The Development of Quality Assurance System for Nuboon Co., Ltd.

by

Mr. Chanvit Chavanont

A Final Report of the Three - Credit Course
CS 6998 System Development Project

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
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Project Title	The Development of Quality Assurance System for Nuboon Co., Ltd.
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Academic Year	March 2000

The Graduate School of Assumption University has approved this final report of the three-credit course, CS 6998 System Development Project, submitting in partial fulfillment of the requirements for the degree of Master of Science in Computer Information Systems.

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ABSTRACT

This project is conducted in order to present example of computer systems in an actual business company and propose some improvements, if required. Actually there are some restrictions in installing computer system to business organization. The main reason underlying is limitation of resources personnel, investments, and etc.

This paper provides the overview of the computer system of "Nuboon Co., Ltd." The information system is implemented from the users' requirements. They need low-cost information system to support the routine work and to reduce the workload. The information system is also designed for the staffs that have no background in the computer field. Therefore, the easy to use interface is designed to suit the need.

ACKNOWLEDGEMENTS

According to the information gathered from the "Nuboon Co., Ltd.", it helps the writer in having a systematic overview. The writer applies theories and practices into the analysis of the system under advises of 'The advisor; Dr. Thotsapon Sortrakul'. With the implementation of Information system recommended, the writer hopes that all staff in the "Quality Assurance Department" will be more convenient and comfortable in applying the modified system. Nevertheless, creating the new system has to invest some scarce resources before getting the better daily life and better workflow system.

The writer would like to take this opportunity to express gratitude to the suggestions of "Dr. Thotsapon Sortrakul" and thank all his colleagues for valuable information. However, any faults and errors remain the writer's responsibilities.

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I. INTRODUCTION

1.1 Background of the Project

Since the author works as a "Food technologist" at Nuboon manufacturing plant, this project is conducted to support the routine work system of the "Quality Assurance Department". Nuboon company has a computer-based system " Windows NT 6.0" which has a workstation that operates with "Window 98" with the limited resources and budget. This project will be designed to improve daily performance.

The company plans to change the main system to some database in which it collects all data. Even though the new system is implemented, the QA department still requires another individual system to support.

1.2 Objectives

Owing to unavailability of a computer-base for QA department, this project is implemented. Nuboon Company is a food manufacturer, the main functions of the company are 'QA' and 'Production'. The resources and budget are not sufficient to provide all departments, so this project is designed to meet this need. With good data keeping, computers can also reduce storage space, time, etc.

The main objectives of the project are:

(1) To study the existing system and design a new system to meet the requirements.

(2) To design low cost computer-based information system.

(3) To develop and test a software package of computer-base which is written in 'Microsoft Access with Visual Basic' regarding the purpose of implementation "Computer-based information for Quality Assurance division" are:

(a) To keep track of raw materials and finished products consistently and with the most up-to-date database system.

(b) To develop the filling system for better query and better organization.

(c) To save time in filling and searching.

(d) To give better service to other departments.

(e) To support the decision making of the manager.

(f) To print reports with full information

(g) To reduce paper-work

(h) To reduce storage space of documents

(i) To improve the other outputs of the department.

(j) To use it as a management tool.

1.3 Scope

This project would emphasize on the management information of the QA division. The information will cover:

(1) Raw materials database

Keep all-important details of each raw material code.

(2) Products database

Keep all-important details of each product code.

(3) Right first time information

Keep all details which are related to manufactured batches; how many times of adjustment for each batch.

(4) Manufactured batches in each month

The manufactured batches are assigned batch numbers as a serial unique number.

(5) Reworked products information

Whenever either raw materials or finished products are found unqualified, stock flow moving slowly or obsolete, etc, the management staff will consider the loss that they have to face and decide to get rid of some or all of them as much as possible. The amount of reworked products is also interested.

(6) Returned products information

The management staffs are also interested in returned products. Whenever a customer returns the finished products, the quantity is under consideration.

(7) Customer feedback information

The company also provides "Sales representatives" to service at site. Complaints of the products, services or wrong deliveries will give feedback to the representative or sales department. These complaints will be investigated case by case by the operations department.

The project not only specifies the filling or management of information but also emphasizes on the improvement of the work system in QA system.

II. EXISTING SYSTEM

2.1 Background of the Organization

Nuboon Co., Ltd. was a Thai company that was established in 1994 with an initial registered capital of 50 million Baht. The company is currently located at Klongton trade center on Sukhumvit 71 Rd and the factory is located on Bangna-trad Rd Km 12. It produces fruit juice, tea and coffee in cans and bottles. It imported raw material, concentrated fruit juice, to produce fruit juice. It produces to sell domestically more than for export. It exports fruit juice cans to America and Europe. In the past, the company's' sales have increased every year. The company has planned to increase production capacity to make more profit. In 1999, Nuboon got a works system as follows; ISO9002, HACCP (Hazard Analysis Critical Control Point), and GMP (Good Manufacturing Practice) that will make the company have more advantage than other companies.

The organization is separated into departments, comprising of:

(1) Production Department

(2) Quality Assurance Department

(3) Maintenance and Engineering Department

(4) Factory Personnel Department

(5) Planning and Warehouse Department

(6) Logistics Department

(7) Personnel Department

(8) Marketing Department

(9) Purchasing Department

(10) Business Department

(11) Accounting Department

(12) Sales Department

The computer system, which supports the information of the company, is "Window NT 6.0" of Microsoft corporation. It supports all departments in the company. Generally, "Window 98, Microsoft Word and Microsoft Excel" record some information of the department. The routine work in QA department is also done manually, some important data is still collected with paper. It is very hard to find some data from the paper in the past year. So this department wants a database system that will make them easy to collect and find data.

2.2 Existing Business Function

Nuboon Co., Ltd. is a food manufacturer. The business concerns "Quality and Services" of food product. Planning Department will issue planning for Production Department to produce products. QA department will guarantee quality of that product.

2.3 Resources

Resources are men/material used in the daily operations. Below is the list of resources used in the existing QA Department:

Personnel

(1)	QA manager	1 person
(2)	Chief of Microbiology	1 person
(3)	Chief of Quality Control	1 person
(4)	Chief of Research and Development	1 person
(5)	Laboratory assistant	8 persons

Facilities

(1) 2 Workstation that are supported by Window NT6.0 with accessories

(2) 1 Printer with accessories

(3) Diskettes

(4) Papers

(5) Other lab equipments (used for testing and checking products)

2.4 Roles and Responsibilities of Personnel in QA Division

The QA Department or "Quality Assurance Department" as named, has functions relating to the quality of product. The organization chart of QA division is shown in Figure 2.1.

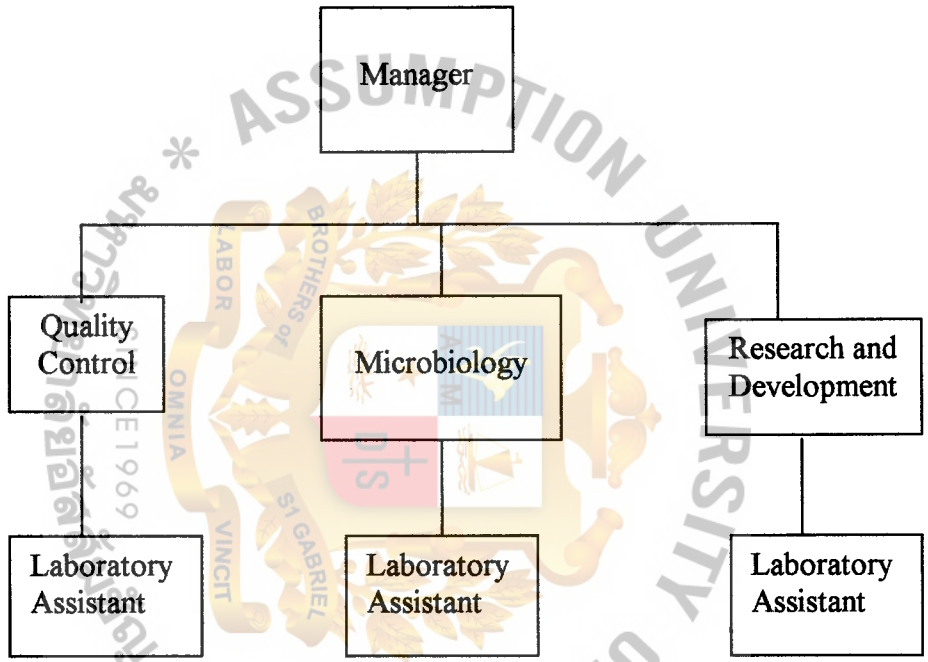

Figure 2.1. Organization Chart of QA Department.

The manager of the Department, "QA manager", reports to "Factory Manager". The QA manager supervises "Three section" that has an assistant each to help in inspection and assurance.

Most of the routine work are testing and checking of raw materials and finished goods products. Other work will come up as a routine work due to competition in business to serve Sales and Marketing department. All the work in QA Department can be described as follows:

QA Manager

(1) Controlling and monitoring laboratory job which each section reports.

(2) Taking care of technical parts and in-coming problems, which come from internal and external trouble.

(3) Being responsible for "Calibration program"

(4) Taking care and creating raw material code and finished product code

(5) Being responsible for control budget, expense of the QA Department.

(6) Supporting the training development of the "Microbiology, Quality Control, Research and Development"

(7) Take care of all equipment and instruments in QA Department.

(8) Being a key person of "5S program", "ISO9002 program", "HACCP program" and other company's activities.

Chief of Microbiology

(1) Controlling and monitoring Microbiology job.

(2) Taking care of technical parts and in-coming raw materials that are involved with microbiology.

(3) Assurance of the quality of finished goods in microbiology part.

(4) Control laboratory assistant for microbiology.

Chief of Quality Control

(1) Controlling and monitoring Quality Control job.

(2) Taking care of technical parts and in-coming raw material that is involved with physical-chemistry specification of raw material.

(3) Assurance of the quality of finished goods in physical chemistry part.

(4) Control laboratory assistant for Quality Control.

Chief of Research and Development

(1) Controlling and monitoring Research and Development job.

(2) Taking care of technical parts of development products.

(3) Control laboratory assistant for Research and Development.

Laboratory Assistant

(1) Routine work

(2) Work as the chief orders.

2.5 Current Problems and Areas of Improvement

The current system of the Department is operated mainly by the routine work system. Department is responsible by "QA manager". The manager will control a wide range of Department works. "Microbiology" will take much closer care of all the routine work of section with 2 microbiologist assistants who operate the routine work "Quality Control" will take much closer care of all the routine work of section with 2 quality control assistants who operate the routine work "Research and Development" will take much closer care of all the routine work of section with 2 research assistants who operate the routine work. As human resources are limited and work is overloaded, high technology and better work system are needed to meet the needs.

Problems which the division faces are:

(1) Most records are written as manual documents. A few information is kept and keyed in the computer to be printed out as a report.

(2) With limited human resources, most information is not up-to-date. The main function of "Quality Assurance Department" is to control quality of products and raw materials. The first priority of job is testing and checking products and raw materials while updating information is the next priority.

(3) Within the past years, more and more documents are kept. While some documents are kept, others are in use. Moreover, storage space is not enough for future recording. This is another problem of storing interest.

Areas to improve under consideration are;

(1) System of documents.

(2) Merging related information with consistency and centralization.

(3) Having better query of information

(4) Having better updated information

(5) Creating shortcut of work flow system

2.6 Weaknesses and Strengths of the Current System

Weaknesses

(1) Most of the current system are manual systems. Almost all records e.g. QC record, RM record, etc. are still needed to record batch per batch.

(2) Limited manpower. In QA division, there are limited persons to do all jobs including QA manager.

(3) Limited equipment and instruments. Ex. A personal computer has to be shared with other departments. This hinders immediate updating.

(4) Limited budget for improving the system. Every request of expenses is needed to declare the reasons of payment.

(5) Some processes have to take some time to work with, making the other jobs delayed because of system sharing among departments.

(6) No up-to-date information

(7) Inflexible in querying information; having to search in manual file.

Strengths

(1) Stable and full understanding about work flow systems by related persons

(2) Tidy record of data makes it easy to find

(3) Data recording by low cost entry form.

2.7 Existing Computer Systems

The computer system: The company uses the "Window NT 6.0" of Microsoft Corporation. The computer system has been set in 1998. However, the existing computer system does not include QA information, especially the technical data or other special details of products. The actual system of the department which has " Window NT 6.0" keeps formulation and other queries, relating to the formulations, excluding other product details, raw materials, etc. The point is, whatever information has to be shared with other departments will be stored in the system. Therefore, this project is implemented to suit this need.

2.8 Data Flow of the Existing System

Context Diagram

This diagram (Figure 2.2) shows the overview of "QA information system". The system relates to many departments and persons. The QA information system, which has been mentioned is done by:

(1) QA manager

(2) Chief of Microbiology

(3) Chief of Quality Control

(4) Chief of Research and Development

All jobs of QA department are delegated and rotated. In case anyone is absent, the others can take his place to keep the work flow of the system. Department and persons relating to QA routine work system are:

(1) Purchasing Department: request supplier profile. Ex. Supplier raw material quality.

(2) Planning and Warehouse Department: submit non-conformity information to QA department.

(3) Production Department: submit non-conformity information to QA department.

(4) Sales and Marketing Department: submit customer complaint information to QA department.

(5) Supplier: Delivery raw material and packaging

(6) QA manager: request product and raw material and packaging, approve product and raw material and packaging details.

(7) Factory manager: request product and raw material information.

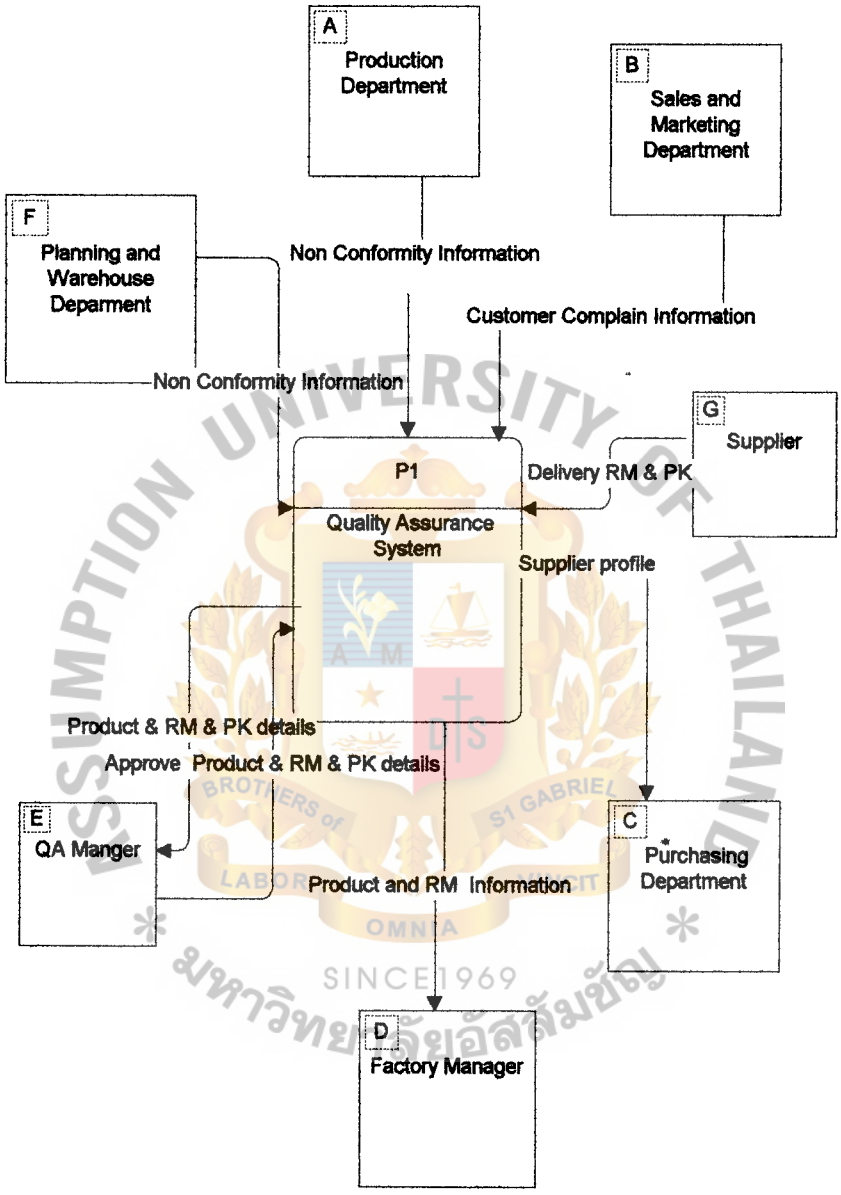

Figure 2.2. Context Diagram of Existing System.

III. PROPOSED SYSTEM

3.1 User Requirements

The user means the person who takes care and is responsible for all jobs and data of the system. People from all levels of the organization use computer –processed data to help them work more efficiently. The term that can be defined for the group of people is called "End-user". End user is a person who needs the outputs produced by application software to perform his or her job. The users of this system comprise of:

(1) QA manager

(2) Chief of Microbiology

(3) Chief of Quality Control

(4) Chief of Research and Development

(5) Assistant of Microbiology

(6) Assistant of Quality Control

(7) Assistant of Research and Development

They require a new system to support their jobs because:

(1) Reduction of manual record and paper work.

(2) Timeliness of some information that is required urgently and need faster response.

(3) Accuracy and consistency of all information that is released from the division must be accurate and consistent.

(4) Reduction of document storage in which many kinds of documents can be kept and required no space.

(5) Improve the information system to give better service to other departments.

(6) Increase Department productivity.

(7) Require low cost computer-based information system.

3.2 System Design

After the requirement analysis of the system is complete, either wholly or partly, system design takes place. The system design phase usually consists of three activities:

(1) Reviewing the system's informational and functional requirements.

(2) Developing a model of the new system, including the logical and physical specification of input, output, processing, storage, procedures and personnel.

(3) Reporting results to management.

3.2.1 Reviewing the Systems Requirements

After the user's requirements have been declared, all requirements are confirmed by the user:

(1) To maximize to get the highest flexibility, maintainability and expandability from the new system.

(2) To minimize all paper works and potential repeats of work that can occur.

(3) To satisfy all the users with easy-to-use system.

(4) To tradeoffs to compromise between cost of new system versus the operational quality of the system and its outputs.

3.2.2 Develop a Model of the New System

When the system has been designed, the logical and physical levels in each of the following areas will be realized:

(1) Input

(a) Raw material and packaging income

(b) Mixing quantity and lot

(c) Process quality control

(d) Finished goods detail

(e) Non-conformity product

(f) Customer complain

(g) Microbiology of product and in process

(2) Output

(a) List of details of mixing of each product

(b) List of details of process of each product

(c) List of details of finished goods product

(d) List of details of raw material and packaging income

(e) List of non-conformity

(f) List of customer complaints

(g) List of microbiology of product and in process

(3) Processing

After input and output requirements are established, the nature of the processing tasks must be assessed. The new system is considered whether it should be created in-house or acquired from a vendor. That is "Make-or-buy decision".

As mentioned above, the business is emphasized on the "QA and Production", the information system seems to be the second priority. However, the information system has to be accompanied by the "Quality Assurance Department" to support the business. The low cost information base is needed first for trial and error.

The information system of QA department is designed with Microsoft Access Version 97 with Visual basic 6 in Microsoft Window 98.

(4) Storage

The storage requirements can use the following medium;

(a) Hard disk

(b) Diskette

Because the information will be designed on Microsoft Access Version 97 with Visual Basic 6, it will use all existing resources as much as possible in order to reduce the investment.

(5) Procedures

The limited resources of human and machines are utilized to design procedures.

Work procedures

From the input designed, it will be used to plan the work procedures. Most of the practices stated in documents are action taken by internal personals in the department, so it should not have many trouble.

(a) Raw material and packaging income

Raw material and packaging specification data of that Lot will be collected when we receive and analyze it. We will view the data according to our specifications or not.

(b) Mixing and quantity and lot

QA staff will collect data of mixing, quantity and lot of each batch. This will benefit when we want to check quality of the product.

(c) Process quality Control

QA staff will check data that is used to process each product. We can check product problem from machine and process from these data.

(d) Finished goods detail

QA have to check finished good product before they are sold to ensure that the quality is the best.

(e) Non-conformity product

When the other department found some problem in raw material, packaging, process, and machine, they will inform QA about non-conformity.

(f) Customer Complaints

If customer is not satisfied with our product quality, they will inform that to our sales or marketing. Sales and marketing will inform that data to QA department.

(g) Microbiology of product and in process

Microbiologist will check quality of product by using microbiology tests to ensure that quality is good and contains no harmful microorganism.

Control procedure

The persons who can access this system are;

(a) QA Manager

(b) Chief of Microbiology

(c) Chief of Quality Control

(d) Chief of Research and Development

(e) Assistant Laboratory

(f) Factory Manager

More details will be mentioned in Security and Controls

(6) Personnel

Personnel constitutes one of the costliest aspects of most systems' operations. Personnel requirements can be declared in each area:

(a) Work description: All personnel's work description has to be modified and shared for more time in processing transactions.

(b) Qualifications of the users who have no background in using computers required training to operate the work.

(c) Training most users who have not so good background in using computer. They have to be trained. At least they should know how to operate and get the work done.

3.2.3 Reporting Results to Management

All designs that have been created are submitted to the "QA manager" to review that they are satisfied to use and to invest or not.

The recommendations and comments will be gathered to improve and make it easy-to-use operations.

3.3 Data Flow of the Proposed System

3.3.1 Context Diagram

For the Context Diagram of the proposed system (Figure 3.1.), it is similar to the existing system. The related persons still have to contact "QA Department" as it used to be.

3.3.2 Data Flow Level 0

The data flow of each process (Figure 3.2.) can be explained as;

(1) Found Non Conformity Product

(2) Generate Non Conformity Report

(3) Analyze Non Conformity Problem

(4) Generate Customer Complaint Report

(5) Generate Finished Goods Report

(6) Inspect RM&PK

(7) Generate Inspection Report

(8) Generate Microbiology Report

(9) Identify Problem

(10) Approved Report

(11) Generate Supplier Profile

(12) Approved Problem

(13) Generate Product Problem Report

(14) Inspect Finished Goods

(15) Inspect Microbiology

In this level, most data are still the same as the existing system (Figure 2.1.). Actually, the working system is almost the same but it will be more flexible. The computer system is introduced to be a part of the routine work. After the normal work flows are done as usual, the information is gathered and kept in "Information System" which is implemented on Microsoft Access with Visual Basic 6.

All the information are keyed in by "Chief of each section" who has spare time for updating information. All data that are put in will be printed out as a monthly report to "Factory manager" and "QA manager".

3.3.3 Data Flow Level 1

For this level (Figure 3.3.), only data that is important to analyst problem will be summarized together to find the solution for the problem.

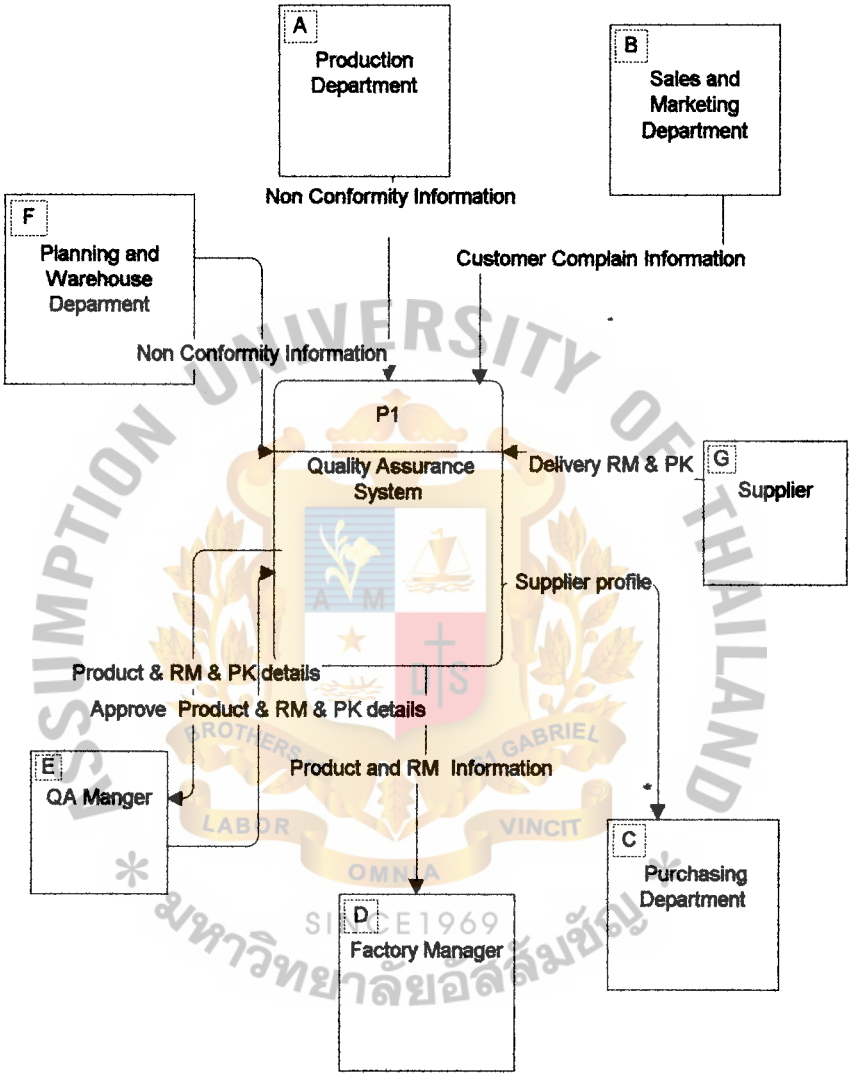

Figure 3.1. Context Diagram of Proposed System.

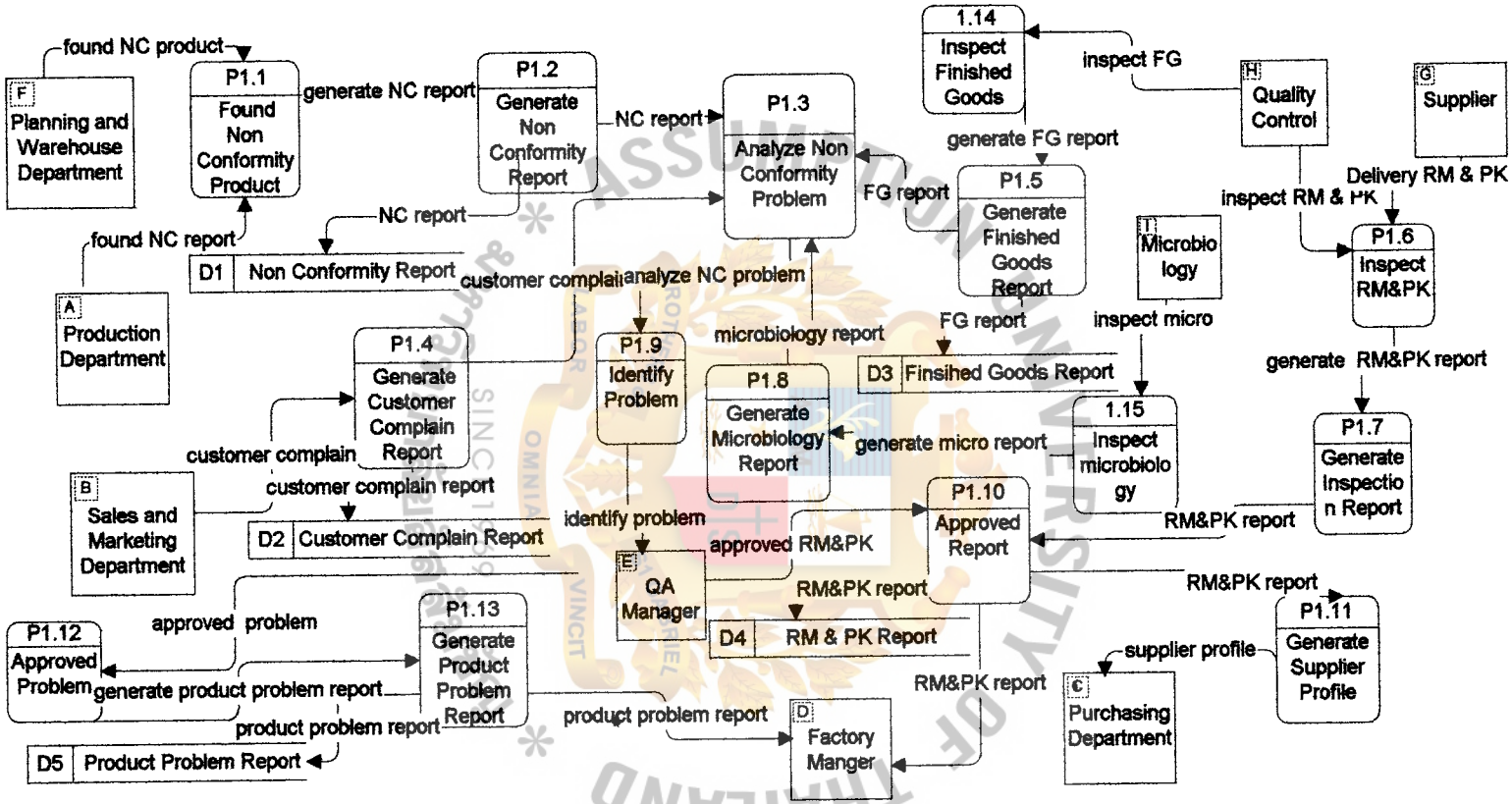

Figure 3.2. Level 0 Diagram.

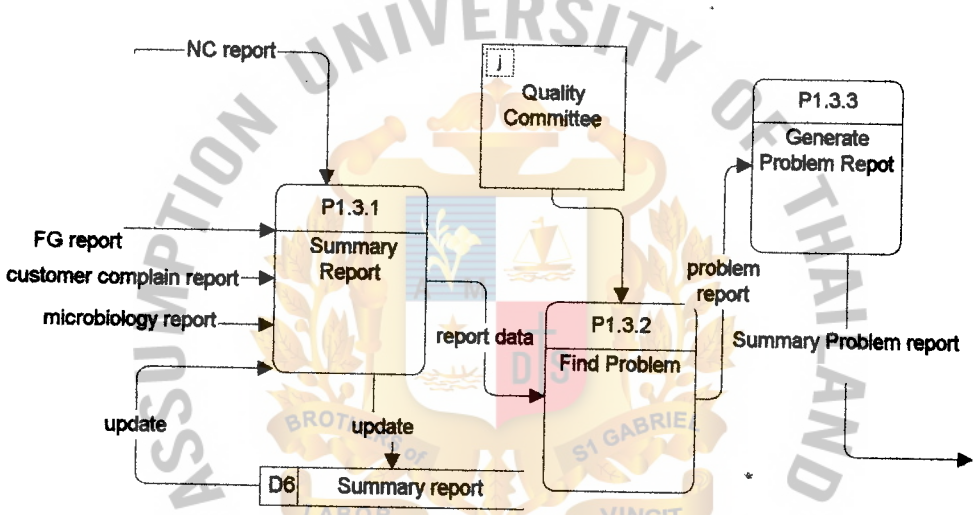

Figure 3.3. Data Flow Level 1 Diagram.

3.4 Proposed Computer System

According to available resources in the company, the proposed system can use these existing resources and help in saving the investment of the new system. The storage space on new 'Window NT 6.0' can be shared. The terminals of the new system can link from the main system.

For the proposed system in the first phase, the new system is tried on. For the next phase, the system will be modified to suit the needs.

3.5 Hardware and Software Requirements

Hardware

Need 2 computers for workstation and 1 printer.

Software

(1) System software Microsoft WINDOW 98 which uses the company's license.

(2) Application software Microsoft Office Version97

(3) Application software Microsoft Visual Basic 6

3.6 Security and Controls

Security refers to the protection of computer-based resources. For Hardware, software, data, procedures and people, against alteration, destructions or unauthorized use. Control is a function that is designed to raise quality in a computer information system. Control provides assurance that standards of completeness and accuracy are enforced for each individual record or group of business transactions.

The objectives of security are;

(1) Confidentiality to protect data from unauthorized persons.

(2) Availability makes data and information available to those authorized to use it.

