BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR THE CONSTRUCTION
OF
THE WATER SUPPLY AND ENVIRONMENTAL SANITATION TRAINING CENTER
IN
THE REPUBLIC OF INDONESIA

SEPTEMBER 1988

JAPAN INTERNATIONAL COOPERATION AGENCY

PREFACE

In response to the request of the Government of the Republic of Indonesia, the Government of Japan decided to conduct a basic design study on the Project for the Construction of the Water Supply and Environmental Sanitation Training Center and entrusted the study to the Japan International Cooperation Agency (JICA). JICA sent to Indonesia a Basic Design Study Team headed by Dr. Yasumoto Magara, Director of Sanitary Engineering Department of the Institute of Public Health, Ministry of Health and Welfare, from May 21 to June 11, 1988.

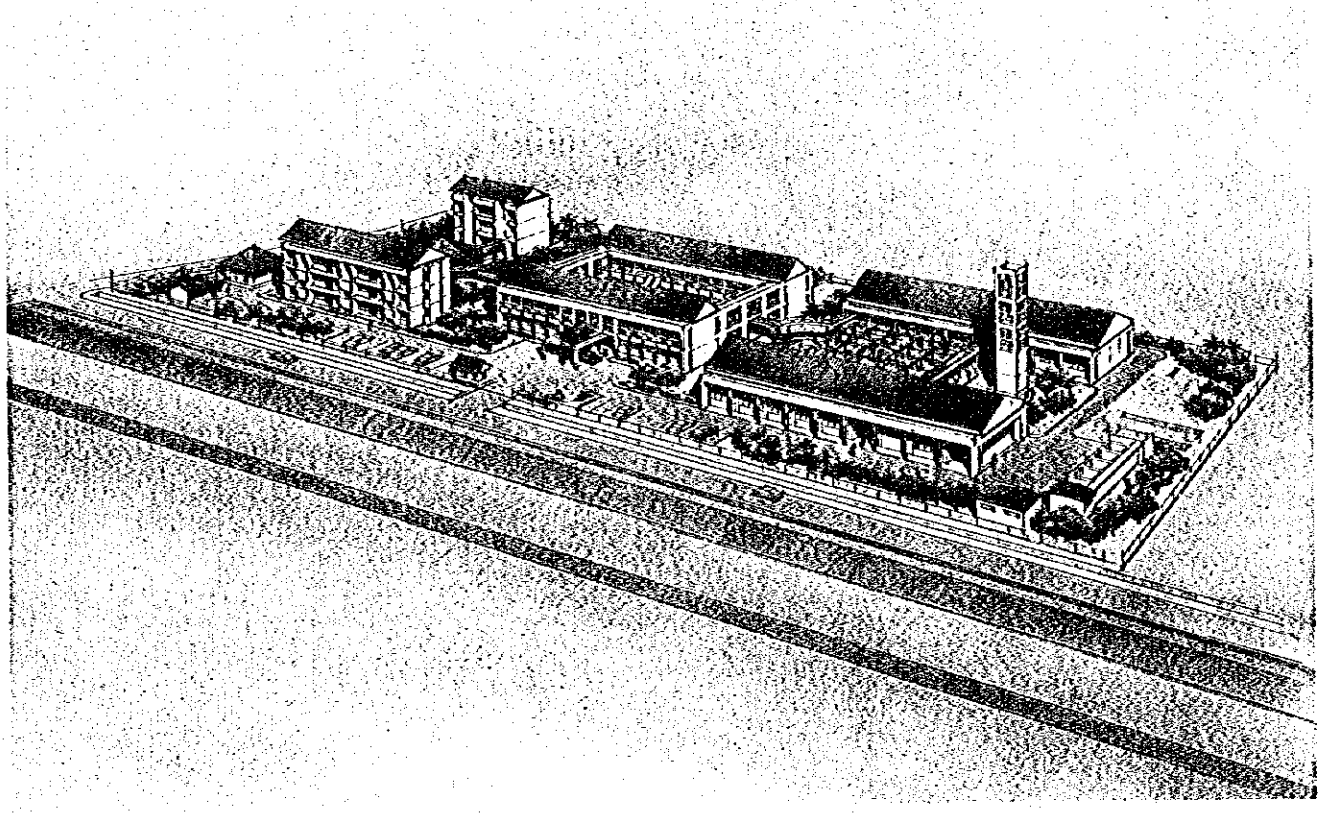
The team had discussions with the officials concerned of the Government of Indonesia and conducted a field survey in Bekasi and Jakarta. After the team returned to Japan, further studies were made, a draft report was prepared and a mission to explain and discuss it was dispatched to Indonesia. As a result, the present report has been prepared.

I hope that this report will serve for the development of the project and contribute to the promotion of friendly relations between the two countries.

I wish to express my deep appreciation to the officials concerned of the Government of the Republic of Indonesia for their close cooperation extended to the team.

