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18019

DP/ID/SER.A/1310
2 February 1990
ORIGINAL: ENGLISH

STRENGTHENING QUALITY CONTROL AND TESTING FACILITIES OF NON-ALCOHOLIC LIQUID FOODS INCLUDING FISH SAUCE AND SOY-BEAN SAUCE

DP/VIE/87/009/11-01

VIET NAM

Technical report: Review and assessment of the quality control and testing capability for food of the Department of Quality Control and Metrology
Preparatory assistance*

Prepared for the Government of Viet Nam
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

Based on the work of Alicia Lustre,
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Vienna

* This document has not been edited.

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REVIEW AND ASSESSMENT OF THE QUALITY CONTROL AND TESTING CAPABILITY FOR FOOD OF THE DEPARTMENT OF QUALITY CONTROL AND METROLOGY OF THE MINISTRY OF DOMESTIC TRADE OF VIETNAM

I. INTRODUCTION

The Government of Vietnam has requested UNDP for assistance in upgrading the food testing and quality control capability of the Department for the Quality Control of Goods and Metrology (DTQC) of the Ministry of Domestic Trade. The upgrading is viewed as critical to the control of the existing quality of foods in the market, particularly fish and soybean sauce and other non-alcoholic liquid foods. A high percentage of these products (15% to 20%) is reportedly rejected in the marke. and its content of total nitrogen is below the minimum national standard of 10 - 12 grams per liter.

The control of the quality of non-alcoholic liquid foods is in line with the governments program for the development of consumer goods which was adopted by the 6th Vietnamese Party Congress on 17 December 1986.

In relation to this request for UNDP assistance and to provide a basis for the preparation of the Project Document, a study was commissioned by UNDP with the following objectives:

1. To review and assess the actual situation of quality control and testing at DTQC, including the existing equipment and technical methodology applied, particularly for non-alcoholic liquid food products.

2. To prepare recommendations for improvement of the methodology for quality control and testing in order to ensure supply of better quality liquid food and reduce waste;

3. To prepare recommendations on equipment requirements and technology and training of existing staff.

This document was prepared to answer the above objectives. It is based on a 19-day visit at the DTQC in Hanoi and involved discussions with its management and technical personnel, observations of its facilities and equipment; interviews with heads of trading companies related to DTQC functions; and visits to foodstores and a market in Hanoi (see Annex 1 for schedule at Hanoi City).

II. REVIEW OF DTQC AND ITS ACTIVITIES

1. Background Information

1.1 Organization and Mandate of DTQC

DTQC was created in 1960 as a department under the Ministry of Domestic Trade (see Annex 2, Functional Chart). Government resolution No 28/HDBT dated April 6, 1983 made DTQC a legal body and gave it responsibility to control and test the quality of goods in trade from selling, buying, storing and transport. It also made DTQC responsible for the management of two branch laboratories in Danang and Ho Chi Minh City as well as the organizations for the quality control of goods and metrology at provincial trade services, Vietnamese collective firms and all corporations and their subsidiary units in 3 cities, 1 special zone and 36 provinces. These firms are all under the Ministry of Domestic Trade.

DTQC is headed by a Director and Vice Director. The food testing and quality control functions of DTQC are implemented by the Agriculture and Food Products Section which is headed by a Food Engineer and a Chief of Laboratories. The Section has thirteen (13) analysts to test and inspect food quality in eighteen (18) provinces in the northern part of the country.

The branch laboratories of DTQC in Danang and Ho Chi Minh City oversee food quality in the central and southern regions of the country respectively. They are administratively under DTQC but have authority over day to day decision making except when involving big problems as the withdrawal of large volumes of food from the market.

1.2 Functions

In relation to its mandate to control the quality of consumer goods, DTQC has the following duties and responsibilities : (excluding responsibilities for metrology)

a) Unification of the management of all quality control and testing functions in the Ministry of Domestic Trade.

b) Assuring quality of consumer goods through inspection, testing and certification.

c) Establishment of domestic standards for consumer goods quality and participation in the government committee for the establishment of Vietnamese standards.

d) Conduct of technical research to support testing and inspection functions and those related to assisting the Ministry in the promulgation of domestic trade laws.

1.3 Activities

DTQC implements the following functions and activities in relation to food quality control :

a) It monitors the quality of food marketed in the country through actual sampling, inspection and testing.

b) it conducts laboratory analysis of food products, averaging about 2,000 sample analyses per year, of which 600 - 800 are fish and soy sauce samples.

c) It exercises professional supervision over the quality control laboratories of corporations, collective firms and trade services up to the district level. It provides advice, laboratory testing and helps in resolving technical problems.

d) It provides education and training to the above quality control network to insure use of uniform methodologies.

e) It acts as the official government arbiter for quality problems that arise between buyers and sellers.

f) It provides the official government certificates for the quality of food product samples.

g) It conducts research on methods of analysis and storage, postharvest handling of agricultural crops, and processing of fruit and vegetable products.

h) More recently, with the government's new open policy on trade, DTQC certifies the quality of export shipments for companies under the Ministry of Domestic Trade.

1.4 Relationship with Other Government Institutions

In the discharge of its responsibilities, DTQC cooperates with other government institutions and complements their activities in the areas of standards development, analysis and quality control as follows :

a) In standards development

The Director of DTQC is a member of the official committee of the General Department for the Standardization of Metrology and Quality Control, for the establishment of Vietnamese food standards (GDSMQC).

b) In analysis

DTQC is assisted by other government agencies in analysis. The Institute of Hygiene confirms isolates of microbial pathogens, the Institute of Nutrition provides analytical procedures as for heavy metals, and the Polytechnic University assists in special equipment repair.

c) In quality control

DTQC coordinates with the provincial branch of GDSMQC whenever quality problems are detected that require correction at the factory level. The latter agency is responsible for the proper operation of factories. DTQC is responsible only for food quality in the market. Thus while DTQC can order the closure of stores, only GDSMQC can

order the closure of factories. Generally, such drastic measures have reportedly not been necessary because the traders and/or storeowners are able to induce the producers to follow the recommendations made by DTQC.

It is noted that there are other government agencies involved in food testing and inspection in Vietnam.

The Institute of Nutrition of the Ministry of Health, has laboratories for microbiological and nutritional evaluation of foods. The Department of Plant Protection of the Ministry of Agriculture and Food has entomology and pesticide laboratories. These institutes will likely not duplicate the activities of DTQC as the food testing and inspection they conduct are components of other Institute programs that are not related to food quality control.

There are two other institutions in the government however that are reportedly doing food testing and inspection with the objective of promoting quality in the domestic and export trade. These are :

a) Vinacontrol under the Ministry for International Trade and
b) Institute for Standardization and Quality Control under the State Committee for Science and Technology.

Institute b) above in particular has been the recipient of UNDP assistance in a 3-phase project that began in 1979 and continues to the present. Both of the above Institutes appear to assume very broad mandates for the quality of many industrial products, food among them. It is necessary to examine their objectives and activities in greater detail before their relationship to DTQC's responsibilities and functions can be properly assessed.

1.5 Relationship with the Quality Control (QC) Network of the Companies of the Ministry of Domestic Trade

The trade service bureaus, the vietnamese collective firms and corporations in the Ministry of Domestic Trade operate a quality control network consisting of quality control (QC) units doing quality checks at important points in the marketing chain. The QC unit at the village level may be a single individual acting as a quality inspector and at the provincial level, it could be a quality testing laboratory with personnel to perform limited laboratory testing of specific foods.

The QC network is supervised professionally by DTQC (see Annex

3). It trains the personnel of this network and insures that they use official standards and methodologies. DTQC also uses the network to collect samples of products in markets out of its reach. In this manner, DTQC increases the coverage of its monitoring activities.

