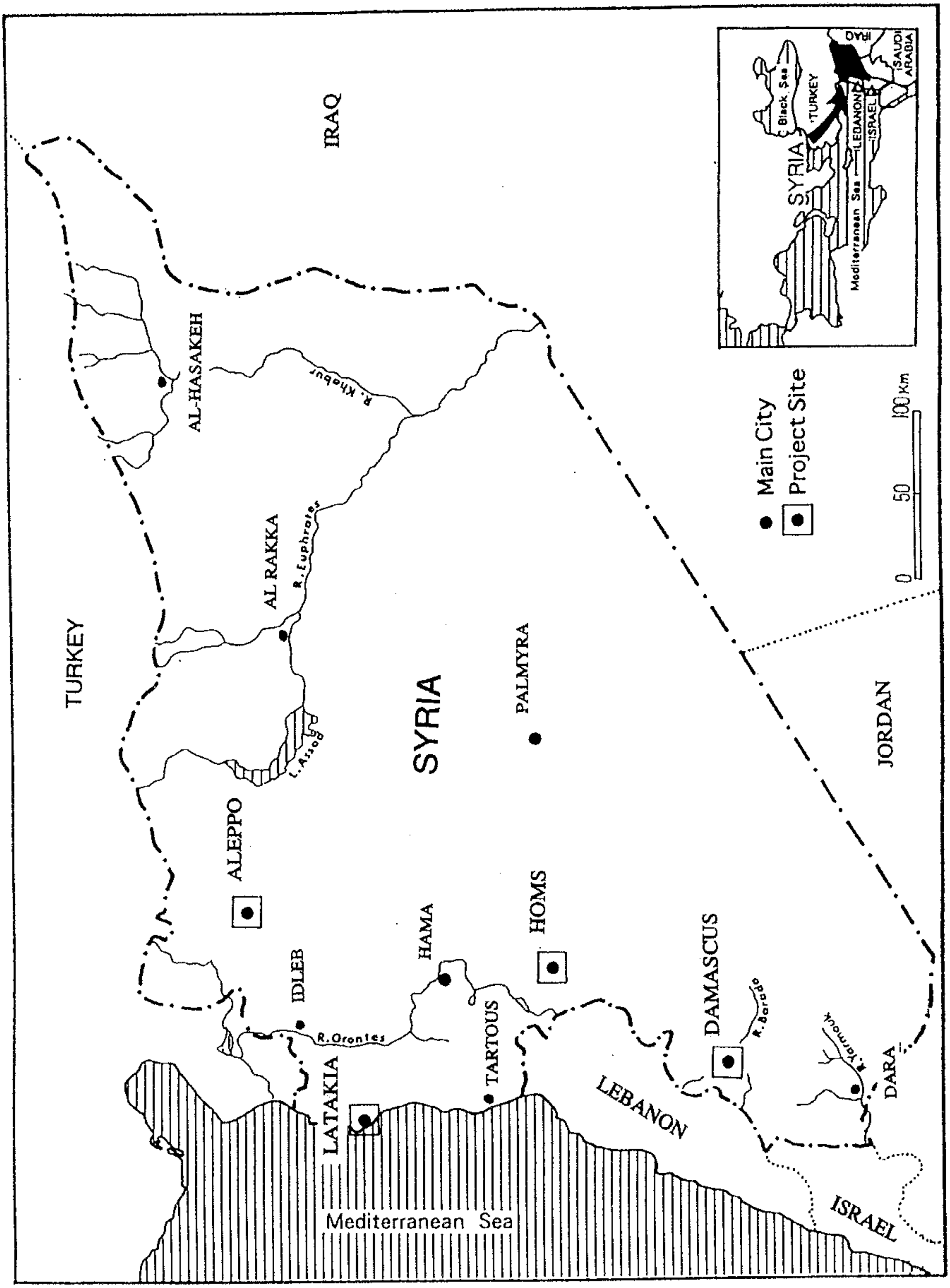
This study was conducted by Overseas Merchandise Inspection Co., Ltd. (OMIC), under a contract to JICA, during the period November 22, 1994 to March 27, 1995. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Syria and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

We wish to take this opportunity to express our sincere gratitude to the officials concerned of JICA, the Ministry of Foreign Affairs. We would also like to express our gratitude to the officials concerned of the Ministry of Supply & Internal Trade, the JICA Syria office, the Embassy of Japan in Syria for their cooperation and assistance throughout our field survey.

Finally, we hope that this report will contribute to further promotion of the project.

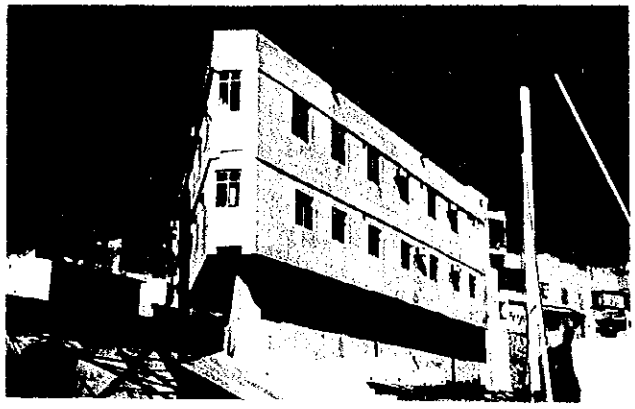
Very truly yours,

Makoto Yamada
Project manager
Basic design study team on
the project for improvement of
laboratories for food quality control
in the Syrian Arab Republic
Overseas Merchandise Inspection Co.,Ltd.



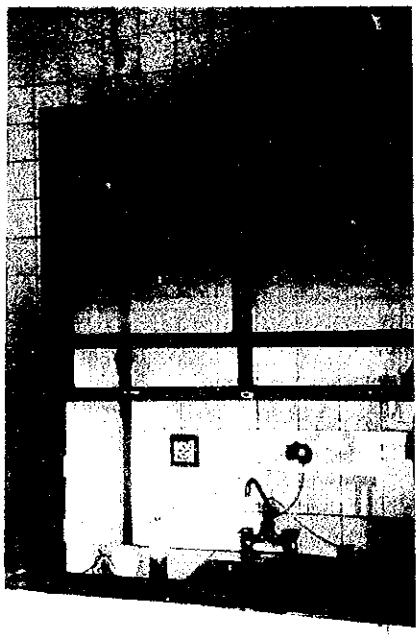
LOCATION OF PROJECT SITES

Central Food Control Laboratory, Damascus

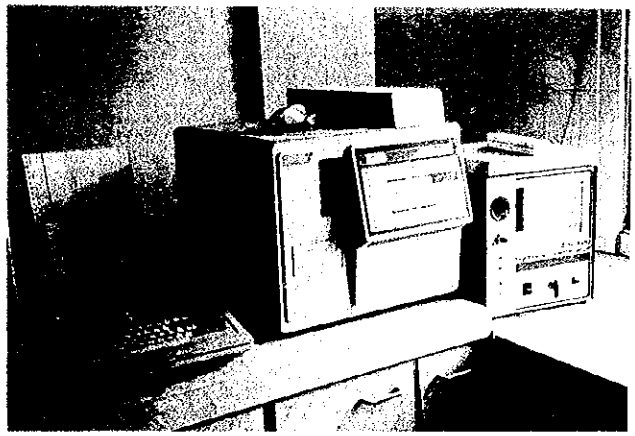


Complete view of building
Three-storeys, triangle building located in urban area

Front view of laboratory building
Sample reception and office of Laboratory head are situated at the right side.

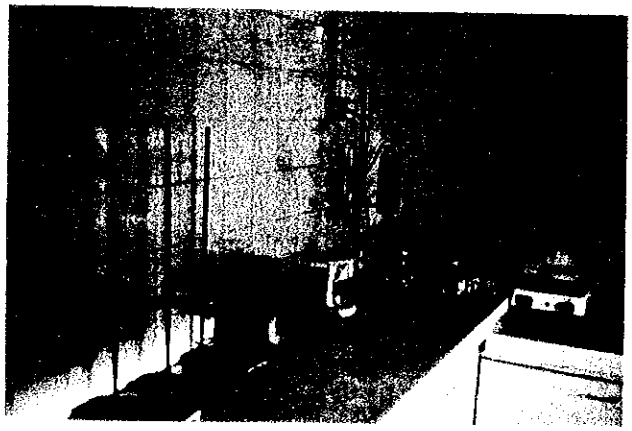


Fume cupboard
wooden frame, not easy to handle



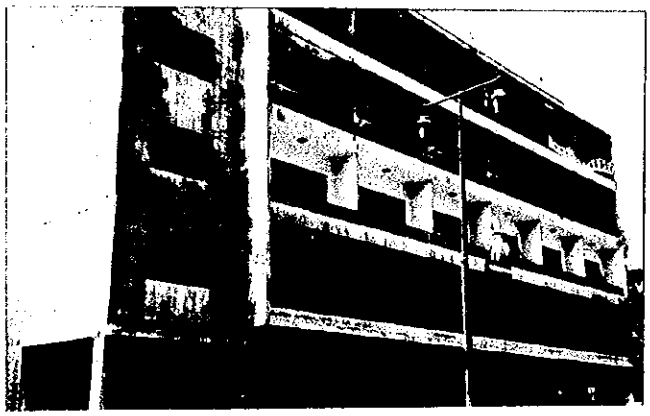
Gas chromatograph
5 sets of GC including ECD, FID for analysis of food contaminants, actively operating. Hydrogen generator is placed at the side of GC.

Store room at basement
Reagents and glasswares are put on shelf in good order.



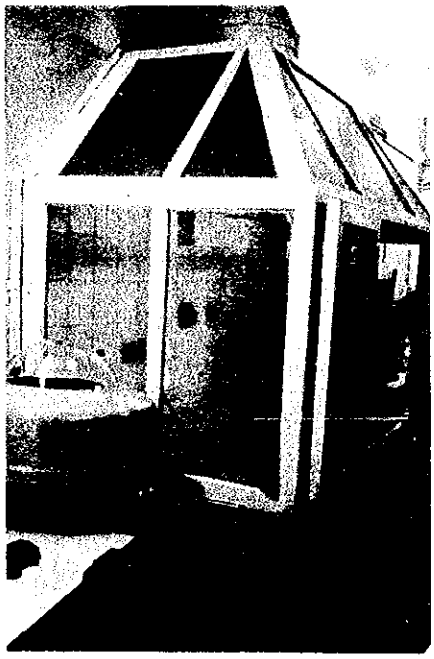
Room for compositional analysis
Electric outlets are placed at intervals of 1.0 meter over each laboratory table.