September, 1988

Kensuke Yanagiya
President
Japan International Cooperation Agency



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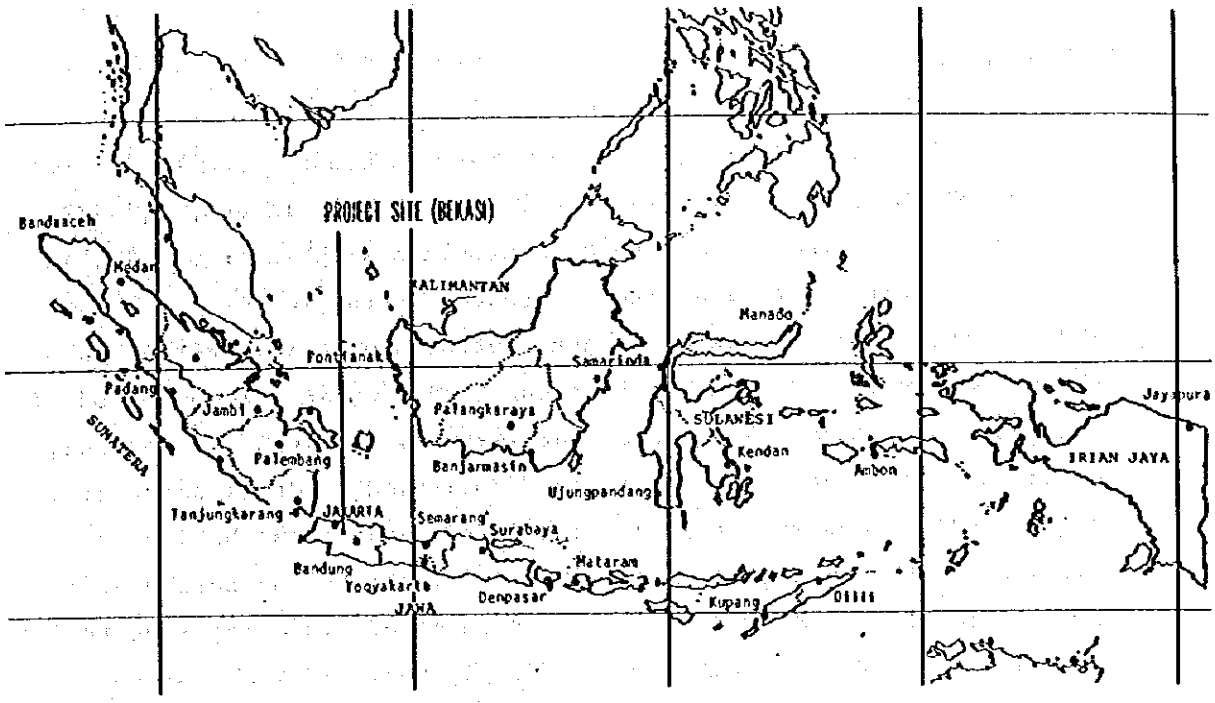
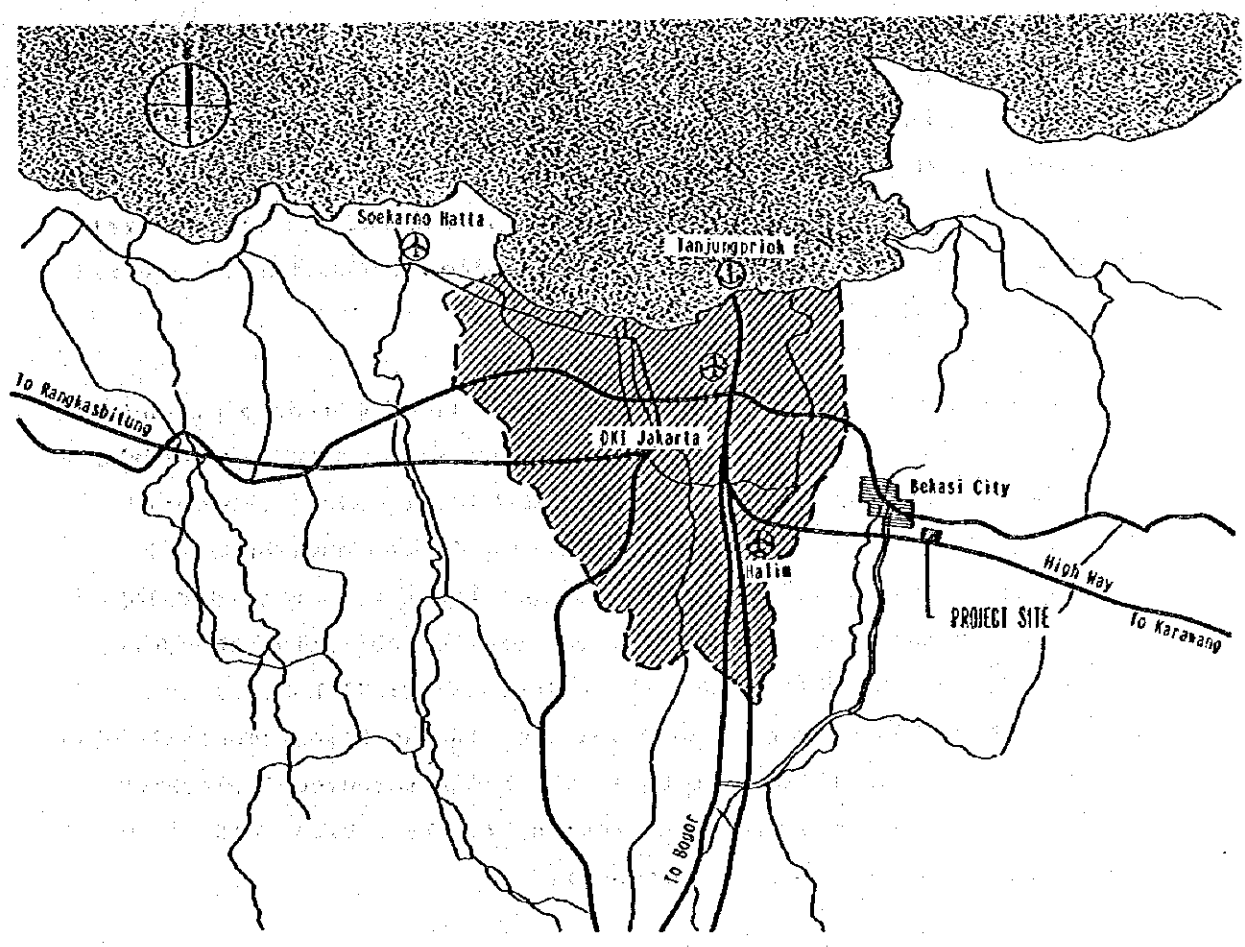


MAP OF INDONESIA



MAP OF THE SUBURBS OF JAKARTA

SUMMARY

The water supply facilities in Indonesia were constructed by its former suzerain, the Netherlands, before World War II and, by 1940, 62 cities across the nation had been provided with water supply. In the wake of World War II and the subsequent struggle for independence, the Indonesian economy suffered a serious setback and the society was thrown into confusion, resulting in a long period of stagnation in the development of water supply services. It was only after 1969 that the nation launched a full-fledged development of water supply along with the formulation of a Five-Year National Development Plan. The current year, 1988, falls in the last year of the ongoing Fourth Five-Year Plan, and an effort is being made to increase the service level of water supply to 75 % of the urban population from 40 % at the end of the Third Five-Year Plan and to 55 % of the rural popuration from 32 %. Required facilities to meet these targets have been under development.

The development of environmental sanitation was given a top priority in the current Five-Year Plan. The objective is to improve these facilities in all of the country's 200 cities with a view to achieving a disposal rate by official agencies of 50 % for household refuse and 100 % for commercial and industrial refuse. The central government is extending technical and financial assistance required for this purpose.

The Government of Indonesia has recognized the importance of human resources as well as improvement of infrastructures to develop the country's economy. This has been national policy since the Third Five-Year Plan. In the sector of water supply and environmental sanitation as well, it is recognized that human resource development goes hand in hand with the development of the facilities themselves. The Directorate General of Human Settlements (CIPTA KARYA), the Department of Public Works has developed a Human Resource Development Project (HRDP) in an attempt to secure human resources to achieve the goals of the above-mentioned Fourth Five-Year Plan, and implemented the training of personnel.

However, since facilities are inadequate for such training in Indonesia, the HRDP has not been fully implemented as planned in terms of both quantity and quality. By the end of fiscal 1987, training had been given to a total of 3,396 people in the area of water supply and 1,453 in environmental sanitation, which account for only 15 % and 29 %, respectively, of the targets set by the HRDP. The Government of Indonesia, thus, has formulated a plan for constructing a training center for water supply and environmental sanitation aiming at extensive training of personnel and the development of the requisite number of instructors pursuant to the HRDP, along with training materials and curricula. Under this plan, in the sector of water supply, regional training centers are to be established in five locations around the nation together with a Central Training Center in Jakarta. However, with respect to environmental sanitation, for the time being, only a Central Training Center in Jakarta is to be constructed.