DTQC's role in supervising the QC network is highly regarded by the trading companies. The three (3) we met in this visit look to UNDP assistance to strengthen DTQC as their quality control arm for food export activities. One of these companies, Intimex, is already extensively engaged in exports and was hoping to increase the contribution of food and agriculture to its operations from the present 25% to 50%. (see Report on Company Visits Annex 7)

The visit to the companies of the Ministry of Domestic Trade indicated that in spite of its limited resources for food testing, DTQC is appreciated by the Industry.

2. The Quality Control and Testing System at DTQC

2.1 Sampling and Inspection

DTQC monitors the quality of food in the market through regular inspection and sampling. This is conducted weekly, monthly or annually depending on the volume of the food sold and its likelihood of contamination. Sampling is also increased following reports of adulteration and complaints by consumers.

The different food products that are inspected by DTQC and their frequency of sampling is shown below as Table 1.

Table 1. Frequency of Sampling for the Different Types of Food Products Inspected by DTQC

	Food Product	Frequency of Sampling
1.	Fish sauce and other fermented sauces	regularly
2.	Solar salt	"
3.	Sugar	"

4.	Milk	"
5.	Tea	"
6.	Bread	"
7.	Biscuits	"
8.	Confectionery	"
9.	Aquatic products	occasionally
10.	Vegetable oils	regularly
11.	Canned food	"
12.	Peas	"
13.	Vodka	"
14.	Alcohol	occasionally
15.	Beer	regularly
16.	Fruits, dry and fresh	"
17.	Vegetables and spices	"
18.	Cooked meats	"

The food products inspected regularly are those which are important in volume of consumption and are susceptible to quality problems.

Fish sauce and soy sauce are among the most important in the above list in terms of frequency of sampling. Two to three bottles are analyzed daily at the DTQC laboratory. Other important products are vegetable oil, and milk, which are tested for conformity with DTQC standards. Other products as salt and sugar, are only visually evaluated at the market and tested in the laboratory if they show signs of adulteration. Countryside markets/storages facilities are inspected monthly.

2.2 Number and Types of Analyses Performed

DTQC analyses about 2000 food samples yearly, representing 30% of the total number of samples which DTQC estimates it must evaluate yearly. The low level of analysis is reportedly due to the slow time consuming methods it uses, and to the lack of chemicals.

Of the samples received for analysis approximately 50% are obtained by its own inspectors, 30-35% are provided by the QC network of the companies of the Ministry of Domestic Trade, and 20-25% are samples of private individuals.

The types of analyses and procedures used for laboratory testing of products is shown in Table 2.

Table 2. Types of Analysis and Procedures for Food Testing at DTQC

1. Chemical Analysis

1.1 Analyses applied to most foods

Total N - Kieldahl Method
Moisture - Air Oven Method
Fat - Soxhlet extraction Method
Ash - burning in a furnace
Acid insoluable ash - same
% Acid - Titrimetric Method

1.2 Analysis specific to fish sauce, soy sauce and similar products

Total N - Kieldahl Method
Amino N - Formol Titration Method
Ammoniacal N - Magnesium oxide method
% Sodium chloride - Mohr method
Acidity - pH meter Method

1.3 Analysis specific to salt

Calcium - colorimetric, reaction (rx) with casein
Magnesium - colorimetric, rx with eriochrome blackT
Potassium - gravimetric, rx with tetraphenylborate
Sulphate - gravimetric, rx with barium chloride

1.4 Analysis specific to fats and oils

Solidification point - Capillary tube method
Melting point - Capillary tube method
Peroxide number - Titrimetric Method
Saponification number - titration after saponification
Iodine value - Titrimetric Method
Unsaponifiable matter
Acid number - Titration Method

1.5 Analysis specific to alcoholic beverages

% Alcohol - alcohol meter
% Ester - Saponification
% Aldehyde - Schiffs Method
Carbon dioxide - Manometric Method
Malt - Bertrand

1.6 Analysis of heavy metals

Arsenic - colorimetric method
Lead - colorimetric - dithizone method
Zinc - colorimetric - dithizone method
Copper - colorimetric - pyridine ammonium thiocyanide method

2. Physical and Sensory Evaluation Methods

Can seam tightness - dipping in 80°C water
Drained weight - weighing
Color, odor, taste - sensory evaluation techniques
Net weight of packaged product - weighing

3. Microbiological Analysis

Total plate count
E - coli
Anaerobes
Aerobes
Staphylococcus
Salmonella - shigella : enrichment in beef broth
isolation in brilliant green agar

Table 2 shows that DTQC performs thirty (30) types of chemical analysis, six (6) microbiological analyses and four (4) physical and sensory evaluation tests for food quality.

The chemical tests consists of methods for the general proximate analysis of foods and tests specific to fish sauce, soy sauce (and similar products), salt, sugar, fats and oils and alcoholic beverage. Classical colorimetric procedures are used for the analysis of toxic metals. The physical and microbiological tests conducted are seen to be very limited in number.

The quality indices analyzed and the procedures used by DTQC for food testing are taken from the Vietnamese standards formulated by the GDSMQC. Results of analyses are also evaluated against these standards. When there are no official standards, DTQC makes its own standards based on its own experiences, which eventually become official standards of the Ministry of Domestic Trade. When DTQC is unable to make its own standards, international specifications as those from Hungary and Bulgaria, are used.

Most of the chemical tests conducted at DTQC give information primarily on product composition rather than safety. This is mainly

due to the fact that testing is done to determine compliance with national standards which emphasize conformity with product identity rather than safety. Fish sauce and soy sauce however have been found to be exposed to various types of contamination. Adulteration due to contaminants is also a major focus of food testing in many importing countries. It is thus important to update DTQC's testing capability in this area.

Due to inadequate equipment, the methodologies used at DTQC do not reflect developments in food analysis that have enhanced speed and accuracy in testing while reducing operating costs. Chromatographic and spectrophotometric methods of analysis for example have replaced many classical wet methods for food analysis. They are more accurate, less subject to interference and make use of equipment that have wide ranging applicability. The equipment for above methods are not available at DTQC.

The lack of information on internationally accepted methods of analysis makes some of DTQC's methodologies inappropriate for export testing.

2.3 Equipment and Facilities Used

The listing of equipment at DTQC is shown in Annex 6 and indicates the following;

a) Tne presence at DTQC of only the minimum number and type of equipment required for routine and simple chemical analysis of food constituents

b) The absence of equipment for the analysis of many important quality indices in food as microbial pathogens, aflatoxin, heavy metals, filth and extraneous matter, food additives as sulfites, colors, and sorbic acid

c) The absence of equipment for the rapid analysis of substances routinely monitored, as % N in fish sauce or % fat in other foods. New equipment for these types of analyses should enable DTQC to analyze 3-4 times more samples of fish sauce for N than it is presently capable of doing and about 10 times more samples of food, for fat. Reduced cost will also result from the reduced use of solvent, as much as 50% less, for fat analysis.

d) The absence of equipment for many important day to day analysis as an apparatus for distilled water, a vacuum oven, sample blenders, fast reading top weighing balances and an efficient fume hood. The provision of these equipment will increase overall efficiency in

laboratory analysis and in the case of the fume hood, enhance safety.

e) The absence of simple equipment for quality monitoring as portable thermometers, refractometers, vacuum gauge and portable pH meters which are important tools for providing objective data in the understanding of visual experiences in quality inspection.