Aleppo Laboratory

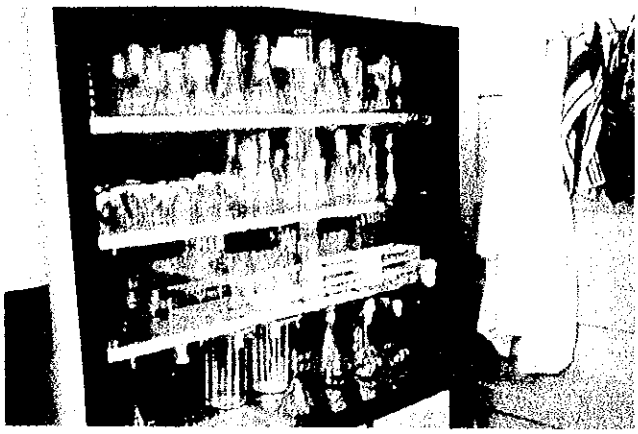


Complete view of building
Laboratory is located on 3th floor.

Compositional analysis room
Several reagents are placed on laboratory table



Fume cupboard
Large sized pentagon chamber

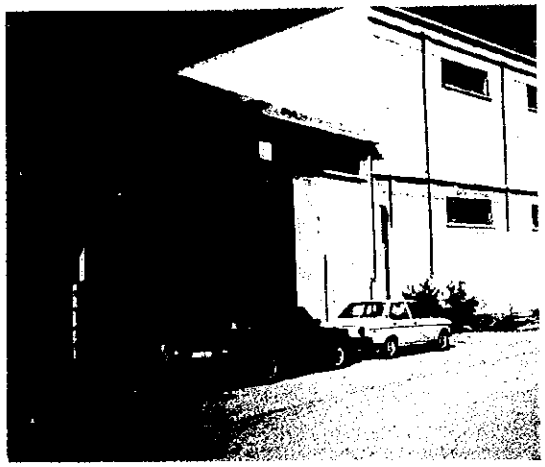


Glasswares placed on shelf
in microbiological experimental room

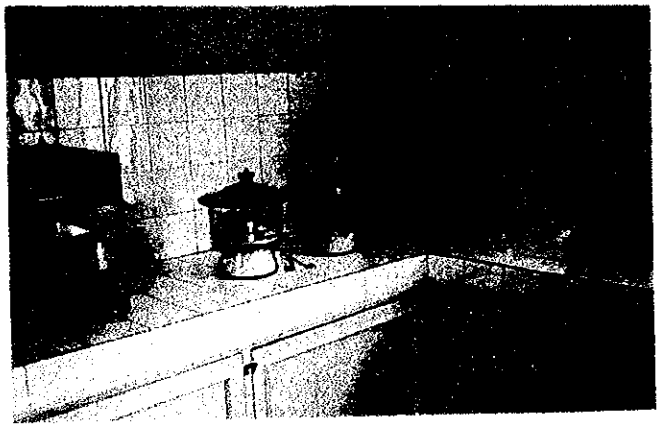
Large sized refrigerator
Some flammable reagents are stored.

Latakia laboratory

Complete view of building
Laboratory is located on 4th floor.

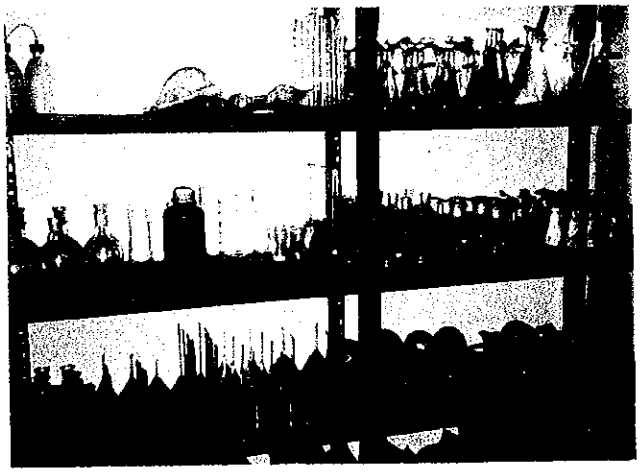


Warehouse owned by MOS in Latakia port
This facilitiy may be used as temporary storage house for equipment after discharge from ship and until transportation to each laboratory.

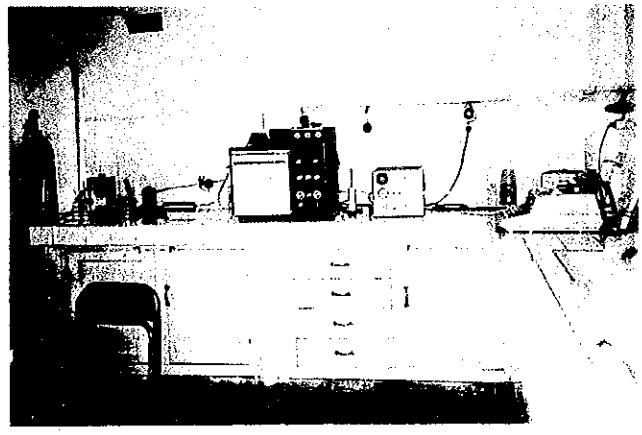


Compositinal analysis room
Chemical balance and others

Samples collected from markets



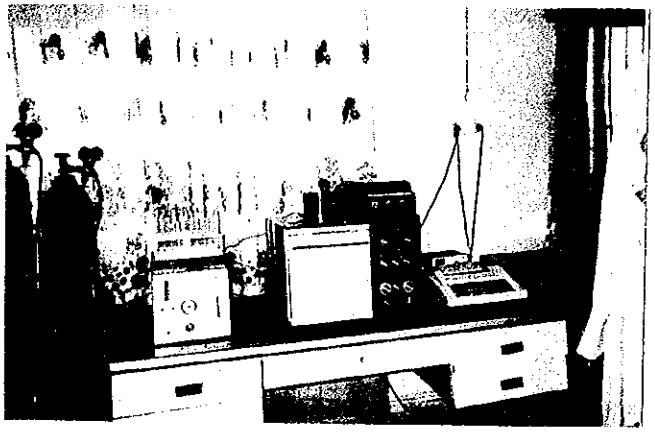
Glasswares
Glasswares are stored on the shelf neatly



Gas chromatograph
This G.C. was procured about 7 years ago and still used with good care.

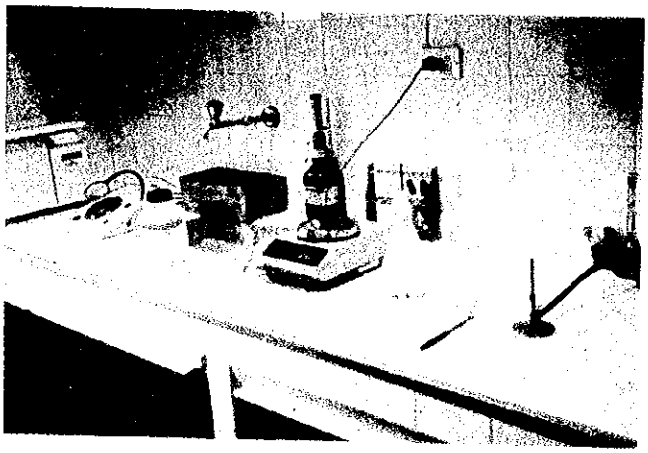
Homs laboratory

Complete view of building
Laboratory is located on ground floor.



Gas chromatograph
Procured 15 years ago and still in use.

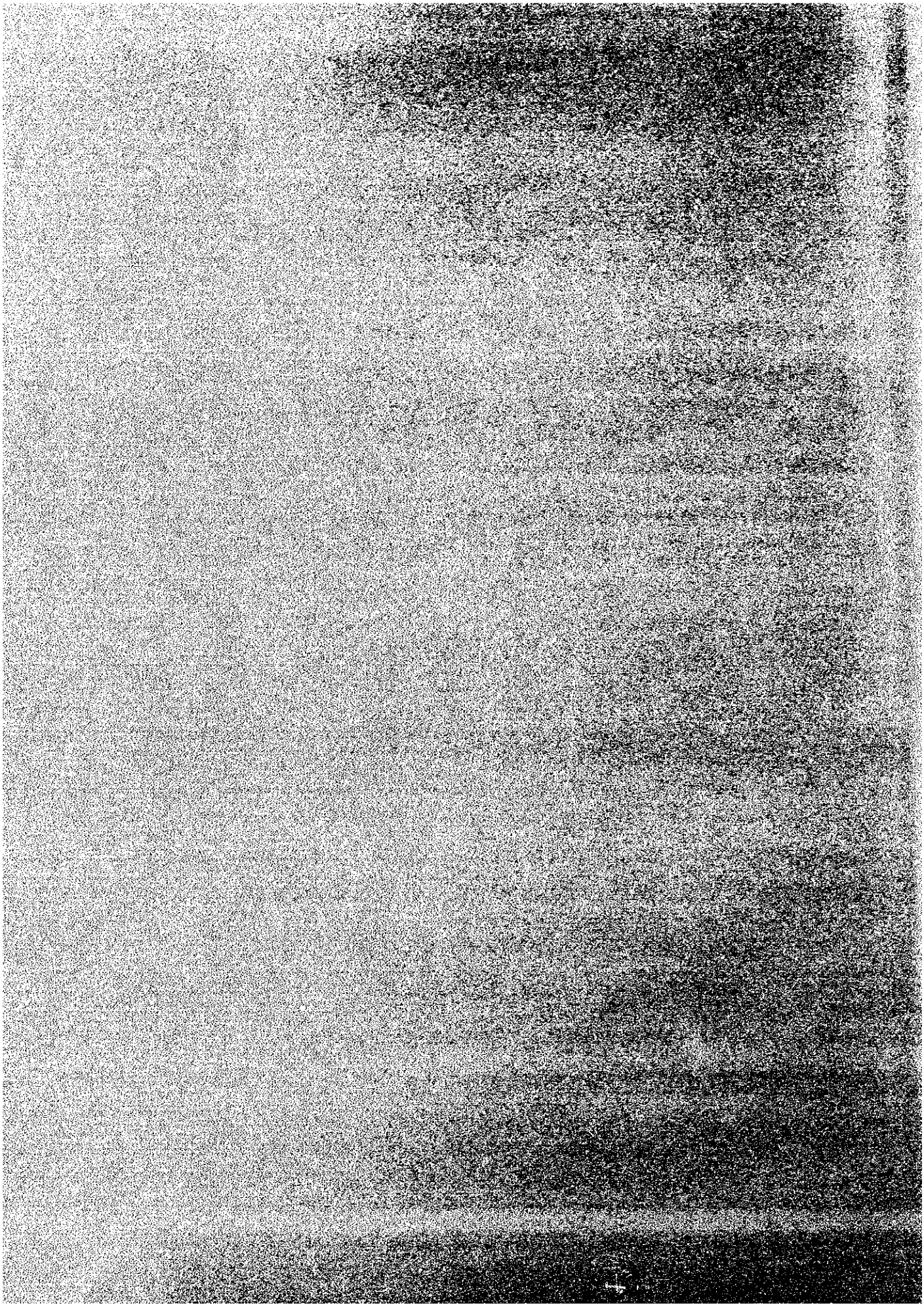
Compositional analysis room
Many kinds of reagents are placed side by side closely in shelf on laboratory table.