The Government of Indonesia has requested grant aid from Japan for the construction of the regional training center for water supply at Ujung Pandang and the central training center in Jakarta as well as project-type technical cooperation in connection with the operation of the central training center.

Upon request from the Government of Indonesia, the Government of Japan decided to conduct a preliminary study on the subject plan. The Japan International Cooperation Agency (JICA) dispatched the preliminary study team to Indonesia, headed by Mr. Kiyoshi Suwa, Deputy Director of the Grant Aid Division, the Economic Cooperation Bureau of the Ministry of Foreign Affairs from February 22 to March 10, 1988. As a result of the preliminary study, it was confirmed that the development of human resources in this sector is essential and the construction of the central training center is the most urgent task. The Government of Japan, therefore, decided to conduct a basic design study on the project for the construction of the Water Supply and Environmental Sanitation Training Center (hereafter referred to as the Project) as a grant aid project.

JICA then dispatched the basic design study team to Indonesia from May 21 to June 11, 1988, led by Dr. Yasumoto Magara, Director of Department of Sanitary Engineering, the Institute of Public Health, Ministry of Health and Welfare.

The Team held discussions with the officials concerned of the Government of Indonesia and collected data and information necessary to draw up a basic design for the Project. After returning to Japan, the Team analyzed the materials obtained in the course of their field survey and prepared a basic design for the Project, based on the results of the above discussions and analysis.

The objective of the Project is to contribute to the sound development of water supply and environmental sanitation services in Indonesia by expediting the current HRDP through the construction of the central training center in Jakarta, which has been placed on top priority in the training center construction program worked out by the Government of Indonesia, under the grant-aid of the Government of Japan.

Approximately 16,700 square meters of land has been secured as a construction site for the Training Center in the suburb of Bekasi City, about 30 km east of Jakarta. Since the site is owned by the Directorate General of Water Resource Development of the Department of Public Works, the Directorate General of Human Settlements, which is to take charge of the Project, is now preparing to transfer the right of land use.

The infrastructure in the vicinity of the site, such as road, electricity, water supply, drainage and telephone lines, poses no major problems, and the site can gain access to all of these public utilities.

The following is an outline of the facilities and equipment involved in the Project,

(1) Building facilities;

Administration/ Training Building,	RC,	2-storied,	1940 sq.m.
Workshop Building(1),	RC,	1-storied,	702 sq.m.
Workshop Building(2),	RC,	1-storied,	702 sq.m.
Dormitory(1),	RC,	3-storied,	903 sq.m.
Dormitory(2),	Rc,	3-storied,	417 sq.m.
Canteen,	RC,	1-storied,	130 sq.m.
Ancillary Buildings	RC/S,	1-storied,	509.5 sq.m.
Total			5303.5 sq.m.

Remarks:RC: Reinforced Concrete Structure, S: Steel Structure

(2) Indoor Training Plants

Small-size Water Treatment Plant 24 cu.m./day	1 unit
Pump Operation Training Plant	1 unit

(3) Outdoor Training Facilities

Training Field for Leakage Detecting	1 place
Training Field for Pipe Laying	1 place
Experimental Tank for Sanitary Landfill	1 unit

(4) Equipment;

Training equipment - general training equipment, laboratory equipment,
practical training equipment, training vehicles,
training furniture

General use equipment - equipment for seminars, furniture for dormitory and canteen

All of the above facilities and equipment are indispensable to the proper functions of a Central Training Center.

The implementation body for the Project is the Directorate General of Human Settlements of the Department of Public Works. After completion, the Center will be operated as an organization of the Directorate General under the supervision and guidance of a Management Board to be established therein. With regard to the operation of the Center, the Directorate General will assume the financial burden, estimated at about 790 million Rp per annum, which accounts for 37 % of the total amount that the Directorate General disbursed nationally in fiscal 1987 for personnel training purposes. No problems, therefore, are anticipated in this connection after the start of operation of the Center.

Construction work is expected to take 15 months following the Exchange of Notes.

Establishment of the Center will enable the Government of Indonesia to promote personnel training in the sector of water supply and environmental sanitation and put the nation's policy of human resource development on the right track. The Government of Indonesia has so far been forced to conduct its training programs in limited facilities, and this existing training activity is to comprise a part of the general course program at the new Center. The Center is expected, therefore, to raise not only the volume but the quality of training activity in this field. With regard to training volume, a total of 1,350 people will be accommodated each year in the general and advanced courses, representing an increase of 810 people per year from past levels. In terms of quality, technical training can be carried out more effectively, making use of practical training facilities. Among other things, newly created advanced courses for technical and skill training will improve expertise and techniques for planning, construction, proper operation and management of facilities for water supply and environmental sanitation services. Based upon the above observations, it is considered that the construction of the Center will make a great contribution to the sound development of the water supply and environmental sanitation services in Indonesia. The Project, therefore, holds appropriateness as the subject of a grant aid from the Government of Japan.

With a view to achieving the objective of the Project, it is particularly important for the Government of Indonesia to take the following supporting action:

1) To train as many as 20 part-time instructors, living in Jakarta for water supply, prior to the opening of the Center

2) To select the cadre of full-time instructors and members of the main operating staff at an early stage, and start immediate preparations for opening the Center

3) To promote construction of regional training center in parallel with the implementation of the Project so as to achieve more effective training of personnel through close cooperation between the Central and Regional Training Centers

Although the training of instructors for the advanced courses and the development of training methods and materials could be realized gradually through trial and error, considering the pressing necessity for such courses, it is recommended to obtain the required expertise in an effective manner through the channel of technical cooperation.

CONTENTS

CHAPTER 1 INTRODUCTION

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The Republic of Indonesia is making a major effort, under its Fourth 5-Year Plan (REPELITA IV--1984-1988), to improve water supply and evironmental sanitation services. In 1984, only 40% of the country's urban population and 32% of the rural were served by water mains or sanitary well water. Accordingly, in the Fourth 5-Year Plan, an effort is being made in this area with a view to increasing the penetration of water supply to 75% of the urban and 55% of the rural population.

Environmental sanitation in the areas of solid waste disposal and night soil treatment have hitherto been handled independently by local governments. However, reflecting in part the inadequate development of administrative structures, the development of such facilities has lagged considerably. Nevertheless, the proper development of environmental sanitation is one of the key areas of emphasis in the current 5 Year Plan; the objective is to improve these facilitites in all of the country's 200 cities with a view to achieving a disposal rate by official agencies of 50% for household refuse and 100% for commercial and industrial refuse.