It was also observed that most of the equipment at DTQC are old (close to 20 years old). They are as a result rusty and hard to maintain due to lack of spare parts. DTQC staff do an admirable job of making these equipment serve their needs. With the existing situation however, this cannot be accomplished without loss in productivity and very likely, some loss in accuracy. Glassware and metalware were also limited in number and some were poor in quality relative to the manner in which they are used. Poor quality glass for example reportedly breaks at the high temperature needed to digest fish sauce samples. Many of the metalware were rusty.

DTQC has no computer facilities. Thus its capability to calculate, analyze, store and reproduce information is limited. This capability is important when DTQC's activities in testing and quality control are strengthened.

Existing facilities and equipment thus greatly curtail the capability of DTQC to do more up-to-date and efficient testing and analysis and quality control of foods. This in turn prevents it from embarking on more innovative food quality control programs.

2.4 The Manpower For Quality Control

Manpower capability for food testing and quality control at DTQC is capable, in relation to the tasks it presently undertakes. Sampling plans for example are carried out with a logical basis and provide maximum information relative to DTQC's limited resources. The expertise in food testing is primarily in the area of wet classical methods of chemical analysis. In spite of this, the technical background is good and valuable experience exists in the discipline required for food testing.

Many of the staff have been with DTQC for a long time, 10-30 years, (see Annex 5). They are thus well exposed to nuances in fish sauce quality and that of other commodities DTQC evaluates. The staff reportedly has done well in formal training courses on sensory evaluation of food. This expertise is valuable.

A few of the senior staff are well versed in processing technology including that of fish sauce and soy bean sauce. One has had experience in commercial food processing operations and as a result is able to relate the quality problems they encounter with processing and distribution difficulties.

The manpower at DTQC however, is for the most part limited in its testing and quality control expertise to end-product evaluation. There is little experience in the other aspects of quality control as plant and process inspection. This expertise is important in minimizing product spoilage and in certifying quality of products in bulk.

There is also as expected, no expertise in important areas of food analysis which DTQC has not been able to implement due to the lack of resources. Examples of these are the important area of microbiological testing and the chromatographic and spectrophotometric methods for the analysis of many important food constituents.

An important concern likewise is that presently there is no manpower at DTQC for the maintenance of new electronic equipment that will come with the upgrading of its testing capability. This is a critical area of need. Support for instrument repair is reportedly provided by the Polytechnic University. A minimum aptitude level for trouble shooting however will still be necessary for the early detection and resolution of simple problems.

In spite of their long working experience, most of the DTQC staff have had limited opportunities to interact with equivalent professionals in other countries. There is little access to international publications and very few (2) relatively comprehensive but old (1975) books on food analysis and inspection. They thus have an understandably healthy desire to meet with colleagues in other parts of the world, to establish professional links and to study how other countries cope with similar problems and challenges.

2.5 Physical Infrastructure and Utilities

The DTQC laboratories are located on the second and third floors of a three-storey building. In anticipation of this project, the useful floor area was increased from 90 m^2 to 500 m^2. Five laboratories for food analysis have been constructed: chemistry, toxicology, sensory testing and microbiology. At the time of the visit, the microbiology lab oratory was not yet completed. The design of the five food

laboratories is shown in Figure 1.

The laboratories appear to be well constructed and designed with adequate provisions for good ventilation. The compatibility of this design to the equipment to be purchased however will have to be studied.

The first floor of the DTQC building is occupied by family dwellings. This area shares an open center court and a common entrance with the laboratories. The situation is not satisfactory because accidents from e.g. chemical spillage, will pose a risk to children, pregnant mothers and the elderly. With DTQC's present volume of work, the risks may be minimal. If this project is implemented however, the risks will be considerably increased due to the increased number of analysis, the work with aflatoxin standards, compressed gases and microbial pathogens. The problem requires study. The opening of a separate entrance is feasible and was readily approved by the Ministry upon this Mission's recommendation. Careful design of the laboratory to minimize the risk of accidents is essential.

Power and water utilities have also been improved. A transformer at the entrance of the building regulates voltage and the laboratory is connected to two power sources - the industrial and city power source. In spite of this however, there were occasions when there was no power supply to the office. A standby generator will be required for sensitive rooms and equipment of the project.

Water is directly connected by a 15 mm diameter pipe to the 600 mm pipe of the city water supply line. The adequacy and suitability of this water supply will have to be checked.

3. Quality Testing of Fish Sauce and Soy Sauce

Fish sauce and soy sauce are major items in the quality monitoring system of DTQC and the QC Network of the companies of the Ministry of Domestic Trade. These products are analyzed for % total nitrogen (N), amino N, ammoniacal N, salt, color, clarity, taste and smell.

A good correlation generally exists between taste and total N. Occasionally however, fish sauces have been found to have a poor taste but a high % N due to the incomplete fermentation of the fish, or adulteration of the sauce with other nitrogenous compounds as glutamic acid salts. In order to discourage such malpractices, the laboratory analysis of fish/soy sauce for

both chemical and sensory characteristics is required by DTQC.

In the Vietnamese national standard, fish sauce is classified as either special superior, first or second class, depending on its content of total N and other nitrogenous constituents. Clarity, taste, color and smell of the sauce are related to total N and are used as bases to determine consumer preference (see Annex 4).

Soy sauce is evaluated in the same manner using identical standards. However, when made by acid hydrolysis of soy bean, it is always analyzed for lead and arsenic.

Several quality problems have been identified in fish and soy sauce in the market. In 1988, the Hanoi Food Products Co, (a large retailing Co, see Report on Company Visits, Annex 7), rejected 26% of fish sauce that had passed physical inspection at the buying centers after they were found to have a low N content in the laboratory. In addition, 5-7% of the deliveries to their retail stores were further rejected due to an off smell and/or poor clarity.

In 1986-87 DTQC withdrew 400,000 liters of soy sauce produced by acid hydrolysis, due to the presence of lead. Aflatoxin in soybean and adulteration of the sauce with benzoic acid, bone meal, and other non-permitted food additives have also been detected or are suspected.

Fish sauce, soy sauce and other sauces are susceptible to adulteration and while high in salt could encounter microbiological spoilage problems. However, the facilities presently at DTQC are too limited and will not allow the testing for contaminants, and therefore the establishment of methods for their control.

III. ASSESSMENT OF THE TESTING AND QUALITY CONTROL CAPABILITY OF DTQC

The Department of Quality Control and Metrology of the Ministry of Domestic Trade is responsible for assuring the quality of food products in the market which are under the control of the Ministry of Domestic Trade. This is done by laboratory testing of products randomly sampled in the market and through professional supervision of the quality control network of collective firms and trading companies under the Ministry of Domestic Trade. Recently, with the government's open policy o trade, the latter companies have started to export food and agricultura' ommodities. As a result, DTQC has also had to control the quality of products destined for export.

The food testing and quality control capability of DTQC is limited in relation to the magnitude of its responsibilities for assuring food quality. Market inspection and laboratory testing, which are the basis for assuring quality, cannot be carried out in the scope and depth necessary. This is mainly due to limited equipment, facilities, and as a result manpower skill, for relevant and up-to-date testing of foods and food products.

The test methods used at DTQC are time consuming, expensive in the use of chemicals, less accurate and/or sensitive and limited in applicability for the wide range of tasks needed for establishing the needed quality control systems for Vietnam.

The situation, while allowing DTQC to detect incidents of malpractices in the trade, has not given it the expertise required to prevent such malpractices and to engage in innovative programs that will encourage the practice of total quality control in the food industry.

The transition from the present situation to that of an organization with the facilities and skill for productive food testing and quality control, will be significant. It will require not only upgrading of equipment and facilities but more importantly, the training of existing manpower to operate and use these facilities to meet desired objectives. The technical background and commitment of the seven staff and the years of experience of DTQC personnel in food testing, should make the transition feasible.