View of microbiological experiment
Conducting analysis in a special place partitioned by glass

Autoclave
In microbiological room

Summary



Summary

The population of the Syrian Arab Republic grows at an annual rate of 3.6%. Each year it increases by 500,000 and is projected to exceed 20 million in 2005. Ensuring a steady supply of food has become the most urgent issue facing the government of Syria. In its Sixth Five-year National Development Plan (1986-1990), the government included a program to promote agricultural development and the food industry in an effort to increase self-sufficiency, specified this requirement as the most important of all development projects.

Under the program, the food industry developed rapidly, and the volume of agricultural production grew. Unfortunately, use of agricultural chemicals, antibiotics and food additives also increased, posing a threat to consumer health, an issue that has recently come to light.

As the country increased food production, it began to export more agricultural products, and goods from other countries were imported into Syria. Problems concerning food safety, including residual agricultural chemicals and food additives, have become an obstacle to expanding exports. Further, the import of agricultural products grown or processed in countries affected by orally contagious diseases have raised concerns about an epidemic in Syria.

The Ministry of Supply and Internal Trade is responsible for protecting Syrian consumers from health hazards attributable to contaminated foods. It fulfills that role by surveillance activities on price and safety of products on the markets. The regulations date back to the Control of Commercial Fraud and Deceit Law, promulgated in 1960. Under the law, actions were based upon complaints or lawsuits filed by consumers. At that time, the majority of controlled products were food items, which were subjected to a simple component analysis of moisture content, carbohydrates, proteins, fats and oils and impurities.

In 1980, the Ministry of Supply improved specific points in the legal and administrative system, inspection and analysis with technical assistance and recommendation of FAO. The Central Food Control Laboratory was established in Damascus and laboratory equipment were then installed in order to strengthen the analytical capacity in local laboratories. However, the equipment needed for food

contaminants analysis of residual agricultural chemicals, antibiotics and additives is all foreign-made and expensive, making it difficult for the Syrian government to acquire.

Syria has since made technological progress in the production, processing and marketing of foods, expanding the role of laboratories each year. Establishing a food quality control system backed by advanced food contaminant analysis technologies were urgently needed to protect consumers from hazardous substances such as residual agricultural chemicals and food additives. Accordingly, the Ministry of Supply is planning to set up the Comprehensive Food Control System from 1996.

Under the system, the Ministry of Supply will implement the quality control systems for all consumable products available on the domestic market, in addition the Ministry will continue the above mentioned services in response to consumer complaints. This type of operation requires the ability of accurate and time saving analysis of residual agricultural chemicals, antibiotics and a range of food additives. Most of the analyzers being used at the laboratories are so antiquated that they are unable to perform the kind of food contaminants analysis required. At present, Syria does not have sufficient number and quality of equipment necessary. To gain the trust of consumers, the government must procure the necessary equipment in its major laboratories that are located in front line of the food control service by the Ministry of Supply. Accordingly, the Syrian government has requested assistance from Japan to procure modern analyzers and ancillary equipment necessary to analyze harmful residual agricultural chemicals, antibiotics and additives in foods.

The purpose of this Project is to upgrade food analyzing equipment at the central food control laboratory in Damascus and laboratories in Aleppo, Homs and Latakia to increase efficiency of food safety control activities for consumer's health protection. The long-term objectives are as follows. These are food control policies to be adopted when the analyzers are improved

(1) Establish a food quality control system for safety of foods, both for foods marketed in the domestic markets and for imported foods.
(2) Store fundamental information regarding the safety of foods and promote exports.

Following categories of equipment were requested for this Project. These laboratories

will be modernized under the purpose to achieve the goals of the Project;

a. Food compositional analysis
b. Food contaminants analysis
c. Sugar analysis
d. Trace analyses I and II (food contaminants analyses using high precision equipment)
e. Food microbiological analysis
f. Preparation for food microbiological analysis
g. Sample preparation and washing glasses
h. Testing for canned foods
i. Analysis of physical property of wheat flour
j. Testing packing materials
k. Measuring radioactivity
l. Common laboratory equipment (ice making equipment, etc.)
m. Others (Air conditioner and Cleaner, etc.)

In response to a request from the Government of the Syrian Arab Republic, the Government of Japan decided to conduct a Basic Design Study on the Project for Improvement of Laboratories for Food Quality Control in the Syrian Arab Republic and sent a study team to Syria from November 26 to December 18, 1994. The team held discussions with the officials concerned from the Government of Syria and conducted field surveys.

The goal of this Project is to improve the capacity of analysis at each laboratory and to enhance the quality control services currently being planned by the government, through the procurement of equipment for the central food control laboratory in Damascus and three other major local laboratories. Each laboratory plans to carry out the following analytical works when the new food control system starts from January 1996.

Number of samples delivered to the four laboratories of Damascus, Aleppo, Latakia and Homs under the integral food control program started by the Ministry of Supply is expected to reach about 40,000 in the year 2000, since the population of the four areas is anticipated to be 10 millions and four (4) samples are collected from each of one thousand (1,000) population per year for the execution of food control program. The ratio of each analysis field is expected to be about 55% for compositional analysis; carbohydrate, protein, fat, sugar content, etc., about 15% for microbiological test; E. coli, Salmonella, Vibro, etc. and about 30% for contaminants analysis; pesticide residues,

food additives, mycotoxin and heavy metals, etc.

The main objective of the Project is to facilitate food quality control activities for the Ministry of Supply, and priority in equipment procurement is placed on modernization and renovation of food control services and not to include the analytical equipment for other consumables like fuels, detergents and cosmetics, and also equipment for research and development. Gas Chromatographs and High Performance Liquid Chromatographs as the principle instruments are practical and appropriate selection in terms of future maintenance and operation. Through the study on the Ministry's activities and their conditions presently involved, it is concluded as appropriate to procure the equipment with the scope and scale shown below;

Outline of Equipment to be Procured for Each Laboratory

Field	Main items	Damascus	Aleppo	Latakia	Homs
Chemical analysis	Water content meter, Color meter, Fume cupboard, pH meter, Speedy fat extraction analyzer, Oven	30	22	25	23
Trace analysis	Rotary evaporator, Homogenizer, water circulator	5	4	5	5
Sugar analysis	Abbe's refractometer, Polarimeter, Brix meter	2	2	3	3
Instrumental analysis I	Gas Chromatograph,Flame spectrophotometer, Atomic absorption spectrophotometer	4	4	4	4
Instrumental analysis II	High Performance Liquid Chromatograph, Fluorescence spectrophotometer, Densitometer	9	8	7	7
Microbiological analysis	Biological microscope, Clean bench, Microbiological testing kit, Incubator, Colony counter	16	13	13	14
Preparation of microbiological analysis	Autoclave, Constant pressure steam sterilizer, Hot air drying type sterilizer	2	2	1	1
Washing and sample preparation	Crusher,Drying shelf, Pipette cleaner,Ultrasonic cleaner, Sampling kit, Sample mill	11	7	7	6
Can testing	Can testing set, Device for determination of CO2	2	2	2	2
Common use	Ice making machine	2	1	1	1
Others	Air conditioner, Heavy metal treatment apparatus, Stabilizer, Cleaner, Spare parts	13	10	10	9
Total		96	75	78	75

(Source:MOS 1993)

The comprehensive food control system planned by the Ministry of Supply will commence in January 1996. It will take 11 months to complete the Project from the date of E/N conclusion and installation of the analyzers is scheduled to be completed at the end of January 1996, so the equipment will be put to immediate, effective use. The personnel plan prepared by the Ministry specifies a suitably qualified engineer to be in charge of equipment maintenance and control. The engineer will regularly visit local laboratories to inspect, maintain and control the procured equipment.

Administrative and maintenance expenses in 1996, the year of Project completion, will be 15,473,370 Syrian pounds, close to 3% of the entire budget for the Ministry of Supply and Internal Trade. That amount almost equals to the expenses the Ministry currently bears to purchase needed equipment.

Under this Project, the installation of analyzers at four major laboratories will improve Syria's capacity to more accurately analyze residual agricultural chemicals and additives in food items, so the Project will play a significant role of protecting human health from contaminated foods. It will have several positive effects on the society:

(1) It will improve food safety with a reinforced capacity to detect contaminated food that might affect the health of the Syrians.
(2) It will promote sound growth of the food industry.
(3) It will enhance fair, safe trade by overseeing the safety of import/export foods.

Growth in the quantity of food production due to improved productivity, and promotion of the food processing industry resulted a decline in the quality and safety of food. Through the quality control activities, this Project aims to provide proper guidance regarding the safety of foods distributed into the domestic markets in order to adjust the balance between increased food production and a qualitative decline. Expanded functions for laboratories that come under the Ministry of Supply will ensure more reliable, time saving actions targeting a wider range of food items. The Project to assist the government in tackling the problem is expected to be of great benefit. The laboratories are already conducting food contaminants analysis using gas chromatographs, so they have the technical capacity to implement the Project. The Project is considered appropriate to be carried out under the grant aid scheme. The Syrian Government has already prepared and submitted a formal request for

dispatching a Japanese engineer and sending Syrian engineers overseas for training through the Syrian State Planning Commission.

The following recommendations are presented for implementation of the Project as well as the smooth and effective operation of the food quality control services to attain their ultimate goals;

(1) Secure an appropriate budgetary fund and human resources for this Project,
(2) Improve inspection technologies through technical assistance,
(3) Cooperate/integrate with other Syrian organizations related to food hygiene,
(4) Conduct appropriate activities in the way of encouraging industrial growth,
(5) Improve sampling technologies, and
(6) Reserve funds to replace equipment in the future.