(3) Integrity to maintain a conceptual information system that accurately reflects the physical system.

With less related persons, risk in security can be reduced. For the major problems of security, they can be classified as including the follows types:

(1) Human carelessness error from humans can occur in keying or inputting error, physical damage of I/O media, program damaged, etc.

(2) Computer crime this kind of problem will have the least chance to occur because most employees are not experts in the computer field. But sensitive data can be changed by unauthorized persons who don't really know how to use it.

(3) Natural disasters fire or water damages.

(4) Hardware and software failures can occur from damages caused by undetected viruses, hardware or software failure, etc. The preventive measures that can be done are:

(a) Physical security such as locked doors, keep input form in place, and keep diskette in box.

(b) Restrict the authorized persons to access, modify and update.

(c) Protect resources with passwords.

(d) Educate people in security measures. Employee should know the importance of security issues.

(e) Disaster recovery prevents from natural disaster or accidents that can occur.

(f) Backups keep duplicate data in diskette in case of any accidents or infections.

(g) Use disinfections utilities, such as anti-viral software.

3.7 Cost and Benefit Analysis

Costs and benefits must be measured and quantified to justify a project or a new system. Identifying the costs associated with developing the system and the benefits derived from the operational system requires a great deal of thought, hard work and ingenuity. The task is made somewhat easier if the analyst has a way to identify and classify both the cost and the benefits associated with the new system. Typically, costs and benefits fall into three classifications;

(1) Fixed versus variable

(2) Tangible versus intangible

(3) Direct versus indirect

For this projects costs and benefits are classified in terms of 'Tangible and Intangible cost'. Tangible means something touchable and not abstract. A tangible cost or benefit is concrete and easily identified and measured. Example; Cost of hardware, equipment, etc. Intangible means something abstract or vague. Intangible costs or benefits are generally easy to identify but difficult to measure. Example: Loss of confidence in information systems, dissatisfaction caused by changes in the way end-users must use the system, etc.

The costs of the proposed system, which is implemented, can be classified below; The cost of implementation is supposed to cover;

(1) Systems development cost with this small system.

(2) Training cost supposed to give in-house training. Because the personnel in the company are available, the IT staff can set up training for the QA staff. Costs are evaluated from paper for preparing documents, electrical, water, etc.

(3) Cost of software and hardware that we use for this system.

(4) For the annual operation, costs are supposed by programmer and System analysts to improve and maintain system.

The benefits that can be achieved, it will be classified as;

Tangible benefits

(1) Reduce man power of all staff in the QA department

(2) Reduce stationary costs

Intangible benefits

(1) Improve service to other departments.

(2) Used as a center of information about quality.

(3) All information can be kept within the organization, staff can use it when they require.

(4) Support the user work, has enough information.

(5) As a guide of "Research and Development Section".

Table 3.1. Estimated Costs for Proposed System.

Personnel:		Baht
1	System Analysts (600 hours/ea 150 Baht/hour)	90,000
1	Programmer/Analysts (400 hours/ea 85 Baht/hour)	170,000
1	Database Specialist (80 hours/ea 145 Baht/hour)	11,600
Expenses:		
4	Training registration(2000 Baht/student)	8,000
New Hardware & Software		
1	DBMS server software (Access 97)	30,000
1	Application software (Visual Basic6.0)	50,000
8	DBMS Client software (30000 Baht/client)	240,000
	Total Development Costs:	599,600
Projected Annual Operating Costs		
Personnel:		
1	Programmer/Analysts (200 hours/ea 50 Baht/hour)	120,000
	Total Project Annual Costs:	120,000

Table 3.2. Payback Analysis for Proposed System.

Cost Items	Years					
	0	1	2	3	4	5
Development cost	599,600					
Operation & maintenance cost		120,000	129,600	139,968	151,165	163,259
Discount factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time adjusted costs (adjusted to present value)	599,600	107,160	103,291	99,657	96,141	92,568
Cumulative time-adjusted costs over lifetime(Baht)	599,600	706,760	810,051	909,708	1,005,850	1,098,417
Benefits derived from operation of new system	0	300,000	345,000	396,750	456,263	524,702
Discount factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time-adjusted benefits (adjusted to present value)(Baht)	0	267,900	274,965	282,486	290,183	297,506
Cumulative time-adjusted benefits over lifetime(Baht)	0	267,900	542,865	825,351	1,115,534	1,413,040
Cumulative lifetime time-adjusted cost + benefits(Baht)	-599,600	-438,860	-267,186	-84,357	109,684	314,623

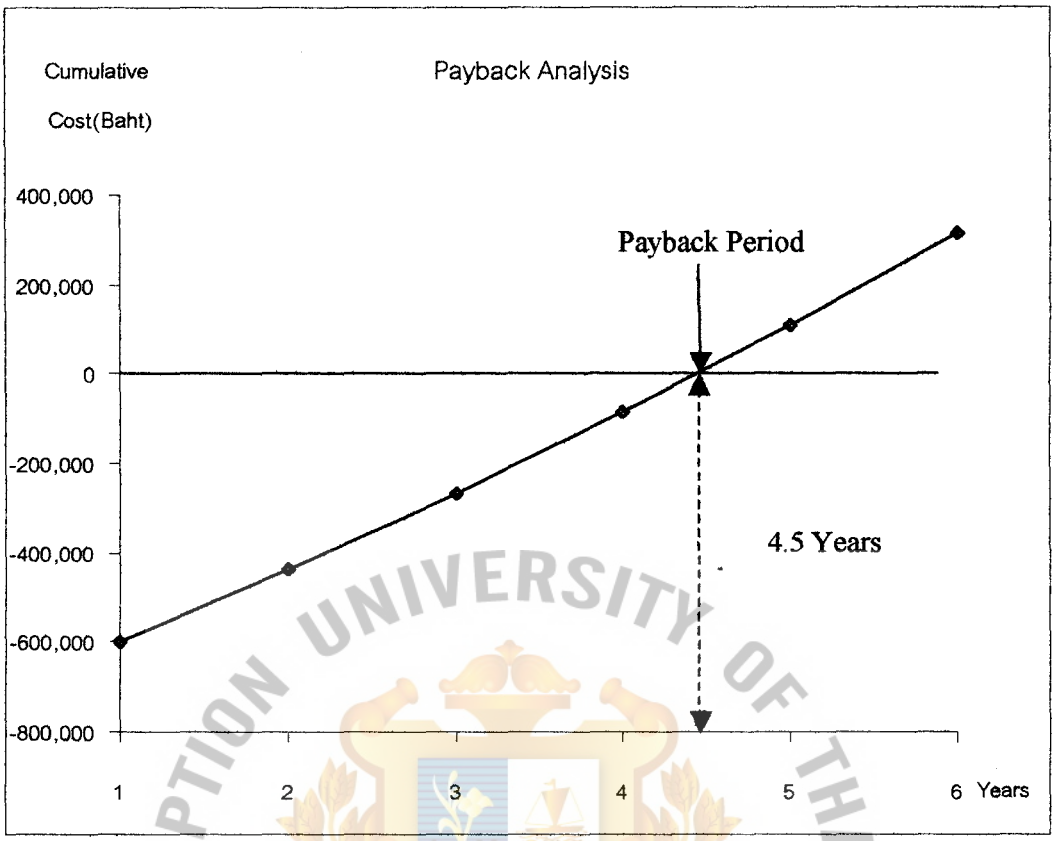

Figure 3.4. Payback Analysis.

Table 3.3. Estimated Costs for Existing System.

Personnel:		Baht
12	Annual Salary	357,500
12	Miscellaneous Expense	10,000
12	Overhead Expense	20,000
Expenses:		
4	Training Program	14,000
Personnel:		
2	Operation & maintenance Cost	253,000
	Total Annual Costs:	654,500

Table 3.4. Compare Existing System with Proposed System, in Baht.

Cost Items	Years				
	1	2	3	4	5
Existing System					
Salary(357,500+10%)	357,500	393,250	432,575	475,833	523,416
Operation & maintenance cost(253,000+10%)	253,000	278,300	306,130	336,743	370,417
Utility(44,000+10%)	44,000	48,400	53,240	58,564	64,420
Total annual cost	654,500	719,950	791,945	871,140	958,253
Cumulatvie costs of Existing System	654,500	1,374,450	2,166,395	3,037,535	3,995,788
Proposed System					
Hardware cost	47,385	47,385	47,385	–	–
Software cost	26,667	26,667	26,667	–	–
Salary(330,000+10%)	330,000	363,000	399,300	439,230	483,153
Utility(55,000+10%)	55,000	60,500	66,550	73,205	80,526
Development cost	50,000	-	-	-	-
Operation & maintenance cost(198,000+10%)	198,000	217,800	239,580	263,538	289,892
Total annual cost	707,052	715,352	779,482	775,973	853,570
Cumulative cost of Proposed System	707,052	1,422,403	2,201,885	2,977,858	3,831,428
Cumulative lifetime time-adjusted Existing System - Proposed System	-52,552	-47,953	-35,490	59,676	164,360

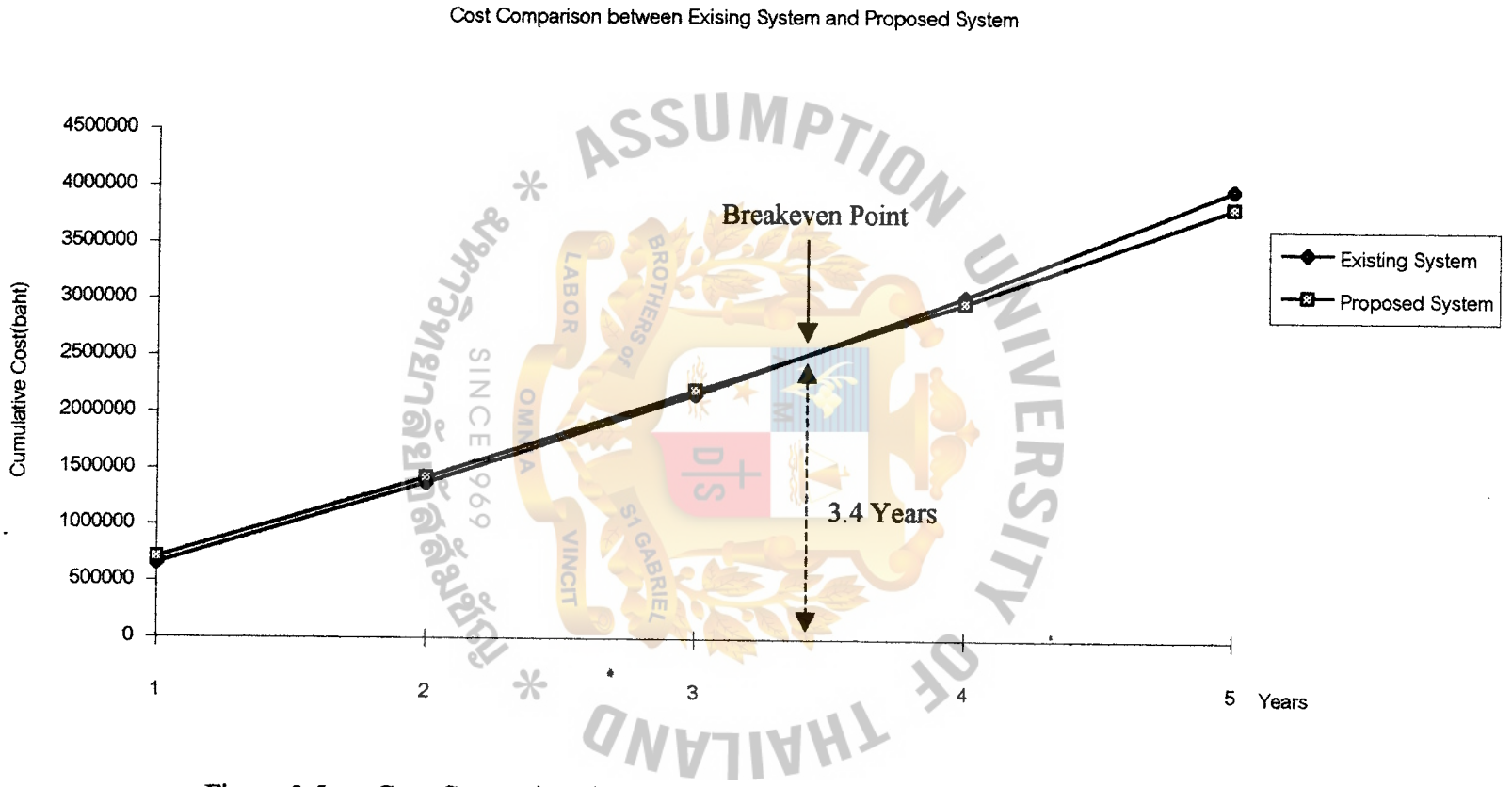

Figure 3.5. Cost Comparison between Existing System and Proposed System.

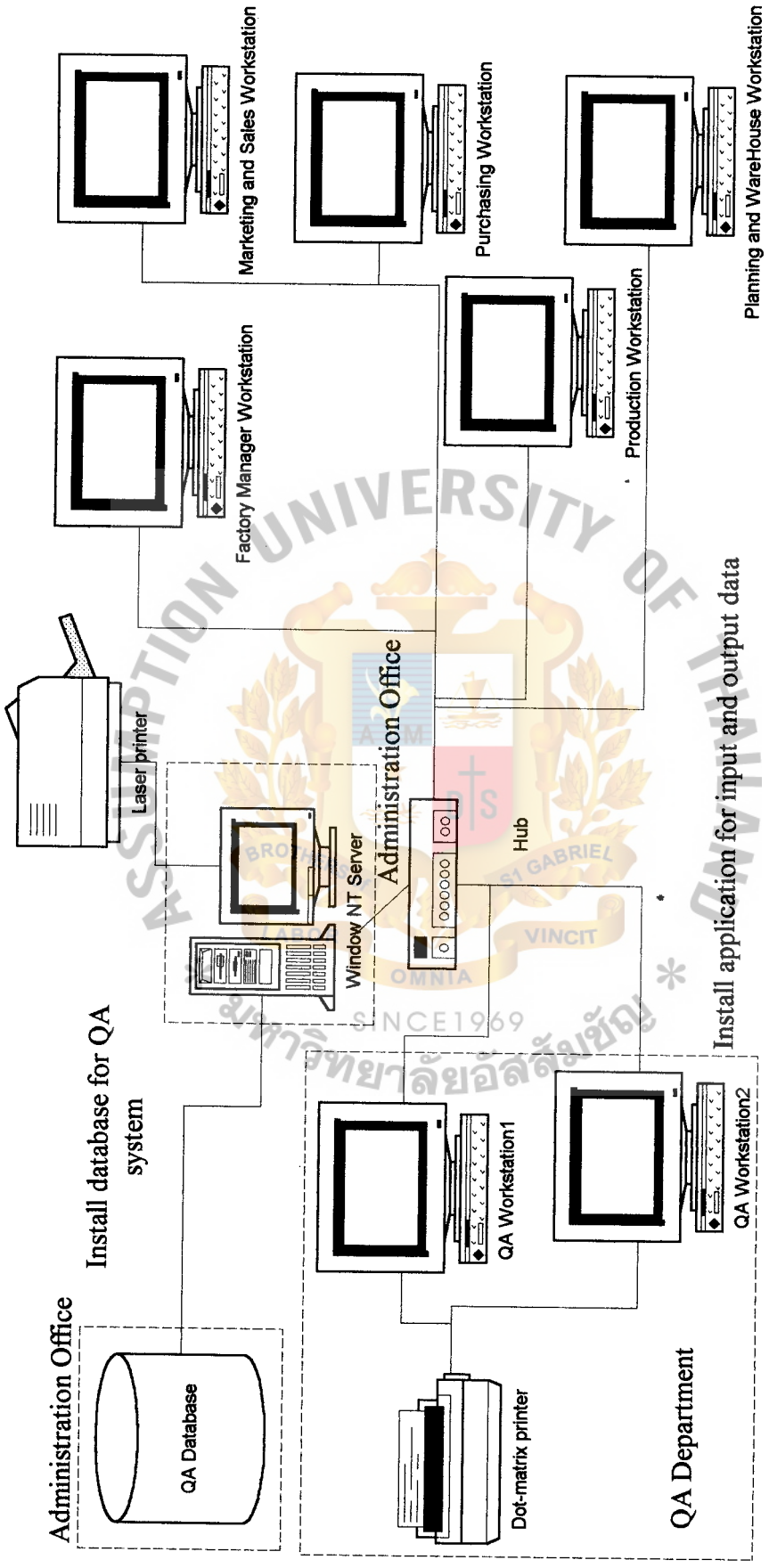

Figure 3.6. Network Configuration of QA Systems.

3.8 Project Implementation

System implementation phase of development will begin with the following activities;

(1) Scheduling

To ensure that the system can work by a certain date, on time, the timetable (see appendix) showing activities related to implementation must start and finish according the schedule. The tools chosen to establish and implement the timetable is the "Gantt chart". It is a project modeling tools that use a bar chart representation of project tasks.

(2) Testing

This process is to certify that a program or the system implemented is free of errors. For the new information system that has been implemented, it is also tested to check any errors that occur. System testing is made to ensure that all programs making up the new system effectively work altogether. The acceptance of testing is also considered. To evaluate the extent to which the new system meets user requirements under normal conditions, re-checking process takes place to check as the last step before developing the operation.

(3) Hardware Installation

For this step, we must install hardware 2 workstations and 1 printer that we use to input data for this system..

(4) Software Installation

For this step, we must install software that we develop to use in this system for QA department in the computers.

(5) Train System Users

User training program has to be developed because the main function of the company's business is not in the Computer field. Most of the employees are familiar only with the food field. A training program is necessary.

(a) The training has to start from how to use the computer to get them familiar with the computer. Know how to use keyboard, mouse and other equipments. Persons having least knowledge of computers are "Chiefs of each section". They need to know these steps.

(b) Next is to know how to use "Windows" and "Microsoft Access with Visual Basic 6". Some users know about "Windows", so it will not cause many problems.

(c) Determine training resources with limited resources in the department. We have to prepare all facilities to be ready for training.

(d) Develop training programs after all resources and users are available; the training is developed. This step can also include testing the program to check whether it works.

(e) Implement the training program the training is set up in-house. The training will use "Instructor-led methods" because all trainees can learn faster and more effectively when they interact with each other. However, after the program has operated, the users have to try to get them to be familiar with computers for better understanding.

(6) Convert to New System

When the old system is modified, the reaction is reluctance to change, according to human nature. It has to make the users comfortable. That is to make them work as they have been doing before and to prevent any

resistance. Try to change a little until it is in place, which takes time. It will not initiate many problems because it is implemented to use in department, which has some persons to use it. Therefore, it will have fewer problems than a bigger system, which is related to many persons.

Degree of Achievement of the Proposed System Compared with the Existing System

Table 3.5. show the time spent on each process of the Proposed System Compared with the Existing System. It shows that each process of the Proposed System spends less time than each process of the Existing System, which has to pass many manual work steps. This can be explained as that the Proposed System is more efficient and effective than the Existing System.

Table 3.5. Degree of Achievement between the Proposed System and the Existing System.

Process	Existing System	Proposed System
Found Non-Conformity Product	1.5 hrs.	1 hr.
Generate Non-Conformity Product	30 mins.	15 mins.
Analyze Non-Conformity Product	1 hr.	15 mins.
Generate Customer Complaint Report	30 mins.	15 mins.
Generate Finished Good Report	30 mins.	15 mins.
Inspect RM&PK	15 mins.	10 mins.
Generate Inspection Report	15 mins.	10 mins.
Generate Microbiology Report	15 mins.	10 mins.
Identify Problem	1 hr.	30 mins.
Approved Report	15 mins.	15 mins.

Table 3.5. Degree of Achievement between the Proposed System and the Existing System (Continued).

Process	Existing System	Proposed System
Generate Supplier Profile	1 hr.	15 mins.
Approved Problem	15 mins.	15 mins.
Generate Product Problem Report	30 mins.	15 mins.
Inspect Finished Goods	30 mins.	15 mins.
Inspect Microbiology	15 mins.	10 mins.
Summary Report	1 hr.	15 mins.
Find Problem	1 hr.	15 mins.
Generate Problem Report	1 hr.	15 mins.
Total	11 hrs. 30 mins.	5 hrs. 16 mins.

IV. CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

For the project that the author has implemented, the part that has action are:

(1) Study the background of the organization.

(2) Study the existing system.

(3) Study the workflow of QA department.

(4) Gather the users' requirements.

(5) Design the overview of the proposed system.

(6) Design the workflow system.

(7) Design the computer information system; both input and output.

(8) Implement the information system; both input and output.

All staff in QA department have to perform routine work and also in the new information system that has been proposed. Some redundant jobs are necessary to ignore.

The implemented information system is designed to suit this need. The easy-to-use system is needed to apply because the users have no background in the computer field. Therefore, the user interface is quite simple and easy to understand. The implementation includes the beginning of "Trial and Error" of the information system. The program is written in "Microsoft Access Version 97 with Microsoft Visual Basic 6".

4.2 Recommendations

After the implementation has been done, the author thinks that they have found some problems as follows:

(1) The workflow system has to make short cuts to prevent any confusion that can occur and also the employees have more time to do other jobs.

(2) Some QA staff are still not familiar to use computers to input data even if the system has some protection from human error.

(3) The system is not identifying specification of data to compare with data, so QA staff cannot distinguish which is good or bad. They still have to use manual specifications to compare data again, that will take too time much.

(4) This system can only collect data as database system but it cannot analyze data, so they must still use humans to analyze and identify all data. In the future, we can improve this system by adding some analysis data system.

APPENDIX A

USER INTERFACE SCREEN LAYOUT

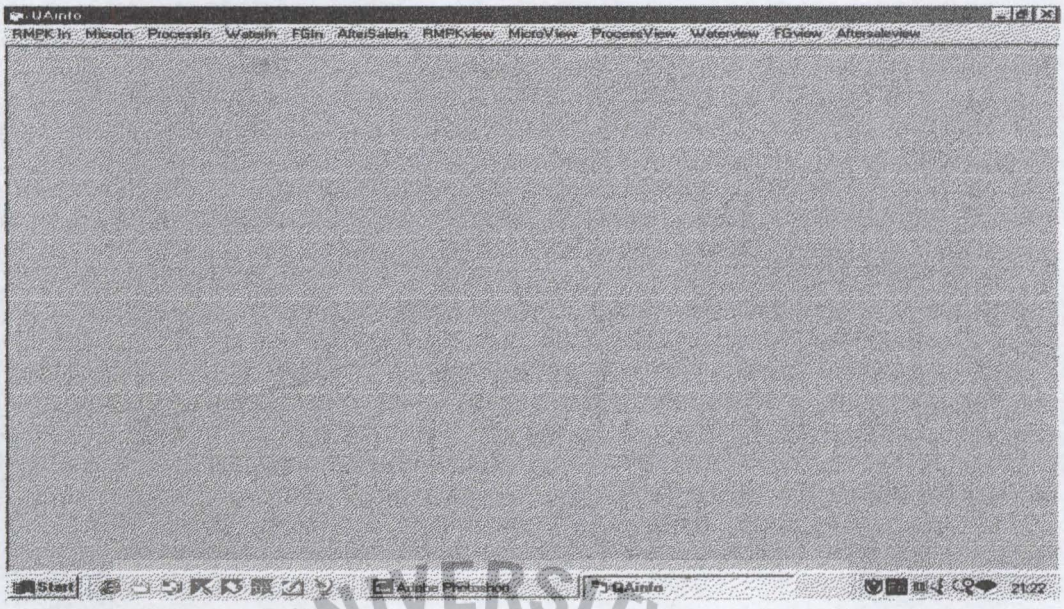

Figure A.1. Main Menu.

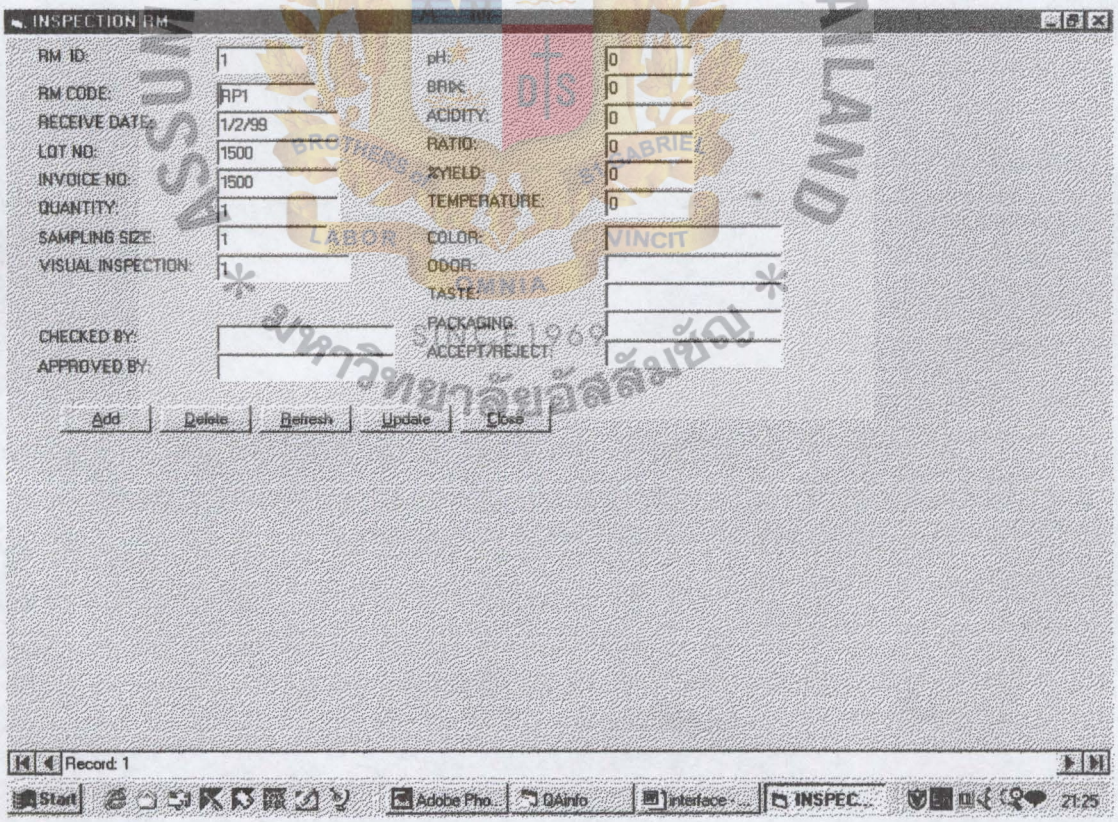

Figure A.2. Raw Material Input Screen.

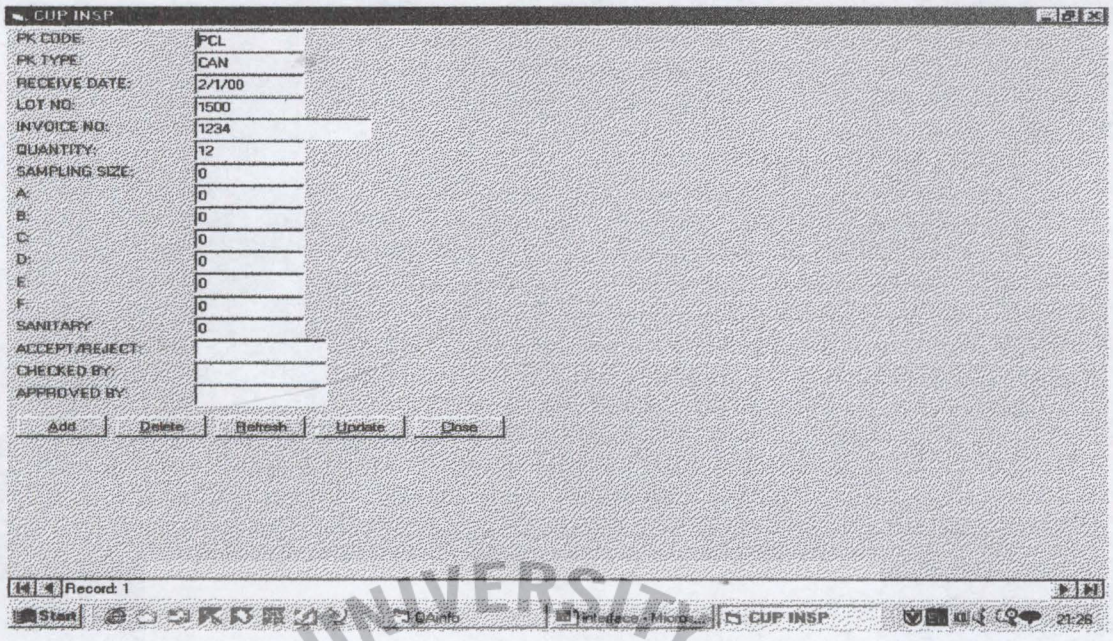

Figure A.3. Packaging CUP Input Screen.

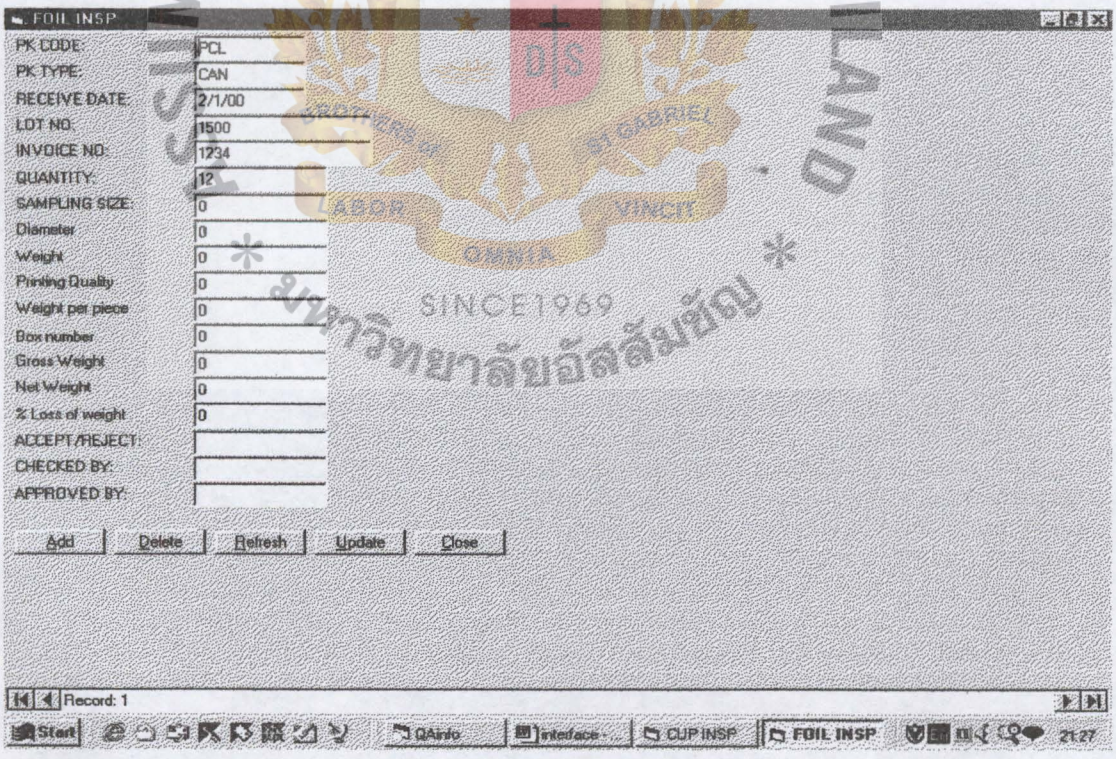

Figure A.4. Packaging Foil Input Screen.