IV. RECOMMENDATIONS

In view of the above, it is strongly recommended that DTQC's capabilities be upgraded to the level needed to perform the testing and inspection required to promote the marketing of foods that meet the quality requirements of domestic trade consumers and buyers.

Upgrading is essential to implementing DTQC's mandate for assuring the quality of food products in the market. Intentional adulteration in particular will be greatly discouraged when the government's capability for detection and thus for regulation is strong. Unintentional contamination on the other hand will be prevented when the quality monitoring system properly identifies the nature and sources of contamination and on this basis recommends the specific cost-effective methods for their control.

The proponent's original request was to develop the testing and quality

control capability for fish sauce and soy sauce and other non alcoholic liquid foods. It was obvious however that although the volume of consumption of fish sauce and soy sauce are high, DTQC's mandate for food quality assurance goes beyond the requirements of these types of food products, and DTQC's operations therefore, cover more products than fish sauce and soy sauce.

To optimize the use of facilities and equipment and the manpower that will be trained in upgrading DTQC's capability, it is necessary to consider the testing and inspection needs of all the major food items controlled by the Ministry of Domestic Trade. Further, since the trading companies in this Ministry have started to pursue new opportunities in the export market, DTQC's upgraded facilities should find great value in supporting this new thrust. The upgrading of DTQC's capability for food testing and quality control will require the following :

1. Provision of moden equipment that will enable DTQC to accurately and productively analyze foods according to existing domestic and international requirements for quality, safety and wholeness. The following types of equipment are necessary

1.1 Equipment for the rapid analysis of the proximate composition of foods as nitrogen, fat, and crude fiber, and moisture

1.2 General support equipment for food testing and analysis as sample blendors, distilled water apparatus, fast reading and accurate top loading balances, metalware and glassware

1.3 Instruments for the accurate and rapid analysis of contaminants as radionuclides, non-permitted food additives, preservatives, and pesticide residues.

1.4 Facilities and equipment for microbiological testing and filth analysis

1.5 Equipment for establishing the physical properties of food products and their containers, as can seam test bits, vacuum gauge, sieves, water activity meter, pH meter, thermometers and others

1.6 Facilities for sensory testing and evaluation

1.7 Computers for the evaluation and storage of data and for word processing

2. Training of manpower to insure the absorption of knowledge and the transfer of needed skills on new methods of food analysis as well as modern concepts of food safety and quality control and its management. There should be three types of training programs

2.1 Training for DTQC management

This will involve study tours in relevant institutions as well as short term practical experience in the use and operation of analytical equipment for quality control. The objective is to study the organization, management and content of food quality control programs in institutions in other parts of the world as well as to gain familiarity with as much of the equipment and testing methods that are being used.

This program should last for 4 - 8 weeks and must be attended by senior technical managers of DTQC.

2.2 Training for senior laboratory analysts

This will involve intensive formal and hands-on experience in instrumental and other modern methods of food analysis. The objective is to gain in-depth knowledge on the principles of analysis, and on the operation and maintenance of equipment.

Select senior analysts will train in laboratories for 6 weeks to three months to gain knowledge and skill on certain identified areas of food testing. Participants in this training program will be the future trainors of junior analysts and will be the future leaders in specific areas of food testing at DTQC.

2.3 In-house training on testing and quality control

This will involve the use of external consultants to assist DTQC trainors from above on the use of the equipment purchased for the project and to help them train other junior personnel. The consultants will also conduct training seminars as well as workshops to help develop and strengthen knowledge in the use of test methods for developing and implementing relevant quality control programs.

The areas of specialization for the above training programs will cover the following :

a) Chromatography (HPLC, GC, TLC) and its application to the analysis of food additives, preservatives, contaminants of aflatoxins and nutrients

b) Microbiology especially the isolation and confirmation of the presence of microbial pathogens

c) Operation and maintenance of modern equipment for test methods already existing at DTQC as micro kjeldahl N analyzer, rapid fat analyzer etc.

d) Spectrophotometric and other instrumental methods for food analyses, as atomic absorption for trace metal analysis

e) Sensory evaluation and design of sensory evaluation tests

f) Physical evaluation of foods and of food containers

g) Microanalytical methods for filth and extraneous matter analyses and evaluation of test results

3. Provision of support facilities as books, periodicals, training aids and equipment, that will insure the continuing development of the testing expertise and quality control programs to be established.

Books and periodicals must be provided on the following topics : Recent methods in food analyses, food microbiology, food additives and contaminants, food standards and regulations of other countries, Codex standards, instrumental methods in food analysis, food processing technology, food quality control.

Training equipment as overhead projectors, audiovisuals, sound system, slide projectors and cabinets, copiers, binders, staplers will be important.

The requirements for quality in food products change with the market, with changes in technology and with new knowledge. Thus for DTQC to assure quality of products in the trade, it must have the capability to test and inspect these products according to changing market requirements. Under the present circumstances, this is not feasible unless DTQC's facilities and expertise are upgraded.

Better facilities for testing however should not end simply with improved product analysis. It should lead to a better analysis of problems in product quality and spoilage, and to a better control of these problems.

With its upgraded facilities, DTQC should be able to do the following :

1) Improve the methods used in food testing and quality control

2) Identify the critical factors important to preventing quality loss and spoilage

3) Recommend or establish cost-effective methods to control the above problems

4) Assure minimum risk of rejection of export shipments

5) Establish certification and other programs that promote industry-wide total quality control

Achieving the above will initially be dependent on providing the right facilities and training opportunities in this Project. However, in the long term, what will be critical is the provision of the operating funds and the needed management direction. These should be adequate to enable the manpower at DTQC to continue to respond to the challenges in quality control created by changing market opportunities, technologies and needs.

ANNEX 1

SCHEDULE AT HANOI CITY

May 13

2:30 pm — Arrive at Hanoi International Airport from Bangkok. Met by Mr. Phan Duc Thang, Director of the Department for the Quality Control of Foods and Metrology (DTQC), Ministry of Domestic Trade and staff from DTQC and the Ministry.

May 15

9:00 am — UNDP 27 Phan boi Chau, Hanoi
Mr. Tran Trong Phung, Programme Officer
- preliminary discussions

Philippines Embassy, Ho xuan Houng street
Mr. Villasor, OIC (Officer-in-Charge)

2:00 pm — DTQC 76 Nguyen Truong To, Hanoi
Mr. Phan Duc Thang, Director
Mr. Le Xuan Dich, Deputy Director
Mr. Ngo Dinh Cc, Secretary of the Project
Head of Quality Control of Agriculture and Foodstuff Section
Mr. Phan Quoc Dong, Chief of Quality Control Laboratory
Mr. Tran Cong Dinh, Head of Section for Metrology
Mrs. Thai thi Tuat, Adjoint of Section Quality Control of Agriculture and Foodstuff
- introduction to management staff of DTQC

2:30 pm — Agriculture Products Co. of Hanoi, 65 Ngo thi Nham, Hanoi
Mr. Pham Ben, Director
Mrs. Hoang thi Minh, Vice-Director
- discussions on trading and QC activities for soybean and other agricultural commodities

May 16

8:00 am — UNDP
Mr. Tran Trong Phung, Programme Officer

9:30 am — DTQC

Director Phan Duc Thang and Staff
- discussions on the history, responsibilities, functions and organization of DTQC
- discussions on the quality control network

2:00 pm **INTIMEX**, 96 Bd Tran Hung Dao, Hanoi

Dr. ec Vu Kim Ngan	- Directrice Generale
Dac Qaung Ngoc	- Directeur, General Adjoint
Nguyen van Thao	- Manager, Export Department Agricultural Products
Pham Duc Khanh	- Dep. Director, Foreign Relation Section
Nguyen thi Nhu Anh	- Vice-Chief of International Shopping Centre of Intimex Corp.