Contents

Appendix

ABBREVIATIONS

AOAC	Official Methods of Analysis of the Association of Official Analysis chemists
AVR	Automatic Voltage Regulator
ECD	Electron Capture Detector
FAO	Food and Agriculture Organization
FID	Flame Ionization Detector
FPD	Flame Photometric Detector
GC	Gas Chromatograph
HPLC	High Performance Liquid Chromatograph
ISO	International Standardization Organization
MOS	Ministry of Supply and Internal Trade
SASMO	Syrian Arab Organization for Standardization and Metrology
SP	Syrian Pound
WHO	World Health Organization

Chapter 1 Background of the Project

Chapter I. Background of the Project

1-1 Background of the Project

The population of the Syrian Arab Republic grows at an annual rate of 3.6%. Each year it increases by 500,000 and is projected to exceed 20 million by the year 2005. Ensuring a steady supply of food has become the most urgent issue facing the government of Syria. In its Sixth Five-year National Development Plan (1986-1990), the government included a program to promote agricultural development and the food industry in an effort to increase self-sufficiency, specifying it as the most important of all development projects.

Syria's agricultural conditions are not favorable. A large area of the nation is desert, so boosting food production in a short time is not easy. Two methods are available to improve agricultural production: one is to expand the irrigated areas and the other is to improve the productivity of each square meter of land. The former requires a large amount of funds, so it has to be implemented as a national project. The latter can be achieved through the use of chemical fertilizers and agricultural chemicals. Similarly, livestock farmers have begun to use a growing volume of antibiotics and hormones. The problem raised here is the harm that residual of agricultural chemicals, antibiotics and hormones in agricultural and livestock products have on consumer health.

The Syrian government's campaign to vitalize the private sector economy succeeded in attracting small and medium-size private capital in the industry, resulted in the introduction of a diverse range of food items to the market and the development of food processing technologies. Food processors today use a number of chemical compounds (preservatives, color, anti-oxidant, bleaching agent, dietary supplements, emulsifiers, flavorings, etc.), and some use an excessive amounts.

The western part of the country faces the Mediterranean Sea and is relatively warm even in winter. Green house cultivation of vegetables prospers, and fruit production is abundant. Once the region meets domestic demand, it will export agricultural products to neighboring Arab countries and Western nations, contributing significantly to the acquisition of foreign currencies. It is generally known that large amounts of agricultural chemicals are used to grow green house vegetables. Because the country has not yet successfully controlled residual agricultural chemicals during production and marketing of vegetables, issues of safety have been raised and Syria's agricultural products have received a bad international image, an impediment to boosting exports. Globalization of trade, on the other hand,

has brought a diverse range of food imports into the country, including products that were either produced or processed in regions where orally contagious diseases are prevalent.

As explained above, some domestic dairy, vegetable and livestock products are contaminated with residual agricultural chemicals or additives, and products that were processed in unhygienic conditions are being marketed. Concern is rising over the possible threat these products may pose to consumer health, such as food poisoning and outbreaks of contagious diseases. The Syrian government has been pressed to immediately set forth effective counter measures to protect consumer health, and to ensure fair, safe transactions in international trading of foods. In November 1994, the People's Assembly ratified the main policies for 1995 presented by the Cabinet and in these policies, the reinforcement of the quality control for food and consumables as well as improvement of the functions of laboratories were emphasized.

In Syria, the Ministry of Supply and Internal Trade is fulfilling the administrative role to protect consumers from contaminated food products. The Ministry has been striving to ensure fair, safe transactions since attaining independence. The initial food administration was based on the Control of Commercial Fraud and Deceit/Decree 58, 1960. The administration took actions based on complaints and lawsuits filed by consumers. Surveillance activities at that time are mainly inspections of visual appearance and mediation of the disputes concerning commercial contracts.

Technical developments in food processing and marketing complicated food safety problems. The Ministry of Supply and Internal Trade was pressed to improve its activities. The National Food Control Strategy Seminar, held in Damascus in 1980, triggered reform. FAO provided technical assistance for the seminar, with participation from representatives of Syrian government organizations involved in food control. The seminar set the Syrian food administration on a course for modernization. To begin, the Central Food Control Laboratory was established in Damascus and basic laboratory equipment was installed in local laboratories and personnel increased based upon FAO recommendations.

Syria has since made technological progress in the production, processing and marketing of food products, expanding the role of laboratories each year. Establishing a food quality control system backed by advanced food contaminants analysis technologies were urgently needed to protect consumers from hazardous substances such as residual agricultural chemicals and food additives. Accordingly, the Syrian government plans to set up a Comprehensive Food Control System from January, 1996.

Under the new system, the government will implement regular food quality

control on all consumable products available on the domestic markets. In addition, the Ministry of Supply will continue surveillance in response to consumer complaints. Inspectors of the Ministry will regularly collect samples from all consumable goods on the market. The analyzers at each laboratory will be suitably modernized to carry out chemical composite analysis, as well as more reliable food contaminants and microbiological analyses.

A requirement for this type of system is the ability to accurately and quickly analyze residual agricultural chemicals, antibiotics and a range of food additives. The analyzers being used at the laboratories can only conduct general chemical composite analyses, and are so antiquated that they are unable to perform the kind of food contaminants analysis required by consumers. To gain the trust of consumers, the government must modernize the laboratory facilities and renovate the analyzers being used at major laboratories. Accordingly, the Syrian government has requested assistance from Japan to procure modern analyzers and ancillary equipment necessary to analyze harmful residual agricultural chemicals in foods, as well as equipment necessary to carry out microbiotic analysis.

1-2 Outline of the request

1-2-1 Objectives of the request

The purpose of this Project is to upgrade food analyzing equipment at the central food control laboratory in Damascus and laboratories in Aleppo, Homs and Latakia to strengthen efficiency of food safety control activities for consumer's health protection. The long-term objectives are as follows. These are food control policies to be adopted when the analyzers are improved.

(1) Establish a food quality control system for safety of foods, both for foods marketed in the domestic markets and for imported foods.

(2) Store fundamental information regarding the safety of foods and promote exports.

1-2-2 Project Activities

With the installation of analytical equipment at each laboratory, the Ministry aims to modernize their food quality control activities to ensure the safety of foods and daily consumables. The goals of the Syrian food administration are:

(1) To establish a reliable, safe food quality control system,

(2) To control regularly contaminated agricultural and livestock products in

marketing stage,

(3) To provide technical information on safety to the producer and the manufacture of food products

1-2-3 Requested equipment

Equipment to be procured under the Project will be installed at four of the total 13 food laboratories in the country: the Central Food Control Laboratory in Damascus and local laboratories in Aleppo, Latakia and Homs.

The laboratories are already in operation. Partial modification to these facilities will enable installation of equipment. No major problems are anticipated in terms of water, electricity and other utilities. The Syrian government will be responsible for modification of the facilities where the equipment is to be installed under this Project.

The outline of the request is as follows. Table 1-1, which gives a detailed list of equipment, was appended to the request. They are categorized into following groups.

a. Food compositional analysis
b. Food contaminants analysis
c. Sugar analysis
d. Trace analyses I and II (food contaminants analyses using high precision equipment)
e. Food microbiological analysis
f. Preparation for food microbiological analysis
g. Sample preparation and washing glasses
h. Testing for canned foods
i. Physical property of wheat flour
j. Testing packing materials
k. Measuring radioactivity
l. Common laboratory equipment (ice making equipment, etc.)
m. Others (Air conditioner and Cleaner etc.)

Table 1-01 Requested Equipment and Appratus

(1) Equipment listed on the request

Group	Name of Equipment and Appratus	Damascus	Aleppo	Latakia	Homs	Total
Compositional	Drying oven	1	1	1	1	4
Analyses	Vacuum type drying oven	1	1	1	1	4
	Microwave heater	1	1	1	1	4
	Electric furnace	1	1	1	1	4
	Electronic balance	2	0	0	0	2
	Water content meter	1	1	1	1	4
	Centrifuge	1	1	1	1	4
	Shaker	1	1	1	1	4
	Soxlet extractor	2	0	0	0	2
	Speedy fat extraction analyzer	1	1	1	1	4
	Color meter	2	1	1	1	5
	pH meter	2	1	1	1	5
	Water analyzer	1	0	0	0	1
	Water quality testing system	1	1	1	1	4
	Hydrometer	1	1	1	1	4
	Turbidimeter	1	1	1	1	4
	Water bath	1	1	1	1	4
	Oil bath	2	2	2	2	8
	Distilled water maker	1	0	0	0	1
Contaminants	Homogenizer	1	1	1	1	4
Analyses	Rotary evaporator	2	2	2	2	8
	KD Concentrator	1	1	1	1	4
Sugar Analyses	Abbe's refractometer	1	1	1	1	4
	Brix meter	1	0	0	0	1
	Polarimeter	1	1	1	1	4
Instrumental	Gas chromatograph	4	3	3	3	13
Analysis I	Gas chromatograph (TEA)	1	1	1	1	4
	Quantitative organic element analyzer	1	0	0	0	1
	Flame spectrophotometer	1	1	1	1	4
	Atomic absorption spectrophotometer	1	1	1	1	4
	Mercury analyzer	1	1	1	1	4
Instrumental	Fluoresence spectophotometer	1	1	1	1	4
Analysis II	High performance liquid chromatograph	1	1	1	1	4
	Aminbo acid analyzer	1	0	0	0	1
	Automatic organic acid analyzer	1	0	0	0	1
	Ion chromatograph	1	0	0	0	1
	UV/VIS spectrophotometer	1	1	1	1	4
	Near infrared spectrophotometer	1	0	0	0	1
	Furier transform infrared spectrophotometer	1	1	1	1	4
	Thin layer chromatograph	1	1	1	1	4
	Ultra violet lamp	1	1	1	1	4
	Electrophoresis apparatus	1	0	0	0	1
	Gel permuation chromatograph	1	0	0	0	1
	Ultra purified water maker	1	0	0	0	1
Microbiological	Biological microscope	1	1	1	1	4
Analyses	Glove box	1	1	1	1	4
	Incubator	1	1	1	1	4
	Colony counter	1	1	1	1	4
	Constant temperature and humidity chamber	1	0	0	0	1
	Constant temperature water bath	1	1	1	1	4