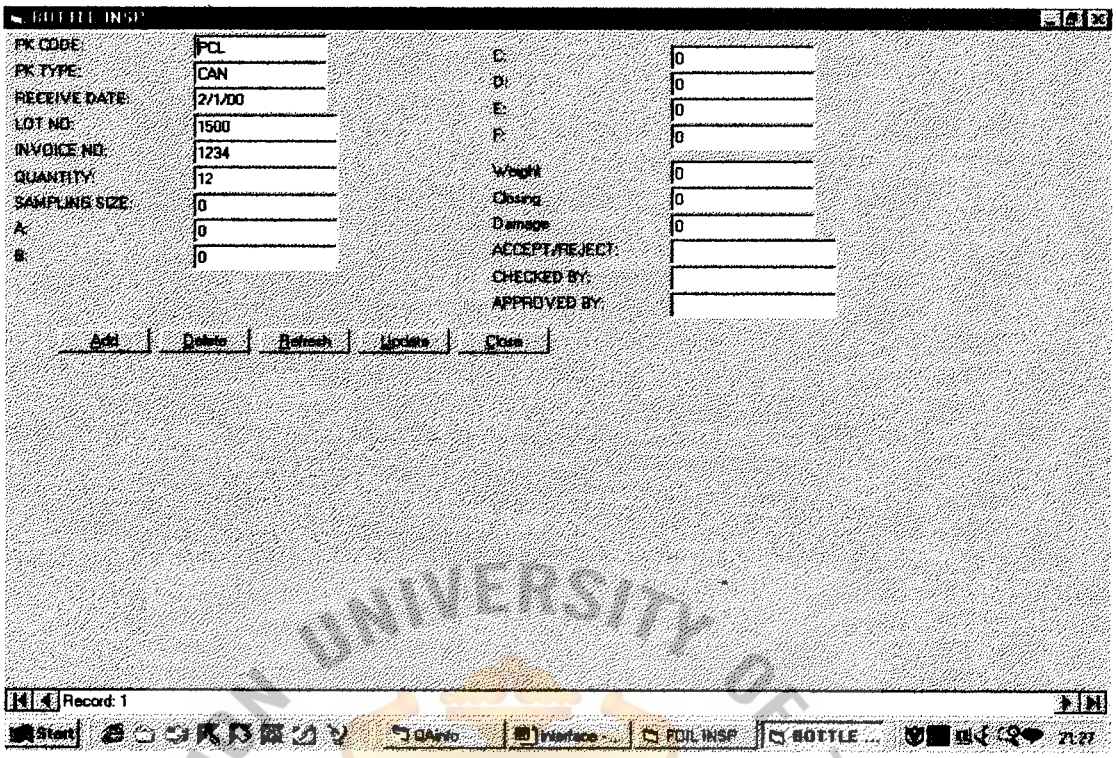

Figure A.5. Packaging Bottle Input Screen.

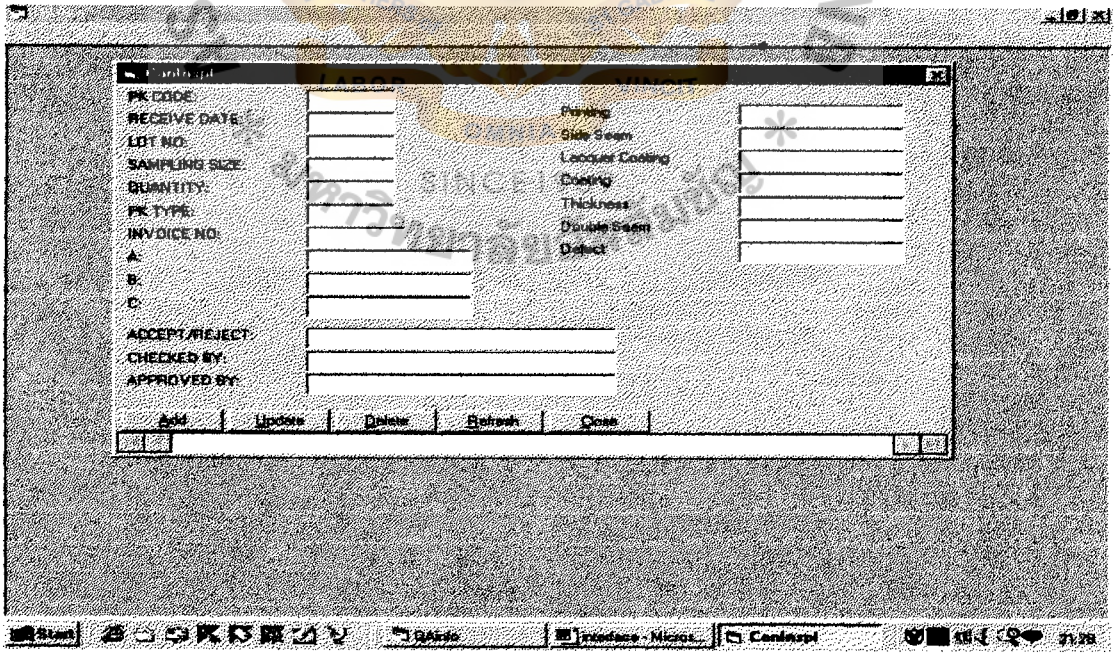

Figure A.6. Packaging CAN Input Screen.

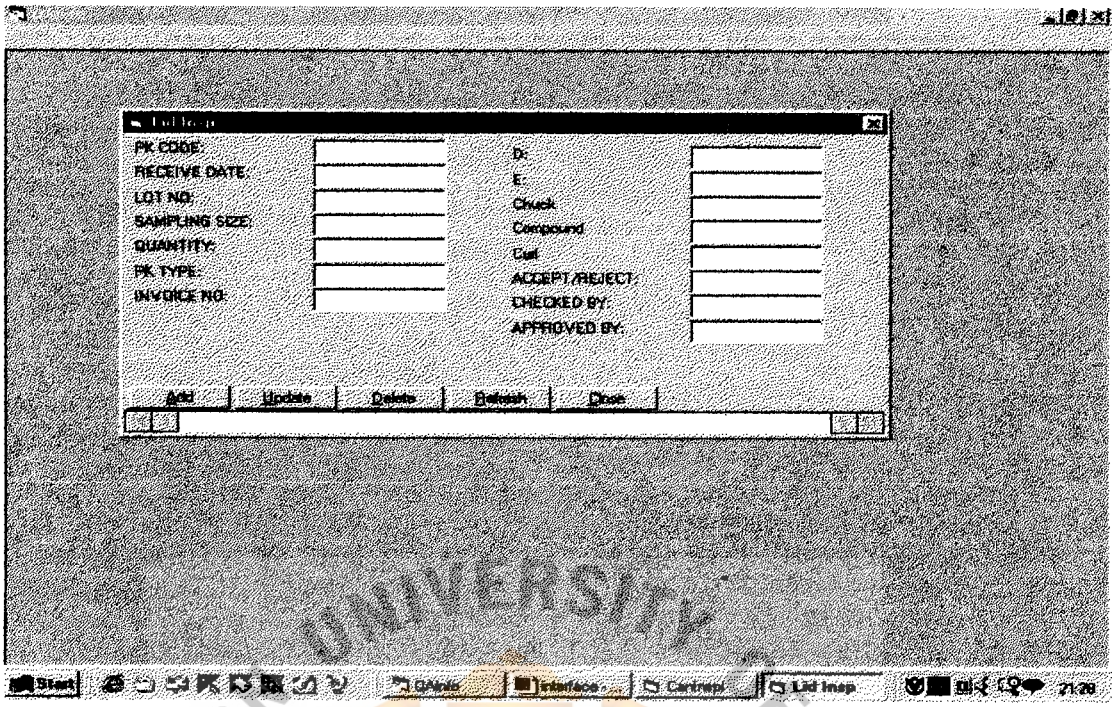

Figure A.7. Packaging LID Input Screen.

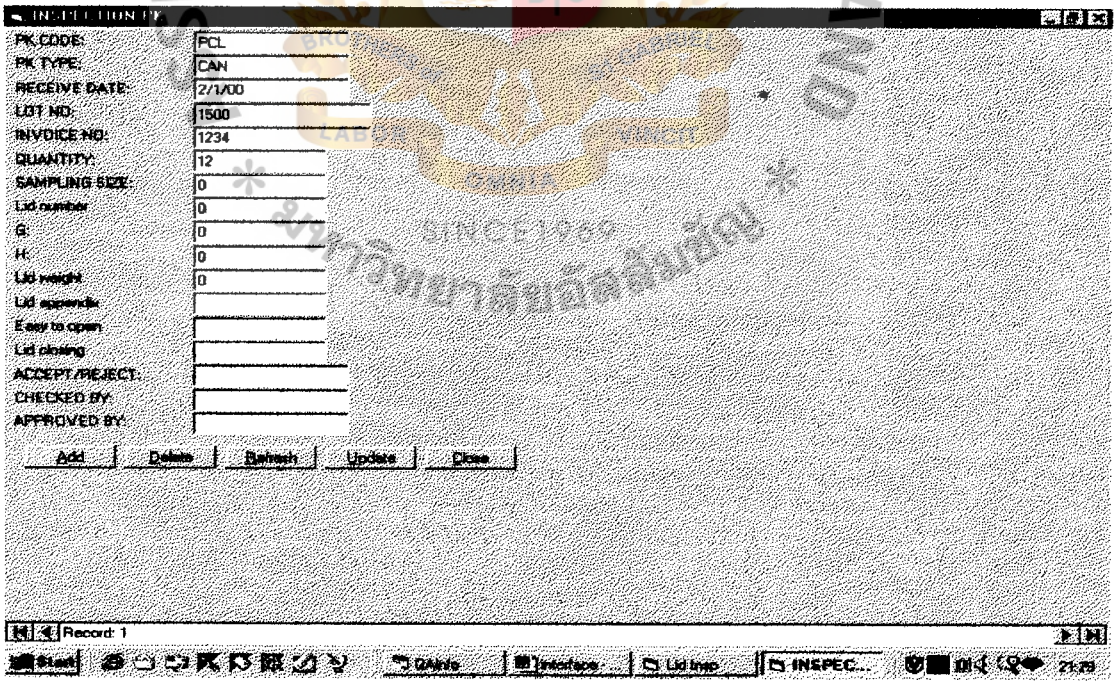

Figure A.8. Packaging LID bottle Input Screen.

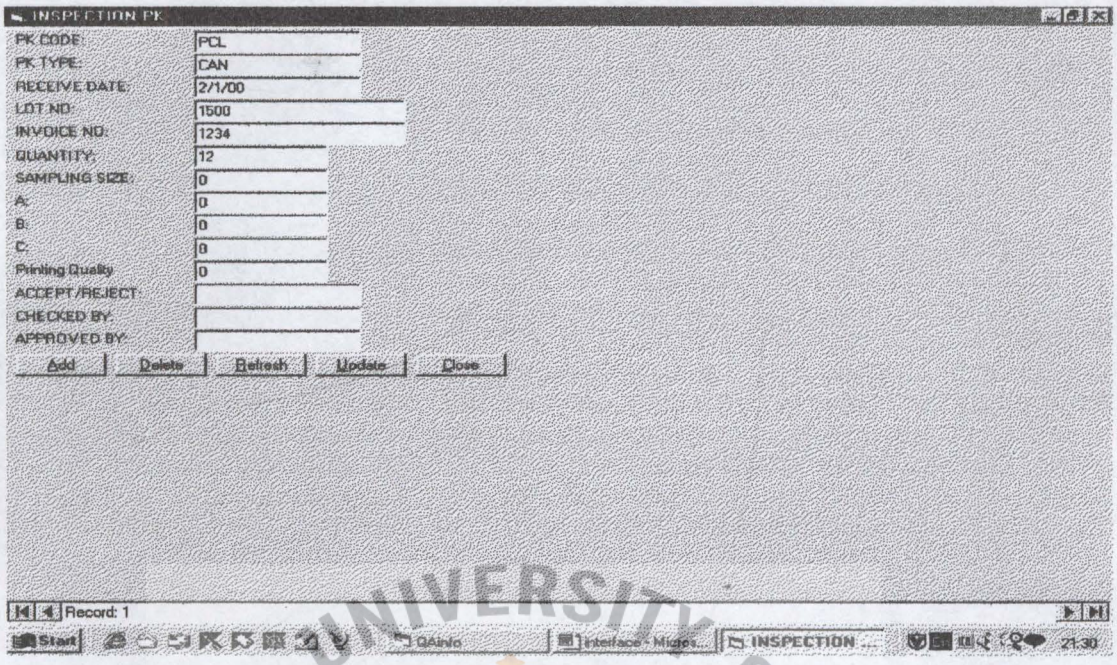

Figure A.9. Packaging SHF Input Screen.

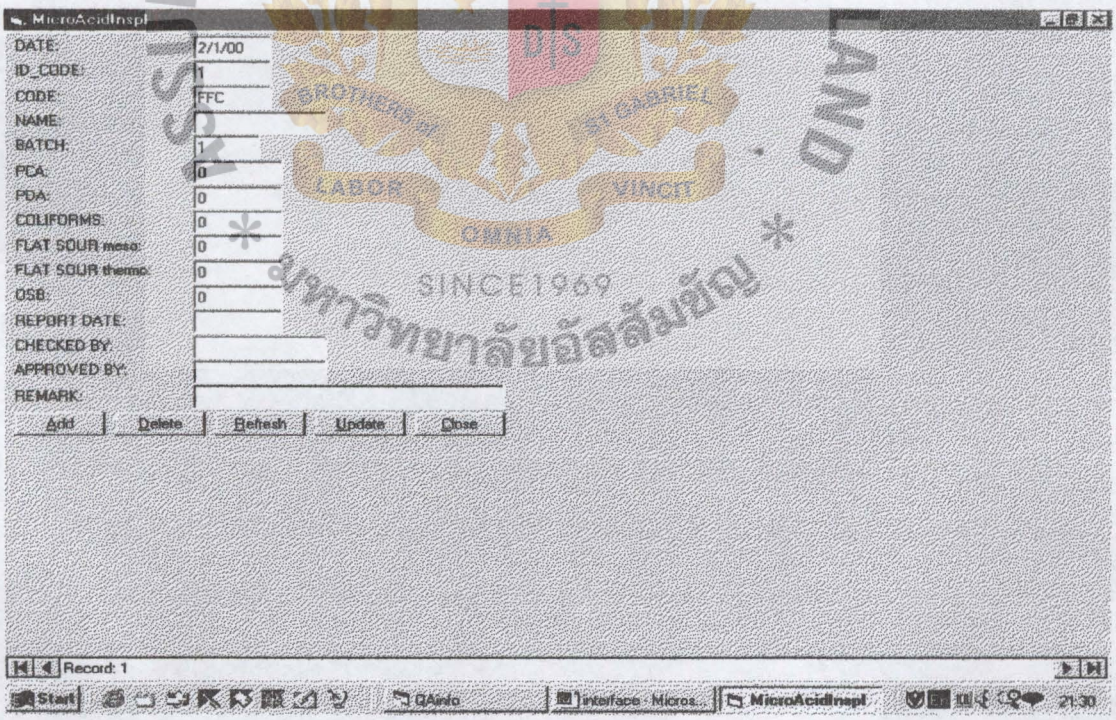

Figure A.10. Microbiology Inspection for Low Acid Food Input Screen.

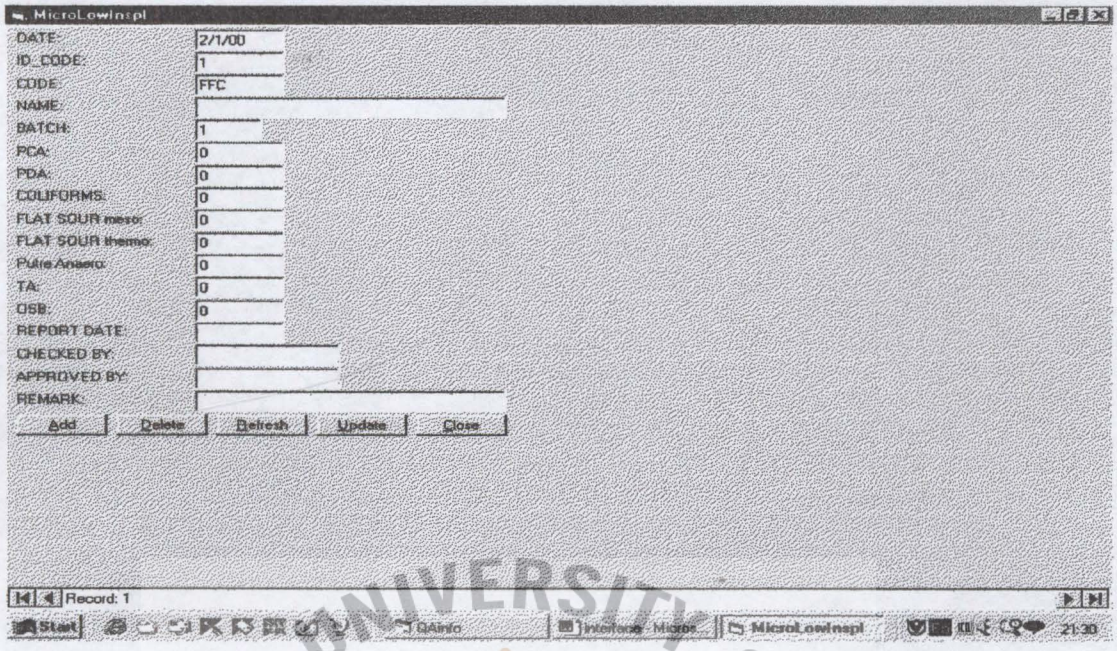

Figure A.11. Microbiology for Acid Food Input Screen.

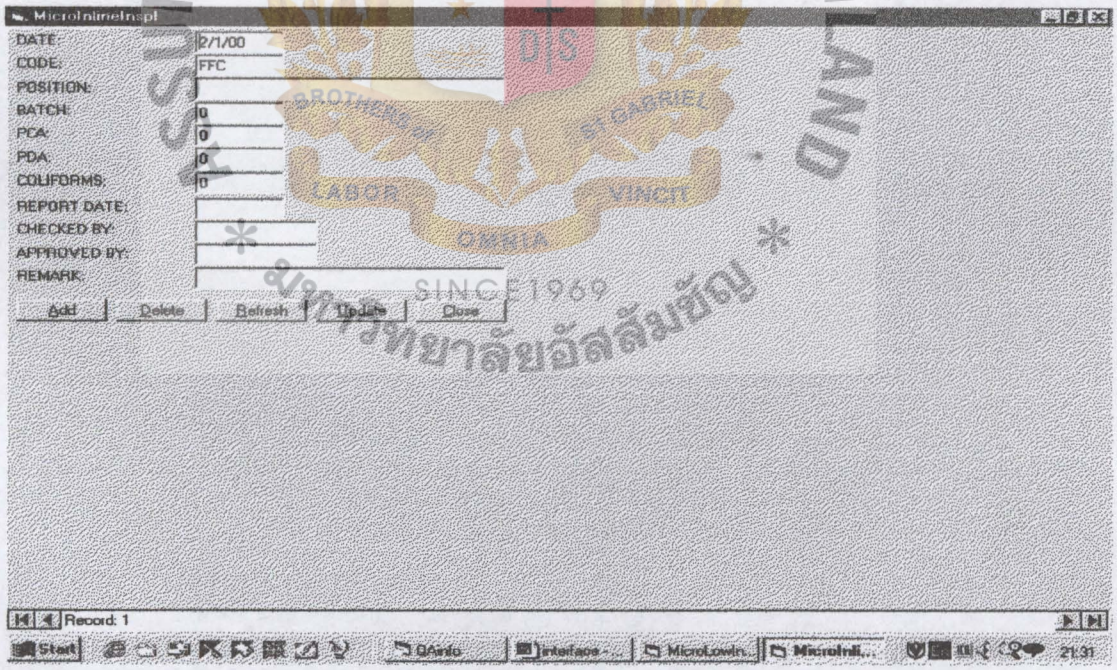

Figure A.12. Microbiology for Inline Input Screen.

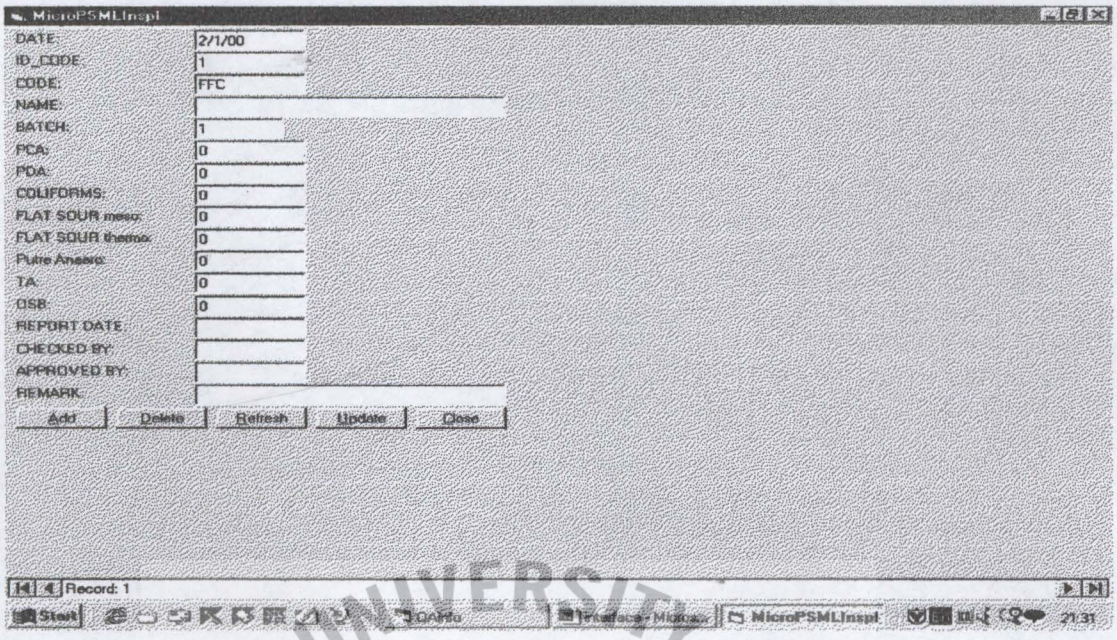

Figure A.13. Microbiology for Pasteurized and Concentrate Product Input Screen.

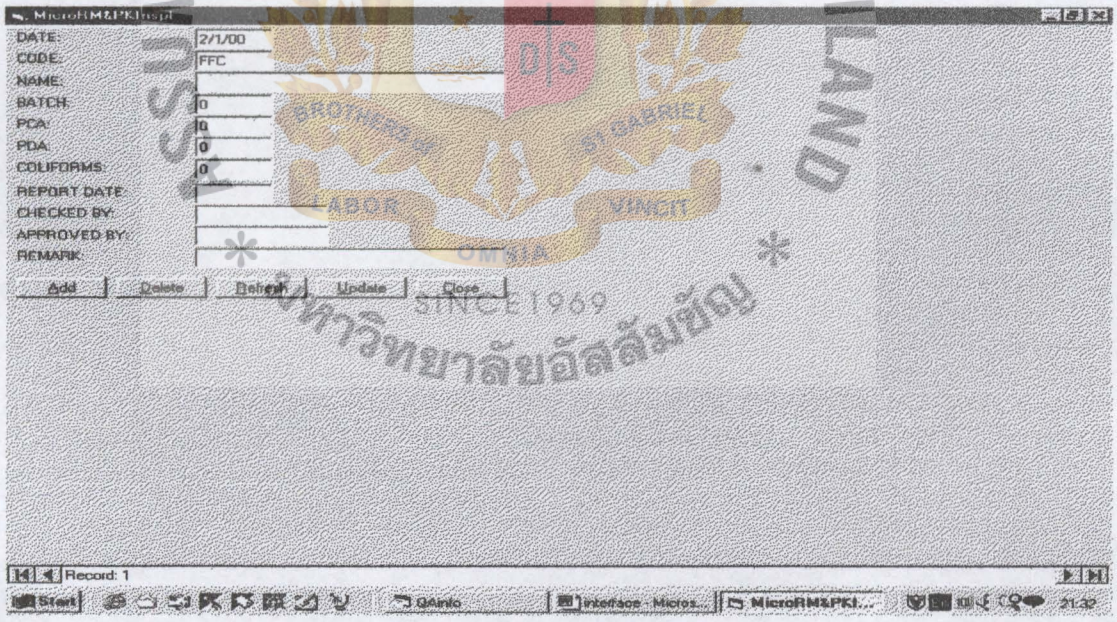

Figure A.14. Microbiology for Raw Material and Packaging Input Screen.

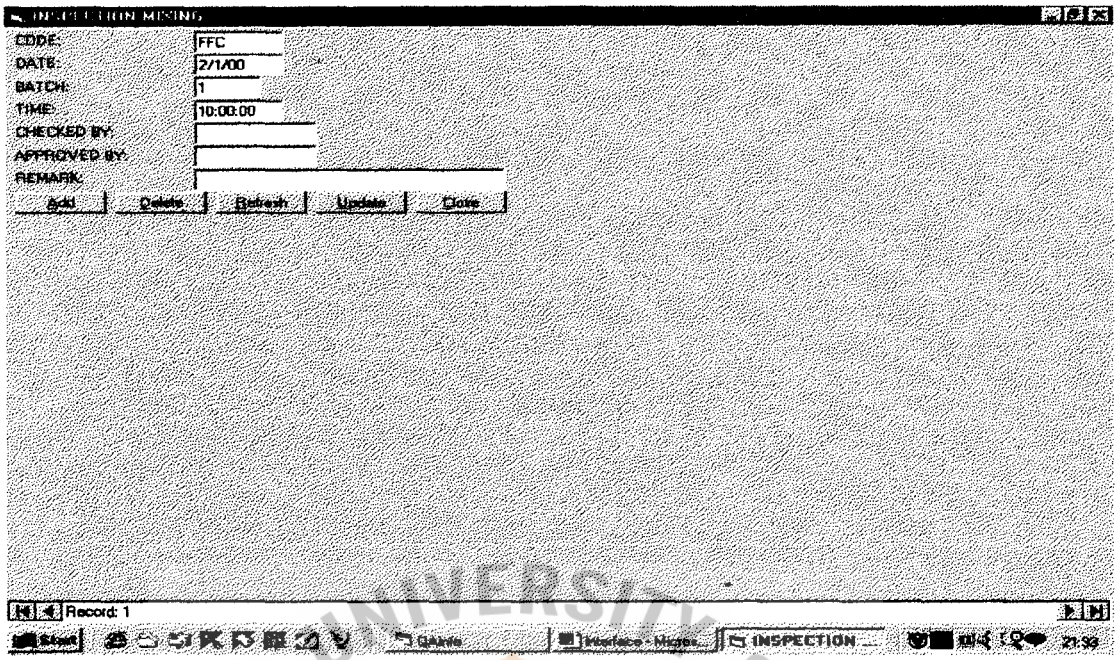

Figure A.15. Mixing Inspection Input Screen.

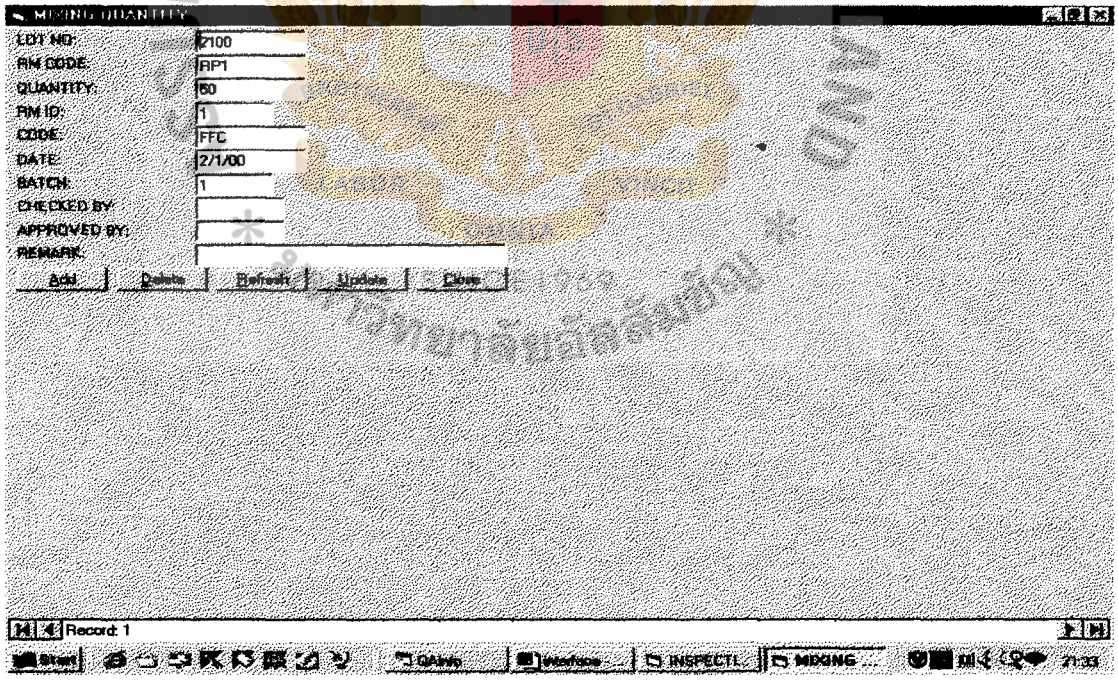

Figure A.16. Mixing Quantity Inspection Input Screen.

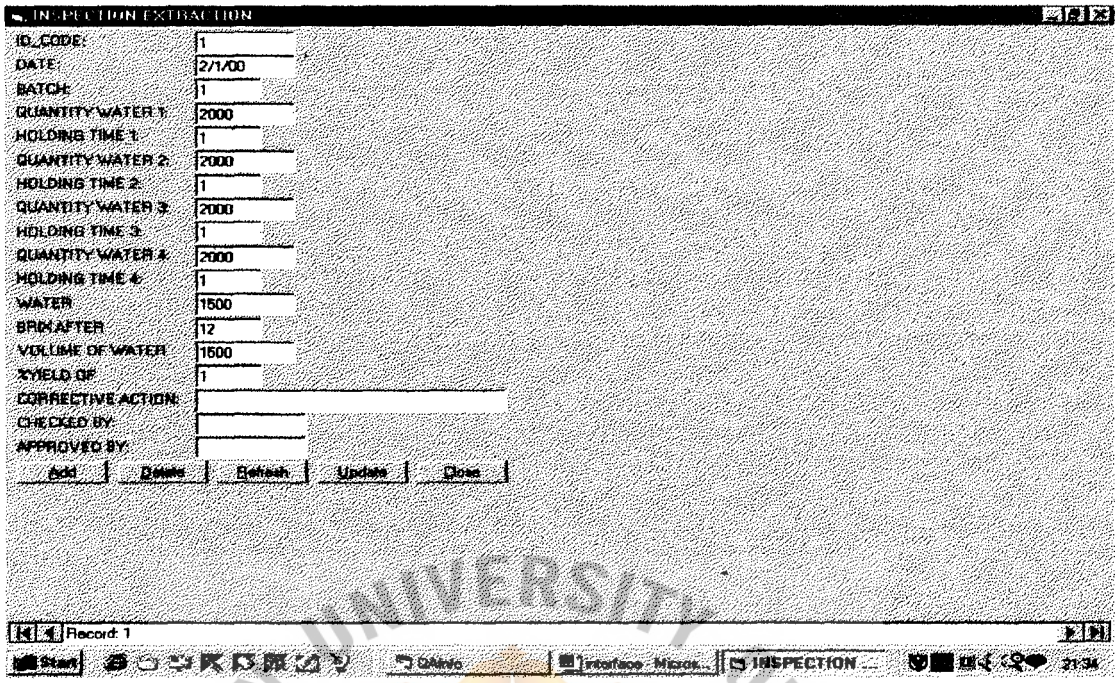

Figure A.17. Extraction Inspection Input Screen.