- discussions on export trading activities

May 17

8:30 am **DTQC**
- discussions on local counterpart contribution to the project, report on consumer goods production

1:30 pm **Ministry of Domestic Trade**
Mr. Hoang Minh Thang, Minister
Mr. Vu ta Luong, member of the Department of External Cooperation
Mr. Ngo Chi Sang, Deputy Director, Department of International Relations, Ministry of Domestic Trade
- discussions with the Minister on DTQC and quality control in trade business

2:30 pm **Hanoi Trade Services**, No. 10 Le Lai street, Hanoi
Eng. Duong Ding Linh - Director, Hanoi Trade Services
Eng. Nguyen Anh Tuan - Vice-Director, Hanoi Trade Services and Director, General Foods Products Co.
- discussions on the company and its food trading activities

Visited a store of the General Food Products Co., 12 Nha Tho street
Mrs. Nguyen thi Lanh - Director

May 18

8:30 am Quality Control Laboratory General Food Products Co.,
Tran nhat Duat street, Hanoi
Eng. Nguyen anh Tuan - Director
Mr. Le Xuan Thieu - Chief of Administrative Office
Bui thu Cuc - Head of Quality Control
Bui Thu Ha - QC staff
Nguyen thi Loan - QC staff
Nguyen thi Khanh - QC staff
- discussions on quality control for General Food Products Co.

Visited the Dong Xuan Market

Visited a store of the General Food Products Co.
on Giang Vo street (D.)
Mrs. Nguyen thi Chien, Director

2:00 pm DTQC
- discussions on the project objective
- inspected laboratory facilities

May 19

8:00 am UNDP
- obtained format for PFF and PD

9:00 am DTQC
- discussions on testing procedure, types and tests, laboratory equipment

2:00 pm DTQC
Director Phan Duc Thang, and the staff of the Agriculture and Food Products Section as follows :

(please see the list of staff attached as Annex 5)

- discussions on educational background and experiences of the staff and their activities

May 20 - 25 DTQC
- Continue discussions and clarifications of the activities, problems and plans for the future of DTQC

- Report writing and formation of the Project Formulation Framework (PFF) and Project Document (PD)

May 26

11:00 am UNDP

Mr. Jean Marc Bonnamy, Senior Industrial Development Officer, UNIDO
Mr. Lars S. Adermalm, Programme Officer, UNDP
Mr. Tran Trong Phung, Programme Officer
- discussions on the progress of the mission and the schedule for the PFF and PD

May 27 DTQC

- continue discussions and clarifications

May 28 - 29

Finalization of the report

May 29, 3:30 pm meeting with the Vice Minister, Ministry of Domestic Trade

May 30

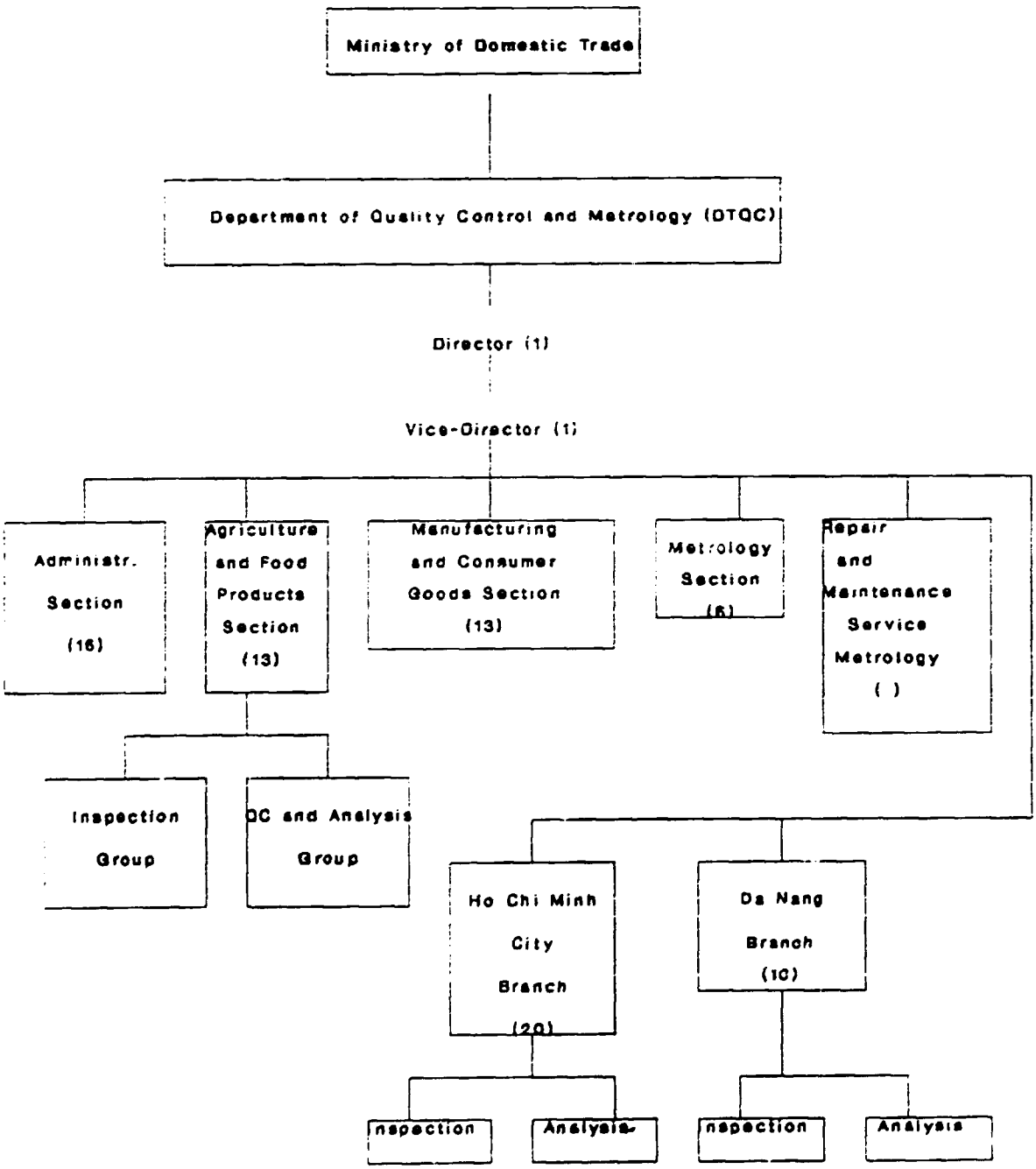
Submission of technical report on Review and Assessment of the Quality Control and Testing Capability of the Department of Quality Control and Metrology of the Ministry of Domestic Trade, to UNDP