The Government of Indonesia has determined that one key aspect of infrastructure development in the National Development Plan is the pressing need to acquire and develop human resources all the sectors, and this has been national policy since the Third 5-Year Plan. In the sector of water supply and environmental sanitation as well, it is also recognized that the development of manpower resources goes hand in hand with the development of the facilities themselves. The Human Resource Development Project (HRDP), aimed at achieving the goals of the Fourth 5-Year Plan, has been developed by the Directorate General of Human Settlements, Department of Public Works (CIPTA KARYA), and the training of personnel is being carried out pursuant to this program.

However, since facilities for such training in Indonesia are inadequate, and the cadre of instructors quite limited, the HRDP has fallen far behind target. The Government of Indonesia, thus, plans to

construct Training Centers for Water Supply and Environmental Sanitation and has formulated plans for the in-depth training of personnel and to develop the requisite number of instructors, pursuant to the HRDP, and foster the preparation of training materials and curricula for the purpose of implementing the HRDP. This plan aims at establishing regional training centers for the water supply sub-sector in five locations around the nation, with a central facility in Jakarta. However, with respect to environmental sanitation, the intent is, for the time being, to build a central training center in Jakarta only.

The Government of Indonesia has requested a grant-aid from Japan for the construction of the Central Training Center in Jakartaand the Regional Training Center for Water Supply at Ujung Pandang as well as project-type technical cooperation in connection with the continuing operation of the Central Training Center after completion.

Upon receiving the request of the Government of Indonesia,the Government of Japan decided to conduct a preliminary survey on the subject plan. In February, 1988, the Japan International Cooperation Agency (JICA), sent a Preliminary Study Team to Indonesia, headed by Mr. Kiyoshi Suwa, Deputy Director of the Grant-Aid Division, Economic Cooperation Bureau of the Ministry of Foreign Affairs.

As a result of this study, the need for the development of water supply and environmental sanitation facilities in Indonesia, that of acquiring and training personnel for this sector, and the appropriateness of constructing the subject training center were recognized.

Since the construction of a Central Training Center in Jakarta has been deemed to be of pressing importance, the Government of Japan decided to conduct a further detailed study, viz., a Basic Design Study, on this Center as a grant-aid project. The proposed Regional Training Center at Ujung Pandang has, for the time being, been excluded from this grant-aid project. With regard to technical cooperation, since this is a matter which must be studied through other channels, the Government of Japan has elected to study the construction of the Central Training Center within the framework of a grant-aid as a "Project for the

Construction of the Water Supply and Environmental Sanitation Training Center in the Republic of Indonesia" (hereinafter called the Project).

Based on the above determination by the Government of Japan, JICA dispatched a Basic Design Study Team to Indonesia from May 21 to June 11, 1988, led by Mr. Yasumoto Magara, Director of the Department of Sanitary Engineering,The Institute of Public Health. This field survey covered the following areas:

1) to explain the objectives and scope of the study and the policy of the Government of Japan on the related technical cooperation;

2) to explain Japan's grant-aid system;

3) To gain a full understanding of present conditions and future plans with respect to human resource training in the sector of water supply and environmental sanitation and reconfirm the need for the Project;

4) To discuss the proposed training plan;

5) To discuss the implementation of the Project;

6) To survey conditions at the planned construction site;

7) To collect data and information required for determining the functions and activities of the Water Supply and Environmental Sanitation Training Center (hereinafter referred to as the Center), preparing a basic design of the facilities, and assessing the appropriateness of the Project.

The results of the discussions held between the Basic Design Study Team and the Indonesian officials concerned were summarized in the Minutes of Discussion, which was signed by Mr. Soelistigo Tjitrohamidjojo, BAE, Secretary of the Directorate General of Human Settlements of the Department of Public Works, and the leader of the Basic Design Study Team.

After returning to Japan, the Basic Design Study Team analyzed the materials obtained in the course of their field survey and drew up a Basic Design for the Project, based on the results of the above analysis and discussions. The contents of the Basic Design were compiled in a draft final report. The Team explained this to concerned officials of the Government of Indonesia and further discussed the Project with them. This report presents the results of the Basic Design Study.

CHAPTER 2 BACKGROUND OF THE PROJECT

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2-1 Water Supply in Indonesia

2-1-1 Histry of Water Supply Development

Water supply was already established in 62 cities in the Republic of Indonesia by the 1940's, prior to World War II. However, owing to the weak economy and internal disorder following the war and the subsequent War of Independence, water supply development had ceased, and the amount of water supplied through the water supply system in 1949 was only 4,500 liters/second (about 390,000 cu.m per day).

During the 20 years from 1950 to 1969, there was a gradual development in water supply services, but even so supply by 1969 only managed to double from the 1949 level to 9,000 l/second (about 780,000 cu.m per day). This was quite inadequate in terms of responding to the increased demand attendant upon the growth of population and economic activity. In April, 1969, the first Five-Year Development Plan started in Indonesia, on the basis of which a number of development policies were adopted. In the water supply sub-sector, facility development was also undertaken under the Five-Year Plan.

(1) The First Five-Year National Development Plan (1969-1973)

During this Plan period, improvements and rehabilitation were undertaken in existing water treatment facilities in all large cities over 1 million population (Jakarta, Bandung, Surabaya, Medan, and Semarang) and 54 medium-small cities, while, in the rural areas, 80,000 wells (hand-pump type) were dug. As a result, by the end of the Plan period, the volume of water supply increased to 15,000 l/second (some 1,300,000 cu.m per day).

(2) The Second Five-Year Plan (1974-1978)

During this period, there was a shift in priorities from obtaining water supply to a dual objective of increasing supply and improving water quality and safety. In other words, from that time on, a start

was made in the development of a modern water supply system. The emphasis in facility development shifted from the rehabilitation of existing facilities to the construction of new facilities. Water supply facility development was implemented not only in the large cities, such as Jakarta, Bandung, Surabaya, Medan, and Palembang, but in 100 medium-sized cities (with 100,000 - 150,000 population) and smaller cities (20,000 - 100,000) as well. As a result, water supply expanded to 29,000 l/second (2,500,000 cu.m per day). Even in rural villages, water supply coverage [cf. Note 1] reached 9%, where good-quality drinking water was supplied.

However, starting around this time, the economic and population growth in Indonesia led to an increase in the amount of solid waste and night soil which, in turn, caused pollution in the water resource. In addition, although there was a notable growth in water supply services under the Second Five-Year Plan, a serious bottleneck developed in qualified human resources which caused a serious delay in establishing efficient management systems in water supply services. Under these circumstances, the Government of Japan extended a series of technical cooperations to the Republic of Indonesia during a 3-year period from 1973-1975 which contributed to the development of human resources in water supply services and raised technical levels of water supply management.