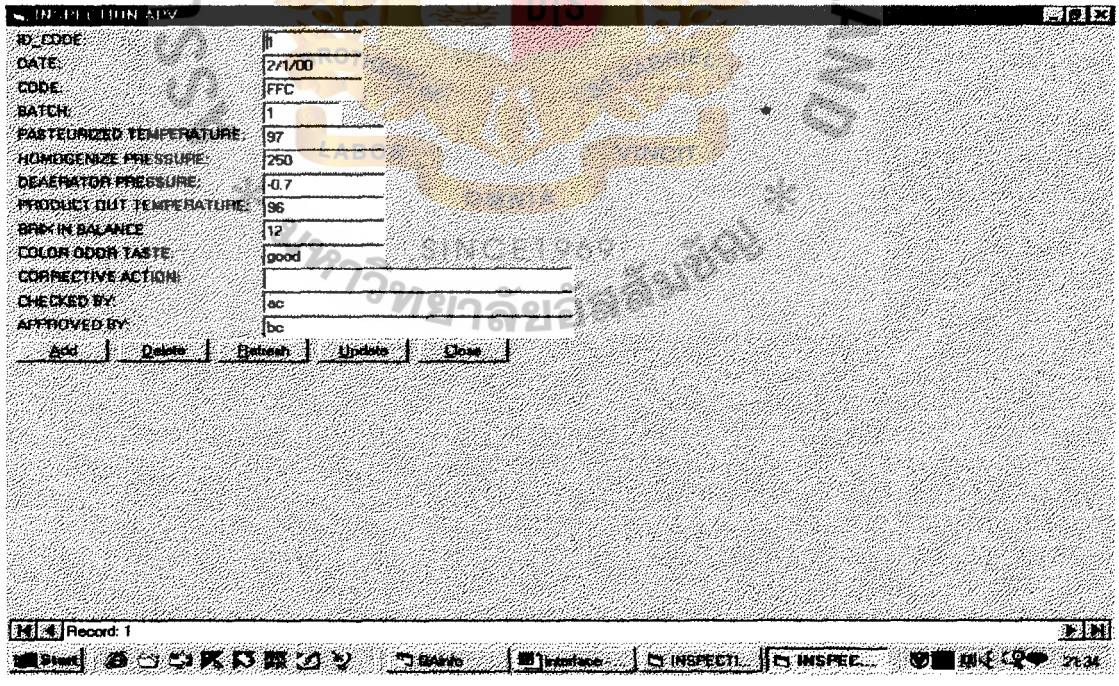

Figure A.18. APV Inspection Input Screen.

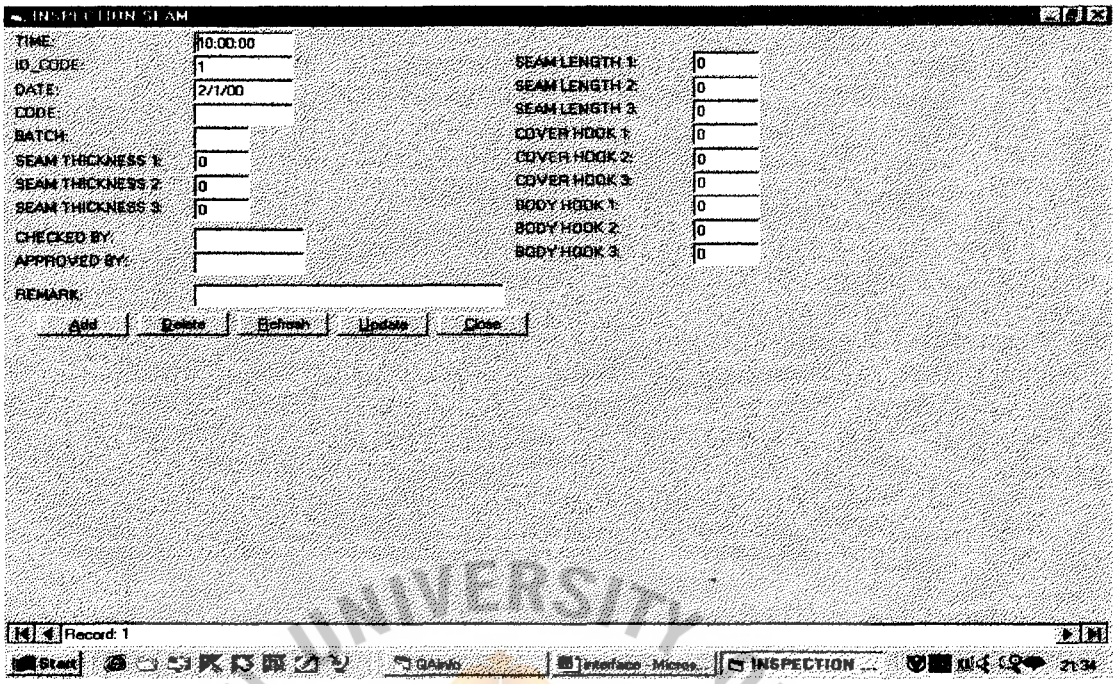

Figure A.19. Seam Inspection Input Screen.

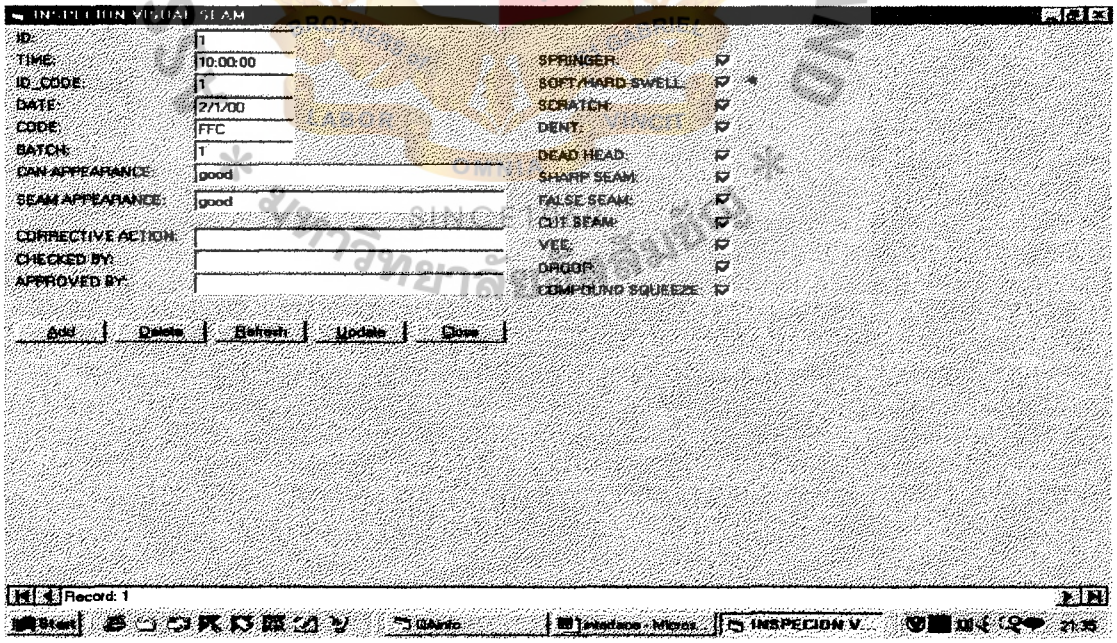

Figure A.20. Visual Seam Inspection Input Screen.

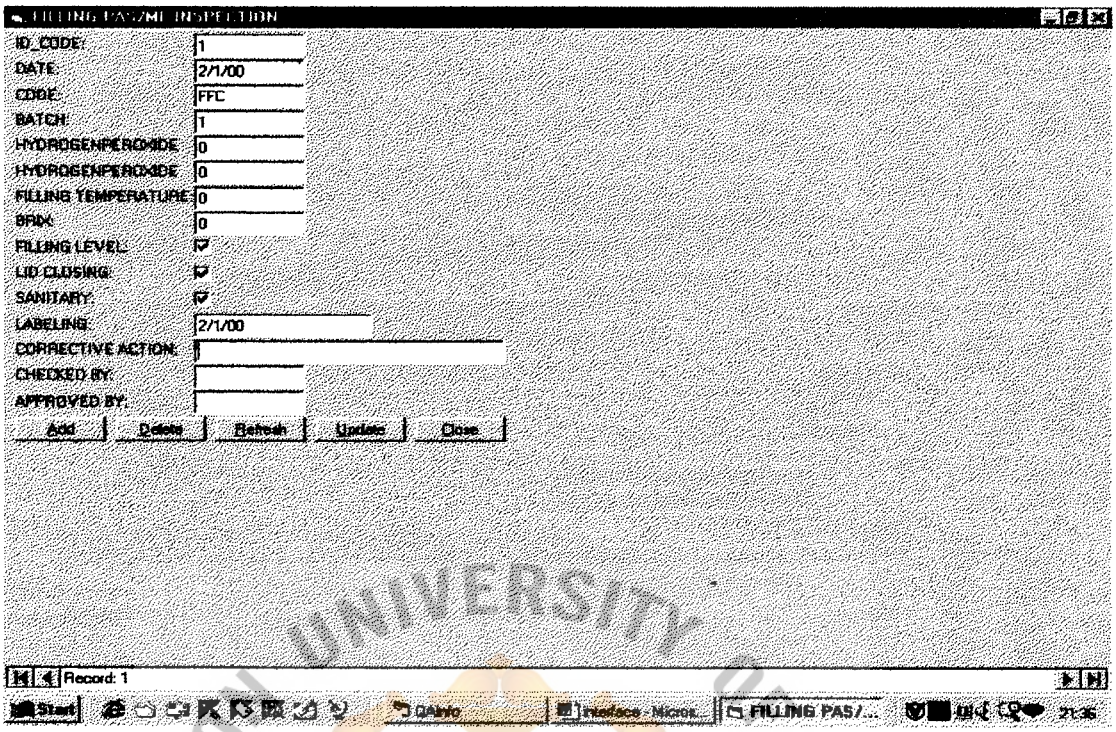

Figure A.21. Filling Pasteurized and Concentrate Inspection Input Screen.

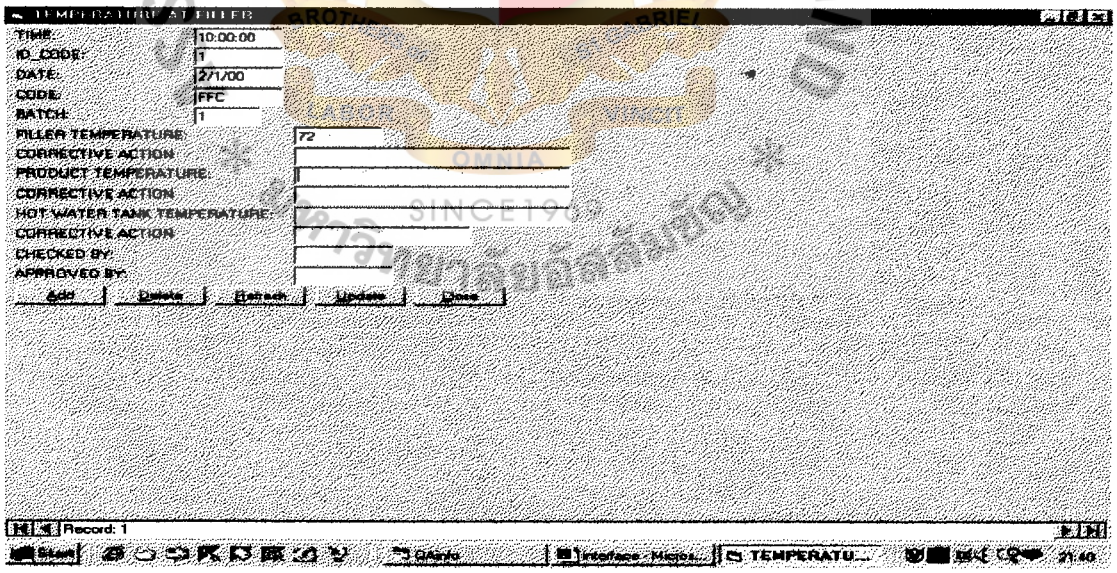

Figure A.22. Temperature at Filler Input Screen.

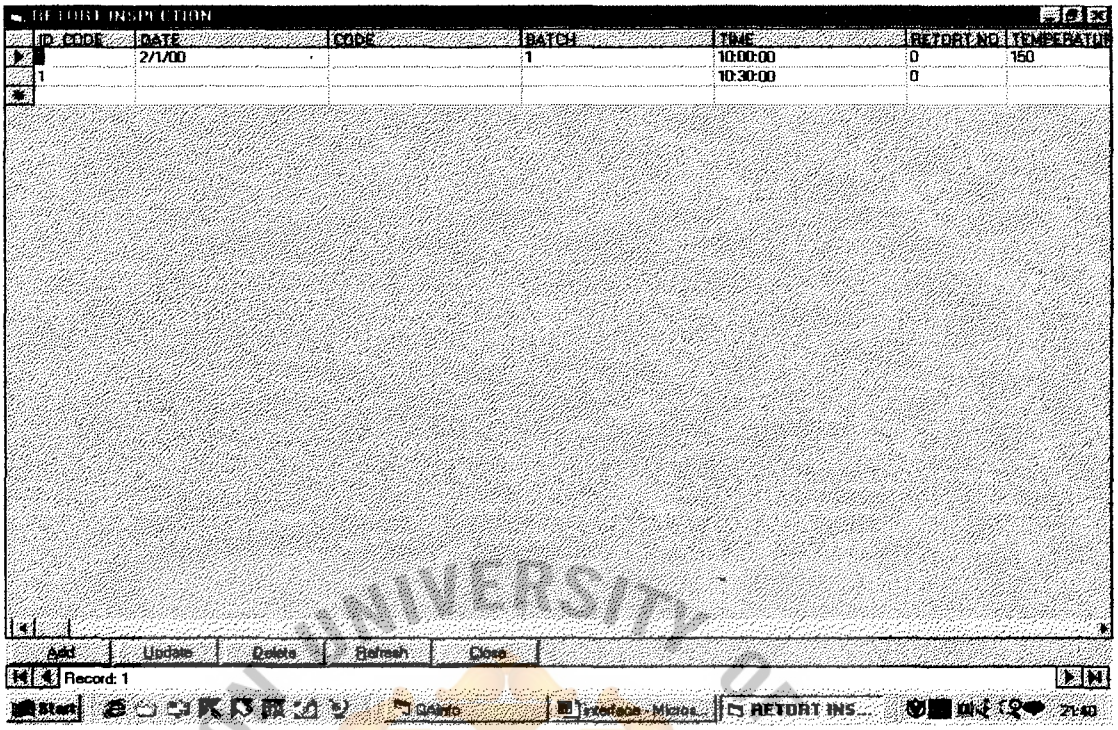

Figure A.23. Retort Inspection Input Screen.

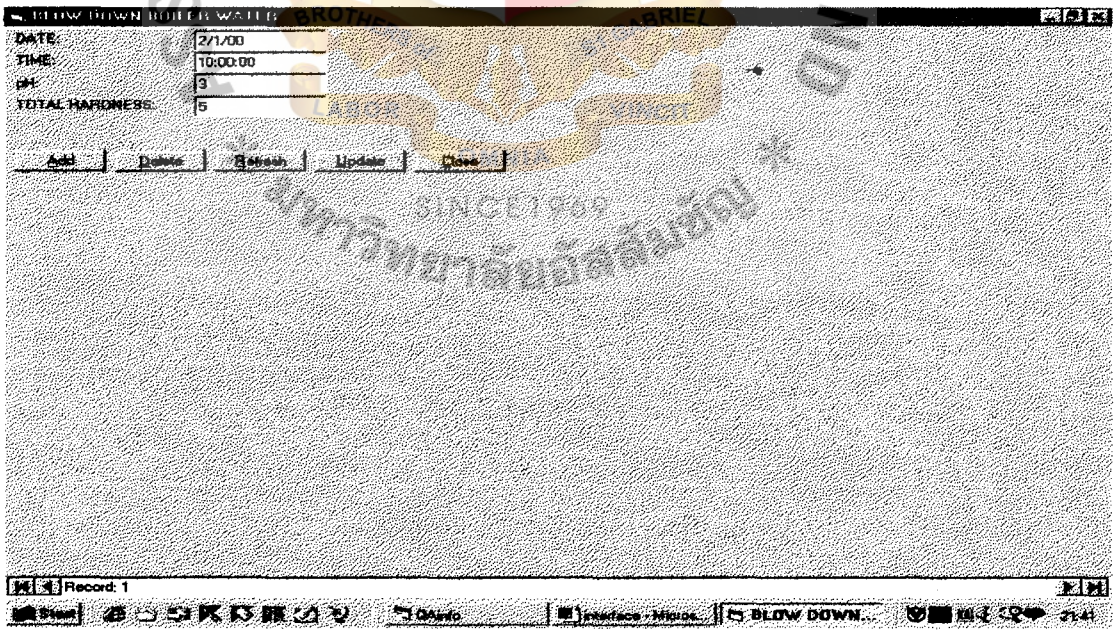

Figure A.24. Blow Down Boiler Water Input Screen.

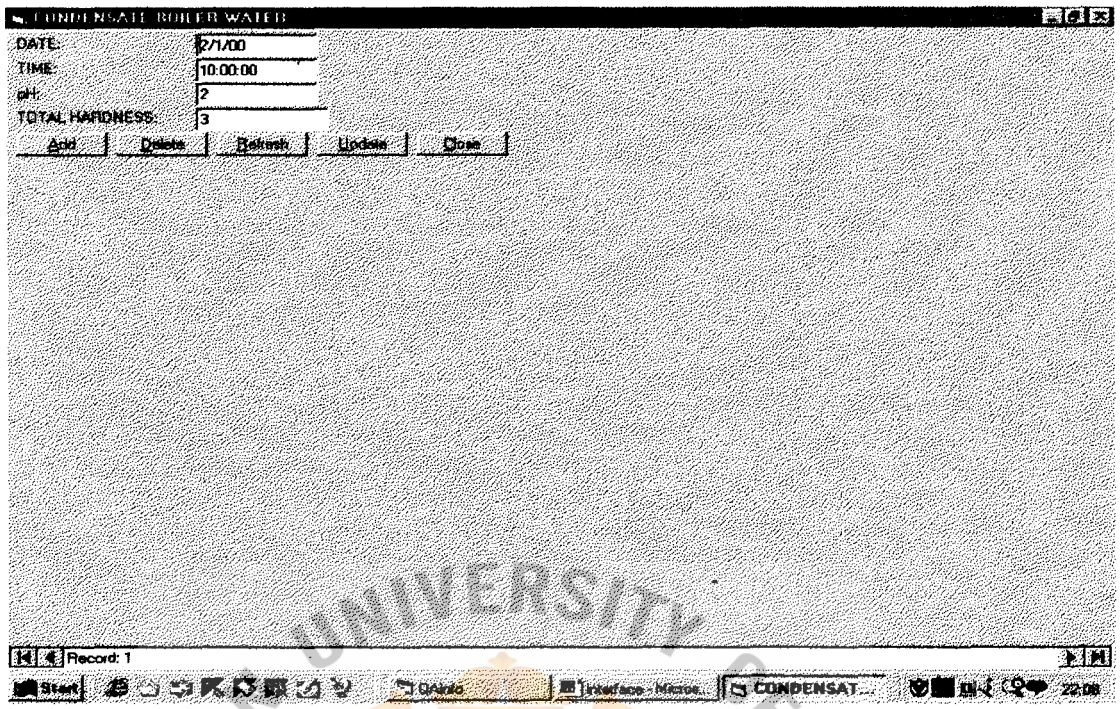

Figure A.25. Condensate Water Input Screen.

Figure A.26. Recycle Water Input Screen.

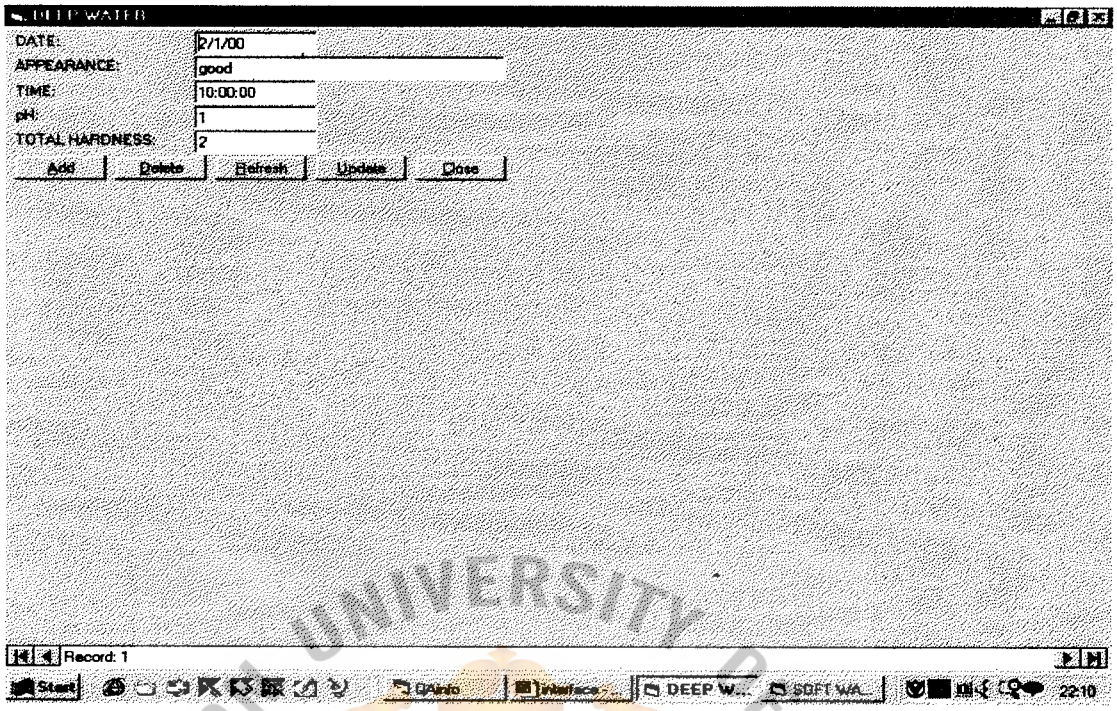

Figure A.27. Deep Water Input Screen.

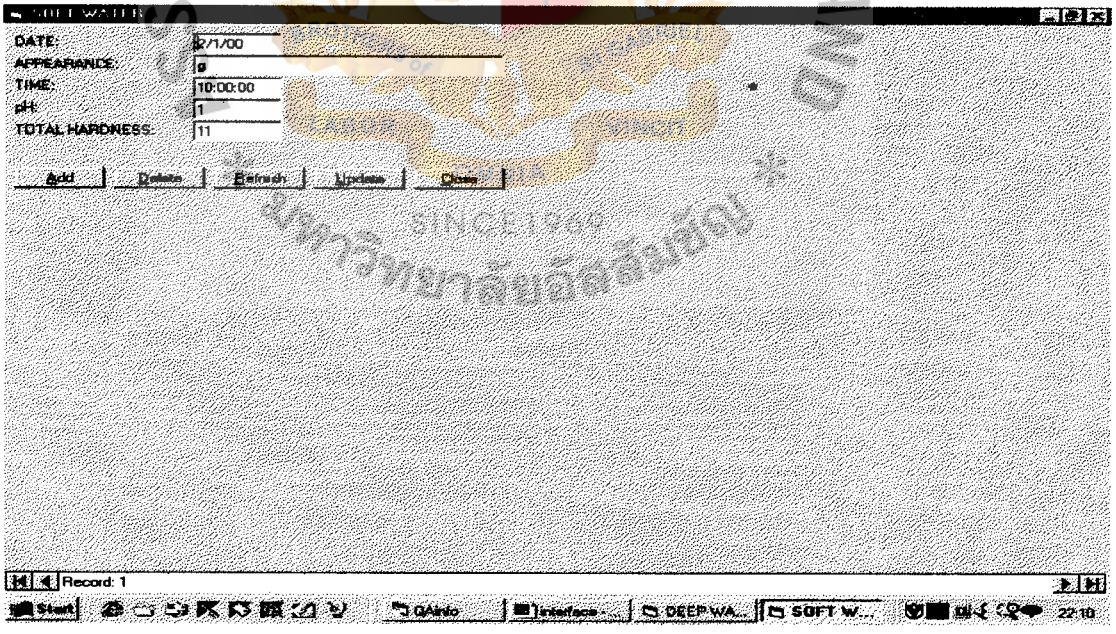

Figure A.28. Soft Water Input Screen.

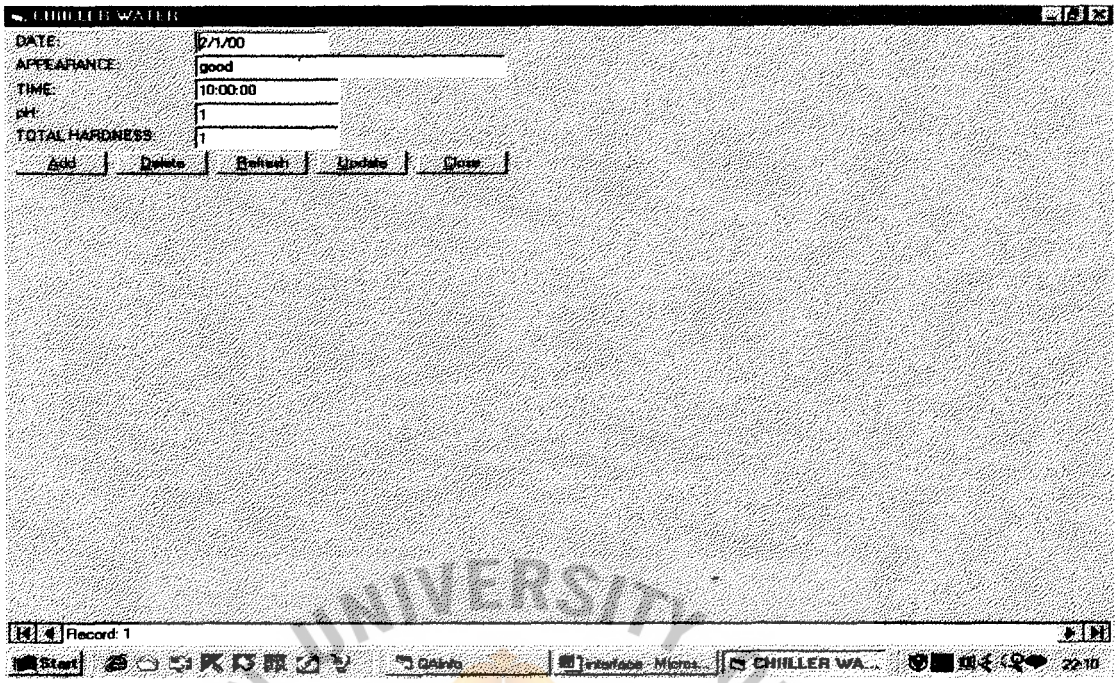

Figure A.29. Chiller Water Input Screen.

Figure A.30. Finished Goods CAN Inspection Input Screen.

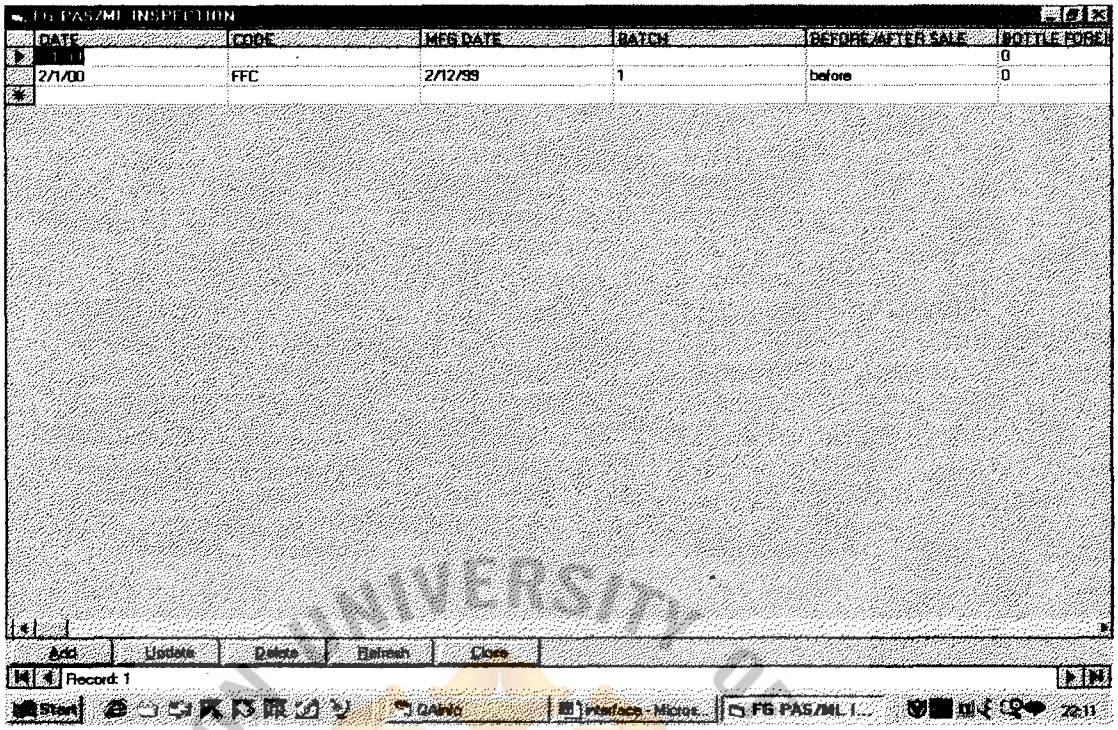

Figure A.31. Finished Goods Pasteurized and Concentrate Inspection Input Screen.

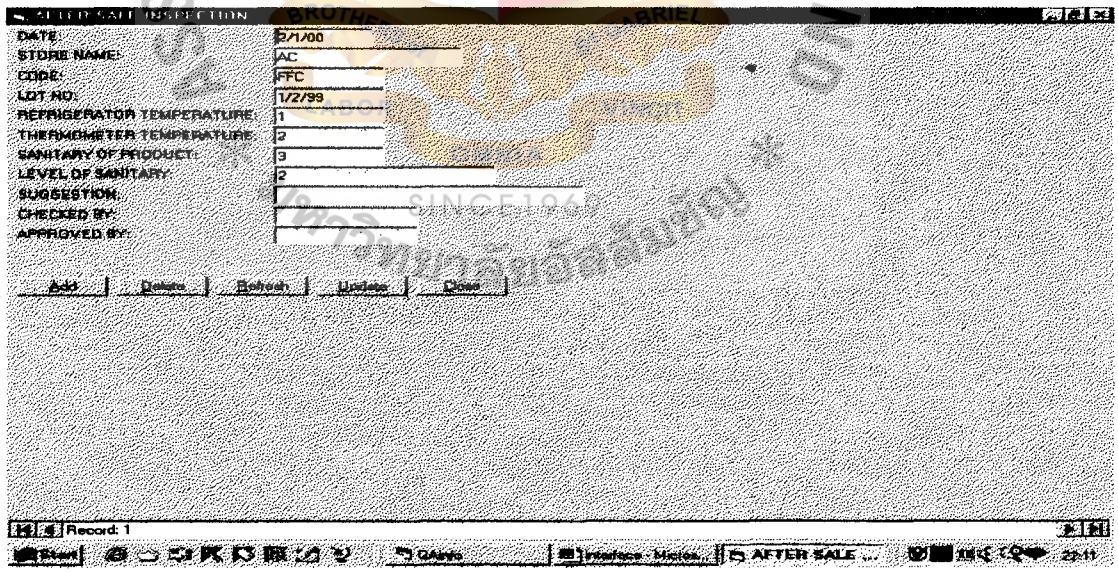

Figure A.32. After Sale Inspection Input Screen.

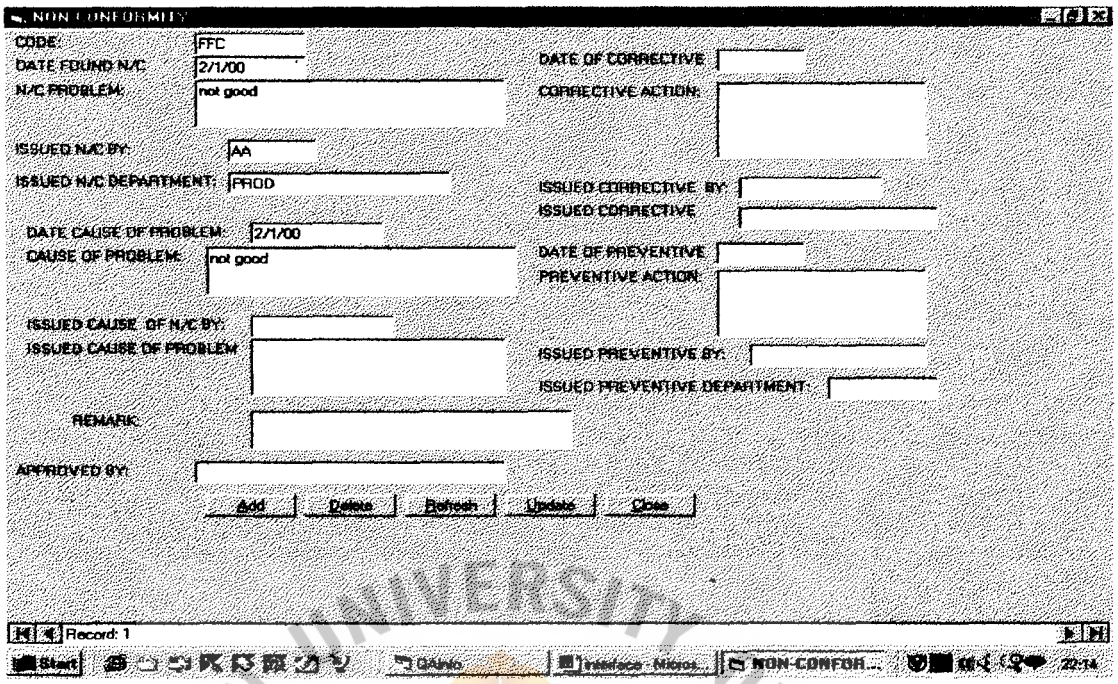

Figure A.33. Non-Conformity Input Screen.