May 31

Leave for Manila

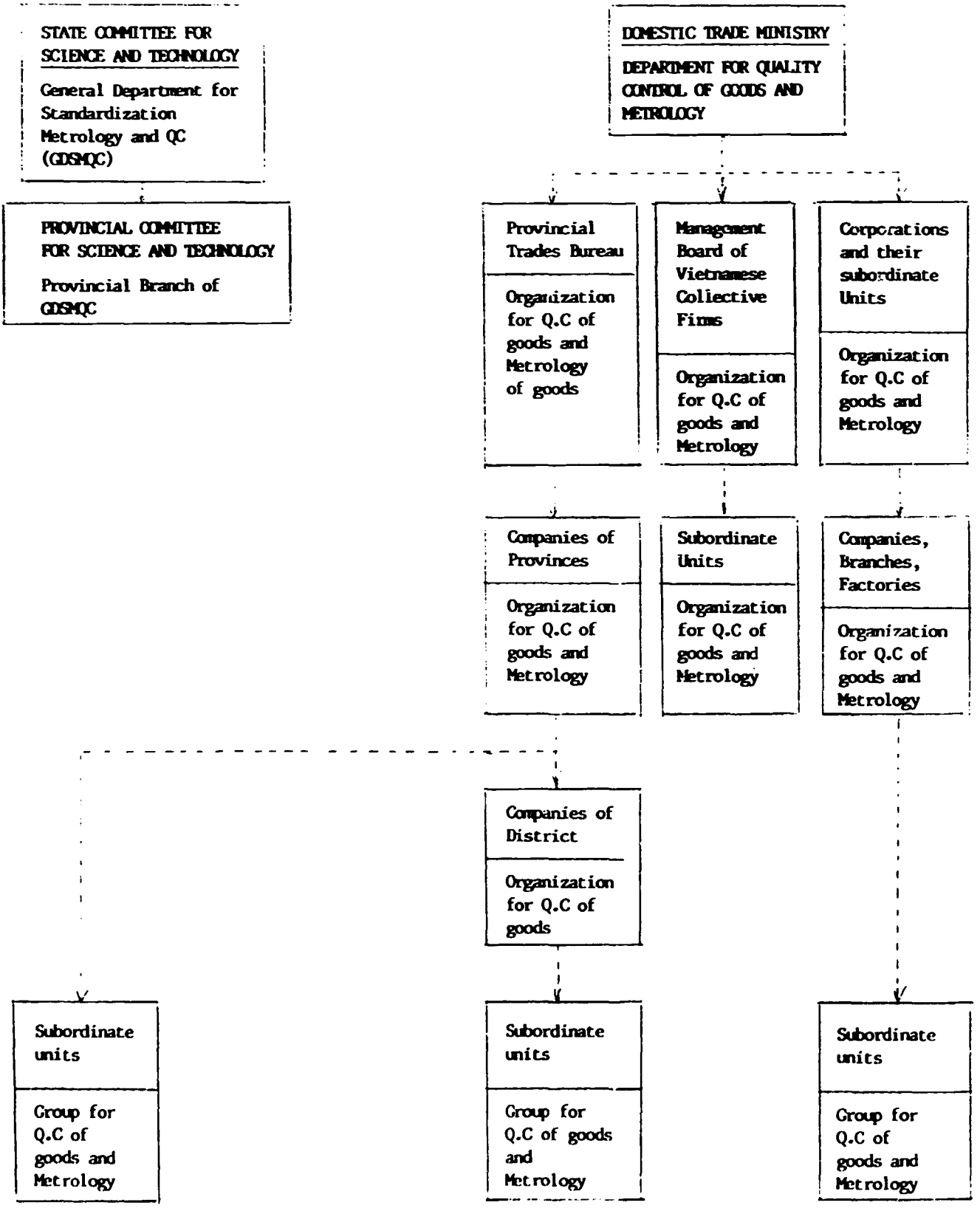
ANNEX 2

FUNCTIONAL ORGANIZATION OF THE DEPARTMENT OF QUALITY CONTROL AND METROLOGY



ANNEX 3

STRUCTURAL ORGANIZATION OF QUALITY CONTROL AND METROLOGY MANAGEMENT SYSTEMS WITHIN DOMESTIC TRADE MINISTRY AND RELATION WITH OTHER QC ORGANIZATIONS



ANNEX 4

STANDARD OF VIETNAM

(FFL) Fermented Fish Liquid TCVN 126572
validity of date September 1, 1973

TESTING METHOD

This standard determined the sampling method, sensory test and chemical analysis of FFL. The applying of this test method was underwritten in the technical requirement of products.

1. Sampling method

1.1 The quality of FFL was defined according to every identical lot of goods and on the basis of examining results of average sample of that serie.

The identical lot, a quality of good having the same brand and type manufactured at the same time and received at one time.

1.2 Before sampling it must define the identical portion of a lot. compare with the sub joined documents control state of package. divide identical lot into groups, in which include approximately equal quantities.

1.3 One group with 1 to 5 containable units, in every unit sampling will bw carried out. Above 6 containable units, number of units designed to be sampled were 5% (percentage) of units of all groups, but no less than 5 points of drawing.

1.4 When sampling at any designated point, FFL must be stired carefully and drawing at various points. Qualities of samples at all points are equal to 1%o (1ml/1 l) of integral part of FFL.

The average sample equal to 1 l is obtained by bringing together in a dry, clean instrument and by mixing carefully all the different drawing samples - stir equally, then take out 1 l for average pattern.

1.5 Average sample divide into two 500 ml bottles. One must be sent to laboratory for analysis and then retained in case of dispote.

The bottle of samples must be dry, clean, sealing carefully and labeling as follows :
- name of office designed for managing the producer
- name of producer
- date of produce
- quantity of lot
- date of sampling
- name of person appointed to sample, the sample is under the designed volume, it will be raised the quantity of sample enough for 1 l.

2. Sensory testing method

Shaking carefully bottle of sample, draw a cork, pour out about 100-150 ml FFL into a dry, clean, colourless glass in order to determine the sensory norms.

2.1 Determine colour

When examining colour, a glass of FFL must be put by the normal light on a white floor, the eyes of the observer are to place at the same direction with source of the light.

2.2 Determining the clearness

Putting glass of FFL between the source of light and eyes of observer, shake lightly the glass to determine the clearness.

2.3 Determining of odour

After pouring out FFL into glass, keep on 15' in quiet state then determine the odour. The testing must be carried out at the well aired place and free from foreign odour.

2.4 Determining of taste

Testing must be carried out by persons who had been cleaning one month by boiled water keeping at cool temperature of the room, stopping to smoke and to take tea during the test.

3. Packaging, labeling, transport, storage :

3.1 Packaging : FFL must be containing in the clean, dry closely covered instruments the containing materials must not be influenced to the FFL quality and the consumer's health.

3.2 Labeling :

3.2.1 On the conveying devices of FFL must labeled the signs and numbers of series adequate to the quality certificates.

3.2.2 The Package for retail sale must be labeling as follows :
- name of produce management office
- name of the manufacturing basis
- name and category of the product
- sign and numbers of the standard
- output date.

Notes: In case of packaging for retail sale by the trade office. It must underwrite on the labels the name of packager, and the packaging date of the product.

3.3 Transport : FFL must be keeping and conveying by cleans, hygiene fitted and carefully, covered means of transportation.