(3) The Third Five-Year Plan (1979-1983)

The primary objective during the Third Five-Year Plan was to develop a water supply system that was in good technical and economic balance and to bring the benefits of water supply to the entire Indonesian population. In this connection, the Government of Indonesia introduced a concept of "basic need for potable water" and established this to be 60 litres per person per day. In new water supply projects, priority

Note 1. Water supply coverage means the proportion of served population to the total population in the water supply plan area..

was given to low-income and densely populated areas as well as outlying areas where clean water was difficult to obtain and areas where water-borne diseases were prevalent.

In this Third National Plan, water development was carried out in 16 large cities, 47 medium-sized cities, 170 smaller cities, and 400 county centers (Ibu Kota Kecamatan: IKK). As a result, water supply coverage rose to 40% in urban and 32% in rural areas.

2-1-2 Present Conditions of Water Supply

(1) Water Supply Administration

Water supply administration in the Republic of Indonesia is carried out by one agency and 4 ministries of the central government and by local government bodies. The central body for the construction of water supply facilities is the Department of Public Works, but inspection and guidance with respect to the quality of drinking water is the responsibility of the Department of Health. The Department of Home Affairs is charged with setting guidelines for water supply administration for local governments and water supply enterprises. The National Planning Agency (BAPPENAS) is concerned with establishing developmental priorities and allocating project budgets to the water supply sub-sector, while the Department of Finance is responsible for executing budgets.

Water supply services in the Republic of Indonesia are operated by the Water Supply Public Enterprise (Perusahaan Daerah Ain Minum: PDAM) and the Water Supply Office (Badan Pengelola Ain Minum: BPMAM) and, at the rural level (towns of below 3,000 population), by area residents. PDAM is established by local governments, while BPAM is the management organ for water supply facilities established and directly controlled by the Department of Public Works.

Water supply administration falls, in principle, under the jurisdiction of local governments,, but facility development is handled by the Department of Public Works and the Department of Health.

That is to say, in towns of less than 3,000 population, the construction of water supply facilities, such as shallow wells, hand pumps, spring ponds, and rainwater storage pits, is under the jurisdiction of the Department of Health, but actual management of these facilities is delegated to the local community. On the other hand, water supply facilities in communities of 3,000 or more are all constructed by the Department of Public Works.

Within two years following completion, the facilities are usually turned over to the local government, and a PDAM is organized to handle the management. When a PDAM cannot be formed in the local area, the BPAM continues to handle the operation.

(2) Present Conditions

1) General Conditions

As of March, 1984, which marked the completion of the Third Five-Year Plan, water supply coverage was 40% in urban areas [Note 2] and 32% in rural areas.

The current Fourth Five-Year Plan (1984-1988) seeks to increase these ratios to 75% and 55% respectively. Under these targets, the number of house connections to water supply in urban areas is to increase from 920,000 to 3,030,000, and new water supply systems are to be provided to 1,800 IKKs out of a total of 3,350. [cf. Note 3 in the next page].

Note 2. "Urban" in this context refers not to the entire administrative area but to areas of concentration of 20,000 persons or over. In Indonesia, there are five main cities with a million of more inhabitants, 11 large cities (200,000 to 1,000,000), 30 medium-sized cities (100- 200,000) and 395 small cities (20- 100,000).

Table 2-1 Water Distribution in Urban Areas (20,000 Population or Over)

Period	Number of House Connections	Number of Public Hydrants	Served Population
End of FY 1983	923,000	7,200	10 670,000
End of FY 1984	1,047,000	9,600	12 396,000
End of FY 1985	1,204,000	11 900	14 407,000
End of FY 1986	1,297,000	16 200	16 174,000
End of FY 1987	1,382,000	16 900	16,900,000
REPELITA-IV Target	3,030,000		

Source : Directorate of Water Supply

However, as this table shows, the number of house connections in urban areas at the end of fiscal 1987 was 1,382,000. Despite the efforts being made to improve services, it may well prove difficult to achieve the targets of the Fourth Five-Year Plan.

2) The Water Supply Service System

As in Japan, water supply services in Indonesia adopt, in principle, a self-supporting system, with water charges intended to defray the costs for construction and operation of the facilities. Nevertheless, since the bulk of enterprises cannot finance construction on their own, they must raise funds from abroad or through subsidies from the national government.

It is for this reason that the Department of Public Works handles facility construction, turning the facilities, upon completion, over the the local water supply enterprise through the local government. These water supply enterprises then apply a portion of their revenues to amortizing the cost of construction. As an example of water rates in Indonesia, a rate schedule for Jakarta is given below:

Note 3. The target areas for water supply facilities operated by the Department of Public Works in rural areas are administrative districts with a core population of 3,000 or more. Water development projects in such areas are called IKK Schemes.

Water Rates in the City of Jakarta, 1988 (Rp./Cum)

Type of Contract and Applicable Users	Amount of Water Used (cu.m.)			
	0-15	16-30	31-50	Over 50
1. Social use:				
A.Public use				
Public stand pipe			150	
Orphanage				
BPAMs				
B.Special uses				
Social dormitory				
Religious place	150	270	350	540
Government hospital				
Water supplywagon				
2. No commercial use:				
A.Home	180	360	550	900
B.Government institution				
Government office				
Embassy/Consulate,	270	450	725	1100
Educational facility				
Training center				
3. Commercial use:				
A.Small-scale users		600		1200
B.Large-scale users		750		1500
4. Industrial use:				
A.Small-scale users		630		1260
B.Large-scale users		840		1680
5. Supply at Harbor			2800	

Source : Directorate of Water Supply (1988)

3) Services Level

The distribution capacity of urban water systems in 1986 was 38,190 l/second (3,300,000 cu.m/day). While good progress has been made in developing continuous water supply systems in the large cities, many small-to-medium cities are still supplied on an intermittent basis.

Water supply services in Indonesia consist of house connection services (including also shared hydrants within a building) and public hydrant services. By fiscal 1987, some 1,380,000 house connections had been realized and 16,900 public hydrants had been installed around the country. Public stand pipes are provided in areas where it is difficult to supply water directly to the homes and/or in low-income areas. Public stand pipes are administered by superintendents who provide water directly to the residents at a charge and even wholesale this water to "water dealers".

Table 2-2 following gives an overview of water supply enterprises in the principal cities of the country.

Table 2-2 Water Supply Enterprises in the Main Cities

Cities	Population	No. of House Connections	No. of Public Stands	Supply Capacity (l/sec)	Unaccouted Water (%)
MEDAN	1,374,000	66,594	134	1,850	45
PADANG	298,000	10,300	65	250	45
PALEMBANG	787,000	39,285	336	1,500	45
JAKARTA	6,481,000	150,000	1,500	6,750	45
BANDUNG	1,461,000	78,000	1,000	1,500	38
JOGJAKARTA	398,000	11,700	30	450	50
SURABAYA	2,018,000	30,822	588	3,200	48
UJUNPANDANG	708,000	31,000	700	600	50

Source: Directorate of water Supply Feb. 1987
(Data for population; 1980, other; 1986)

The ratio of accounted water to total water supply runs 40-65%. Thus, the share of unaccounted water is quite high, creating a serious problem for water supply management.