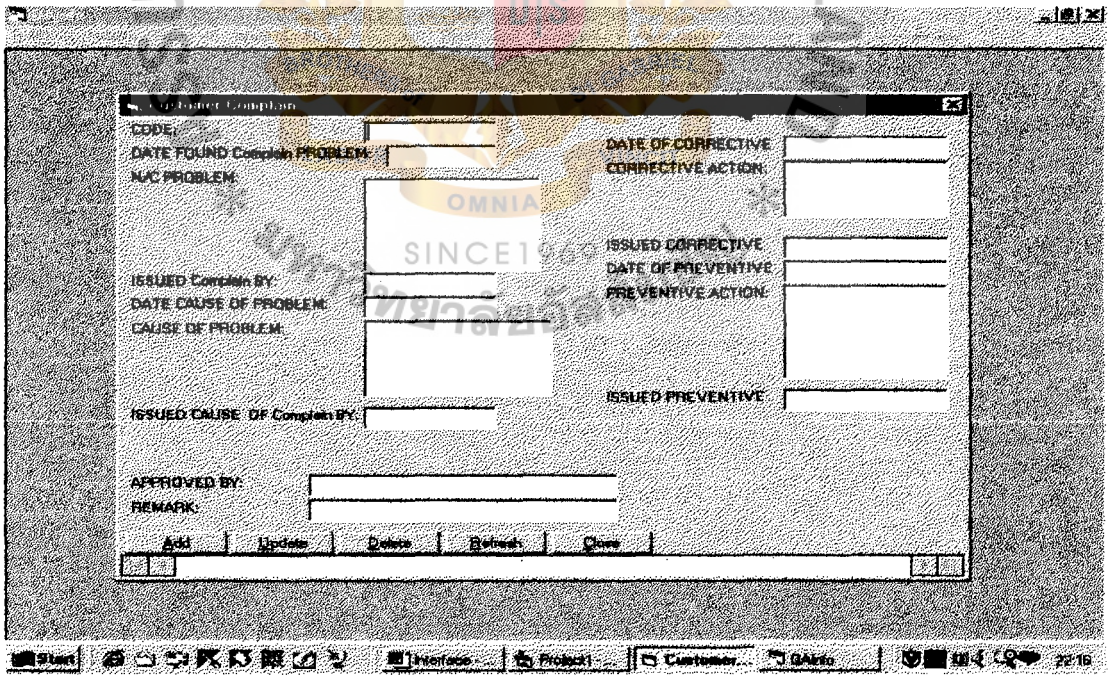

Figure A.34. Customer Complain Input Screen.

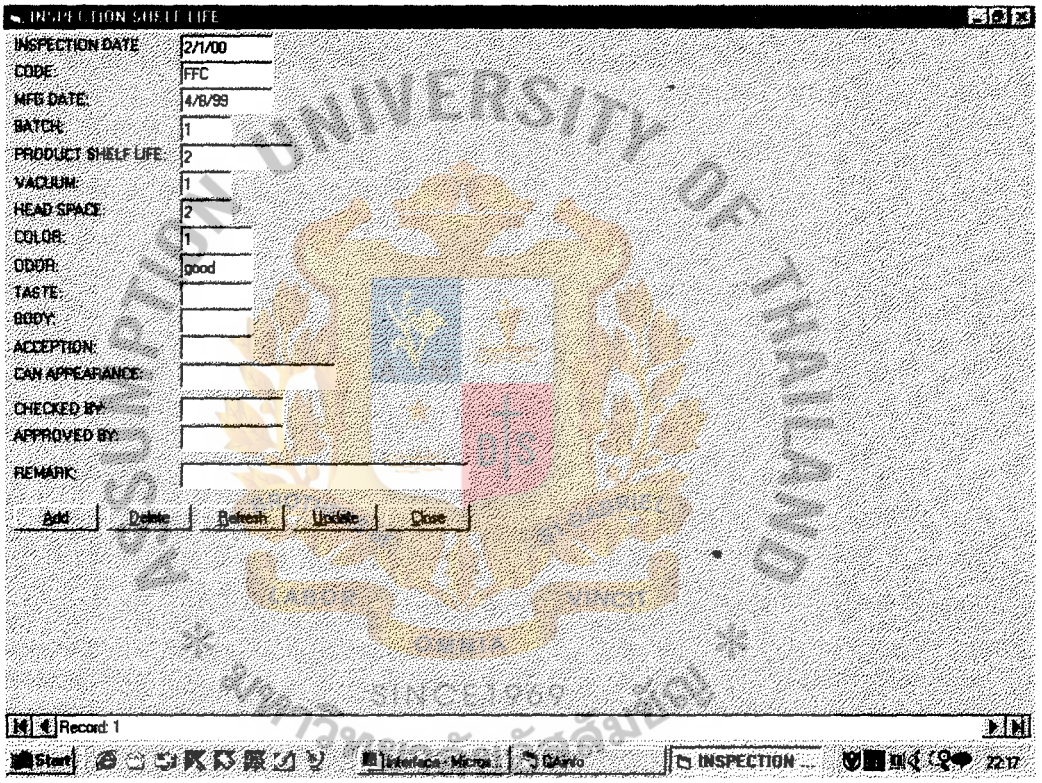

Figure A.35. Shelf Life Input Screen.

OUTPUT DESIGN

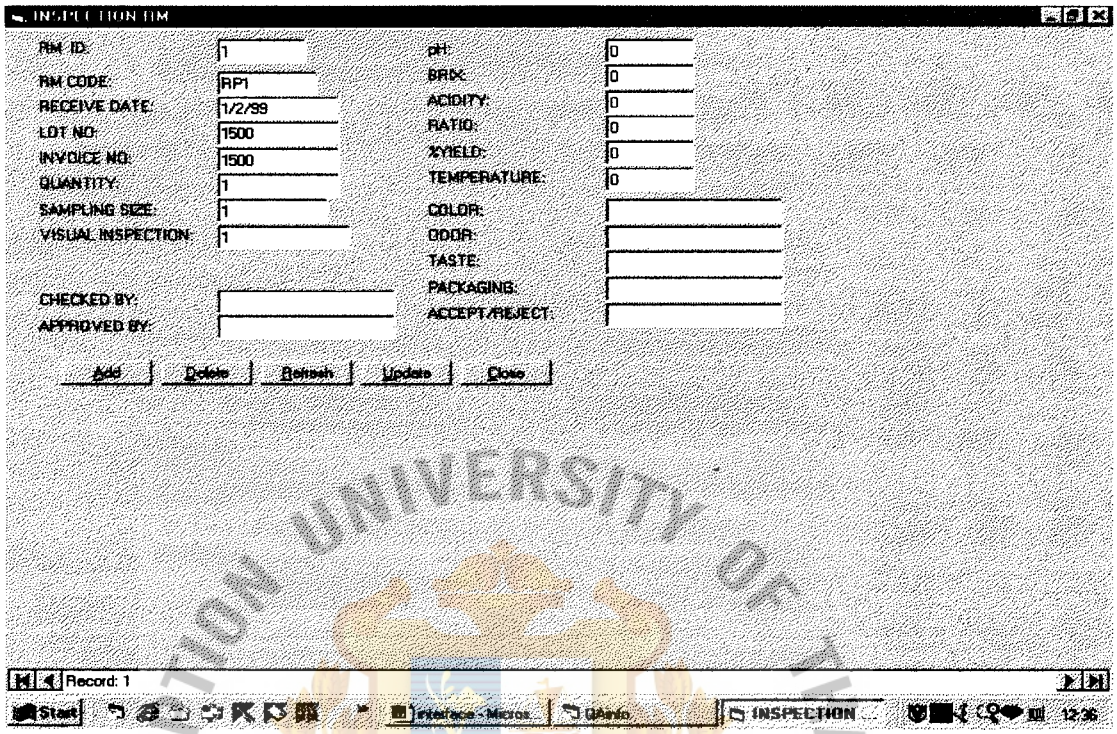

Figure A.36. Raw Material Output Screen.

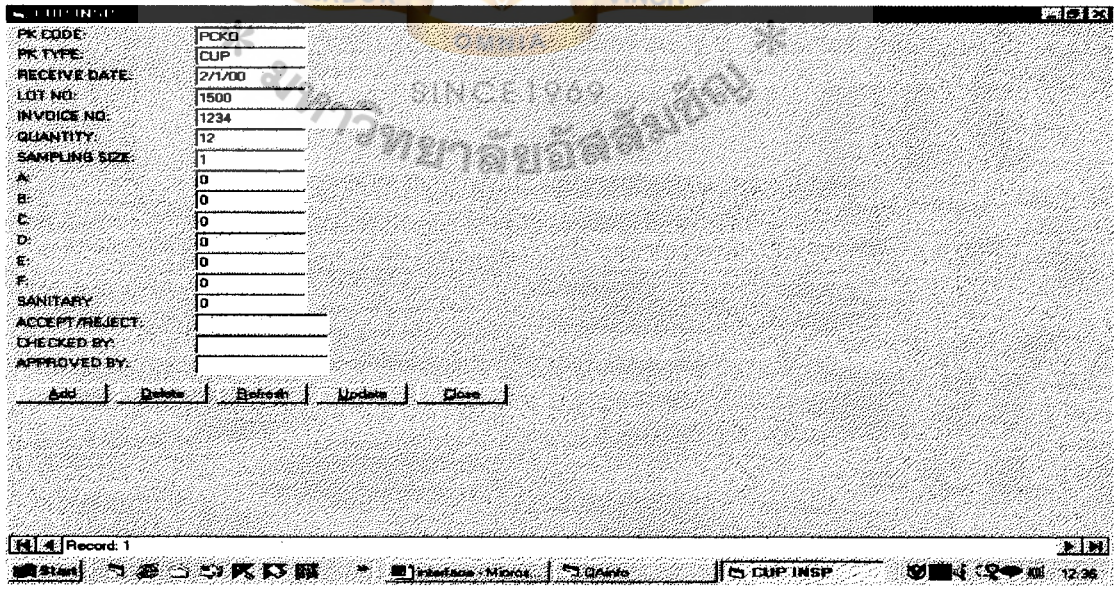

Figure A.37. Packaging CUP Output Screen.

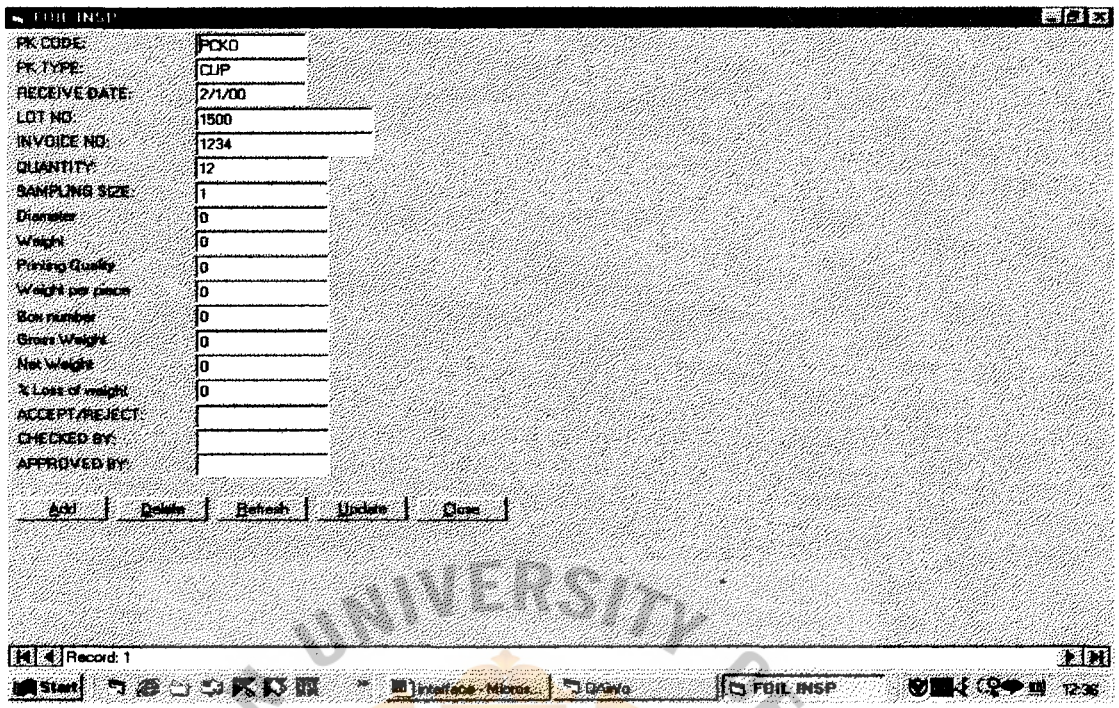

Figure A.38. Packaging Foil Output Screen.

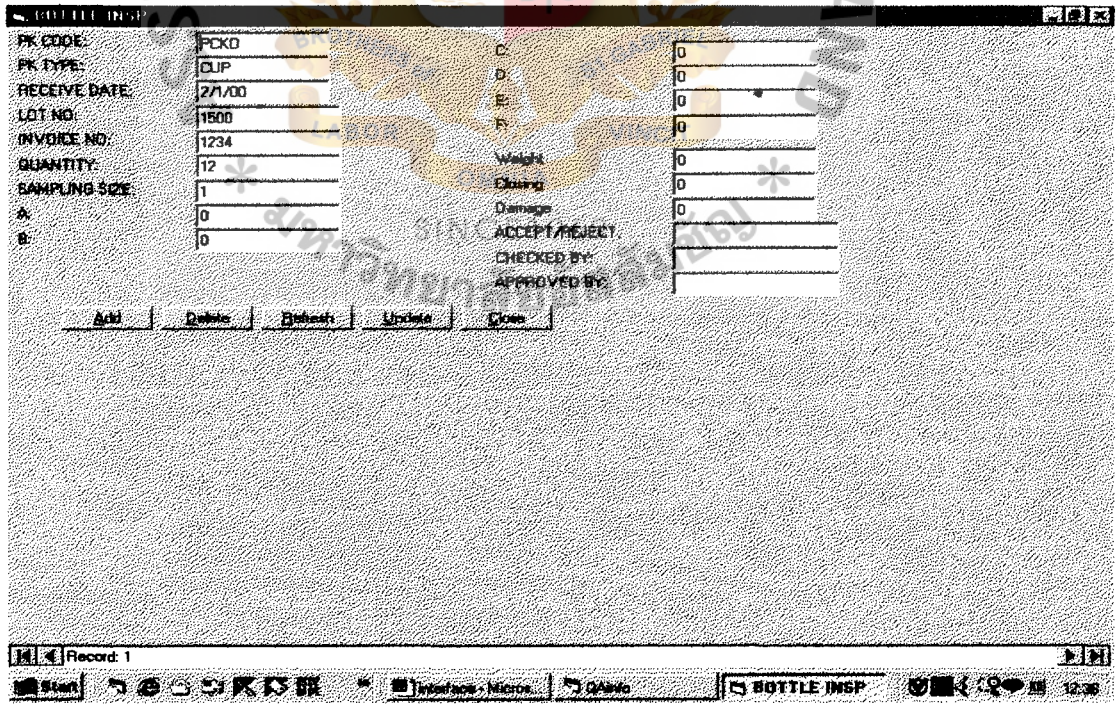

Figure A.39. Packaging Bottle Output Screen.

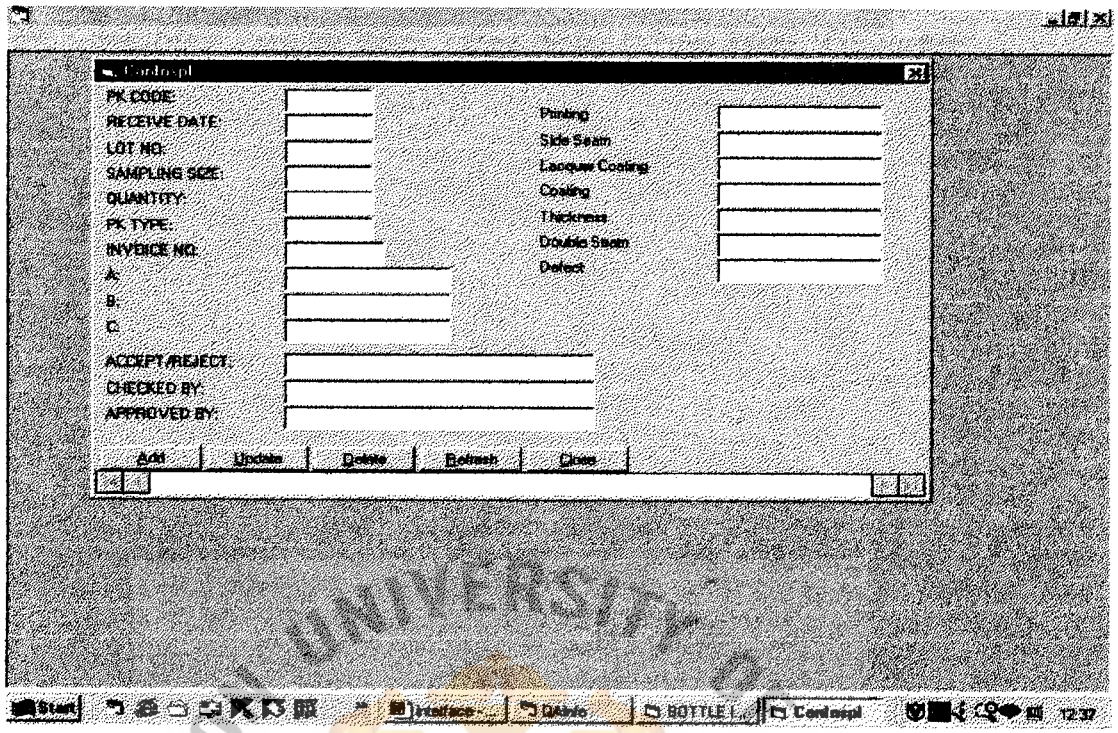

Figure A.40. Packaging CAN Output Screen.

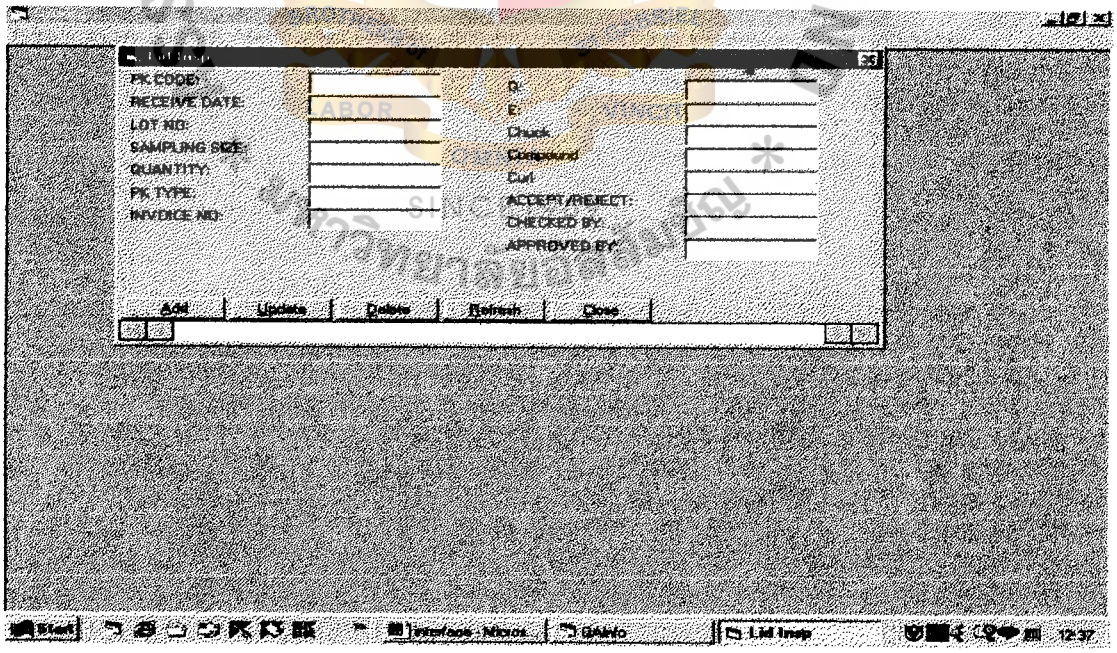

Figure A.41. Packaging LID Output Screen.

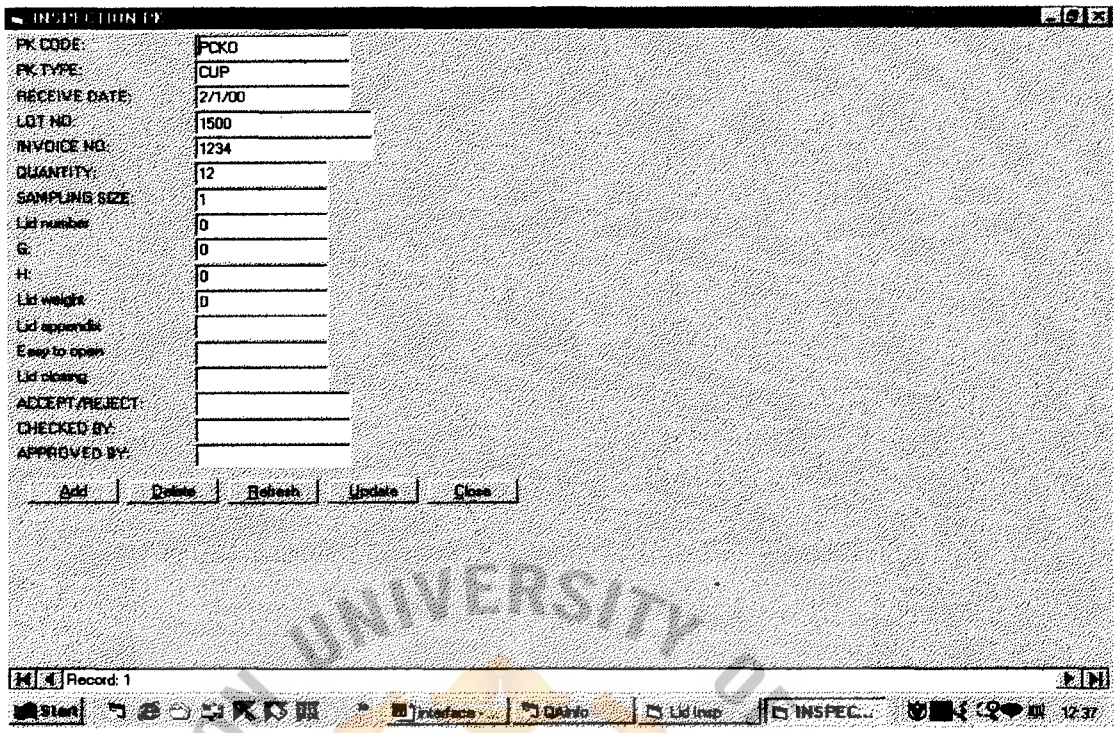

Figure A.42. Packaging LID Bottle Output Screen.

Figure A.43. Packaging SHF Output Screen.

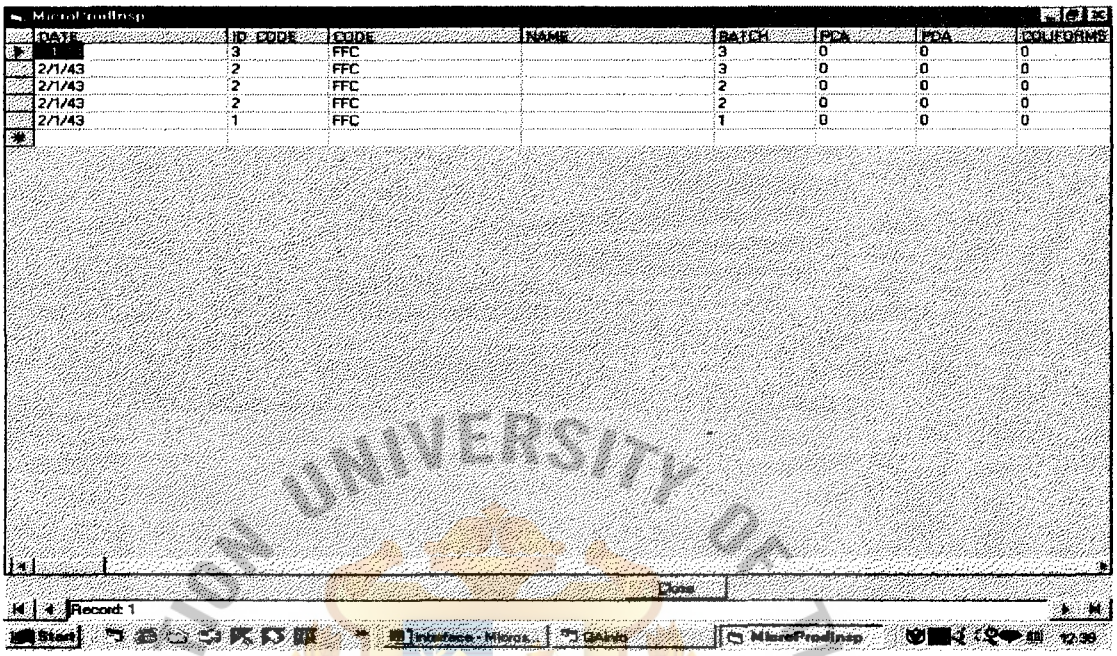

Figure A.44. Microbiology Inspection for Low Acid Food Output Screen.

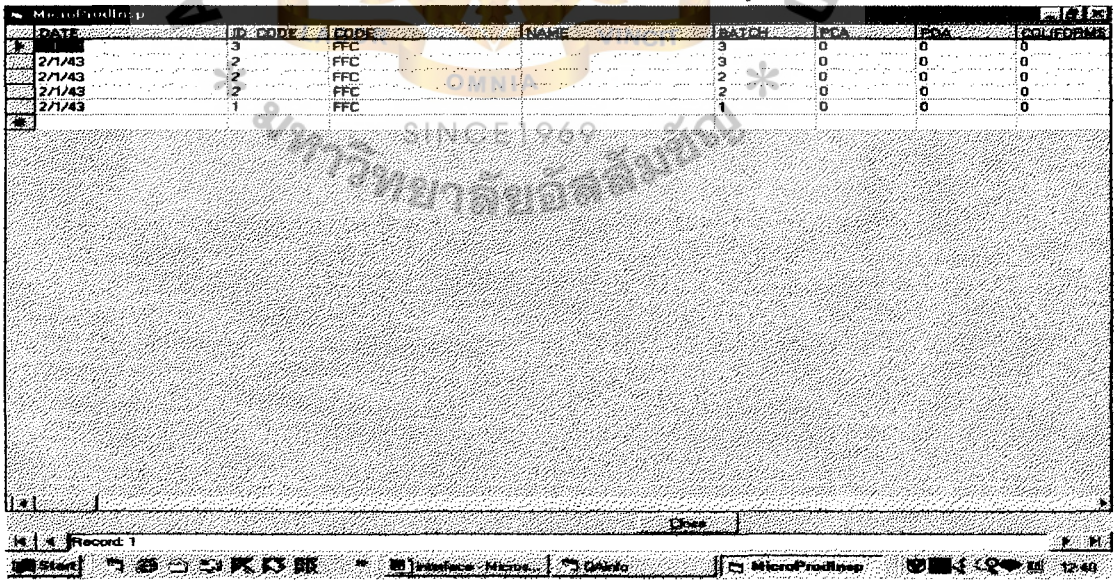

Figure A.45. Microbiology for Acid Food Output Screen.

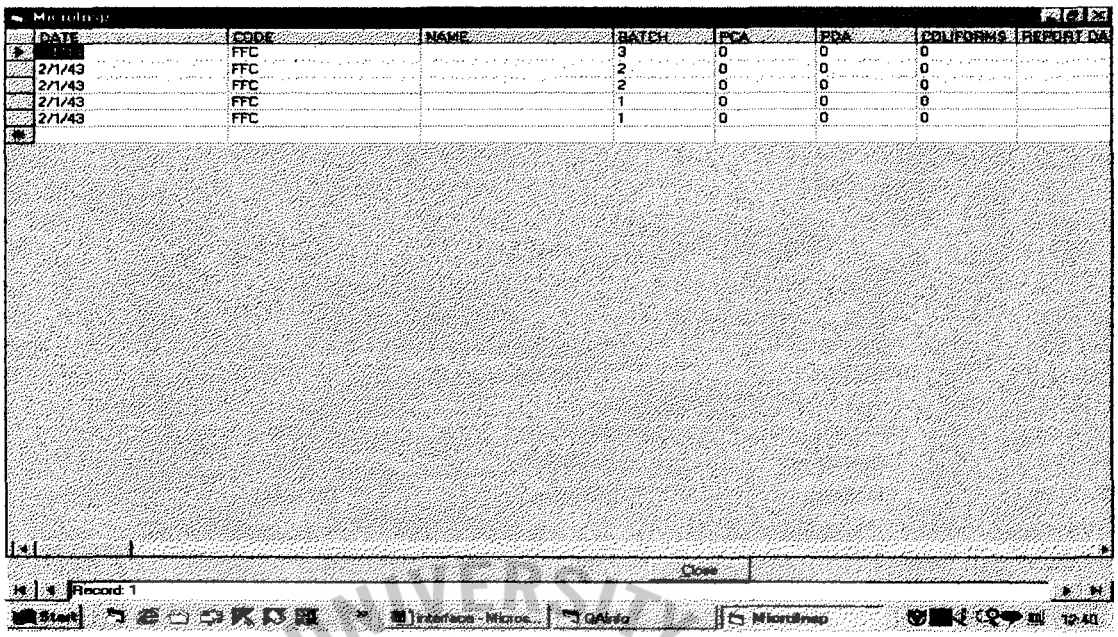

Figure A.46. Microbiology for Inline Output Screen.

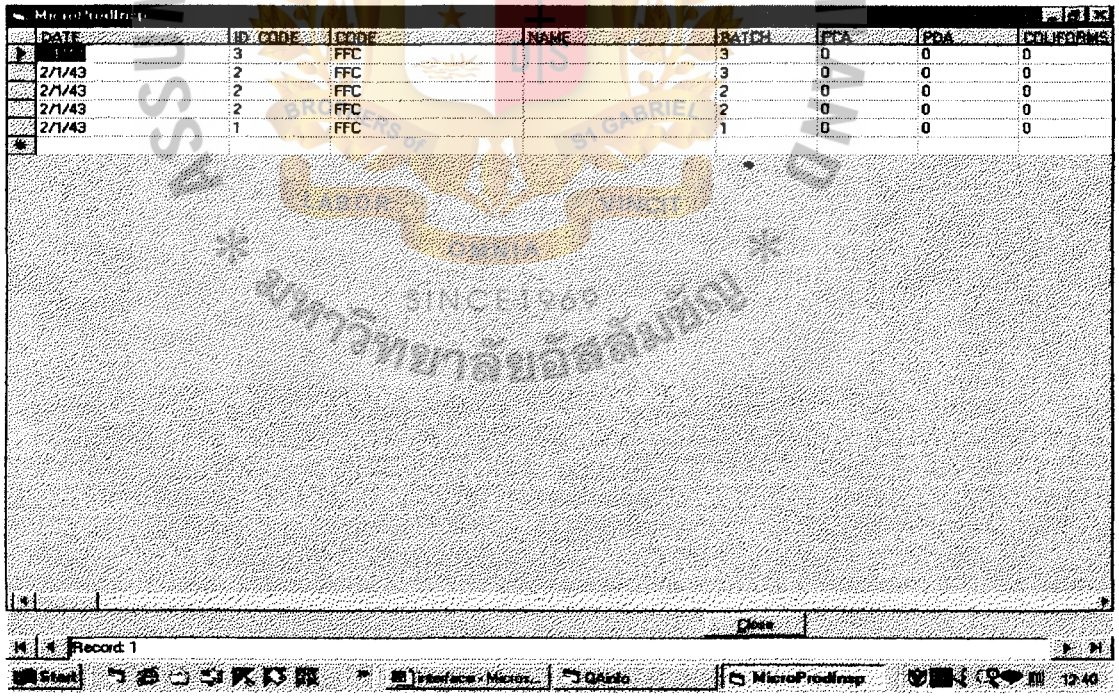

Figure A.47. Microbiology for Pasteurized and Concentrate Product Output Screen.