3.4 Storage :

3.4.1 The stored FFL must be disposed separately according to product categories and output date.

3.4.2 FFL store must be dry, well aired and clean.

3.4.3 Warranty time and storage time of FFL is agreed by manufacturer and consumer in the contract.

ANNEX 5

THE LIST OF STAFF MEMBERS IN THE AGRICULTURAL AND FOOD BUREAU OF DTQC

Number	Name	Graduation	Profession	Duration of Work
I	Management:			
1	Ngo Dinh Co	Food engineer	Head of Agricultural and Food Bureau (AFB) Inspector of agricultural products	30 years
2	Phan Quoc Dong	Pharmaceutist	Chief of lab.	30 years
3	Thai Thi Tuat	Commercial food engineer	Adjoint of Bureau Chief of control section Inspector of food products	20 years
II	Quality control section :			
4	Trinh Hong Thuy	Food engineer	Inspector of agricultural products	17 years
5	Ngo Minh Hue	Food engineer	Inspector of sugar, milk, plant oil, canned products	17 years
6	Lai Van Ty	Food engineer	Inspector of agricultural products	5 years
II	Laboratory :			
7	Ly Thi Dung	Food engineer	analyst of food chemistry	14 years
8	Hoang Hom Vinh	Food engineer	analyst of food chemistry	21 years
9	Nguyen Thi Hanh	Commercial food engineer	analyst + inspector	19 years
10	Nguyen Thi Van Anh	Food engineer	analyst + inspector	17 years
11	Nguyen Thi Dung	Chemistry engineer	analyst + inspector	18 years
12	Huynh Le Tam	Food engineer	Microbiology analyst	12 years
13	Nguyen Thi Tinh	Food engineer	analyst + inspector	23 years

ANNEX 6

LIST OF EXISTING MAJOR EQUIPMENT

Item No	Description	Specifi.	Quantity	Used Since
1	Analytical balance	min W 1 mg	1	1960
2	Analytical balance	min W 1 mg	1	1960
3	Analytical balance	min W 1 mg	1	1980
4	Technical balance	max W 200g	2	1960
5	Duboc colorimeter		1	1970
6	Saccharimeter		1	1987
7	French Drying Oven	max to 200 C	1	1970
8	Hungarian Dryer	max to 200 C	1	1972
9	Muffle furnace		1	1970
10	Water bath		2	1975
11	Incubator	max to 100 C	2	1985
12	Steam sterilizer	p; 1,5/1	1	1987
13	Vacuum pump		1	1960
14	Centifuger	6000 r/m	1	1960
15	Refrigerator	120 l	1	1970
16	Refrigerator	401	2	1975
17	Kjeldahl		2	1988
18	Set of sieves		1	1960
19	Ultraviolet lamp		1	1970
20	Microscope		1	1970
21	Universal microscope		1	1960
2	Biocular microscope		1	1960

ANNEX 7

REPORT ON COMPANY VISITS

1. Hanoi Agricultural Products Co.

a) Nature of the company and its activities :

The company is a trading company and belongs to the Ministry of Domestic Trade. It is involved in the purchase, storage and sale of agricultural products as soybean, white beans, green mungbeans, peanuts, tea, coffee, pepper, rice and corn.

It handles 100,000 MT of soybean and 60,000 MT of peanuts. Soybeans are harvested in July and August and in November. Of the total volume handled 5000 - 10000 tons go to domestic trade for soybean sauce and other soybean products.

Since 1988, when the country adopted an open policy in trade, the company has also been engaged in exports.

The produce is purchased at the farms after stringent inspection and sorting in the presence of company collectors. Size, moisture content and the absence of molds and insects are the indices of quality used for soybeans. The crop purchased at the farms is resorted by machines at the company's processing facility. The best quality is immediately exported. The remainder is stored for future sale.

The company services 500 centers. It has a network of warehouses with capacities ranging from 5,000 - 12,000 tons. It has 1000 personnel, most of whom are collectors (or inspectors) who graduated from the University of Domestic Trade and Commerce.

b) Quality Control :

The Company has a laboratory for QC but the facilities are old. They thus depend on DTQC to certify the quality of all their shipments for export. No shipment is made without the DTQC certificate. The latter is also responsible for discussing any quality problems with the buyers.

c) Problems :

The company is eager to obtain more contacts for export marketing. They have no problems in export because they are very quality conscious and are supported by DTQC. Quality problems and trading problems arise only when the weather is bad and the harvest therefore is poor in volume and quality.

2. INTIMEX

a) Nature of Co. and activities :

Intimex is a trading company belonging to the Ministry of Domestic Trade. It is engaged in the export and import of all commodities. Handicrafts take up 50% of the total volume of its exports, artwork 25% and agriculture 25%. Its products are exported mainly to the socialist countries but with the country's new open policy, it now has trading relations with the rest of Indochina, Japan, Singapore, Thailand, India and France.

For food and agriculture products, Intimex has been exporting pepper, chili, ginger, garlic, dried banana, rice noodles, peanut candy, sesame candy, biscuits and cakes. They could export fresh fruits but the distance of Vietnam from its existing markets makes this difficult. Canning the fruits is not yet possible due to the unavailability of cans.

b) Quality Control :

The company put a high priority on quality and is keenly aware of its importance in export marketing. This was also evident in the quality of products they had on display. They follow government standards and use their laboratories. They would like DTQC to upgrade its facilities and to set-up a very healthy system for quality control in order to be able to avoid too much discussion on problems with buyers.

c) Problems :

They have been exporting food products for 10 years and have not had too many problems. They are worried and are always vigilant about contamination of their food products by aflatoxin and bacteria.

d) Others :

Visited the general department store of Intimex. The department store sells imported items as radios, televisions, cosmetics and domestic items for export. It caters mainly to foreigners in Hanoi.

3. HANOI TRADE SERVICES, GENERAL FOOD PRODUCTS CO. AND RETAIL STORES

a) Nature of Co. and Activities :

A trading company responsible to both the Ministry of Domestic Trade, the Hanoi City Administration. Its network of trading companies belongs to the Ministry of Domestic Trade but its staff are paid by Hanoi City.

Hanoi trade services has 10 companies, the biggest of which is the Hanoi Food Products Co., which has 4000 personnel. Its other companies are engaged in transportation, building and others.

The Hanoi Food Products Co. has a network of stores in many markets of Hanoi. It supplies all the products that the Vietnamese people need for their meals except rice, vegetables and drinks. It does not handle rice because it is an activity of another trading company and vegetables because of its high perishability.

The company sells pork meat, noodles, vegetable oil, canned milk, plant extracts, cooked meat, sausage, soybean curd, fish sauce and soybean sauce, chili, pepper and other spices.

Fish and soybean sauce are among the most important products of the company. Every year, it collects 8 - 10 million liters of fish sauce from various bying and collection centers. The fish sauce are accumulated in three buying centers by another government ministry from the various production factories. The latter are not always homogenous. The sauce is contained in 20 liter white polyethylene containers which are completely closed except for a 3 inch round opening on top. They are convenient and easy to handle but difficult to clean. Because of limited supply of plastic containers, some production batches of fish sauce have to be transported in many large metal containers.

The sauce is transported to the various network of retail stores of Hanoi Food Products Co. The distribution takes about 10 days from the time of purchase at the collection center to consumer sale.

At the retail store, the fish sauce is dispensed from a gravity controlled dispensing equipment designed by Engineer Tuan. Buyers bring their glass bottles and purchase the sauce in volumes of 500 ml which is the minimum volume dispensed automatically by the equipment.

The consumption of fish sauce is high because Vietnamese people have a tradition of putting fish sauce in all their meals. They for example use fish sauce as the salting agent in soups. It was a sales leader in the store.

b) Quality Control

The company believes that one of the most important factors for success in their food trade business is to have quality. Thus to protect buyers the Hanoi Food Products Co. operates a quality control system for all the products that it buys and sells. It has a QC laboratory in Hanoi and where it is not convenient to send samples to this laboratory for analysis. it uses government laboratories such as that of DTQC, to do the analysis.

Fish sauce at the buying centers are first inspected by company inspectors and only those that pass visual examination are sampled and sent to the laboratory for analysis. Those that pass analysis are purchased and transported to Hanoi where sampling and analysis is done to verify quality and to detect changes that may occur during transport. On arrival of the sauce at the retail stores visual inspection is again carried out to check quality.

A 5% level of sampling, based on number of containers is adopted at the collection centers. Inspectors at every point in the distribution chain are made responsible for the quality of the product they accept for purchase.

Fish sauce from different manufacturers have different quality and so it is not easy to control product quality. For all their stores, a standard for total nitrogen of 20 grams per liter, is used. This corresponds to the Vietnamese national standard for the superior class of fish sauce, which they have adopted as it is what their buyers want. They also check for amino nitrogen and ammoniacal nitrogen and have very experienced staff to evaluate clarity, color, smell and taste.