(1) Equipment listed on the request 2/2

Group	Name of Equipment and Appratus	Damascus	Aleppo	Latakia	Homs	Total
	Petrifilm	1	1	1	1	4
	Food plate	1	1	1	1	4
	Food stamp	1	1	1	1	4
	Kit of Identification for Aflatoxin	1	1	1	1	4
	Kit of rapid identification for Salmonella	1	1	1	1	4
	Ultra high speed centrifuge	1	0	0	0	1
	Stomacher lab. blender	1	1	1	1	4
Preparation for	Autoclave	1	1	1	1	4
Microbiological	Constant pressure steam sterilizer	1	1	1	1	4
Analyses	Hot air drying type sterilizer	1	0	0	0	1
Physical Property	Extensograph	1	0	0	0	1
of Wheat	Farinograph	1	0	0	0	1
	Reofermentograph	1	1	1	1	4
Washing and	Pipette cleaner	1	0	0	0	1
Sample	Washer	1	0	0	0	1
Preparation	Sampling kit	1	1	1	1	4
	Crusher	1	0	0	0	1
	Sieve set	1	1	1	1	4
Can Testing	Can testing set	1	1	1	1	4
Packaging	Gas transmission rate tester	1	0	0	0	1
Radioactivity	Contamination monitor	1	1	1	1	4
	Scintillation counter	1	0	0	0	1
	Becquerel monitor	1	1	1	1	4
Common uses	Refrigerator	2	0	0	0	2
	Freezer	2	0	0	0	2
Others	Camera	1	1	1	1	4
	Copy machine	1	0	0	0	1
	Over head projecter	1	0	0	0	1
	Slide type projecter	1	0	0	0	1
	Personal computer	1	1	1	1	4
	Glass instruments	1	0	0	0	1
	Electric generator	1	1	1	1	4
	Stabilizer	1	1	1	1	4
	Heavy metal waste treatment apparatus	1	1	1	1	4
	Total	95	59	59	59	272

(2) Equipment which was requested additionaly at field survey

Appratus for octane value	Densitometer
Gas chromatograph / Mass spectrometer	Stereoscopic microscope
ICP-emission spectrophotometer	Clean bench
Kit of identification for Pesticide residue	Microbiologica testing kit
Kit of identification for Hormone	Kit of identification for meat
Water activity meter	Drying shelf
Solid phase extraction vacuum manifold	Sample mill
Kent and Jones	Device for determination of CO2 in Beverages
Conductivity meter	Ice making machine
Draft chamber	Air conditioner
Magnetic stirrer w/hot plate	Vehicle with refrigerated box
Viscosity meter fo oil	Spare parts
Shaking water bath	
Water bath (low temperature)	
Cool water circulator w/ aspirator	

1-3 Projects by Other Countries and International Organizations

FAO has contributed in laying foundations for the quality control of food by providing their technical cooperation in Syria as follows.

(1) Holding Seminars

In November 1980, a "National Food Control Strategy Seminar" was held with the assistance of FAO, attended by various government organizations related to food control to discuss on the following agenda.

- Discussion on general conditions of Food Control Activities,
- The roles and functions of each organization for the food control system,
- Planning of National Food Control Strategy,
- Recommendations on the effective Food Control System

In this seminar, recommendations and decisions were made on various matters concerning national food quality control such as legislation, administration, inspection, necessary facilities and equipment, etc. Also, a decision was made to establish the Central Food Laboratory and to enforce the activity of local laboratories under the project "Strengthening Food Control Services" for which FAO technical assistance is provided.

(2) Dispatch of Specialists

- Dr. M.H.H. Ragab advised planning the new laboratory, and submitted the following report to the Ministry.

  "Report on planning of the new central food control laboratory, Damascus (1983)"

- Dr. P.G. Martin also conducted consultation to the Ministry and submitted the following technical report.

  "Report to the Government of the Syrian Arab Republic on central food control laboratory, Damascus, Ministry of Supply and Home Trade (1983)"

(3) Technical Cooperation

FAO dispatched the following consultants under the technical cooperation for "Strengthening of Food Control Services"(1986 - 1988):

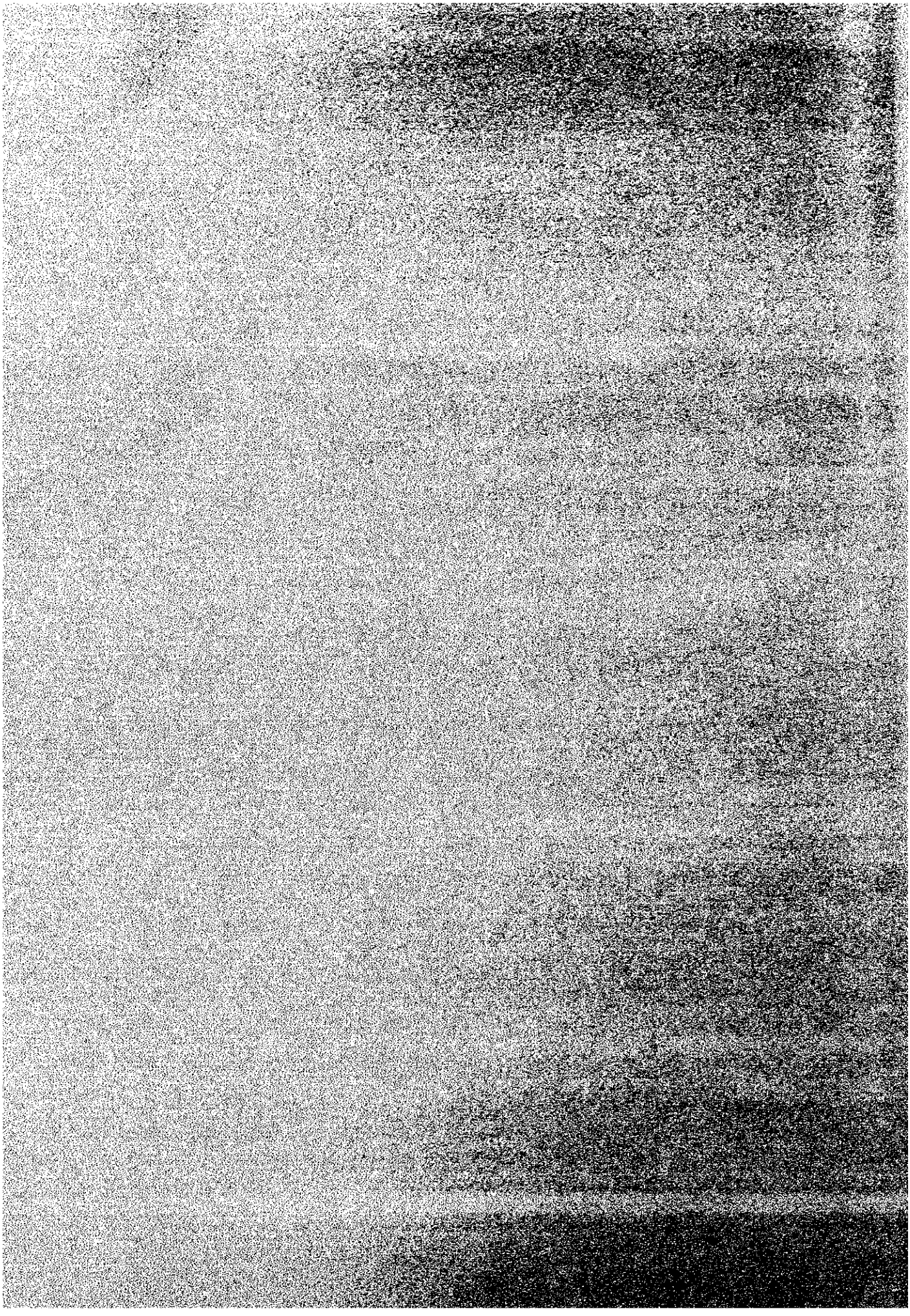
- Mr. R. VAZ (Laboratory Instrumentation Consultant)
- Dr. Mousa Ali Ahmed (Food Microbiology Consultant)
- Dr. B. Kekhia (Food Contaminants Analysis Consultant)

The study mission wished to visit FAO office during their stay in Damascus and

requested an interview on numerous occasions for obtaining some information on the result and evaluation on the above cooperations and to inquire about future plans. However, the interview was not materialized for the reasons that there was no one in the office who could answer and also two resident staff members were busy and not in Damascus most of the time.

According to the Ministry of Supply, the cooperation from FAO for the project of "Strengthening of Food Control Services" has been completed and there is no sign of reopening.

Chapter 2 Outline of the Project



Chapter 2 Outline of the Project

2-1 The Purpose and Object of The Project

The Ministry of Supply is the sole administrative organization in Syria to protect the health of their people from the hazardous contaminants in food. For this purpose, the Ministry maintains inspecting officers positioned at markets who conduct sampling and analysts at the laboratories located in each administrative division to analyze those samples. These activities have mainly been conducted in response to the complaints, suspicions and appeals from consumers.

At present, analysis is conducted with out-dated facilities and equipment. The Ministry has planned the renovation of the laboratories with the following targets in order to protect consumers from the contaminated foods by reinforcement of the food quality control system covering the whole of Syria and by strengthening the analytical capacity of its laboratories.

(1) Short-term target (with this project), modernization and strengthening of the central and main local laboratories

To enhance performance levels of the food control services carried out by the Ministry, through renovation of the analytical equipment of the central food laboratory in Damascus and the main local laboratories at Aleppo, Homs and Latakia.

The target shall be achieved by the end of the 7th 5-year National Development Plan (1991-1995).

(2) Long-term target (1996-2000) Establishment of food control system

Upon completion of the main laboratories in Damascus, Homs, Aleppo and Latakia, the full-scale and nation-wide food quality control services will begin. The above target shall be achieved in the 8th 5-year National Development Plan by the self-supporting effort of the Syrian government.

The purpose of this Project is to procure and install the equipment necessary to improve the quality of the food and to protect consumers from hazardous foods.

2-2 Implementing Structure of The Project

2-2-1 Organization

(1) Implementing Agency

The Implementing Agency for this Project is the Department of Technical Affairs, the Ministry of Supply and Internal Trade, herein after referred to as MOS.

The Ministry has been carrying out quality control activities for food and daily consumable from the standpoint of consumer protection. The Department of Technical Affairs is responsible for the technical matters, for instance, the management of the laboratories.

(2) Operating Structure of The Department of Technical Affairs

The relationship between the laboratories and the Department of Technical Affairs, the Implementing Agency of this Project, is as follows:

The central food control laboratory and the local laboratories function under technical auspices of the Department of Technical Affairs and are standing as an independent body in the field of administrative functions.