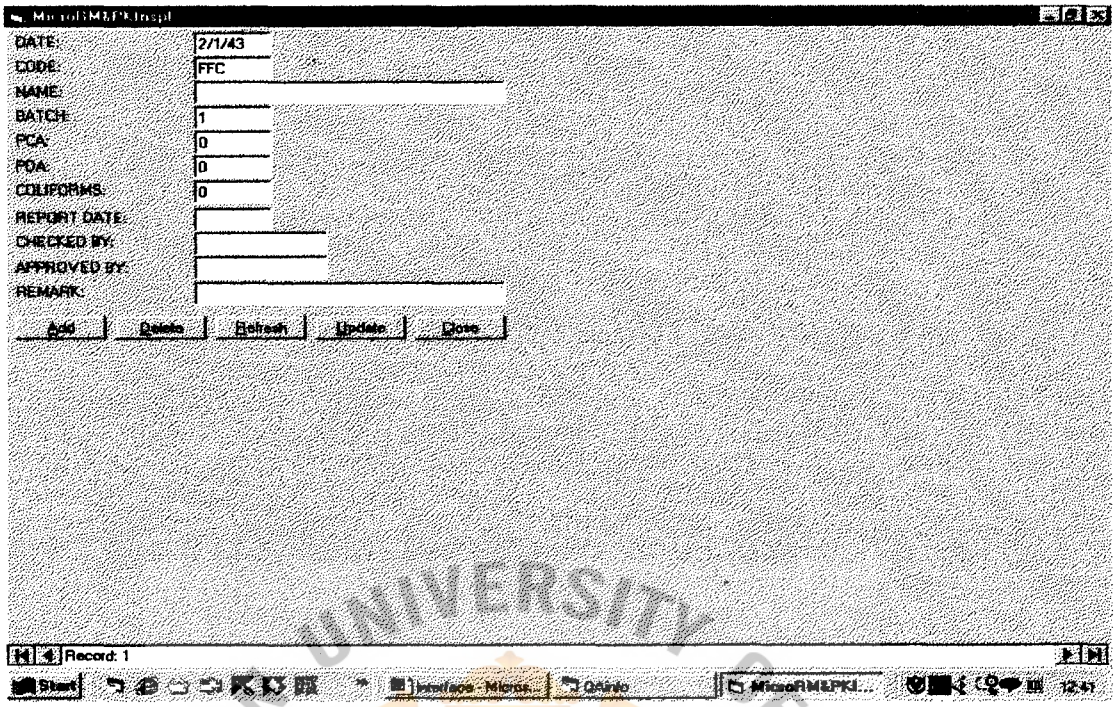

Figure A.48. Microbiology for Raw Material and Packaging Output Screen.

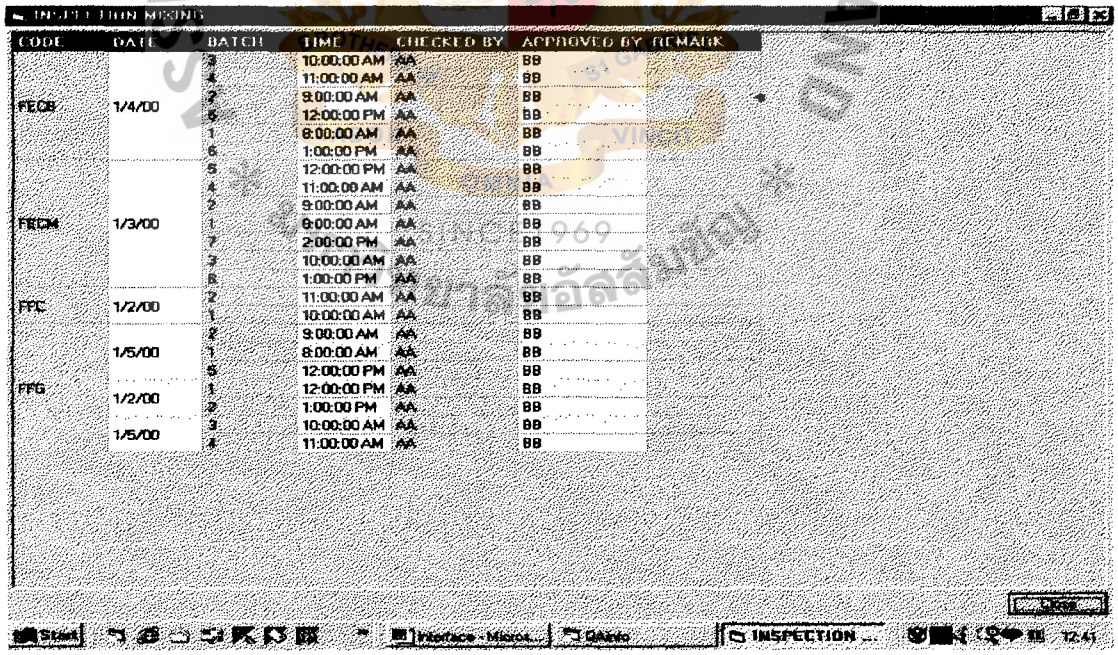

Figure A.49. Mixing Inspection Output Screen.

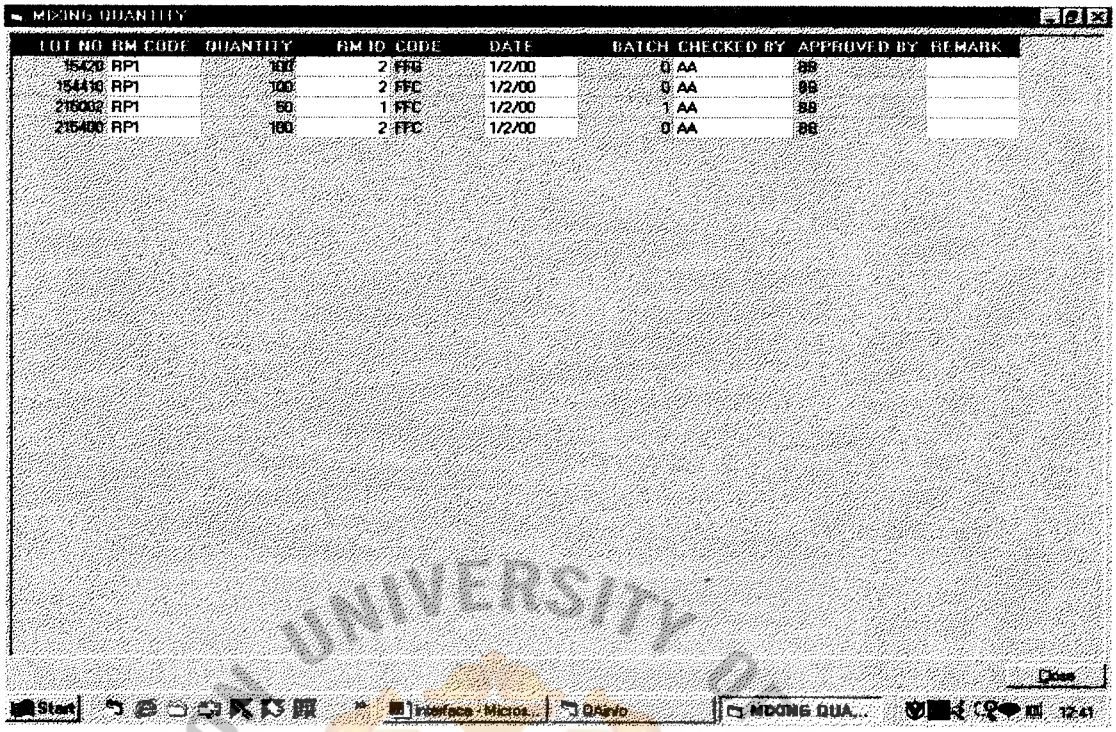

Figure A.50. Mixing Quantity Inspection Output Screen.

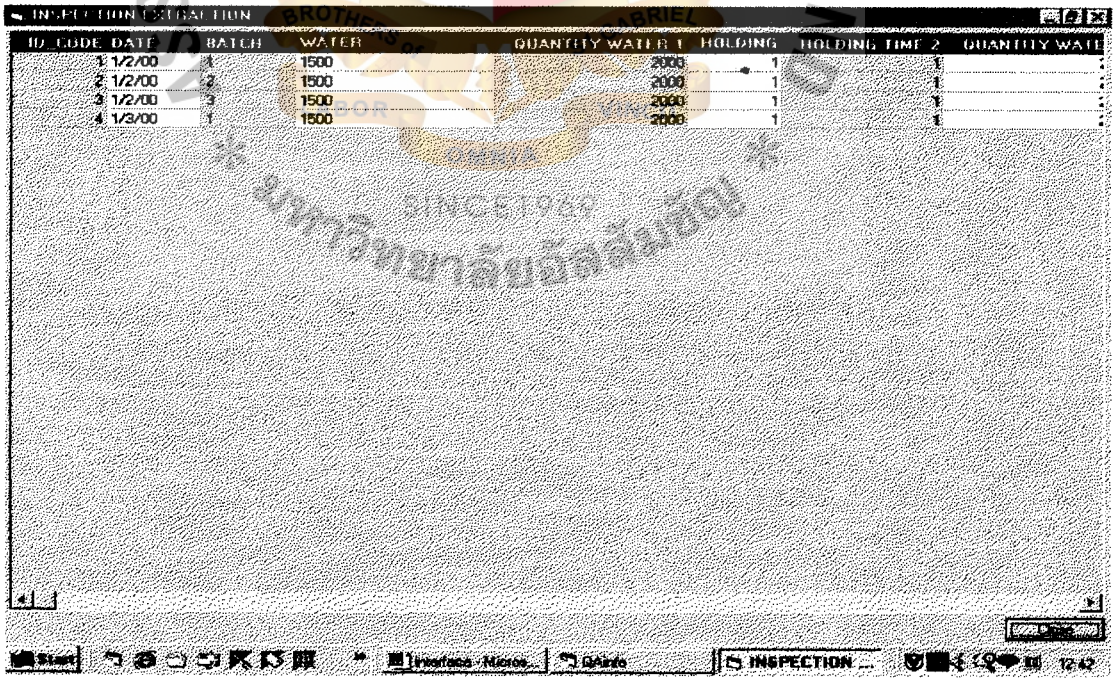

Figure A.51. Extraction Inspection Output Screen.

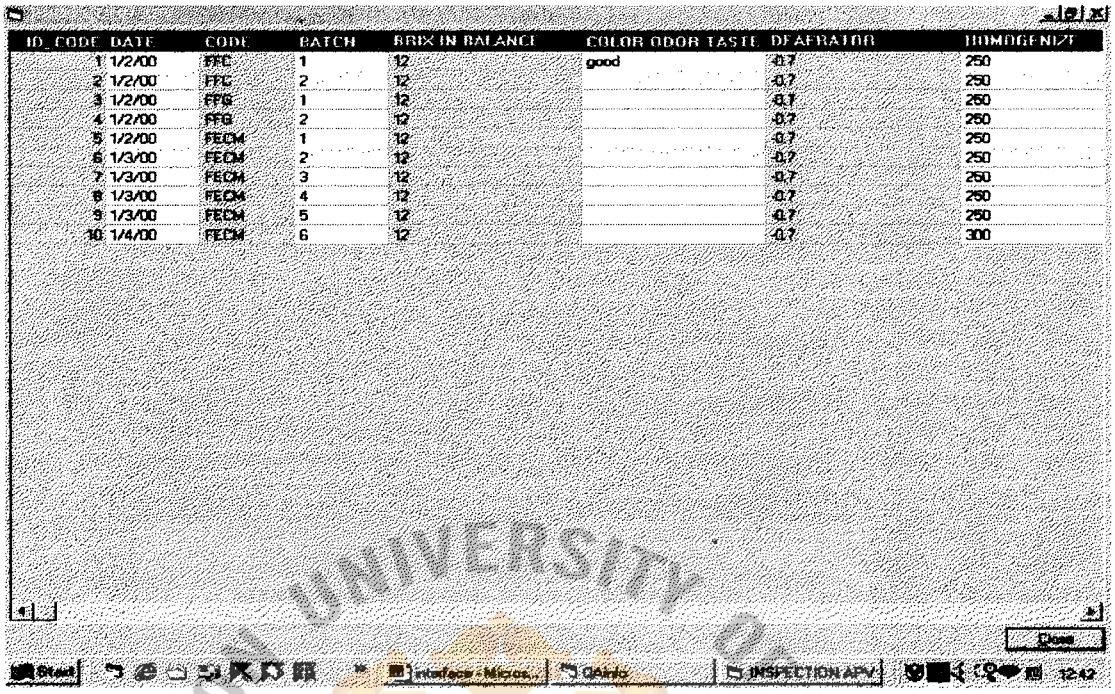

Figure A.52. APV Inspection Output Screen.

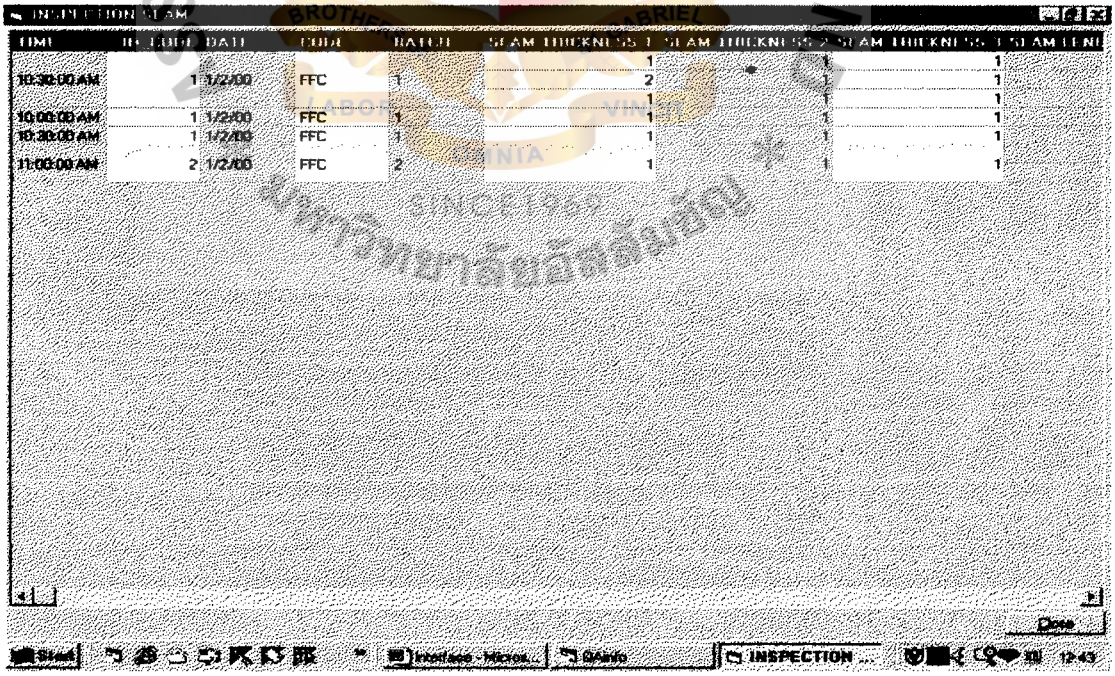

Figure A.53. Seam Inspection Output Screen.

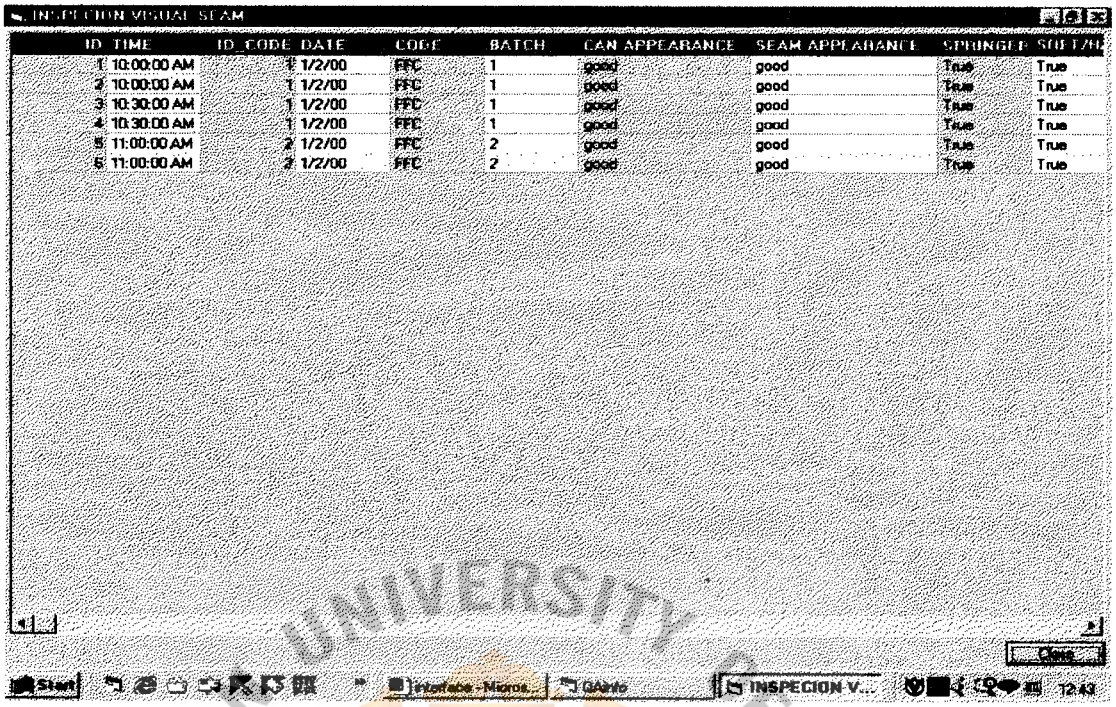

Figure A.54. Visual Seam Inspection Output Screen.

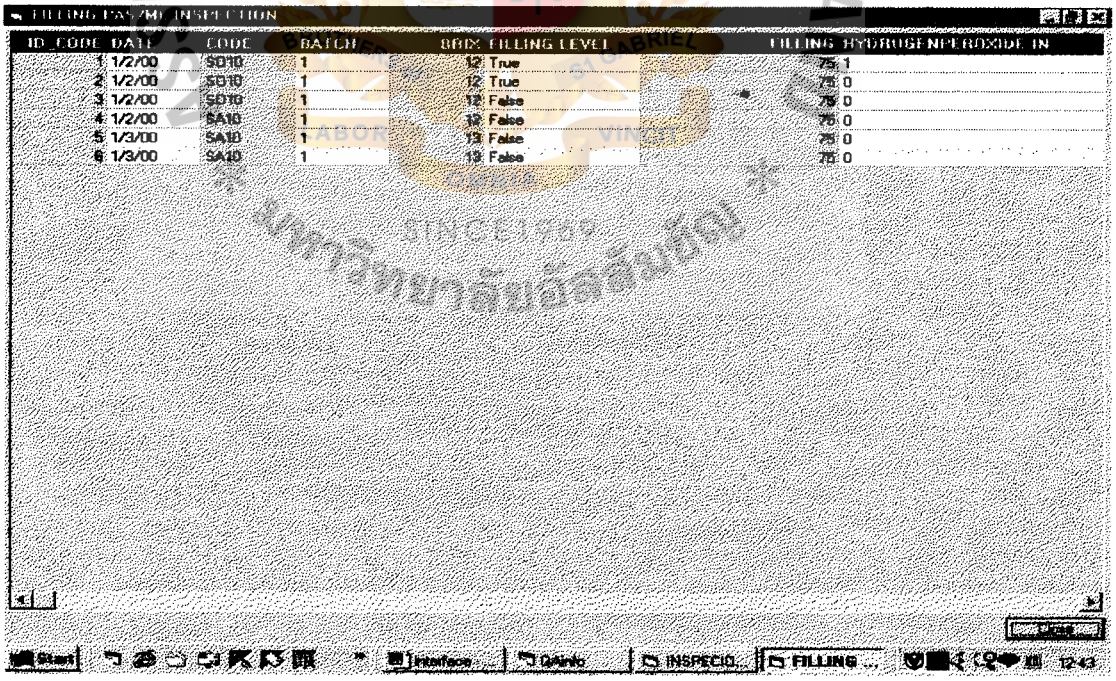

Figure A.55. Filling Pasteurized and Concentrate Inspection Output Screen

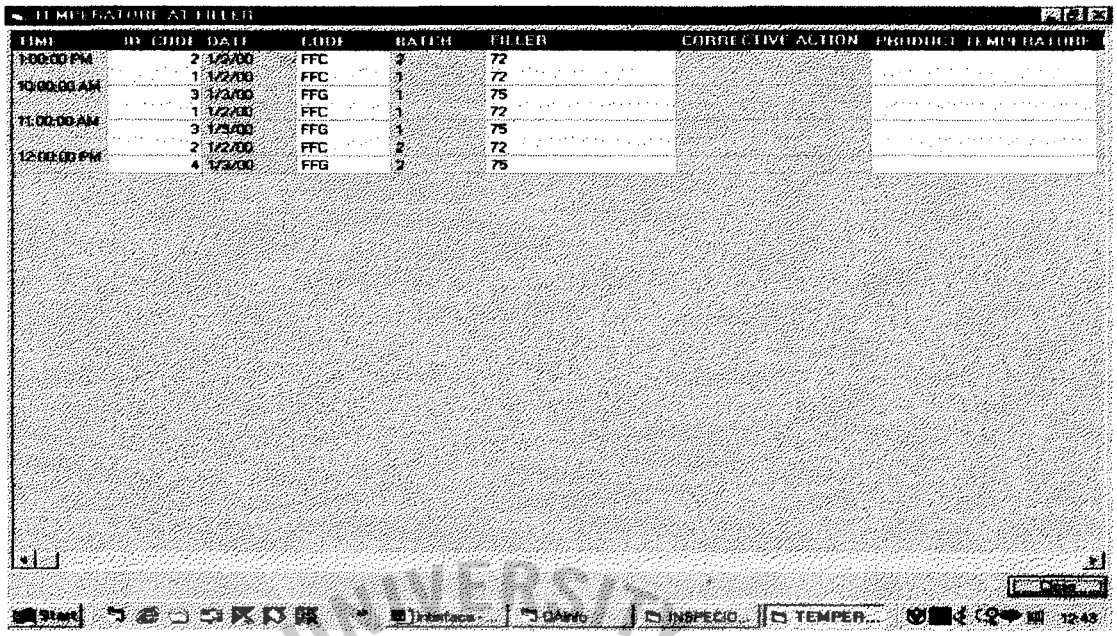

Figure A.56. Temperature at Filler Output Screen.

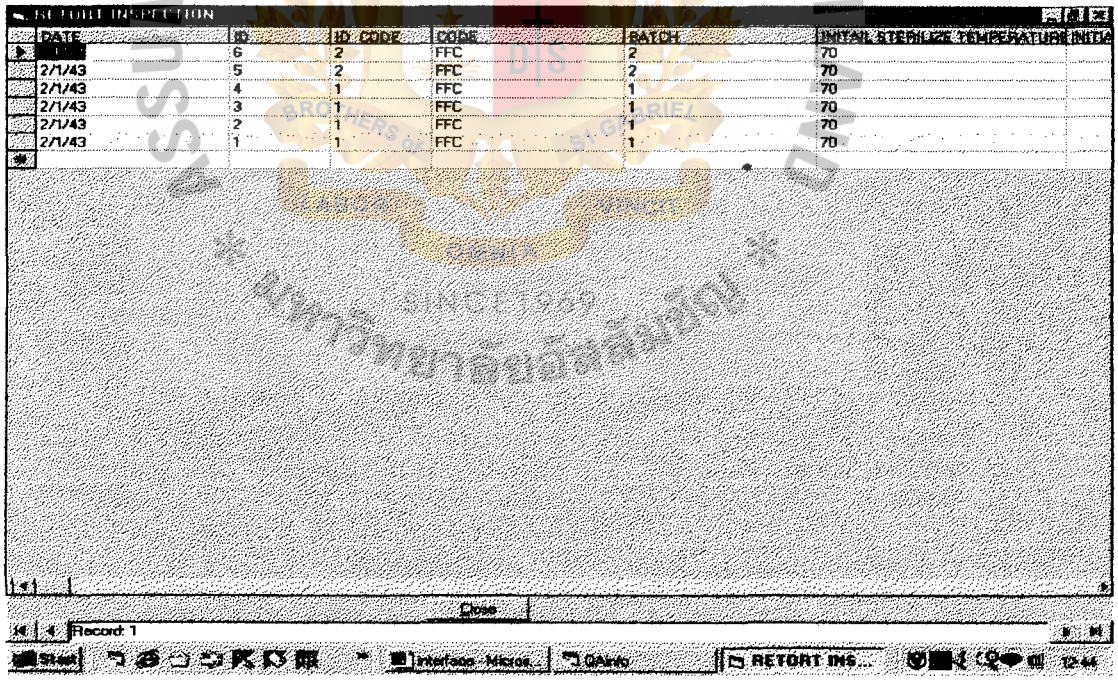

Figure A.57. Retort Inspection Output Screen.

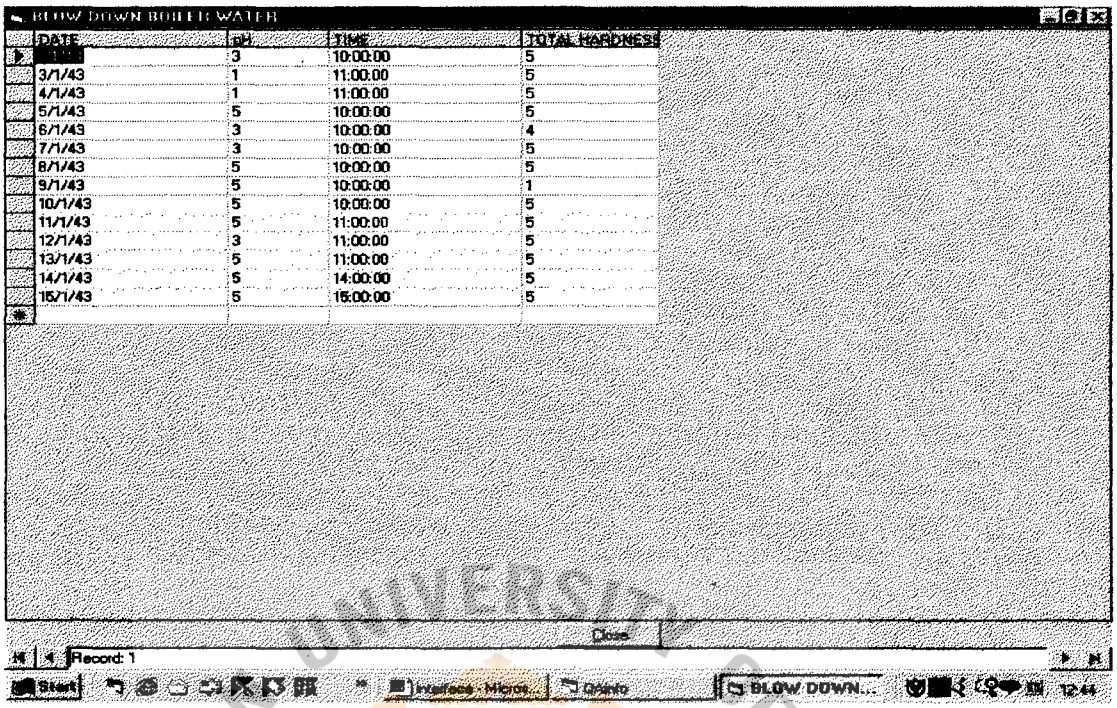

Figure A.58. Blow Down Boiler Water Output Screen.

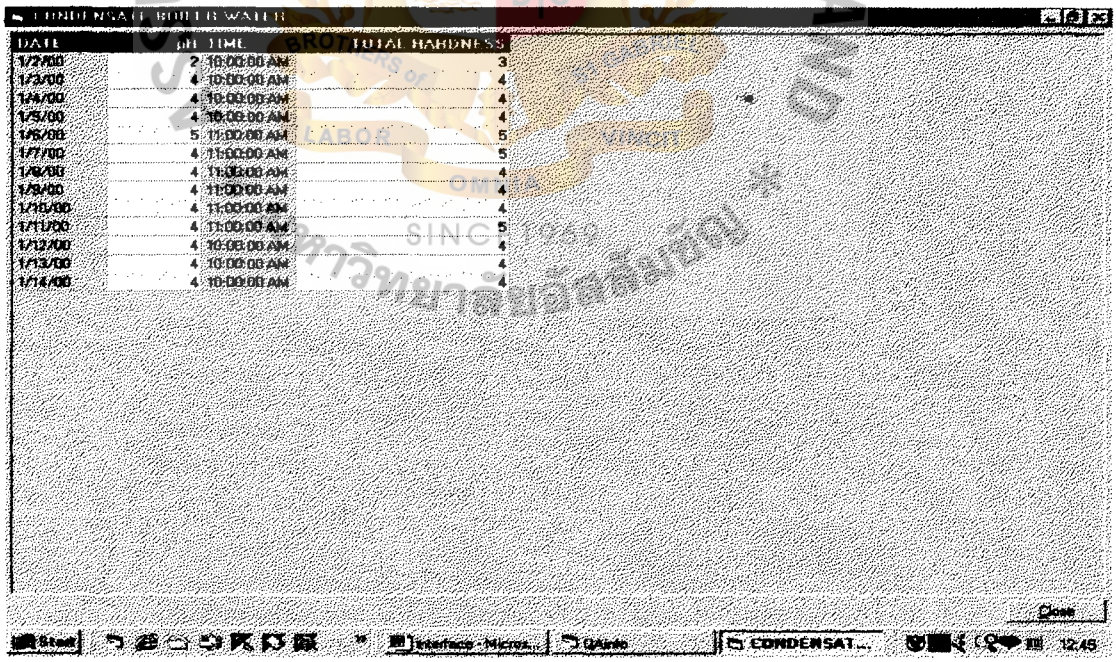

Figure A.59. Condensate Water Output Screen.