2-1-3 Water Supply Development plan

(1) Long-range Plan

By way of responding to the United Nation's International Water Supply and Sanitation Decade (1981-1990), Indonesia, through the Department of Public Works, organized several workshops involving the participation of international agencies and developed countries and set forth the following basic policies with respect to the long-range water supply plan:

1) By 1990, 75% of the urban population and 60% of the rural will be able to receive clean water.

2) This target is to be achieved under the current Five-Year Plan for the water supply sub-sector, which links the Third to the Fifth Plan (1989-1993).

3) The functions of the concerned departments and agencies are to be as follows:

Authorities	Area of Concern
Department of Public Works	Technical matters
Department of Health	Water quality control
Department of Home Affairs	General administration, public relations

4) Financial assistance for water supply enterprises will be provided in accordance with the policies for assistance set forth in the current Third Five-Year Plan.

5) In terms of the responsibilities to be assumed by local governments, in the case of small-scale water supply facilities in rural communities, the residents will, in

principle, have basic responsibility for maintenance and management, while the local governments will develop facilities at their own expense to the maximum possible extent.

6) In order to achieve the targets, priority should be given to acquisition and training of personnel and establishment of plans for water resource utilization.

(2) Five-Year Plans

The current Fourth Five-Year Plan essentially follows the principles of the Third Five-Year Plan. However, with respect to the basic policy for long-term planning, the following objectives have been added:

1) Development should be carried out more efficiently and effectively, with due consideration for the social importance of water supply development from both a technical and financial standpoint.

2) Since water supply facilities directly support the country's economic development, water supply for port areas and industrial sectors must also be developed.

3) Investment in water supply facilities must be made in such manner as to enable the facilities to be operated on a self-supporting basis.

4) The basic standard of water supply is to be raised from the present 60 l/person/day to 70 l. Planned water supply by area is to include both loss water and industrial demand.

5) Special emphasis is to be given to activating, to the maximum extent possible, the capacity of existing facilities through expansion of water distribution networks.

6) In order to hold loss water to a minimum, efforts are to be made to improve management quality and technical levels in water supply enterprises..

Based on realizing the goals set forth above, the planned level of water supply service at the end of the Fourth Five-Year Plan is as follows:

1) Water supply service level: Urban areas--70%
Rural areas--55%

2) Number of house connections: 3,030,000 urban households

3) Ratio of unaccounted water: Urban areas--20%
Rural areas--15%

In order to realize the above levels, under the Fourth Five-Year Plan, water supply facilities will be newly constructed in 150 small cities and 1,800 IKKs, while existing facilities will be expanded in 350 cities. The required investment is estimated at U.S. $2 billion, of which 41% is expected to be provided by the central government, 19% by local governments and water supply enterprises, and the remaining 40% via loans and grants from other countries and international agencies.

In connection with the development of the Fourth National Plan, it has been pointed out that major efforts are required in the following areas:

1) Raising technical standards to improve the quality of water;

2) Improving the level of water supply services by reducing intermittent supply and interruptions of water supply;

3) Standardizing planning and design methods;

4) Preparing design guidelines for water supply facilities;

5) Developing techniques for lowering water rates;

6) Raising levels of building technology;

7) Refining material standards for water supply facilities;

8) Evaluating existing water resources and developing new resources;

9) Developing human resources and constructing training centers

2-2 Environmental Sanitation in Indonesia

2-2-1 General Review

The administration of environmental sanitation in the Republic of Indonesia is, in principle, the responsibility of local government. However, since priority has been given to date to infrastructure development in other sectors, progress in environmental sanitation development has been slow.

Systems for the collection and transportation of garbage in Indonesia have traditionally relied primarily on wheelbarrows.The collected refuse is transported untreated to nearby disposal areas for reloading on open trucks which transport it to dump areas. Dumping methods do not involve sanitary landfill, as used in Japan [cf. Note 4], but rather so-called "open dumping". Many people make their livelihood at dump areas as "scavengers", going into the garbage to recover valuable items.

Note 4. Sanitary landfill refers to a method of dumping garbage in a sanitary landfill area, the structure of which can prevent surface water and leachate from discharging out of the area. Dumped garbage is covered with soil of a certain thickness. In Japan, such liquid is usually treated at the dumping area before being discharged.

With this sort of dump method, garbage is prone to scatter and there is an effluence of dirty water from the dump area which generates foul odors, rats, and flies. In addition, underground water can easily be contaminated by leachate and surface flow. Also, the night soil is discharged directly into rivers so that practically all the water infiltrates underground via permeation trenches.

In recent years, there has been an increase in garbage, night soil, and waste water stemming from the concentration of population and economic activity in urban areas which has had a very damaging impact on the living environment. Under these conditions, the Department of Public Works decided to promote environmental sanitation on the basis of a national plan, while the treatment of waste matter has been entrusted solely to local governments.

This policy was finally promulgated during the Third Five-Year Plan, and surveys were initially undertaken in principal cities on the conditions of environmental sanitation. As a result, it became evident that public environmental sanitation services were available to only about 35% of the total population in the cities surveyed.

In 1984, the former Environmental Sanitation Section within the Directorate of Sanitary Engineering in the Department of Public Works was upgraded to a Directorate of Environmental Sanitation, indicating that a start has been made under the Fourth Five-Year Plan in developing environmental sanitation facilities on a national scale.

2-2-2 Present State of Environmental Sanitation Services

(1) Administration

According to Government Ordinance 18 enacted in 1953, the organizations directly concerned with the administration of waste matter in Indonesia are essentially local government agencies, and so regulations concerning urban sanitation, whether technical or administrative, are determined solely by these local bodies. Thus, no standardization has yet developed on a national level.

In the large cities, independent Sanitation Departments (Dinas Kebersihan) handle environmental sanitation services while, in the small-to-medium cities, this activity is handled by the sanitation section under a directorate or department of public works. In addition, as a recent trend, in certain large cities like Bandung and Medan, where urban development projects are underway, public corporations (Perusahaan Daerah) have been established for this purpose. The latter are intended, in principle, to be self-sustaining.

Although the environmental sanitation services should be undertaken by local governments, as mentioned above, in order to encourage the development of administrative structures, the central government offers the following kinds of assistance during the initial stages:

1) Guidance in preparing plans
2) Technical assistance in project implementation
3) Technical assistance in the management of waste disposal facilities
4) Preparation of implementation plans

The local government body performs the following tasks in accordance with the implementation plan developed by the central government:

1) Improving operating organizations and systems
2) Promoting citizen participation
3) Developing specific disposal plans that conform to local conditions
4) Maintenance and management of facilities and equipment.