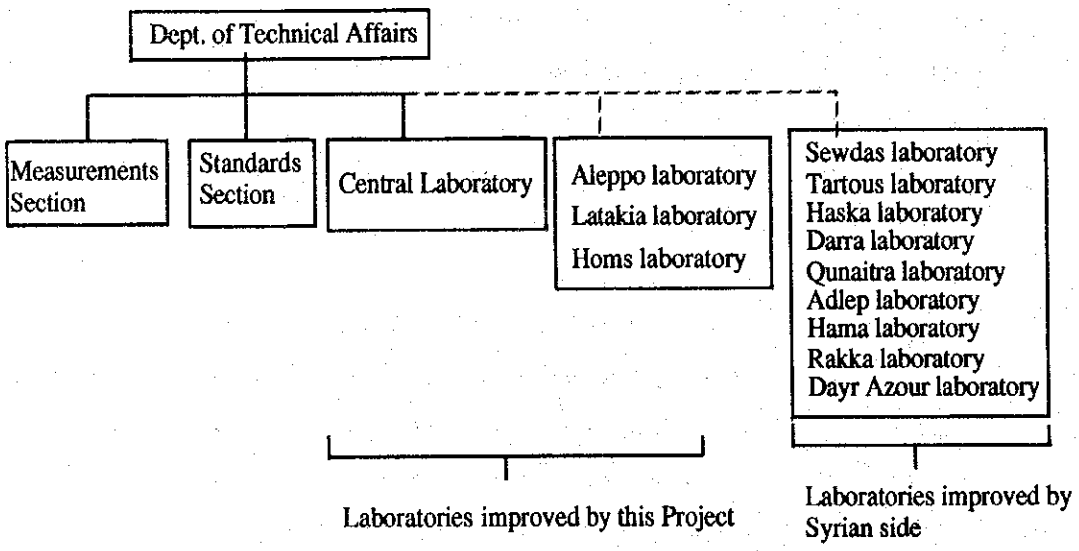


Figure 2 - 1 Structure of Dept. of Technical Affairs

(3) Functions and Duties of the Laboratories

* Central, Damascus	:	* Technical supervision and guidance of all laboratories in the nation.
		* Analysis of food samples collected from the Damascus area.
		* Management of nationwide data
		* Application of any new methods of analysis study for introduction
* Homs	:	* Analysis on livestock product such as dairy products
		* Analysis of food samples collected from the Homs area.
* Aleppo	:	* Analysis on import/export food items to and from Turkey
		* Analysis of food samples collected from Aleppo area.
* Latakia	:	* Analysis on import/export foods passing through the port
		* Analysis of food samples collected from the Latakia area.

(4) Personnel Plan

Food quality control of the Ministry of Supply is carried out by the inspection officers (approximately 700 throughout the country) who collect samples from food shops, markets, and if it is necessary, from each stage of production and processing. The laboratory technicians belonging to the Department of Technical Affairs (about 90 throughout the country) analyze the samples. The results of the analyses are judged synthetically and administrative guidance or legal actions are taken as appropriate.

The existing condition of personnel and its recruitment plan at the four laboratories to be strengthened by this Project are as follows:

Table 2-1 Personnel Plan

Site	Damascus		Aleppo		Latakia		Homs	
	1994	1996	1994	1996	1994	1996	1994	1996
Chemical								
Senior Analyst	4	6	2	4	2	3	2	3
Analyst	18	20	2	4	3	3	1	4
Assistant Analyst	2	6	1	3	0	3	2	4
Total	24	32	5	11	5	9	5	11
Microbiological								
Senior Analyst	1	2	1	1	1	1	1	1
Analyst	3	4	1	2	1	2	1	2
Assistant Analyst	0	1	0	1	1	1	1	1
Total	4	7	2	4	3	4	3	4

(Source : MOS 1994)

The technical level of the laboratory personnel is as follows:

(1) Chief analyzer

The technical level of the chief currently engaged in the analysis are judged to have no problems in the operation of the gas chromatograph, high speed liquid chromatograph, etc. The Department of Technical Affairs is planning to recruit highly qualified analysts from the private sector and the same staff belonging to the Ministry who return home after studying abroad.

(2) Analysis technician

Some of the analysis technicians presently employed at the laboratory have been favoured with less opportunites of conducting analysis. For these technicians and also newly recruited staff members, it is necessary to provide an intensive training schedule.

(3) Analysis assistant

The analysis assistants are engaged mainly in cleaning of glassware and miscellaneous matters, etc. No special technical skills are required, but they are indispensable for efficient analysis work.

2-2-2 Operational Cost

The operational cost (average of 1992-1994) of the four laboratories was Syrian pound 12,848,000 (about 30 million yen) and the breakdown for each laboratory is as follows:

This cost includes: personnel, maintenance for the facility and equipment, depreciation, procurement of equipment, chemicals, glasswares, consumables, etc. The expense for the central food control laboratory includes the procurement cost of equipment not only for their own but also for other laboratories.

Table 2-2 Operational Cost of Each Laboratory

(for the past 3 years)

Year	1992	1993	1994	Average
Damascus	8,500,000	4,500,000	8,500,000	7,167,000
Aleppo	1,711,000	1,885,000	2,070,000	1,889,000
Latakia	1,703,000	1,873,000	2,060,000	1,878,000
Homs	1,735,000	1,909,000	2,100,000	1,914,000
Total	13,649,000	10,164,000	14,730,000	12,848,000

(Source: MOS 1994)

12,848,000 Syrian pounds was the operational costs for the four laboratories (average of 3 years) and was about 2.7% of the total budget of the Ministry of Supply.

Itemwise ratio of the operational cost for personnel cost, equipment cost, chemicals, standards, spare parts, etc. were as follows:

Table 2-3 Breakdown of the Working Cost of Laboratories

Items	Cost (Syrian pound)	Ratio(%)
Personnel expenses	3,212,000	25
Equipment purchasing costs	5,140,000	40
Chemicals, Standards and Spare parts	2,569,000	20
Maintenance Costs(Facility and Equipment)	1,285,000	10
Utility Costs(Electricity, water supply)	642,000	5
Total	12,848,000	100

(Source : MOS 1994)

The estimated operational cost in 1996, when a full scale food quality control system

starts to operate, is as follows:

Pre-condition for the estimation

(1) The operational cost (3 year average of 1992-94), 12,848,000 Syrian pounds shall be the base of the calculation.

(2) The budget for 1996 is the figure of 10% annual increase added to the average of 1992-1994.

(3) The following percentage shall be added to the conventional expense due to the increase of workloads by the food control services from 1996.

Personnel cost	40% increase
Chemicals, spare parts and laboratory consumables	250% increase
Maintenance cost for building & facility	20% increase
Water, Electricity	30% increase

Table 2-4 Estimated Cost of Laboratory Operation, 1996

Items	Average of 1992-94	1995	1996
Personnel expenses	3,212,000	3,533,200	5,299,800
Equipment purchasing costs	5,140,000	---	---
Chemicals, Standards and Spare parts	2,569,000	2,825,900	7,347,340
Maintenance Costs(Facility and Equipment)	1,285,000	1,413,500	1,837,550
Utility Costs(Electricity, water supply)	642,000	706,200	988,680
Total	12,848,000	8,478,000	15,473,370
(10% up)	(12,848,000)	(14,132,800)	(15,546,800)

According to above estimation, the necessary expense in 1996 shall be 15,473,370 Syrian pounds, which is about same as the amount of 10% increase for 2 years inflation starting from 12,848,000 (3 year average of 1992-1994) is less than 3% of the total budget allocated by the Ministry of Supply. This amount does not seam to press the financial status of the Ministry.

2-2-3 Maintenance Plan

The Implementing Agency, the Department of Technical Affairs has the following plan for the maintenance of procured equipment. They have already

started preparation work.

(1) Appointment of an engineer in charge of maintenance

An engineer who is versed in the mechanical construction and functions of the procured equipment shall be appointed as being exclusively responsible for the maintenance of equipment. He shall be authorized to take any necessary actions such as patrol and check the conditions of the equipment, make purchases of necessary spare parts and consumables for laboratory operation and hold training courses how to maintain laboratory equipment properly as necessary.

(2) Regular Inspection of Equipment

The above-mentioned maintenance officer shall make regular tours of each laboratory to inspect the degree of utilization, operating conditions, stock of spare parts, etc. and give technical advise and instruction.

(3) Adoption of Entering System

The operator of equipment shall enter the name of the analyzer, items to be analyzed, conditions of equipment operation, quantity of consumption for used chemicals and reagents, etc. in a book prepared beforehand. The copy of the pages shall be sent to the maintenance officer and registered in the computer so that conditions of the equipment in each laboratory are always known by the maintenance officer.

(4) Environment of Laboratory Room

In Syria, April to June is the sandstorm season. Therefore, a room for the main equipment (Trace analysis I & II) shall be prohibited to enter with dirty footwear. Its entrance shall have double doors.

In the summer, the room temperature shall be suitably adjusted for the operation of the equipment.

2-3 Japan's Cooperation

One member of Japan Overseas Cooperation Volunteers in the field of public sanitation is staying at the central food control laboratory in Damascus from August 1994. He has begun activities regarding technical transfer in the field of laboratry analysis work and a positive result is expected.

Chapter 3 Basic Design

Chapter 3 Basic Design

3-1 Design Policy

3-1-1 Basic Policy of the Design

The basic design shall be planned based upon the design policy which is the guideline for selection of the necessary equipment for the Project. The design policy in the execution of the Project is as described belows:

(1) Internationally Common and Universal Technology

Technical level in this plan shall be set as a internationally common and universal one. The Syrian laws and regulations regarding food control are based on FAO/WHO Codex Alimentarius, its implementation (official method of analysis, application of standards, etc.) must also be accompanied and correspond internationally common technology.

(2) Priority in Analysis Target

There are many kind of agricultural chemicals, food additives and pathogenic microorganisms. For pesticide, there are about 300 effective ingredients in terms of chemical components. In Japan, 103 kinds are registered and used. The maximum allowable residues are specified for each of the 130 kinds of agricultural produce (as of January 1995).

In the case of food additives, there are 248 kinds of chemical compound, and as many as 1,041 kinds of natural additives are used (March, 1994). It is difficult to take a complete measure for all of such a variety, and a wide range of chemicals from both technical and financial point of view. It is advisable to carry out analysis on agricultural chemical residues, food additives and pathogenic microorganism giving priority to the dirtiest ones, which are commonly understood to be the most poisonous and detrimental to human health.

For example, analysis of 10 kinds of the most dangerous contaminants, such as organic phosphorous and organic chlorine in the case of pesticides shown in 3-2-2 (3)- 1). Most Poisonous and Detrimental Pesticides, shall be conducted with correct data, ensuring good reproducibility. The analysis of other contaminants, if it is necessary, may be conducted by way of practical application using the same equipment. This will lead to a better laboratory practice.

With regard to pathogenic microorganism, the analytical capacity shall be introduced initially on the most harmful Salmonella, Staphylococcus and Vibrios. For other kinds, they may be treated as a practical application.

(3) Exclude Equipment for R & D

This Project is designed to assist the food quality control activities conducted by the Ministry of Supply and to contribute to its modernization by strengthening the capacity of each laboratory so that accurate and time saving analysis may be achieved. Therefore, priority in the selection of equipment is placed on the strengthening of the food quality control activities and the equipment for research and development shall be excluded from the procurement programme.