In 1988, they examined 292 lots of fish sauce from a total volume of 6,756,230 liters. Of these, 78 or 26% failed the test for total nitrogen. In the first 4 months of 1989 they evaluated 134 lots of fish sauce from a total volume of 1,643,300 liters. Of these 18 lots or 13% failed the test for total N. The lots evaluated for N had already passed the visual test but had to eventually be rejected.

c) Problems :

Producers mix in poor quality and sice there are many manufacturers of fish sauce, it is not easy for them to control quality. The lots in the buying centers are not always homogenous and they have to be careful about identifying containers belonging to a given lot. When sometimes they find themselves with lots with low N, they mix it with those high in N. Similarly, when the lots have a high ammoniacal N, they can sometimes solve the problem by boiling the sauce.

They need advice on better methods of transport and storage of handling containers. Cleaning and managing the recycling of existing containers is

difficult. Hygiene is also difficult to control and the sauce can be contaminated during selling and distribution.

They want to improve their facilities for selling and their manpower expertise for managing a food distribution system. They believe that while they are doing their best there is much more to learn through training and technology transfer.

d) Others :

Visits were also made to two retail stores of the General Food Products Company and to their stores in the Dong Xuan food market. The physical structures of the retail store do not compare with the supermarkets of the west. However, it was evident that attention had been given to please the customer. Besides selling good quality products, the stores gave an impression of orderliness and fairness. Prices of commodities were conspicously displayed, commodities were neatly arranged, flies where they tended to accumulate, were constantly brushed off; and selling was being carried out from windows; to give buyers an opportunity to hold on to their bicycle while making a purchase.

The weights and volumes of purchases could be independently checked by the buyers using a separate volume measure on weighing scale. This was done not only to please the buyer but to control unaccountable losses.

The stores were all managed by women. With the new policy of the government, it was essential for a store to remain profitable in order to continue to exist. Thus each store had full control over pricing, inventory purchase and overall management of its operations.

The stores do their own quality checking of commodities by visual inspection. About 5 - 7% of fish sauce delivered by the central office per year is still rejected by them. The most common defect is the lack of clarity and an unacceptable smell (an indication of microbiological contamination). For soy sauce, they do not encounter the problem as the product is distributed in bottles.

4. QUALITY CONTROL LAB - HANOI FOOD PRODUCTS CO.

a) Nature and Activities :

The quality control laboratory of the Hanoi Food Products Co. is a small building located at the back of the cold storage with a laboratory floor area of about 60 square meters. A chemical hood is located outside the building. There is a tiled working bench at the center, a Kjeldahl disgestion set-up near the window and an old precision weighing scale. The place is well ventilated and is very neat and clean.

There are four personnel; two engineers, one for inspection and one for analysis; and two technicians. The staff of four also inspect 24 stores, 3 factories (2 producing soybean curd and 1 producing cooked meat) and 2 cold stores, all belonging to the Hanoi Food Products Company.

They analyze 600 - 800 samples per year of which 300 - 500 are fish sauce and soybean sauce. The other products often analyzed are vinegar and sugar. The laboratory has to obtain a certificate from the Director of DTQC to allow sale of food products. The purchase of fish sauce by the company is dependent on the results of their analysis and eveluation of samples which they obtain from the buying centers of fish sauce. Analysis is conducted in their laboratory only when the buying centers are close to it. Otherwise, they use the laboratory of DTQC. However, they always analyze the product on arrival at Hanoi.

Store owners can buy fish sauce from other sources but they cannot sell these unless allowed to do so by their laboratory.

The best indication of fish sauce quality are clarity, taste and smell. In general, the correlation of these factors to total N content is found to be good. They also analyze for % salt using a salt hygrometer, amino N by the formal method and acidity by titration.

b) Problems :

They would be happy if the overall condition of their equipment and laboratory were improved; perhaps a reflection of a desire to be more efficient and productive through better facilities. They also would like to be able to do microbiological analysis and to upgrade manpower capability by training.

ANNEX 8

LIST OF PEOPLE MET

1. **Ministry of Domestic Trade**

Mr. Hoang Minh Thang	-	Minister
Mr. Le Xuan Trinh	-	Vice Minister
Mr. Ngo Chi Sang	-	Deputy Director, Department of International Relations
Mr. Vu Ta Luong	-	Member, Dept. of External Cooperation

2. **Department of Quality Control and Metrology, Ministry of Domestic Trade**, 76 Nguyen Truong To, Hanoi

Mr. Phan Duc Thang	-	Director
Mr. Le Xuan Dich	-	Deputy Director
Mr. Ngo Dinh Co	-	Secretary of the Project and Head of Quality Control of Agriculture and Foodstuff Section
Mr. Phan Quoc Dong	-	Chief of Quality Control Laboratory
Mr. Tran Cong Dinh	-	Head of Section for Metrology
Mrs. Tran Thi Tuat	-	Adjoint of Section, Quality Control of Agriculture and Foodstuff

3. **United Nations Development Programme**, 27-29 Phan Boi Chau St., Hanoi

Mr. Jean Marc Bonnamy	-	Senior Industrial Development Officer, Field Adviser, UNIDO
Mr. Lars S Adermalm	-	Programme Officer UNDP-UNIDO
Mr. Tran Trong Phung	-	Programme Officer UNDP-UNIDO
Mr. Phan Duc Thang	-	Programme Officer UNDP-UNIDO

4. **Agricultural Products Co of Hanoi**, 65 Ngo Thoi Nhiem, Hanoi

Mr. Phan Ben	-	Director
Mrs. Hoang Thi Minh	-	Vice Director

5. **INTIMEX**, 96 Bd Tran Hung Dao, Hanoi

Dr. ec Vu Kim Ngan	-	Directrice Generale
Dao Quang Ngoc	-	Directeur, General Adjoint

Nguyen Van Thao	-	Manager, Export Dept Agricultural Products
Pham Duc Khanh	-	Dept. Director, Foreign Relations Section
Nguyen Thi Nhu Anh	-	Vice-Chief of International Shopping Center

6. Hanoi Trade Service and General Food Products Co., 10 Le Lai St, Hanoi

Eng. Duong Dinh Linh	-	Director
Eng. Nguyen Anh Tuan	-	Vice Director, Hanoi Trade Services and Director, General Food Products Co.
Mr. Le Xuan Thieu	-	Chief, Administrative Office
Mrs. Nguyen Thi Lanh	-	Director of Store
Mrs. Nguyen Thi Chien	-	Director of Store
Mrs. Bui Thu Cuc	-	Head, Quality Control
Mrs. Bui Thu Ha	-	QC staff
Mrs. Nguyen Thi Loan	-	QC staff
Mrs. Nguyen Thi Khanh	-	QC staff

7. Mr. Dang Duong Bang (interp.) - Biochemist, Center for Applied Microbiology, University of Hanoi

Acknowledgements

- To the Ministry of Domestic Trade, its Minister and Vice Minister, the Director and other Officials of the Department for Quality Control and Metrology, - for the preparations made for this Mission and for their full cooperation and assistance.

- To the Senior Industrial Field Adviser of UNIDO and the Programme Officers of UNDP, Hanoi, for their valuable assistance to my understanding of the objectives of this Mission.

- To the management and personnel of the trading companies for taking time to share important insights.

- To the interpreter, typist and other support personnel of this Project - for their skillful and enthusiastic support.

The contributions made by each of the above wre invaluable to the completion of this Mission. Their warm hospitality and friendship made the task most rewarding.