At the central government level, the following departments and agencies are involved in environmental sanitation administration:

1) Department of Public Works:
   Technical development and improvement in urban areas

2) Department of Health:
   Development and improvement of environmental sanitation in residential areas

3) Department of Home Affairs:
General administrative guidance, including the encouragement of citizen participation

4) Agency for Applied Science and Technology(BPPT):
Technical modernization

5) State Minister for Population and Environment:
Coordination within the central government

6) Department of Finance (DEP KEUANGAN):
Provision of budgets to implementing bodies from the National Treasury and foreign funds

7) National Development Planning Agency (BAPPENAS):
Setting developmental priorities and allocation of developmental funds

(2) Conditions of Waste Disposal

During the Third Five-Year Plan, the Department of Public Works, for the first time, conducted a survey on the current state of environmental sanitation activities in the major cities, and this kind of survey activity has been maintained on a continuing basis. Shown below are the results of the 1987 questionnaire survey in 31 principal cities (excluding Jakarta) on the implementation of waste disposal services. This survey gives a good profile of conditions in the nation as a whole.

1) Volume of Waste Generation

Total Volume of Waste Generated (cu.m per day)	Number of Cities	Amount Generated per 1,000 population (cu.m per day)	Number of Cities
Less than 100	2	Less than 1.0	2
100 - 300	3	1.0 - 1.5	3
300 - 500	3	1.5 - 2.0	4
500 - 700	4	2.0 - 2.5	6
700 - 900	4	2.5 - 3.0	9
900 - 1,100	5	3.0 - 3.5	5
1,100 - 2,600	8	3.5 and over	2
5,200 - 5,700	2		

2) Existing Facilities

Number of Wheelbarrows	Number of Cities	No. of Trucks	Number of Cities	Landfill Area(ha)	Number of Cities
>20	4	>10	13	>2.5	8
20 - 50	10	10 - 20	5	2.5 - 5	8
50 - 150	6	20 - 30	8	5 - 10	3
150 - 300	7	30 - 50	1	10 - 30	5
300 - 500	2	50>	4	30>	3
500 & over	1				

3) Diffusion Rates for Garbage Collection Service.

% of Population Served (%)	Number of Cities	% of Garbage Collected (%)	Number of Cities
Below 40	3	Below 40	2
40 - 50	6	40 - 50	5
50 - 60	4	50 - 60	4
60 - 70	6	60 - 70	5
70 - 80	4	70 - 80	4
80 - 90	3	80 - 90	5
90 & over	1	90 & over	2

4) Expenditures on Garbage Treatment by Function and Number of Cities

Expenditures (Rp/cu.m)	Number of Cities		
	Collection	Cartage	Disposal
Below 100	1	0	3
100 - 300	2	4	7
300 - 500	3	3	3
500 - 1,000	8	9	3
1,000 - 2,000	3	7	6
2,000 & over	2	2	0

The state of garbage disposal in Jakarta is as follows:

Population within administrative area: 6.2 million

Amount of waste generated: 18,466 cu.m (3,693 tons)/day	
By households	12,026 cu.m
By markets	2,000
By commercial establishments	1,850
From roads	740
By industry	1,850
Waste generation per 1,000 population:	3.0cu.m/day
Number of wheelbarrows owned:	5,530 units
Number of sanitation vehicles:	669 units
Trucks	255
Dump trucks	242
Loaders	56
Compactors	116
Landfill area:	64 ha
Collection coverage (service level)	
By administrative area:	62.5%
By population:	94.7%
By waste generated:	85.6%
Operating costs per cu.m of waste:	390 Rps/cu.m

2-2-3 Environmental Sanitation Development Plan

The deterioration of the urban living environment in Indonesia is becoming an increasingly serious problem. The lag in environmental sanitation systems and facility development has led to contamination of water resources. Under these circumstances, the Government of Indonesia has drawn up a National Plan for the environmental sanitation sub-sector as well, which has been initiated during the current Fourth Five-Year Plan. The basic concepts of this Plan are outlined below:

1) Transfer of authority from the central to local government (provinces and Kabupaten)

2) Developing funding for urban environmental sanitation centers to be operated on a self-sustaining basis

3) Promoting cooperation between the environmental sanitation and other administrative sectors

4) Maintenance of the role of the central government in technical guidance, fiscal assistance, and the development of appropriate technology

As one of the goals of facility development, in 200 cities (including metropolitan areas; large, medium, and small cities), labor-intensive enterprises will be introduced which will collect 50% of household refuse and 100% of commercial and industrial refuse, with a view to bringing environmental sanitation services to 60% of the urban population. In addition, in Jakarta, other metropolitan areas, and large cities, technical assistance will be provided in implementing surveys, while, in the remaining cities, programs of technical assistance will be instituted, including the supply of facilities and equipment.

2-3 Problems in the Water Supply and Environmental Sanitation

2-3-1 Water Supply Problems and Required Countermeasures

(1) Problems

Problems may be mentioned with respect to both the quantity and quality of water supply in Indonesia.

1) Quantitative problems

Although the Fourth Five-Year Plan set a 75% target for the water supply service level in all cities of 20,000 population or more, the number of house connections at the end of fiscal 1987 was 1,380,000, only 46% of the 3,030,000 targeted by this Plan. The total population service at this time was 17,200,000. The basic standard for per capita water supply is 70 l/day, but this is only about 35% of the Japanese average of 200 l/day.

Under the circumstances, Indonesia's water supply services face a major task in providing facilities to boost both the population receiving water supply and the standard unit of supply. This supply shortfall is further compounded by the large amount of water leakage. For example, in Jakarta, the proportion of unaccounted water has reached 50%; most of this is from leakage, which is reported to be equivalent to 40% of total supply.

Comparing this figure with an average of 15% in Japan, it is evident that the unaccounted water ratio is extraordinarily high and that some sort of corrective measure must be taken to insure the sound operation of water supply services.

2) Qualitative problems

In Indonesia, people customarily boil and then cool their drinking water. With the concentration of population and the increased pace of activity in the nation's cities in recent years, there has been a corresponding increase in the volume of night soil, waste water,

and urban waste. As a consequence, there has been a progressive contamination of drinking water resources both in rivers and underground and, in a number of areas, water is no longer safe to drink even after boiling. Even though water supply facilities are developed, water quality has deteriorated in terms of ammonia nitrogen, organic concentrate, color, and coliform count, reflecting the influence of household drainage. As a result, the safety of tap water has been severely impaired, with coliform bacilli detected even in clean water.Accordingly, a substantial degree of technology is called for, particularly in water treatment.

However, the cacacity of water treatment facilities is not sufficient to respond to this situation, and many water supply enterprises suffer from a serious shortage of technicians engaged in water quality management based on a high level of technology. Also, in areas where water supply is limited to certain time periods, there is a danger of water contamination, owing to the inflow of polluted underground water from leakage points when the pressure is minus.