3-1-2 Primary Scope for the Equipment Design

The scope of the Project shall be confined in order to give the primary conditions of the equipment in details.

(1) Scope of Analysis is limited on food items.

As per the request, the surveillance system conducted by the Ministry was with the principle of Fair Price and Safe Quality and it covers not only the food but also fuel, detergent, construction material, footwear, cloth, etc.

In the actual practice of activity, more than 90% of the sampling and analysis is done on foods. Since dissatisfactions and appeals from consumers are many on foods, this Project places a top priority on protecting consumers from health hazards in foods.

(2) Measuring Equipment of Radioactivity are Excluded.

The legal authority on the radioactivity in Syria exists with the Atomic Committee. In order to avoid any duplication in administrative control, and also due to the less frequency/urgency compared with the agricultural chemical residues and food additives, the radioactivity measuring equipment were excluded from the Project.

(3) Equipment for Quality Control for the Management of Business Enterprises Under the Ministry are also Excluded.

Syria maintains a socialistic economic structure. The Ministry of Supply operates business enterprises and companies for production and sales regard to the goods closely related to its citizens. The equipment for quality control to be used at the flour mills and bakeries was also requested, but these fall outside the purpose of safety protection of the consumers' health. Therefore, they are excluded from this Project.

(4) Use of Existing Equipment

The Ministry of Supply has already procured some of the necessary analytical equipment for the operation of its laboratories, such as for food compositional, contaminants and microbiological analysis equipment and their ancillaries.

In this Project, effective utilization of these equipment and ancillaries shall be utilized as much as possible, in order to avoid supply of any duplicated items.

(5) Other Equipment for Running Laboratory Works

Examination of the request reveals that the equipment for analysis of microorganism and hygine inspection are limitted and also there is no mention concerning the existing problems of dust control, temperature and humidity control for the analysis room. In this Project, countermeasures must be planned in order to provide the necessary equipment and to improve the analysis environment, especially for the main laboratory rooms as trace analysis I & II.

3-2 Basic Plan

3-2-1 Preconditions

The basic design of this Project is stated in the above-mentioned 3-1 Basic Design Policy. Here, more precise factors and conditions for design of the plan are shown below as a guideline for the selection of the equipment.

(1) Natural Conditions

The country has a mediterranean climate in the West and a dry desert in the East. Coastal area like Latakia are hot in Summer and mild in winter. But inland grassy plain and desert are extremely hot and dry in summer with an acutely changeable temperature in winter.

Precipitation in coastal area is 1,200mm on average and in mountainous area, it may reach 1,500mm depending upon the location. In the area between Aleppo and Damascus it is 600mm, the inland area 300mm, and in the desert area it is less than 150mm. The rainy season is from November to March. It snows sometimes in winter and the temperature goes down as low as 10°C below freezing point.

In summer, the maximum temperature can climb to 45°C. Adequate care must be paid in order that the equipment may not be exposed to any acute change in temperature and humidity, which may cause disorder or erroneous functions. (refer Appendix for temperature and humidity distribution graph for each project site.)

(2) Social Conditions

The official language of Syria is Arabic. English and French are understood to

some degree. If manuals are written in English for the main equipment, there may be some misunderstanding , which may lead to problems.

Therefore, the manuals for trouble shooting and maintenance for main equipment shall be translated into Arabic in order to maximize equipment utilization.

(3) Maintenance and Management

They have been conducting food quality control in the market and some the equipment has been installed already. Some of those equipment has been well maitained such as a gas chromatograph which is 15 years old and is still in good working order. Some engineers have been trained abroad and have a good knowledge about analysis technology and equipment operation.

With regard to the maintenance, it is recommended to appoint a Maintenance Officer who shall belong to Department Technical Affairs and make round trips regularly to the local laboratories in order to inspect the conditions of equipment and check the stock of spare parts. In the maintenance work, it is necessary to have adequate knowledge concerning the actual conditions and the frequency of operations of each equipment and the availability of spare parts from the local market, specially for sophisticated analyzing equipment containing built-in computer.

(4) Grade and Scope of Equipment

1) Although food compositional, food contaminants analysis and food microbiological analysis are presently carried out at the existing laboratories, all items specified in the National Standards can not be performed due to their out-dated equipment. Therefore, the equipment to be procured in this Project shall ensure the ability to secure analytical values specified by the National Standards.

2) According to the GAP Codex Guideline, FAO/WHO for analysis of residual agricultural chemicals, required conditions for the laboratories analyzing agricultural chemicals are as follows:

a) The environment should be suitable to accommodate precision analysis equipment and to maintain its high level performance.
b) The laboratory shall have enough space to conduct analysis work.
c) Samples can be kept clean without contamination.
d) Maximum safety is guaranteed for the operators of the analysis equipment.

In this plan, the above guideline shall be taken into considerations in the selection of the equipment and in the making of equipment design. In order to ensure a good environment, air conditioners to adjust temperature and humidity and cleaners to control dust are included. For the safety of technicians and operators of the equipment, draft chambers are also included.

3) The existing equipment, owned by each laboratory, shall be used, if they are proved reliable in operation, as much as possible in order to maximize the utilization.

4) The equipment to be procured shall be suitable to be maintained in Syria without any difficulties. The availability of after sales services such as supply of spare parts and repairing are indispensable factor for the selection of the equipment.

Table 3-1 Grade and Scope of Equipment

Item	Main Specification	Base of Selection
Speedy Fat Extraction Apparatus	Extraction cup, cup folder, Filter Support, Filter, clamp, Filter Stand, Heater	This equipment can extract and condense fat from sample in a short time and it was selected because of saving time.
Kent & Johns (Color grader)	Main lamp, Glass sample cell, Standard plate	To measure the chromaticity of wheat flour precisely and accurately. It was selected because the Kent & Jones values have been adopted conventionally.
Gas chromato-graph (Packed - column type)	Main body, Data processing unit, Stainless column, Glass column, Column packing set, Micro cyringe	It easily conducts analysis of organic compound. It has a wide usage. Different detectors are provided for each group of sample :ECD for organo-chlorine pesticide, FPD for organo-phosphine pesticide, FID/FTD is mainly for food additives. Packed column was selected because it is easier to operate than capillary column, also the column is reproduced.
Gas chromato-graph (Packed and capillary column type)	Main body, Data processing unit, Stainless column, Glass column, Column packing set, Micro cyringe, Gas cylinder (Air, He)	It easily and accurately conducts analysis of organic compound. It has a wide range of use. Different detectors are used for different group of samples. FID/FTD was selected for analysis of main food additives. Common use of capillary and packed column was selected only for central laboratory to analyze of flavorings.
Atomic Absorp-tion Spectropho-tometer	Main body, Graphite atomizer, Auto sampler, Hydride vapor generator unit, Mercury Vaporizer unit, Air compressor, Hollow cathode lamp	For easy and accurate determination of a trace content of heavy metal in foods. Common type for frame/frameless can detect up to ppb level and installed only at central laboratory. frame type are planned for local laboratories.
High Performance Liquid Chromato-graph	Sample injector, On-line degassing unit, Data processing unit, Analytical column, Guard column, Micro cyringe, Solid phase extraction apparatus	This is widely used for qualitative and quantitative analysis of vitamins, additives, pesticide residues in food. Depending on the use, either an UV-Visible detector or different refractive index detector, Electro-chemical detector or Fluorescence detector are selected. A photodiode array detector, highly effective in identifying a trace content in the material with many impurities are planned only at central laboratory.
Near Infra-red spectrophotometer	wavelength, approx. 1200-2400nm Light source, W lamp Detector, PbS, SI Amount of sample, approx. 1 ml-300 ml	This is widely used in the analysis of food samples. It can analyze moisture content, fat, sugar, protein, alcohol, caffeine, etc. Especially, it will be good in determining protein, carbohydrate, fat and also to examining agricultural product.

3-2-2 Planning Factors

(1) Expected Workload

a) Number of samples

The Ministry of Supply plans to initiate a full-scale food quality control operation beginning January 1996, when the new analysis equipment has arrived and has been installed under this Project.

Samples taken by inspectors of the Department of Quality Control are classified into the following two categories: (1) samples taken by the consumers' complains and appeals just as conventional (actual record; one sample per 1000 inhabitants/year) (2) samples taken by the integral food quality control operation (sample number recommended by FAO/WHO) delivered to the laboratories

Table 3-2 Number of Samples Collected in Each Area

Year	1996		1997		1998		1999		2000	
Site	Population	Number of sampling	Population	Number of sampling	Population	Number of sampling	Population	Number of sampling	Population	Number of sampling
Damascus	3,253	13,012	3,370	13,480	3,492	13,968	3,617	14,468	3,748	14,992
Aleppo	3,084	12,336	3,195	12,780	3,310	13,240	3,429	13,716	3,552	14,208
Homs	1,393	5,572	1,443	5,772	1,495	5,980	1,549	6,196	1,604	6,416
Latakia	902	3,608	934	3,736	968	3,872	1,003	4,012	1,039	4,156
Total	8,632	34,528	8,942	35,768	9,265	37,060	9,598	38,392	9,943	39,772

b) Number of Analysis in Each Field

The number of samples to be delivered to the laboratories of Damascus, Aleppo, Homs and latakia may reach approximetely 40,000 by the year 2,000. The breakdown of those samples into each field is as shown in Table 3-03 below. The ratio of each field of analysis such as food composition, microbiology, and food contaminants is based upon their past records as follows:

Compositional chemical analysis
(Moisture content, protein, fat, ash, etc.) 55%

Microbiological analysis
(Pathogenic microorganisms, etc.) 15%

Food contaminants analysis (Residual agricultural chemicals,
Various food additives, mycotoxin, etc.) 30%

Table 3-3 Expected Workload for Each Laboratory in Each Field

Site	Field	1996	1997	1998	1999	2000
Damas-cus	Compositional	7,157	7,414	7,682	7,957	8,246
	Microbiological	1,952	2,022	2,095	2,170	2,249
	Contaminants	3,904	4,044	4,190	4,340	4,498
	Total	13,012	13,480	13,968	14,468	14,992
Aleppo	Compositional	6,785	7,029	7,282	7,544	7,814
	Microbiological	1,850	1,917	1,986	2,057	2,131
	Contaminants	3,701	3,834	3,972	4,115	4,262
	Total	12,336	12,780	13,240	13,716	14,208
Latakia	Compositional	1,984	2,055	2,130	2,207	2,286
	Microbiological	541	560	581	602	623
	Contaminants	1,082	1,121	1,162	1,204	1,247
	Total	3,608	3,736	3,872	4,012	4,156
Homs	Compositional	3,065	3,175	3,289	3,408	3,529
	Microbiological	836	866	897	929	962
	Contaminants	1,672	1,732	1,794	1,859	1,925
	Total	5,572	5,772	5,980	6,196	6,416
Total	Compositional	18,990	19,672	20,383	21,116	21,875
	Microbiological	5,179	5,365	5,559	5,759	5,966
	Contaminants	10,358	10,730	11,118	11,518	11,932
	Total	34,528	35,768	37,060	38,392	39,772