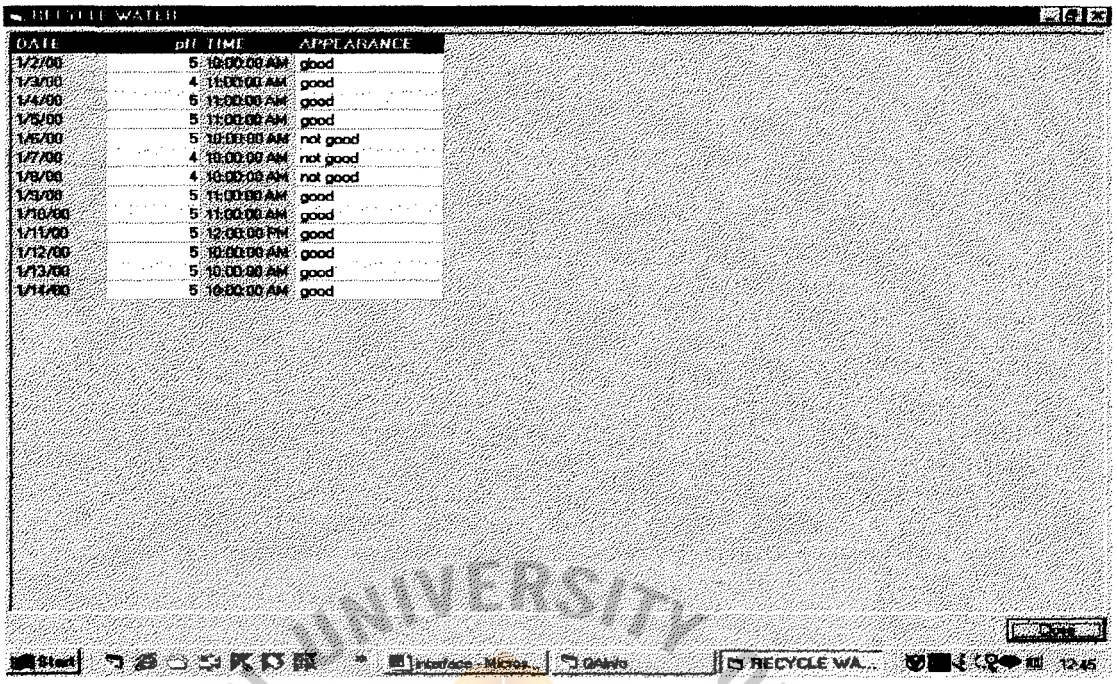

Figure A.60. Recycle Water Output Screen.

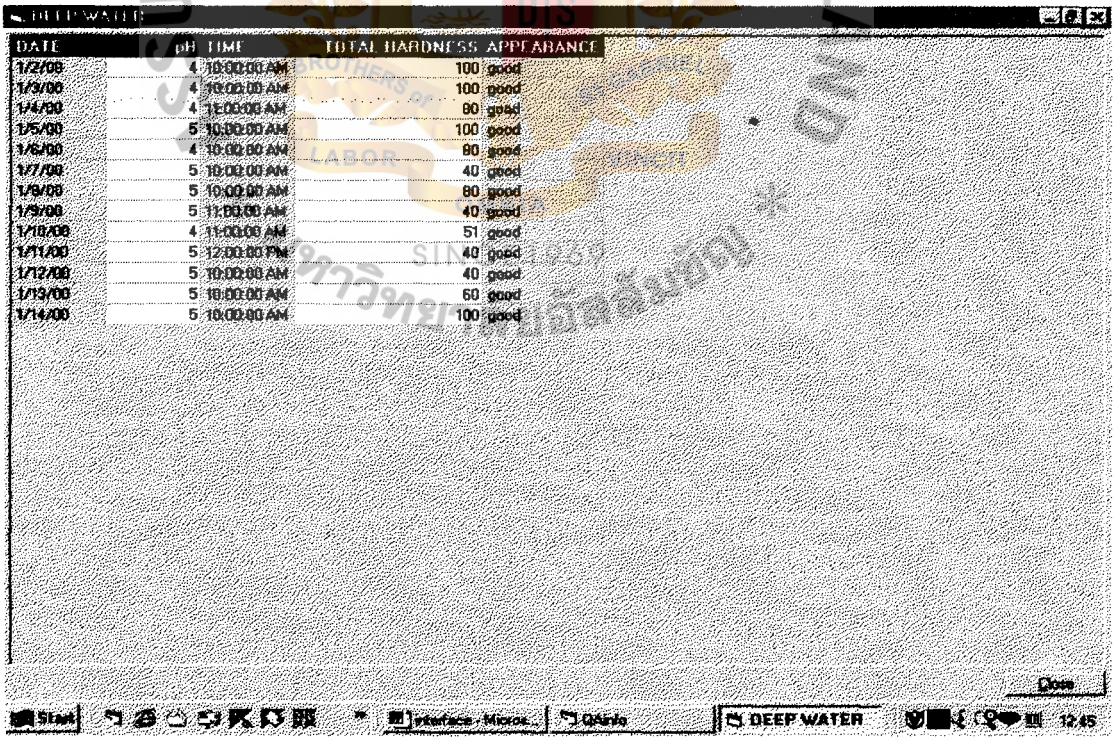

Figure A.61. Deep Water Output Screen.

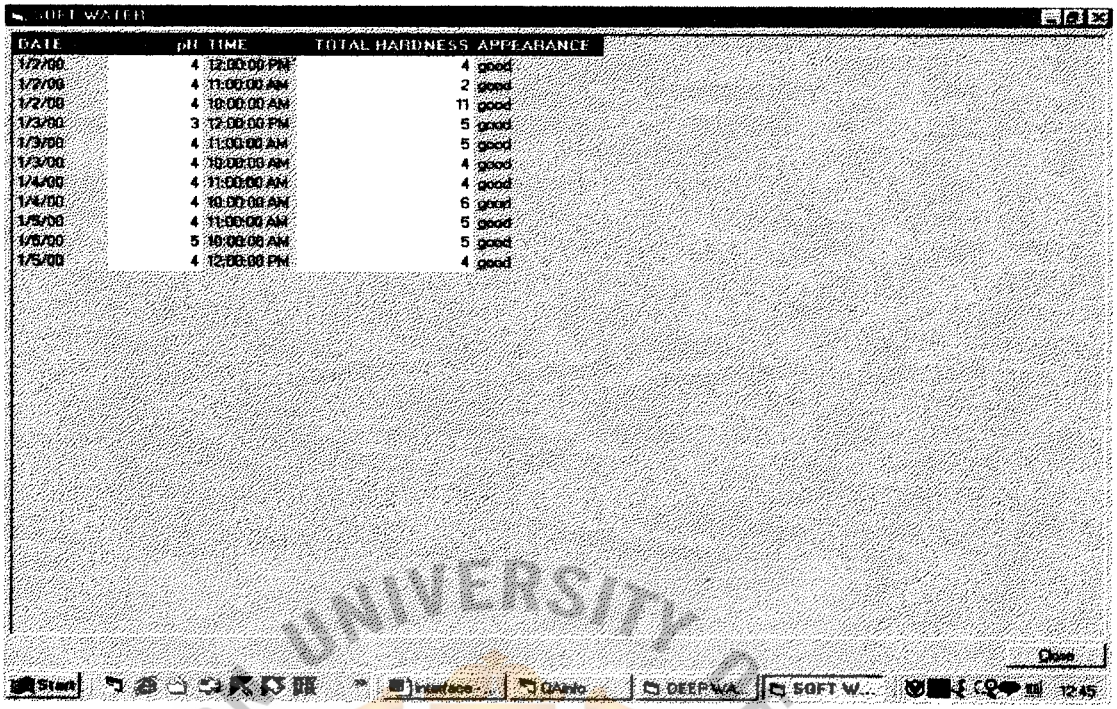

Figure A.62. Soft Water Output Screen.

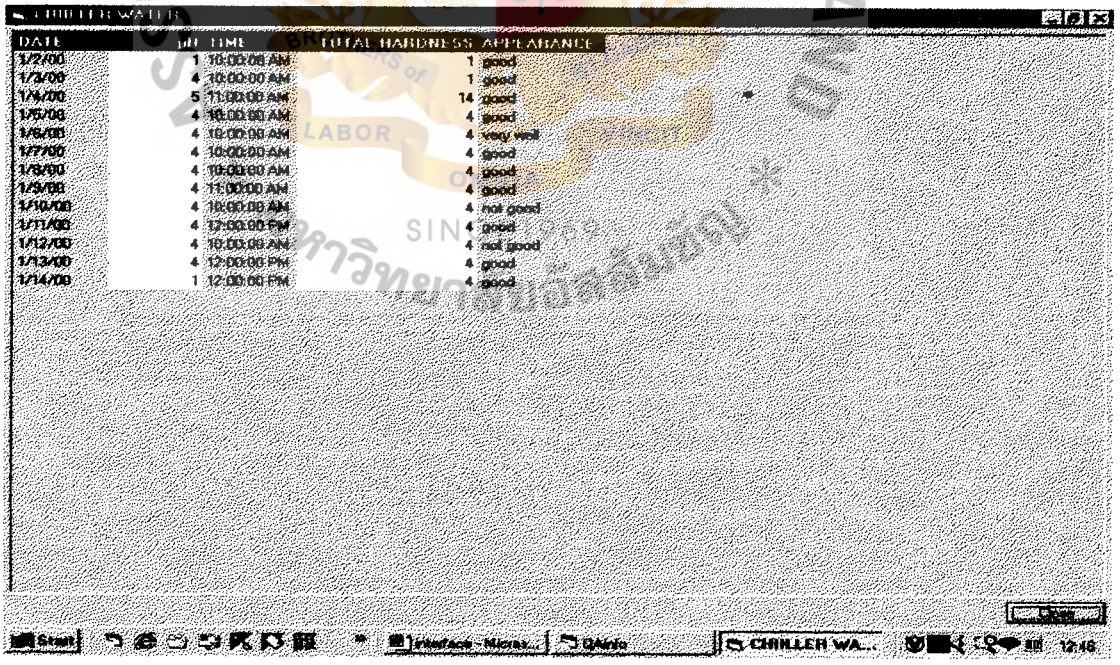

Figure A.63. Chiller Water Output Screen.

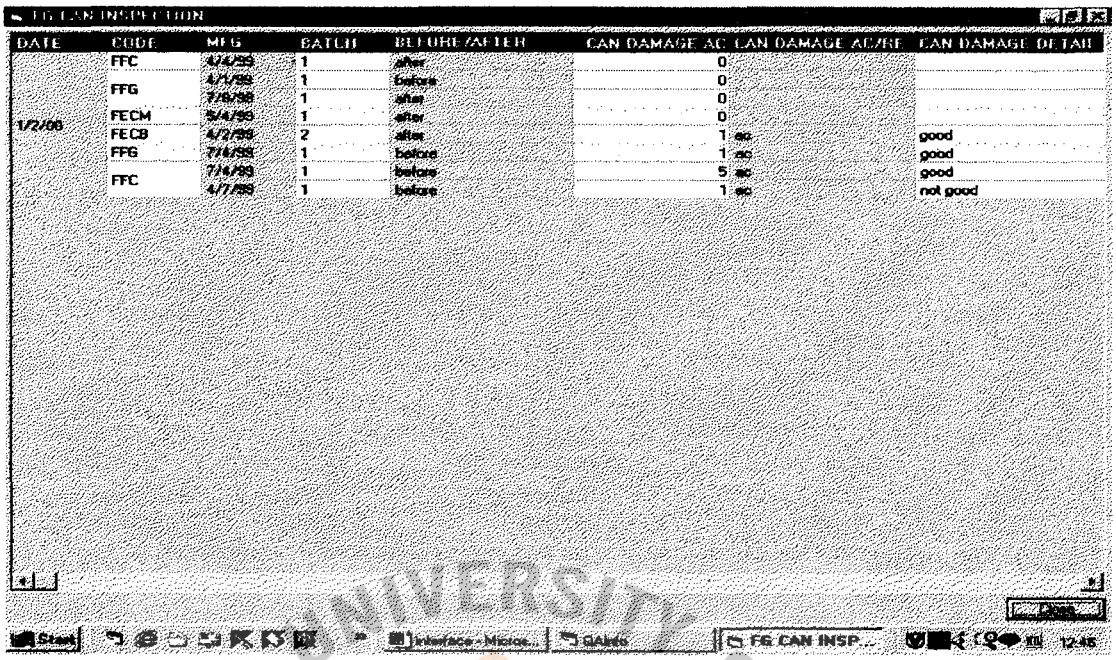

Figure A.64. Finished Goods CAN Inspection Output Screen.

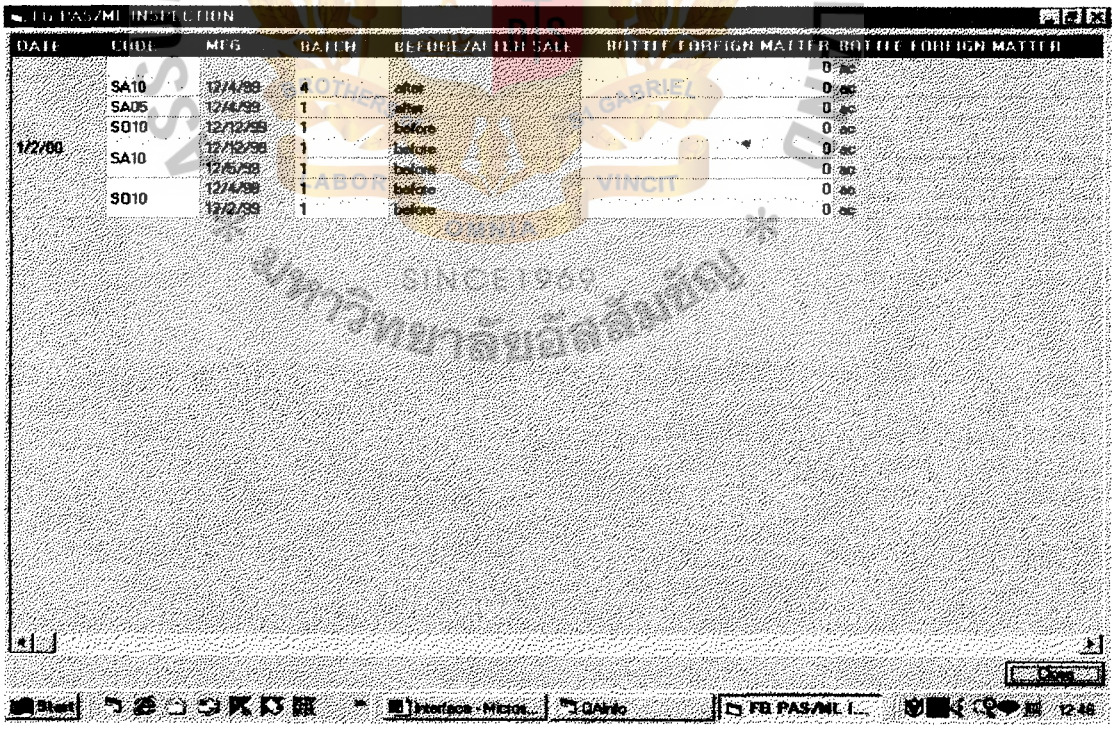

Figure A.65. Finished Goods Pasteurized and Concentrate Inspection Output Screen.

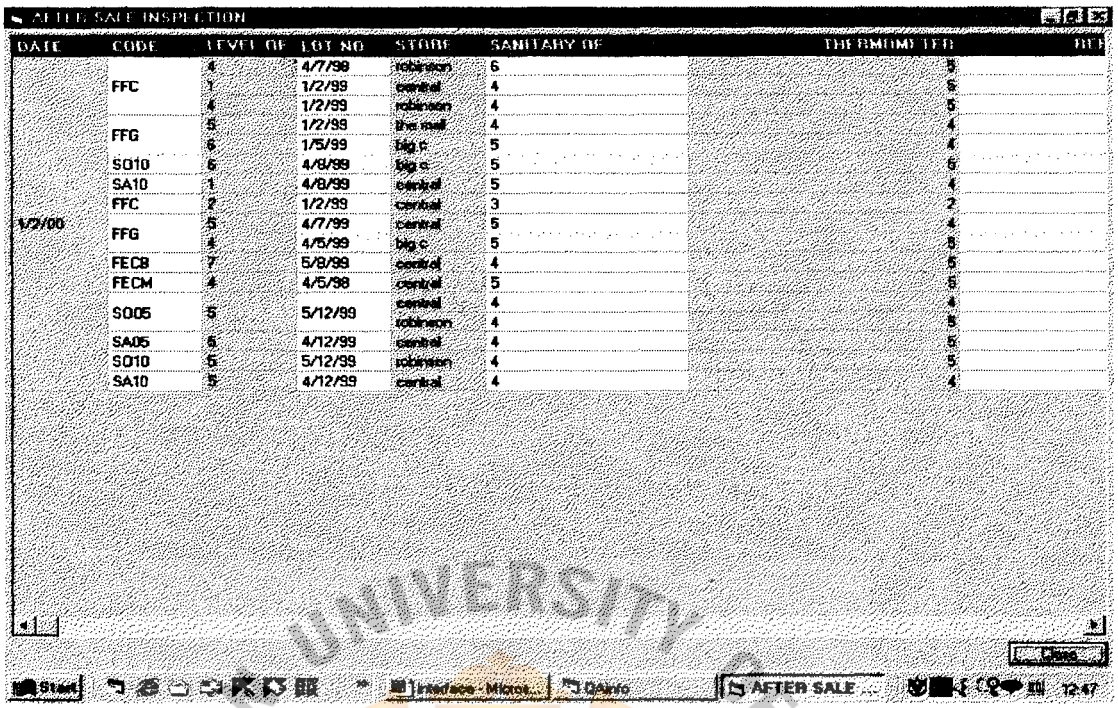

Figure A.66. After Sale Inspection Output Screen.

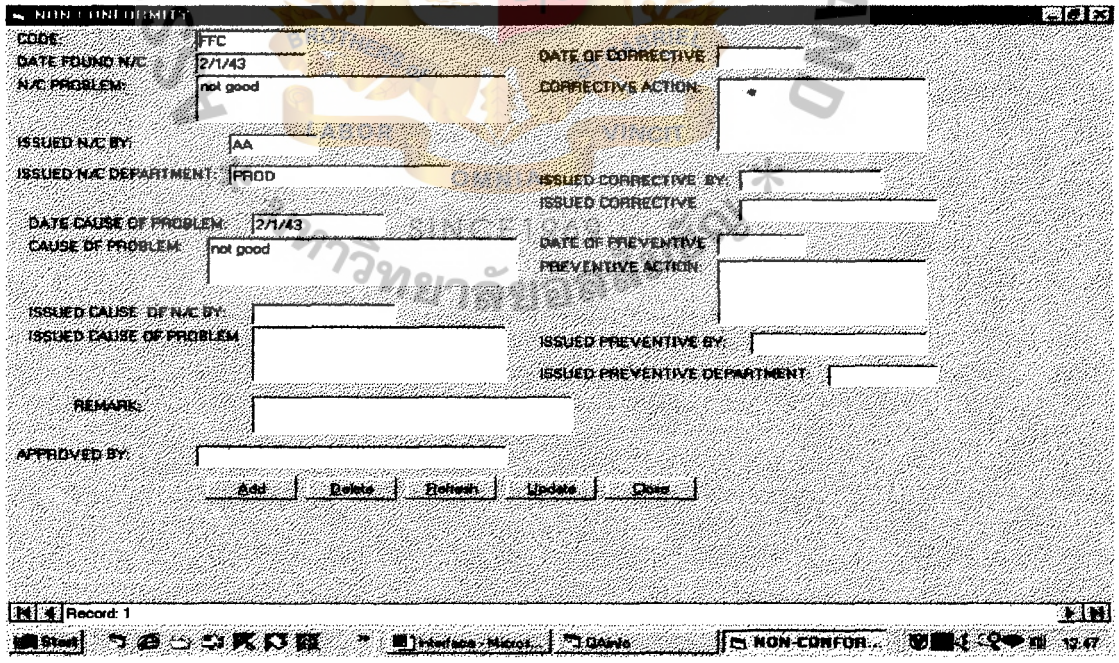

Figure A.67. Non-Conformity Output Screen.

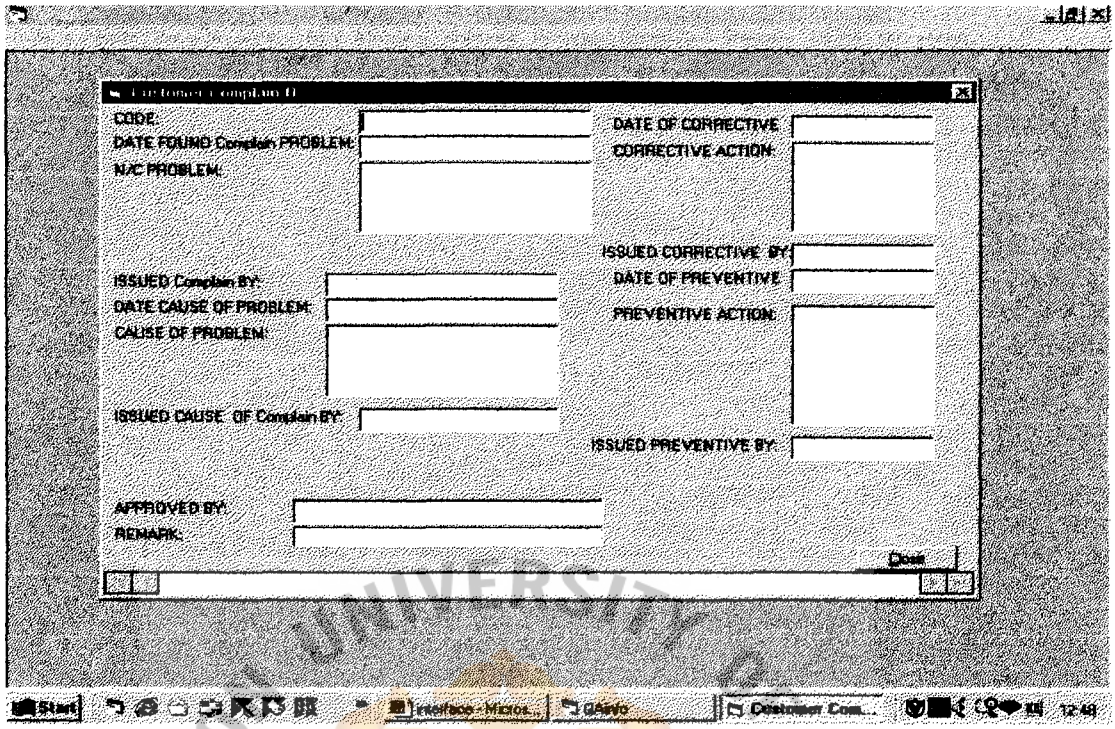

Figure A.68. Customer Complain Output Screen.

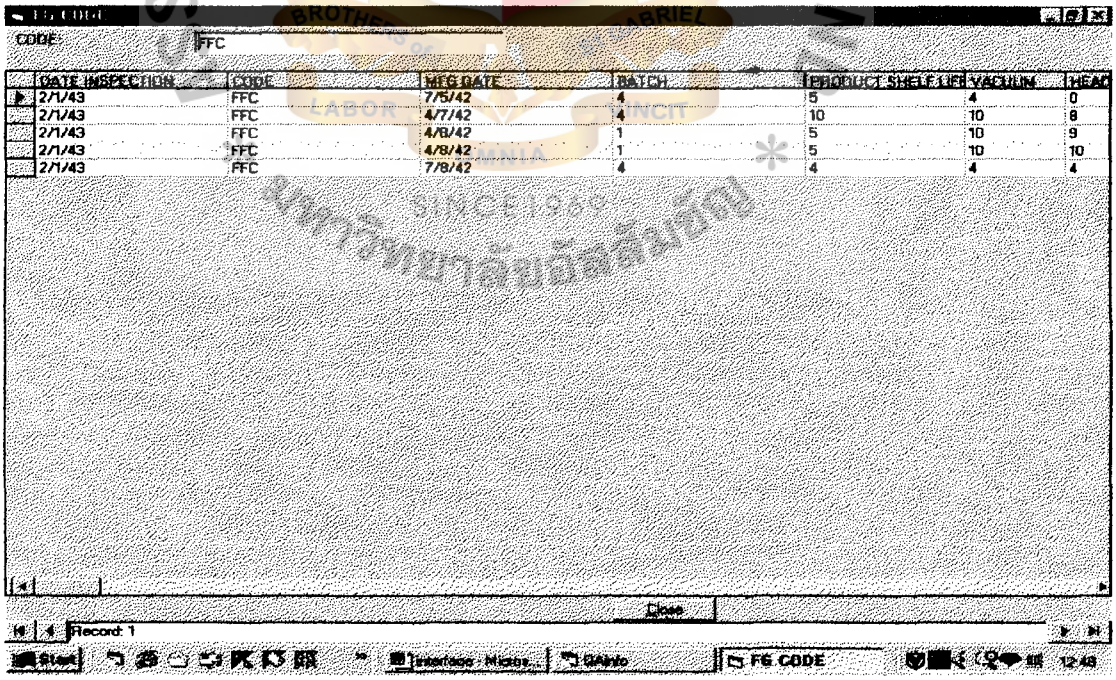

Figure A.69. Shelf Life Output Screen.

APPENDIX B

DATA DICTIONARY

DATA DICTIONARY

Name	Description
ID_CODE	= Primary Key
DATE	= Date
STORE NAME	= The name of store for after sales inspection
CODE	= Code of product
LOT NO	= Lot number of product
REFRIGERATOR TEMPERATURE	= Temperature of refrigerator at store
THERMOMETER TEMPERATURE	= Temperature of refrigerator at store by using thermometer to measure it
SANITARY OF PRODUCT	= Detail about sanitary of product at store
LEVEL OF SANITARY	= Level of sanitary of product at store
SUGGESTION	= Suggestion from QA
CHECKED BY	= Checked by
APPROVED BY	= Approved by
TIME	= Time to collect data
pH	= pH
TOTAL HARDNESS	= Total hardness
APPEARANCE	= Detail about water appearance
BEFORE/AFTER SALE	= Use to identify product before or after sale
MFG DATE	= Manufacturing date
BATCH	= Batch number
CAN LID CLOSING AC	= Total number of can lid closing that accept
CAN LID CLOSING RE	= Total number of can lid closing that reject
CAN LID DEFECT QUANTITY	= Quantity of can lid defect

Name		Description
CAN LID DEFECT DETAIL	=	Detail about can lid defect
CAN LID CLOSING AC/RE	=	Can lid accept or reject
CAN DAMAGE AC	=	Total number of can damage that accept
CAN DAMAGE RE	=	Total number of can damage that reject
CAN DAMAGE QUANTITY	=	Quantity of can damage
CAN DAMAGE DETAIL	=	Detail about can damage
CAN DAMAGE AC/RE	=	Can damage accept or reject
CAN SWELL AC	=	Total number of can swell that accept
CAN SWELL RE	=	Total number of can swell that reject
CAN SWELL QUANTITY	=	Quantity of can swell
CAN SWELL DETAIL	=	Detail about can swell
CAN SWELL AC/RE	=	Can swell accept or reject
CAN LABEL AC	=	Total number of can label that accept
CAN LABEL RE	=	Total number of can label that reject
CAN LABEL QUANTITY	=	Quantity of can label
CAN LABEL DETAIL	=	Detail about can label
CAN LABEL AC/RE	=	Can label accept or reject
REMARK	=	Remark
DESCRIPTON	=	Description
BOTTLE LID CLOSING AC	=	Total number of bottle lid closing that accept
BOTTLE LID CLOSING RE	=	Total number of bottle lid closing that reject
BOTTLE LID DEFECT QUANTITY	=	Quantity of bottle lid defect
BOTTLE LID DEFECT DETAIL	=	Detail about bottle lid defect

Name		Description
BOTTLE LID CLOSING AC/RE	=	Bottle lid closing accept or reject
BOTTLE SANITARY AC	=	Total number of bottle sanitary that accept
BOTTLE SANITARY RE	=	Total number of bottle sanitary that reject
BOTTLE SANITARY DEFECT QUANTITY	=	Quantity of bottle sanitary defect
BOTTLE SANITARY DEFECT DETAIL	=	Detail about bottle sanitary defect
BOTTLE SANITARY AC/RE	=	Bottle sanitary accept or reject
BOTTLE FOREIGN MATTER AC	=	Total number of bottle foreign matter that accept
BOTTLE FOREIGN MATTER RE	=	Total number of bottle foreign matte that reject
BOTTLE FOREIGN MATTER QUANTITY	=	Quantity of bottle foreign matter
BOTTLE FOREIGN MATTER DETAIL	=	Detail about bottle foreign matter
BOTTLE FOREIGN MATTER AC/RE	=	Bottle foreign matter accept or reject
SEDIMENTATION AC	=	Total number of sedimentation that accept
SEDIMENTATION RE	=	Total number of sedimentation that reject
SEDIMENTATION QUANTITY	=	Quantity of sedimentation
SEDIMENTATION DETAIL	=	Detail about sedimentation
SEDIMENTATION AC/RE	=	Sedimentation accept or reject
BOTTLE LABEL AC	=	Total number of bottle label accept
BOTTLE LABEL RE	=	Total number of bottle label reject
BOTTLE LABEL QUANTITY	=	Quantity of bottle label
BOTTLE LABEL DETAIL	=	Detail about bottle label
BOTTLE LABEL AC/RE	=	Bottle label accept or reject
HYDROGENPEROXIDE IN DETERGENT	=	Total hydrogen peroxide in detergent
HYDROGENPEROXIDE RESIDUE	=	Total residue hydrogen peroxide in bottle

Name	Description
FILLING TEMPERATURE	= Filling temperature
BRIX	= Total sugar in product
FILLING LEVEL	= Filling level
LID CLOSING	= Lid closing appearance
SANITARY	= Sanitary appearance
LABELING	= Labeling appearance
CORRECTIVE ACTION	= Corrective action
CAN APPEARANCE	= Can appearance
SPRINGER	= Springer
SOFT/HARD SWELL	= Can appearance about soft or hard swell
SCRATCH	= Can appearance about scratch
DENT	= Can appearance about dent
SEAM APPEARANCE	= Seam appearance
DEAD HEAD	= Can appearance about dead head
SHARP SEAM	= Can appearance about sharp seam
FALSE SEAM	= Can appearance about false seam
CUT SEAM	= Can appearance about cut seam
VEE	= Can appearance about vee
DROOP	= Can appearance about droop
COMPOUND SQUEEZE	= Can appearance about compound squeeze
HEAD NO	= Head number of seamer
VACUUM	= Vacuum

Name	Description
HEAD SPACE	= Head space in can
TASTE	= Taste of product
PASTEURIZED TEMPERATURE	= Pasteurized temperature
HOMOGENIZE PRESSURE	= Homogenize pressure
DEAERATOR PRESSURE	= Deaerator pressure
PRODUCT OUT TEMPERATURE	= Product out temperature
BRIX IN BALANCE TANK	= Brix in balance tank
COLOR ODOR TASTE	= Color and odor and taste of product
QUANTITY WATER 1	= Quantity of water 1
HOLDING TIME 1	= Holding time of water 1
QUANTITY WATER 2	= Quantity of water 2
HOLDING TIME 2	= Holding time of water 2
QUANTITY WATER 3	= Quantity of water 3
HOLDING TIME 3	= Holding time of water 3
QUANTITY WATER 4	= Quantity of water 4
HOLDING TIME 4	= Holding time of water 4
WATER TEMPERATURE	= Temperature of water
BRIX AFTER EXTRACTION	= Brix after extraction
VOLUME OF WATER AFTER EXTRACTION	= Volume of water after extraction
%YIELD OF EXTRACTION	= % yield of extraction
PK ID	= Primary key
PK CODE	= Code of packaging
PK TYPE	= Type of packaging

Name		Description
RECEIVE DATE	=	Date that receive raw material and packaging
INVOICE NO	=	Invoice number
QUANTITY	=	Quantity of income raw material and packaging
SAMPLING SIZE	=	Quantity of sample for inspection
A	=	Value for inspection
B	=	Value for inspection
C	=	Value for inspection
D	=	Value for inspection
E	=	Value for inspection
F	=	Value for inspection
G	=	Value for inspection
H	=	Value for inspection
I	=	Value for inspection
J	=	Value for inspection
K	=	Value for inspection
L	=	Value for inspection
ACCEPT/REJECT	=	Decision for accept or reject
RM ID	=	Primary key
RM CODE	=	Raw material code
VISUAL INSPECTION	=	Visual inspection

Name		Description
ACIDITY	=	Total acid in product
RATIO	=	Brix/acid ratio

Name	Description
COLOR	= Color of product
ODOR	= Odor of product
TASTE	= Taste of product
PACKAGING	= Packaging appearance
A	= Value for inspection
B	= Value for inspection
C	= Value for inspection
D	= Value for inspection
E	= Value for inspection
F	= Value for inspection
SEAM THICKNESS 1	= Seam thickness position 1
SEAM THICKNESS 2	= Seam thickness position 2
SEAM THICKNESS 3	= Seam thickness position 3
SEAM LENGTH 1	= Seam length position 1
SEAM LENGTH 2	= Seam length position 2
SEAM LENGTH 3	= Seam length position 3
COVER HOOK 1	= Cover hook position 1
COVER HOOK 2	= Cover hook position 2
COVER HOOK 3	= Cover hook position 3
BODY HOOK 1	= Body hook position 1
BODY HOOK 2	= Body hook position 2
Name	Description
BODY HOOK 3	= Body hook position 3

Name	Description
DATE INSPECTION	= Inspection date
PRODUCT SHELF LIFE	= Shelf life of product
BODY	= Body of product
ACCEPTION	= Level of acceptation of product
NAME	= Name of position for inspection
PCA	= Plat count agar
PDA	= Potato dextrose agar
COLIFORMS	= Coliforms
FLAT SOUR meso	= Flat sour type mesophile
FLAT SOUR thermo	= Flat sour type thermophile
Putre Anaero	= Putre anaerobe
TA	= TA
OSB	= Orange serum broth
REPORT DATE	= Report date
DATE FOUND N/C PROBLEM	= Date found N/C problem
N/C PROBLEM	= N/C problem
ISSUED N/C BY	= Issued N/C by
ISSUED N/C DEPARTMENT	= Issued N/C by department
DATE CAUSE OF PROBLEM	= Date cause of problem
CAUSE OF PROBLEM	= Cause of problem
ISSUED CAUSE OF N/C BY	= Issued cause of N/C by
ISSUED CAUSE OF PROBLEM DEPARTMENT	= Issued cause of problem department
DATE OF CORRECTIVE ACTION	= Date of corrective action

Name	Description
ISSUED CORRECTIVE BY	= Issued corrective by
ISSUED CORRECTIVE DEPARTMENT	= Issued corrective department
DATE OF PREVENTIVE ACTION	= Date of preventive action
PREVENTIVE ACTION	= Preventive action
ISSUED PREVENTIVE BY	= Issued preventive by
ISSUED PREVENTIVE DEPARTMENT	= Issued preventive department
PK SUPPPLIER NAME	= Name of packaging supplier
PK TYPE	= Type of packaging
TEMPERATURE FOR STERILIZE	= Temperature for sterilize
TIME FOR STERILIZE	= Time of sterilize
PRESSURE	= Pressure for sterilize
RETORT NO	= Retort number
INITIAL TEMPERATURE	= Initial temperature
TIME TO OPEN STEAM	= Time to open steam
TEMPERATURE TO CLOSE DRAIN VALUE	= Temperature to close drain value
TIME TO CLOSE DRAIN VALUE	= Time to close drain value
TEMPERATURE TO CLOSE VENT VALUE	= Temperature to close vent value
TIME TO CLOSE VENT VALUE	= Time to close vent value
INITAIL STERILIZE TEMPERATURE	= Initial sterilize temperature
INITIAL STERILIZE TIME	= Initial sterilize time
INITIAL STERILIZE PRESSURE	= Initial sterilize pressure
STERILIZE TEMPERATURE	= Sterilize temperature
STERILIZE TIME	= Sterilize time

Name	Description
STERILIZE PRESSURE	= Sterilize pressure
THE END OF STERILIZE TEMPERATURE	= The end of sterilize temperature
THE END OF STERILIZE TIME	= The end of sterilize time
THE END OF STERILIZE PRESSURE	= The end of sterilize pressure
TIME TO RELEASE STEAM	= Time to release steam
CHOLRINE RESIDUE	= Chlorine residue
COOLING WATER TEMPERATURE	= Cooling water temperature
RM SUPPLIER NAME	= Name of raw material supplier
CORRECTIVE ACTION 1	= Corrective action for filling temperature
PRODUCT TEMPERATURE	= Product temperature
CORRECTIVE ACTION 2	= Corrective action for product temperature
HOT WATER TANK TEMPERATURE	= Hot water tank temperature
CORRECTIVE ACTION 3	= Corrective action for hot water tank temperature
DATE FOUND COMPLAIN PROBLEM	= Date found complain problem
COMPLAIN PROBLEM	= Complain problem
ISSUED COMPLAIN BY	= Issued complain by
ISSUED COMPLAIN DEPARTMENT	= Issued complain by department
ISSUED CAUSE OF COMPLAIN BY	= Issued cause of complain by

APPENDIX C

DATA STORE (TABLE) OF THE PROPOSED SYSTEM

Table C.1. AFTER SALE INSPECTION.

Name	Type	Size
ID_CODE	Number (Long)	4
DATE	Date/Time	8
STORE NAME	Text	150
CODE	Text	50
LOT NO	Text	50
REFRIGERATOR TEMPERATURE	Number (Long)	4
THERMOMETER TEMPERATURE	Number (Long)	4
SANITARY OF PRODUCT	Text	50
LEVEL OF SANITARY	Text	50
SUGGESTION	Text	255
CHECKED BY	Text	50
APPROVED BY	Text	50

Table C.2. BLOW DOWN BOILER WATER.

Name	Type	Size
DATE	Date/Time	8
TIME	Date/Time	8
pH	Number (Long)	4
TOTAL HARDNESS	Number (Long)	4

Table C.3. CHIILLER WATER.

Name	Type	Size
DATE	Date/Time	8
APPEARANCE	Text	50
TIME	Date/Time	8
pH	Number (Long)	4
TOTAL HARDNESS	Number (Long)	4

Table C.4. CONDENSATE BOILER WATER.

Name	Type	Size
DATE	Date/Time	8
TIME	Date/Time	8
pH	Number (Long)	4
TOTAL HARDNESS	Number (Long)	4

Table C.5. DEEP WATER.

Name	Type	Size
DATE	Date/Time	8
APPEARANCE	Text	50
TIME	Date/Time	8
pH	Number (Long)	4
TOTAL HARDNESS	Number (Long)	4

Table C.6. FG CAN INSPECTION.

Name	Type	Size
ID_CODE	Number (Long)	4
DATE	Date/Time	8
BEFORE/AFTER SALE	Text	50
CODE	Text	50
MFG DATE	Date/Time	8
BATCH	Text	50
CAN LID CLOSING AC	Number (Long)	4
CAN LID CLOSING RE	Number (Long)	4
CAN LID DEFECT QUANTITY	Number (Long)	4
CAN LID DEFECT DETAIL	Text	100
CAN LID CLOSING AC/RE	Text	50
CAN DAMAGE AC	Number (Long)	4
CAN DAMAGE RE	Number (Long)	4
CAN DAMAGE QUANTITY	Number (Long)	4
CAN DAMAGE DETAIL	Text	100
CAN DAMAGE AC/RE	Text	50
CAN SWELL AC	Number (Long)	4
CAN SWELL RE	Number (Long)	4
CAN SWELL QUANTITY	Number (Long)	4
CAN SWELL DETAIL	Text	100
CAN SWELL AC/RE	Text	50
CAN LABEL AC	Number (Long)	4
CAN LABEL RE	Number (Long)	4
CAN LABEL QUANTITY	Number (Long)	4
CAN LABEL DETAIL	Text	100
CAN LABEL AC/RE	Text	50
REMARK	Text	150

Table C.6. FG CAN INSPECTION (Continued).

Name	Type	Size
CHECKED BY	Text	50
APPROVED BY	Text	50

Table C.7. FG CODE.

Name	Type	Size
CODE	Text	50
DESCRIPTON	Text	50

Table C.8. FG PAS/ML INSPECTION.

Name	Type	Size
ID_CODE	Number (Long)	4
DATE	Date/Time	8
BEFORE/AFTER SALE	Text	50
CODE	Text	50
MFG DATE	Date/Time	8
BATCH	Text	50
BOTTLE LID CLOSING AC	Number (Long)	4
BOTTLE LID CLOSING RE	Number (Long)	4
BOTTLE LID DEFECT QUANTITY	Number (Long)	4
BOTTLE LID DEFECT DETAIL	Text	100
BOTTLE LID CLOSING AC/RE	Text	50
BOTTLE SANITARY AC	Number (Long)	4
BOTTLE SANITARY RE	Number (Long)	4

Table C.8. FG PAS/ML INSPECTION (Continued).

Name	Type	Size
BOTTLE SANITARY DEFECT QUANTITY	Number (Long)	4
BOTTLE SANITARY DEFECT DETAIL	Text	100
BOTTLE SANITARY AC/RE	Text	50
BOTTLE FOREIGN MATTER AC	Number (Long)	4
BOTTLE FOREIGN MATTER RE	Number (Long)	4
BOTTLE FOREIGN MATTER QUANTITY	Number (Long)	4
BOTTLE FOREIGN MATTER DETAIL	Text	100
BOTTLE FOREIGN MATTER AC/RE	Text	50
SEDIMENTATION AC	Number (Long)	4
SEDIMENTATION RE	Number (Long)	4
SEDIMENTATION QUANTITY	Number (Long)	4
SEDIMENTATION DETAIL	Text	100
SEDIMENTATION AC/RE	Text	50
BOTTLE LABEL AC	Number (Long)	4
BOTTLE LABEL RE	Number (Long)	4
BOTTLE LABEL QUANTITY	Number (Long)	4
BOTTLE LABEL DETAIL	Text	100
BOTTLE LABEL AC/RE	Text	50
REMARK	Text	150
CHECKED BY	Text	50
APPROVED BY	Text	50

Table C.9. FILLING PAS/ML INSPECTION.

Name	Type	Size
ID_CODE	Number (Long)	4

Table C.9. FILLING PAS/ML INSPECTION (Continued).

Name	Type	Size
DATE	Date/Time	8
CODE	Text	50
BATCH	Text	50
HYDROGENPEROXIDE IN DETERGENT	Text	50
HYDROGENPEROXIDE RESIDUE	Text	50
FILLING TEMPERATURE	Number (Long)	4
BRIX	Number (Long)	4
FILLING LEVEL	Yes/No	1
LID CLOSING	Yes/No	1
SANITARY	Yes/No	1
LABELING	Date/Time	8
CORRECTIVE ACTION	Text	150
CHECKED BY	Text	50
APPROVED BY	Text	50

Table C.10. INSPECION VISUAL SEAM.

Name	Type	Size
ID	Number (Long)	4
TIME	Date/Time	8
ID_CODE	Number (Long)	4
DATE	Date/Time	8
CODE	Text	50
BATCH	Text	50
CAN APPEARANCE	Text	100
SPRINGER	Yes/No	1

Table C.10. INSPECION VISUAL SEAM (Continued).

Name	Type	Size
SOFT/HARD SWELL	Yes/No	1
SCRATCH	Yes/No	1
DENT	Yes/No	1
SEAM APPEARANCE	Text	100
DEAD HEAD	Yes/No	1
SHARP SEAM	Yes/No	1
FALSE SEAM	Yes/No	1
CUT SEAM	Yes/No	1
VEE	Yes/No	1
DROOP	Yes/No	1
COMPOUND SQUEEZE	Yes/No	1
CORRECTIVE ACTION	Text	150
CHECKED BY	Text	50
APPROVED BY	Text	50

Table C.11. INSPECTION AFTER SEAMER.

Name	Type	Size
ID_CODE	Number (Long)	4
DATE	Date/Time	8
CODE	Text	50
BATCH	Text	50
TIME	Date/Time	8
HEAD NO	Text	50
VACUUM	Number (Long)	4
BRIX	Number (Long)	4

Table C.11. INSPECTION AFTER SEAMER (Continued).

Name	Type	Size
HEAD SPACE	Number (Long)	4
TASTE	Text	100
REMARK	Text	100
CORRECTIVE ACTION	Text	100
CHECKED BY	Text	50
APPROVED BY	Text	50

Table C.12. INSPECTION APV.

Name	Type	Size
ID_CODE	Number (Long)	4
DATE	Date/Time	8
CODE	Text	50
BATCH	Text	50
PASTEURIZED TEMPERATURE	Text	50
HOMOGENIZE PRESSURE	Text	50
DEAERATOR PRESSURE	Text	50
PRODUCT OUT TEMPERATURE	Text	50
BRIX IN BALANCE TANK	Text	50
COLOR ODOR TASTE	Text	50
CORRECTIVE ACTION	Text	150
CHECKED BY	Text	50
APPROVED BY	Text	50

Table C.13. INSPECTION EXTRACTION.

Name	Type	Size
ID_CODE	Number (Long)	4
DATE	Date/Time	8
BATCH	Text	50
Name	Type	Size
QUANTITY WATER 1	Number (Long)	4
HOLDING TIME 1	Number (Long)	4
QUANTITY WATER 2	Number (Long)	4
HOLDING TIME 2	Number (Long)	4
QUANTITY WATER 3	Number (Long)	4
HOLDING TIME 3	Number (Long)	4
QUANTITY WATER 4	Number (Long)	4
HOLDING TIME 4	Number (Long)	4
WATER TEMPERATURE	Text	50
BRIX AFTER EXTRACTION	Number (Long)	4
VOLUME OF WATER AFTER EXTRACTION	Number (Long)	4
%YIELD OF EXTRACTION	Number (Long)	4
CORRECTIVE ACTION	Text	150
CHECKED BY	Text	50
APPROVED BY	Text	50

Table C.14. INSPECTION MIXING.

Name	Type	Size
ID_CODE	Number (Long)	4
CODE	Text	50
DATE	Date/Time	8

Table C.14. INSPECTION MIXING (Continued).

Name	Type	Size
BATCH	Text	50
TIME	Date/Time	8
CHECKED BY	Text	50
APPROVED BY	Text	50
REMARK	Text	50

Table C.15. INSPECTION PK.

Name	Type	Size
PK ID	Number (Long)	4
PK CODE	Text	50
PK TYPE	Text	50
RECEIVE DATE	Date/Time	8
LOT NO	Text	50
INVOICE NO	Text	50
QUANTITY	Number (Long)	4
SAMPLING SIZE	Number (Long)	4
A	Number (Long)	4
B	Number (Long)	4
C	Number (Long)	4
D	Number (Long)	4
E	Number (Long)	4
F	Number (Long)	4
G	Number (Long)	4
H	Number (Long)	4
I	Number (Long)	4

Table C.15. INSPECTION PK (Continued).

Name	Type	Size
J	Text	50
K	Text	50
L	Text	50
ACCEPT/REJECT	Text	50
CHECKED BY	Text	50
APPROVED BY	Text	50

Table C.16. INSPECTION RM.

Name	Type	Size
RM_ID	Number (Long)	4
RM CODE	Text	50
RECEIVE DATE	Date/Time	8
LOT NO	Text	50
INVOICE NO	Text	50
QUANTITY	Number (Long)	4
SAMPLING SIZE	Number (Long)	4
VISUAL INSPECTION	Text	50
pH	Number (Long)	4
BRIX	Number (Long)	4
ACIDITY	Number (Long)	4
RATIO	Number (Long)	4
%YIELD	Number (Long)	4
TEMPERATURE	Number (Long)	4
COLOR	Text	50
ODOR	Text	50

Table C.16. INSPECTION RM (Continued).

Name	Type	Size
TASTE	Text	50
PACKAGING	Text	50
A	Text	50
B	Text	50
C	Text	50
D	Number (Long)	4
E	Number (Long)	4
F	Number (Long)	4
ACCEPT/REJECT	Text	50
CHECKED BY	Text	50
APPROVED BY	Text	50

Table C.17. INSPECTION SEAM.

Name	Type	Size
ID	Number (Long)	4
TIME	Date/Time	8
ID_CODE	Number (Long)	4
DATE	Date/Time	8
CODE	Text	50
BATCH	Text	50
SEAM THICKNESS 1	Number (Long)	4
SEAM THICKNESS 2	Number (Long)	4
SEAM THICKNESS 3	Number (Long)	4
SEAM LENGTH 1	Number (Long)	4
SEAM LENGTH 2	Number (Long)	4

Table C.17. INSPECTION SEAM (Continued).

Name	Type	Size
SEAM LENGTH 3	Number (Long)	4
COVER HOOK 1	Number (Long)	4
COVER HOOK 2	Number (Long)	4
COVER HOOK 3	Number (Long)	4
BODY HOOK 1	Number (Long)	4
BODY HOOK 2	Number (Long)	4
BODY HOOK 3	Number (Long)	4
REMARK	Text	100
CHECKED BY	Text	50
APPROVED BY	Text	50

Table C.18. INSPECTION SHELF LIFE.

Name	Type	Size
ID_CODE	Number (Long)	4
DATE INSPECTION	Date/Time	8
CODE	Text	50
MFG DATE	Date/Time	8
BATCH	Text	50
PRODUCT SHELF LIFE	Number (Long)	4
VACUUM	Number (Long)	4
HEAD SPACE	Number (Long)	4
COLOR	Text	50
ODOR	Text	50
TASTE	Text	50
BODY	Text	50

Table C.18. INSPECTION SHELF LIFE (Continued).

Name	Type	Size
ACCEPTION	Text	50
CAN APPEARANCE	Text	50
REMARK	Text	50
CHECKED BY	Text	50
APPROVED BY	Text	50

TableC.19. MicroInsp.

Name	Type	Size
ID_NO	Number (Long)	4
DATE	Date/Time	8
CODE	Text	50
NAME	Text	50
BATCH	Number (Long)	4
PCA	Number (Long)	4
PDA	Number (Long)	4
COLIFORMS	Number (Long)	4
FLAT SOUR meso	Number (Long)	4
FLAT SOUR thermo	Number (Long)	4
Putre Anaero	Number (Long)	4
TA	Number (Long)	4
OSB	Number (Long)	4
REPORT DATE	Date/Time	8
CHECKED BY	Text	50
APPROVED BY	Text	50
REMARK	Text	50

Table C.20. MicroProdInsp.

Name	Type	Size
ID_NO	Number (Long)	4
DATE	Date/Time	8
ID_CODE	Number (Long)	4
CODE	Text	50
NAME	Text	50
BATCH	Number (Long)	4
PCA	Number (Long)	4
PDA	Number (Long)	4
COLIFORMS	Number (Long)	4
FLAT SOUR meso	Number (Long)	4
FLAT SOUR thermo	Number (Long)	4
Putre Anaero	Number (Long)	4
TA	Number (Long)	4
OSB	Number (Long)	4
REPORT DATE	Date/Time	8
CHECKED BY	Text	50
APPROVED BY	Text	50
REMARK	Text	50

Table C.21. MIXING QUANTITY.

Name	Type	Size
ID_NO	Number (Long)	4
LOT NO	Number (Long)	4
RM CODE	Text	50
QUANTITY	Number (Long)	4

Table C.21. MIXING QUANTITY (Continued).

Name	Type	Size
RM ID	Number (Long)	4
CODE	Text	50
DATE	Date/Time	8
BATCH	Number (Long)	4
CHECKED BY	Text	50
APPROVED BY	Text	50
REMARK	Text	50

Table C.22. NON-CONFORMITY.

Name	Type	Size
ID_CODE	Number (Long)	4
CODE	Text	50
DATE FOUND N/C PROBLEM	Date/Time	8
N/C PROBLEM	Text	255
ISSUED N/C BY	Text	50
ISSUED N/C DEPARTMENT	Text	50
DATE CAUSE OF PROBLEM	Date/Time	8
CAUSE OF PROBLEM	Text	255
ISSUED CAUSE OF N/C BY	Text	50
ISSUED CAUSE OF PROBLEM DEPARTMENT	50	
DATE OF CORRECTIVE ACTION	Date/Time	8
CORRECTIVE ACTION	Text	255
ISSUED CORRECTIVE BY	Text	50
ISSUED CORRECTIVE DEPARTMENT	Text	50
DATE OF PREVENTIVE ACTION	Date/Time	8

Table C.22. NON-CONFORMITY (Continued).

Name	Type	Size
PREVENTIVE ACTION	Text	255
ISSUED PREVENTIVE BY	Text	50
ISSUED PREVENTIVE DEPARTMENT	Text	50
REMARK	Text	255
APPROVED BY	Text	50

Table C.23. PK CODE.

Name	Type	Size
PK CODE	Text	50
PK SUPPPLIER NAME	Text	100

Table C.24. PK TYPE.

Name	Type	Size
PK TYPE	Text	50

Table C.25. RECYCLE WATER.

Name	Type	Size
DATE	Date/Time	8
APPEARANCE	Text	50
TIME	Date/Time	8
pH	Number (Long)	4

Table C.26. RETORT INSPECTION.

Name	Type	Size
ID	Number (Long)	4
TIME	Date/Time	8
ID_CODE	Number (Long)	4
DATE	Date/Time	8
CODE	Text	50
BATCH	Text	50
TEMPERATURE FOR STERILIZE	Text	50
TIME FOR STERILIZE	Text	50
PRESSURE	Text	50
RETORT NO	Number (Long)	4
INITIAL TEMPERATURE	Text	50
TIME TO OPEN STEAM	Date/Time	8
TEMPERATURE TO CLOSE DRAIN VALUE	Text	50
TIME TO CLOSE DRAIN VALUE	Text	50
TEMPERATURE TO CLOSE VENT VALUE	Text	50
TIME TO CLOSE VENT VALUE	Text	50
INITAIL STERILIZE TEMPERATURE	Text	50
INITIAL STERILIZE TIME	Date/Time	8
INITIAL STERILIZE PRESSURE	Text	50
STERILIZE TEMPERATURE	Text	50
STERILIZE TIME	Date/Time	8
STERILIZE PRESSURE	Text	50
THE END OF STERILIZE TEMPERATURE	Text	50
THE END OF STERILIZE TIME	Date/Time	8
THE END OF STERILIZE PRESSURE	Text	50
TIME TO RELEASE STEAM	Date/Time	8
CHOLRINE RESIDUE	Number (Long)	4

Table C.26. RETORT INSPECTION (Continued).

Name	Type	Size
COOLING WATER TEMPERATURE	Text	50
CORRECTIVE ACTION	Text	100
CHECKED BY	Text	50
APPROVED BY	Text	50

Table C.27. RM CODE.

Name	Type	Size
RM CODE	Text	50
RM SUPPLIER NAME	Text	100

Table C.28. SOFT WATER.

Name	Type	Size
ID_NO	Number (Long)	4
DATE	Date/Time	8
APPEARANCE	Text	50
TIME	Date/Time	8
pH	Number (Long)	4
TOTAL HARDNESS	Number (Long)	4

Table C.29. TEMPERATURE AT FILLER.

Name	Type	Size
ID	Number (Long)	4
TIME	Date/Time	8
ID_CODE	Number (Long)	4
DATE	Date/Time	8
CODE	Text	50
BATCH	Text	50
FILLER TEMPERATURE	Text	50
CORRECTIVE ACTION 1	Text	100
PRODUCT TEMPERATURE	Text	50
CORRECTIVE ACTION 2	Text	100
HOT WATER TANK TEMPERATURE	Text	50
CORRECTIVE ACTION 3	Text	50
CHECKED BY	Text	50
APPROVED BY	Text	50

Table C.30. CUSTOMER COMPLAIN.

Name	Type	Size
ID_CODE	Number (Long)	4
CODE	Text	50
DATE FOUND COMPLAIN PROBLEM	Date/Time	8
COMPLAIN PROBLEM	Text	255
ISSUED COMPLAIN BY	Text	50
DATE CAUSE OF PROBLEM	Date/Time	8
CAUSE OF PROBLEM	Text	255
ISSUED CAUSE OF COMPLAIN BY	Text	50

Table C.30. CUSTOMER COMPLAIN (Continued).

Name	Type	Size
DATE OF CORRECTIVE ACTION	Date/Time	8
CORRECTIVE ACTION	Text	255
ISSUED CORRECTIVE BY	Text	50
DATE OF PREVENTIVE ACTION	Date/Time	8
PREVENTIVE ACTION	Text	255
ISSUED PREVENTIVE BY	Text	50
REMARK	Text	255
APPROVED BY	Text	50

APPENDIX D

ORGANIZATION CHART AND PROJECT SCHEDULED

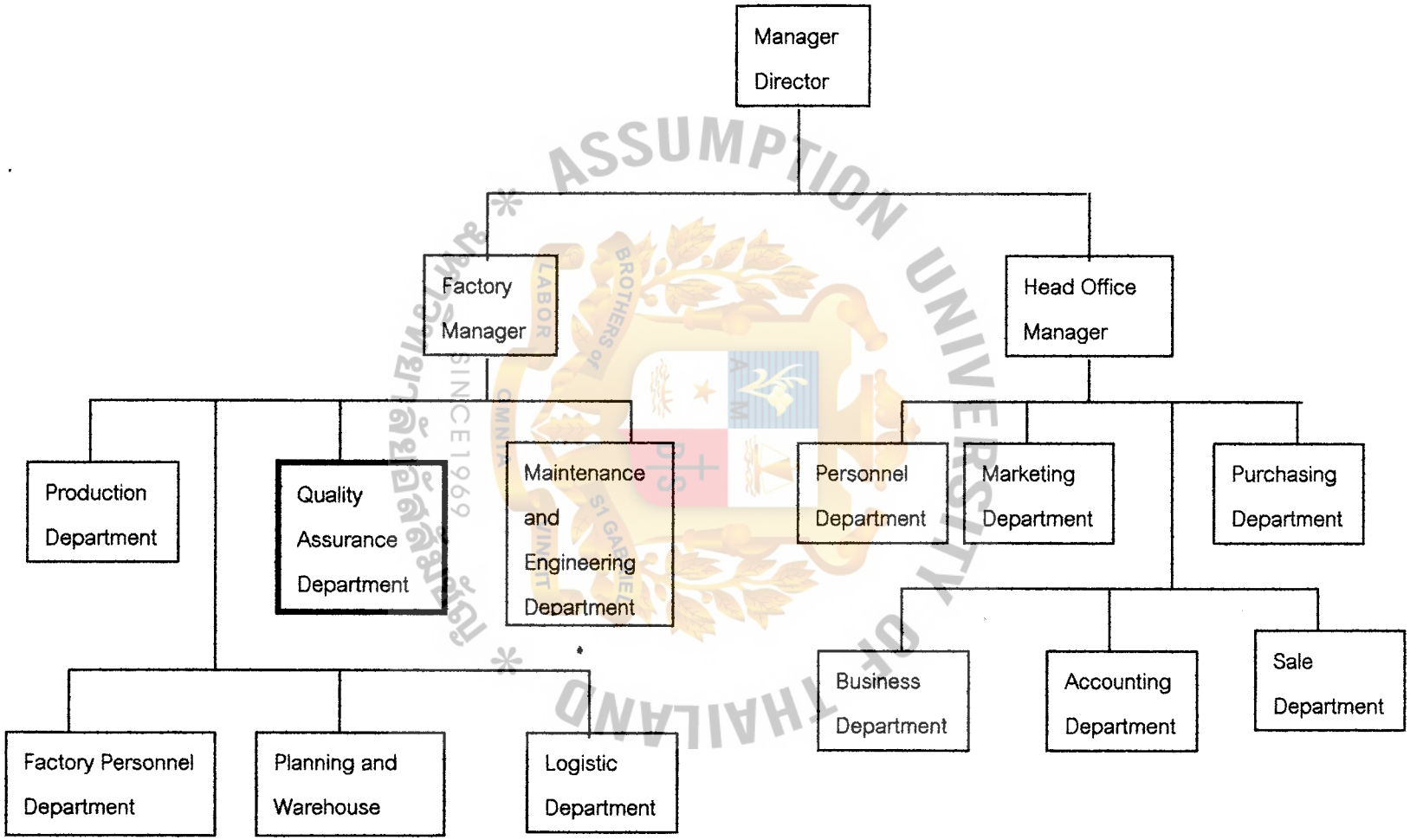

Figure D.1. Organization Chart.

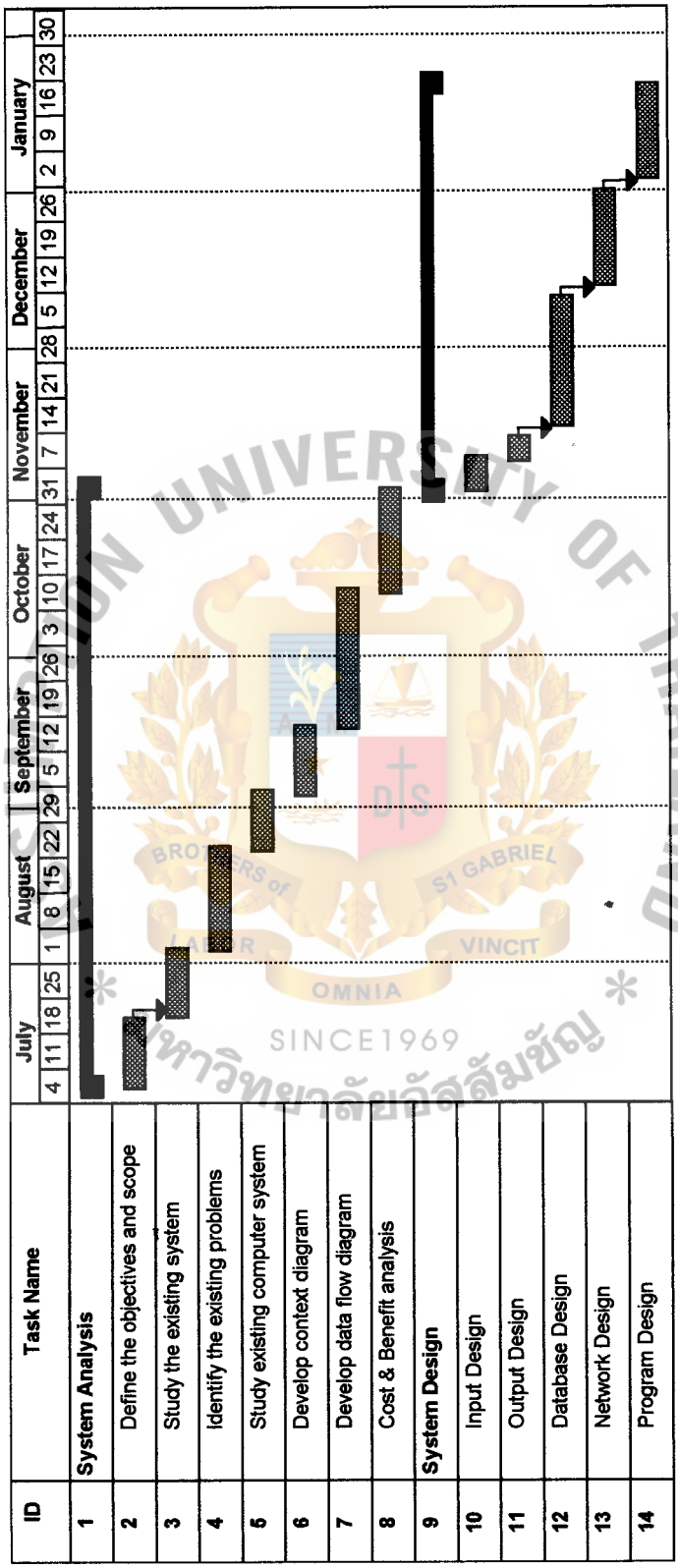

Figure D.2. Project Plan.

ID	Task Name
15	**System Implementation**
16	Coding
17	Testing
18	Hardware Installation
19	Software Installation
20	Train System Users
21	Convert to new system

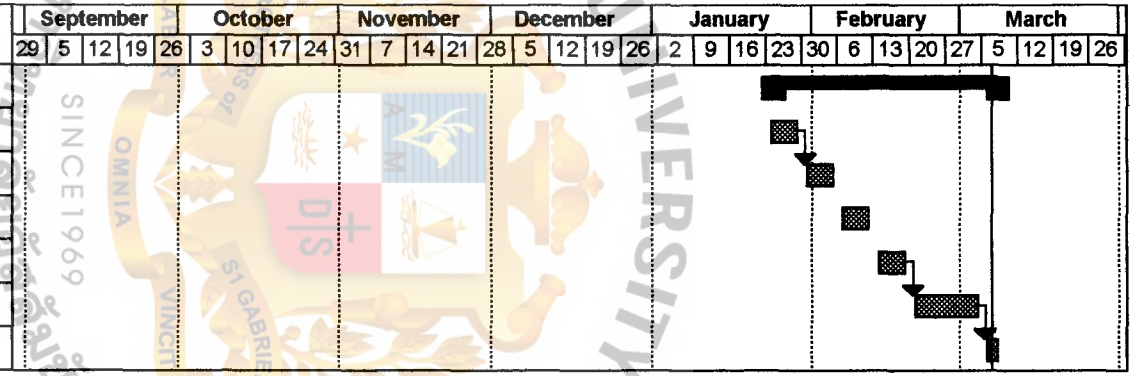

Figure D.2. Project Plan (Continued).

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