Further, the amount of analysis work in a day was estimated for each field of food compositional analysis, food microbiological analysis and food contaminants analysis as follows:

Table 3-4 Approx. Number of Analysis in Each Field in the Year 1996 and 2000

Site	Field	1996		2000		Approx. number of Analysis per day	
		Actual number	Approx. number	Actual number	Approx. number	1996	2000
Damascus	Compositional	7,157	7,000	8,246	8,000	28	32
	Microbiological	1,952	2,000	2,249	2,000		8
	Contaminants	3,904	4,000	4,498	5,000	16	20
	Total	13,012	13,000	14,992	15,000	44	60
Aleppo	Compositional	6,785	7,000	7,814	8,000	28	32
	Microbiological	1,850	2,000	2,131	2,000		8
	Contaminants	3,701	3,500	4,262	4,000	14	16
	Total	12,336	12,500	14,208	14,000	42	56
Latakia	Compositional	1,984	2,000	2,286	2,000		8
	Microbiological	541	500	623	1,000	2	4
	Contaminants	1,082	1,000	1,247	1,000		4
	Total	3,608	3,500	4,156	4,000	14	16
Homs	Compositional	3,065	3,000	3,529	3,000		12
	Microbiological	836	1,000	962	1,000	4	
	Contaminants	1,672	1,500	1,925	2,000	6	8
	Total	5,572	5,500	6,416	6,000	22	24

Note: Annual number of analysis in the year 2,000 divided by 250 working days.

(2) Technical Requirement

As stated in 3-2-1, (4), 1) the capabilities of the analysis of the values specified in the National Standards as maximum or minimum are the primary requirement for the selection of equipment. The items of analysis now being conducted at the laboratories are shown in Table 3-5. Powdered milk was taken as an example to show items of analysis, specified values, the range that can be detected with the existing equipment and its concerns, problems that can be solved by this Project, the planned equipment for that purpose, future problems, etc. in the Table 3-6 below.

Table 3-5 Food and Analytical Items

Name of Food	Analytical items			
	Chemical	contaminants	Pesticide Residue	Microbiological
Yeast	*CO2、Ash、Protein、Humidity			Dided cells
Bread、Cake、Flour	Humidity、Ash、Fat、*Heavy metal Gluten	*Sweetner、*Flavorings、*Anti-oxidants Dyes		
Biscuit	Ash、Fat	Dyes、*Flavorings		Microbiological
Baby food	Fat、Protein、Humidity、Ash、pH Peroxide value、Heavy metals、Sugar	*Vitamins、*Preservatives *Flavorings	*Pesticide Residue	Microbiological
Confectionery	Fat、Peroxide value、*Heavy metals *SO2、Sugar	*Sweetners、*Flavorings、*Aflatoxin		
Chewing gum		*Vitamins、*Flavorings、*Dyes *Preservatives, *Anti-oxidants		Microbiological
Marmalades、Jam	Sugar、pH、Solid matter、SO2、 Heavy metal	*Sweetners、*Preservatives *Aflatoxin	*Pesticide Residue	
Oils and Fats (Cream、Seed oil、Butter)	Fatty acid composition、pH, catotenoides *Heavy metals、Humidity、*Ni-ion Peroxide value、Iodine values	*cis-trans fatty acid、*Vitamines *Anti-oxidants、*Flavorings *Cholesterol、*Additives、*Contaminants		Coliformes、E. coli Salmonella、Funji
Nuts and nuts products (Almonds、Walnut, Pistachio)	Humidity、Oil、pH、Protein	*Aflatoxin、*Preservatives	*Pesticide Residue	
Beverages (Juice、Carbonated beverages)	Sugar、*CO2、*Heavy metals Soluble matter	*Sweetners、Dyes、*Flavorings *Vitamins,*Preservatives、Caffein		Microbiological
Alcoholic beverages	Methanol、Ethanol、iso-propanol Butanol、isoamyl、Organic acids Density、Heavy metal	*Aflatosin		
Fruits and vegetables		*Aflatoxin	*Pesticide Residue	Microbiological
Canned meat and other cans	*Heavy metals、Fat、Protein、NO2、pH Fiber	*Preservatives、*Dyes、*Hormones *Flavorings		Microbiological
Mayonnaise	Fat、Fatty acid composition Peroxide value	*Additives、*Cholesterol、*Flavorings *Enzymes, * Preservatives		
Tea、Coffee、Cacao	Soluble dry matter、Ash、Humidity	Caffein	*Pesticide Residue	
Water	Heavy metal、Hardness、Ions		*Pesticide Residue	Microbiological
Milk and dairy products	Fat、Ash、Lactose、Protein Refraction index、pH	*Flavorings、*Anti-oxidants、Dyes *Contaminants		Microbiological
Spices (Chilli Power, Cordimentes)	Ash、Humidity、Ether extraction、Fiber NaCl	Dyes、*Flavorings、*Preservatives *Contaminants	*Pesticide Residue	Microbiological
Salt	NaCl、SO4--、Humidity、Heavy metals Insoluble matter、Iodine、CO3-			
Food colors	*Heavy metals、*Purity			
Halawa and Tehanh	*Heavy metal、Ash、Fat、Sugar Humidity			

* Items that can be analysed after the project

Table 3-6 Problems and Solution by the Project (ex. Powered Milk)

Item	Regulation in Syrian National Standard	Present condition and problem	Solution by the Project	Planned equipment by the Project	Remarks
Sampling	-Use special sample containers -Labelling: sampline date, Butch No. Name of sampers and Signature -Quantity: over 200gr	Uncleaned sample containers are used	Avoiding sample contaminationand qualitiychange	Ulrasonic cleaners Vehicles with refrigeratingbox	Improvedsample handlingsarerequired
Storagemethod	Darkroom Roomtemperature	It is feared that quality may change in summer season, if samples store in room temperature	Out of scope of the Project	Out of scope of the Project	Domesticrefrigerators for storing samples are procuredbyMOS
Compositional analysis - Fat - Protein - Lactose - Ash (Dry weight)	26% (Milk fat, minimum) 34-38% 6-7%	Detectable(Gel-Belmethod) Detectable(Kjeldarlmethod) Detectable (Abbe's refractometer) Detectable (Furnace)	Preparetheequipment ofminimumrequirement	Drying Oven, Muffle Furnace, Electric balance	
Color	Homogenous cream white as in whole fat	Visible inspection	Evaluatecolor quantitatively	Colormeter	
Nutritionaladditives -Stabilizers; Polyphosphoric acid -Emulsifiers Monoglycerides -Antilumping additives Tricalcium phosphite - Vitamins	5000 mg/kg max. 2500mg/kg max. 10g/kg max. Proportin and quntity in IU should be mentioned on the package label.	notdetectable notdetectable notdetectable notdetectable	Determination as phosporouspentaoxide by AA ppm-orderanalysisby GC ppm-orderanalysisby AA Detactable in IU	Atomicabsortption spectrophotometer(AA) Gaschromatograph with FID AA or Flame photometer Fluorescence spectrophotometer HPLC	Presently MOS laboratoriesanalyze color and food additives qualitatively by using TLC. In the Project, it is planned to procure a densitometerfor quantitative analysis.
Metal -Lead -Tin	Notallowed 100mg/kg	ppm-order analysis by AA (flame type) ppm-order analysis by AA	ppb-order analysisby AA (flameless type) ppb-orderanalysisby AA with Hydride generator	Flameless AA AA with Hydride generator	Presently only one set of AA is operating at the centralfoodcontrol laboratory and there is a high sensiteiv flame/ flameless AA for conductingrefreework.
Sanitaryconditions -Coliform -E. coli -Contaminants	not exceed 50,000 cells pergr free free	Countingwithcolony-counter and usually it takes considerabel time notdetectable Detailsunknown	Provideacolony-counter with a pen Use a kit for identification of E. coli Using microscope of high magnification	Colony-counter Petrifilm Stereoscopic microscope	
Pesticideresidues	completelyfree	notdetectable	Analysis range at ppm-order as a first step	GC HPLC	GC with most popular packedcolumn
Antibiotics	completelyfree	notdetectable	Analysis range at ppm-order as a first step	HPLC	
Can	No swelling, corrosion or rust on the metallic cans	notdetectable	Applyinspection apparatus	Can testing set	
Radioactivity	not exceed the specified limit	notdetectable	Out of scope of the Project	Out of scope of the Project	

(3) Harmful Substances

The priority policy on the harmful substance to human health is already given in " 3-1-1 (2) Priority in Analysis Target." Those harmful substances in each field are listed as follows:

1) Pesticide

Following 10 pesticides are the most poisonous and detrimental to human health because of their strong residual tendency and harmful quality.

Name	Kinds
Aldrin	Organo chlorine
Dieldrin	Organo chlorine
DDT	Organo chlorine
Heptachlor	Organo chlorine
BHC	Organo chlorine
Fenitrothion	Organo phosphine
Malathion	Organo phosphine
Diazinon	Organo phosphine
Ethion	Organo phosphine
Parathion	Organo phosphine

2) Food Additives

The following preservatives, sweeteners and coloring agents, etc. are the objective kinds of additives. Among these additives, the coloring agents made from tar shall be classified as the most harmful food additives.

Kinds of additives	Name of additives		Purposes
Preservatives	Potassium Sorbate Sodium Benzoate		Prevention of mold
Sweeteners	Sodium Saccharin		Sweetness
Antioxidants	Erythorbic Acid		Antioxidation of Fat
Color	Sunset Yellow	Food Yellow No. 5	Colors
	Amaranth	Food Red No. 2	
	Erythrosine	Food Red No. 3	
	Tartrazine	Food Yellow No.4	
	Indigo Carmine	Food Blue No. 2	
	Brilliant Blue	Food Blue No. 1	
	New coccine	Food Red No. 102	
	Fast Green	Food Green No. 3	
Bleaching agents		Sodium Chlorite	Bleaching foods
Yeast nutrients		Calcium Carbonate	Nutrients for yeast
Flavorings		Methyl Cinnamate	Flavorings
Acidity regulators		Lactic Acid, Citric Acid	Add acid taste
Flavorings (for taste-related)		Sodium Glutamate	Taste
Emulsifiers		Glycerin Esters of Fatty Acids	Emulsification