(2) Required Countermeasures

With respect to the quantitative shortfall, there is, needless to say, a need to build new facilities and rehabilitate existing facilities with respect to creating an integrated water supply system from water intake facilities to hydrants in individual households. For this purpose, apart from the procurement of funds for this construction and remodeling, the following efforts will be required:

1) Raising levels of technology in facility planning and design

2) Improving levels of construction skills, particularly in the area of pipelaying

3) Raising skill levels in pump operations to improve the regulation of water pressure

4) Developing effective systems of facility maintenance and improving techniques for leakage surveys

To respond to the qualitative problems, there must be an upgrading of water quality testing techniques and quality control systems. It is vital that quality checks be made daily on both raw and treated water so as to monitor the contamination of raw water and the safety of treated water. The results of these quality examinations are indispensable for the control of anti-coagulants and alkaline injections according to changes in turbidity of raw water and chlorine injection control in accordance with the quantity of ammonia nitrogen and coloform bacilli. These treatment techniques lie at the core of water treatment plant operation, and so an improvement in these techniques along with the development of proper organizations of responsibility are vitally required.

2-3-2 Problems in Environmental Sanitation and Required Countermeasures

A full-scale program to improve environmental sanitation in the Republic of Indonesia is to be included in the Fourth Five-Year Plan, and so work in this area has only barely been started.

Environmental sanitation services fall basically under the jurisdiction of local government and so have been implemented to date on an area by area basis. They have thus been left outside the priorities for infrastructure development in other sectors. Under these circumstances, there are many local governments with inadequate organizations for implementing proper environmental sanitation services. They must contend with a shortage of collection, treatment, and disposal facilities and equipment and a deficiency of personnel to plan, design, operate, and manage these facilities. As a consequence, these local bodies are far from coping fully with the demand for treating the rapidly mounting supplies of solid waste and night soil.

There is, therefore, an urgent need to implement the following programs in connection with environmental sanitation development:

1) To develop, quantitatively and qualitatively, facilities to handle the demand for treatment of solid waste and night soil.

2) To develop national facility standards and raise levels of investment efficiency

3) To develop systems of environmental sanitation along with suitable management

4) To recruit and train personnel required for the development of environmental sanitation services

5) To develop technology in connection with the treatment of solid waste and night soil

Implementation of these programs should not be left in the hands of local governments but should incorporate technical and financial assistance from the central government.

2-3-3 Need for Human Resource Development

In March, 1983, the Government of Indonesia issued a set of "National Principles". It hopes to see a definitive economic "take-off" during the Sixth Five-Year Plan, and the Fourth Five-Year Plan (1984-1988) has been positioned to lay the foundation for this take-off.

The Fourth Five-Year Plan has set its sights on creating a prosperous society, based on national self-reliance, to mobilize the nation's natural, economic, and human resources over a broad range. The government recognizes that the Fourth Five-Year Plan has been subject to major influences, not only in terms of funding availability and changes in the global economy but also from the standpoint of human resources. Thus, the development of human resources has been made a major task of national planning.

Problems affecting water supply and economic sanitation services revolve around both quantitative and qualitative deficiencies, deriving primarily from inadequacies in both facilities and their operation and

management. Accordingly, while the provision of facilities is a major item of priority, there is an equally urgent requirement for trained personnel to properly maintain and operate them after construction. In short, facility construction and human resource development are really two sides of the same coin. Thus, personnel training is clearly vital in terms of improving services in the water supply and environmental sector.

2-4 Human Resource Development in the Water Supply and Environmental Sanitation Sector

2-4-1 Water Supply

(1) Background of the Human Resource Development Project (HRDP)

The need for human resource development in the water supply sub-sector was recognized at an early stage, and a personnel training program was initiated in the Water Supply Directorate of the Directorate General of Human Settlements, Department of Public Works, for staff members of water supply enterprises. Since 1981, in particular, several proposals for personnel training programs have been made by a technical cooperation team from the Government of the Netherlands. They include:

December, 1981-- Manpower Development Program for Community water Supply in Indonesia: "Suggestion for a Regional Training Center"

February, 1983-- "Forecast of Manpower and Training Needs" (1983-1990) (Ibid.)

January, 1984-- Human Resource Development Project for Community Water Supply in Indonesia

The above HRDP report, issued in January 1984, was the inception report for the current HRDP which was modified in October 1985 and June 1986. The current HRDP, revised in 1986, states that these modifications were made from the following standpoints:

... Standing at the halfway point in the United Nations' International Drinking Water Supply and Sanitation Decade, officials concerned with water supply in Indonesia held a workshop at Cipanas at which the basic objectives of the 10-year Plan were reconfirmed as follows*

-- 75% of the urban population will have access to a supply of clean water

-- 50% of the above supply will be delivered directly to in-home distribution facilities

-- The remaining 50% will be delivered from public hydrants

... The construction program for the Fourth Five-Year Plan has already been set. According to this Plan, the number of house connections in urban areas will be increased from 1,100,000 in mid-1985 to 3,000,000, while a framework will be established for launching new water supply enterprises in 1,800 IKKs. In this way, a very high priority has been given to the development of water distribution systems.

... As a result of the review of progress to date at the Cipanas workshop, a conclusion was reached that water supply enterprises are facing numerous problems in connection with operations and maintenance. Many of these problems are closely linked to deficiencies in human resource development.

... The scope of development envisaged by the Five-Year Plan calls for a doubling of present capacity. However, in view of this ambitious goal, there is clearly a pressing need to initiate broader-based programs in the area of human resource development.

The current HRDP report is a compilation of the above proposals amended on the basis of more recent information. A profile of this program is given in the following sub-section.

(2) Outline of the HRDP

The current HRDP report shows the scope and nature of the human resource development that is required to meet the water supply goals of the Fourth Five-Year Plan. Given the present conditions of water supply enterprises, this report stipulates that, in order to develop water supply facilities and properly operate these facilities, there must be an expansion of both water supply enterprises and their personnel as well as implementation of complete training programs for all key job-holders and core technical personnel engaged in water supply.

The number of target personnel is forecast therein as follows:

1) To classify the scale of water enterprise by the number of house connections

2) To assume the number of personnel per 1,000 house connections in an enterprise in accordance with the following classification:

Scale of Enterprise by No. of House Connections	Number of Personnel
less than 2,000	15/1,000 H.C.
2,000 - 7,500	12/ " "
7,500 - 20,000	10/ " "
Over 20,000	10/ " "

3) To assume the number of enterprises by size group required to increase the number of house connections from 1.1 to 3.0 million.

4) To calculate the total number of personnel from 2) and 3) above

5) To prepare a model organization structure of enterprises by size group

6) To list up target job-holders referring to the model organization structures established in 5) above

7) To calculate the number of target job-holders by kind of job from 3) and 6) above.

Based on the above, it is forecast that the number of workers in the water supply sub-sector will increase from 16,000 persons in 1985 to 40,600 at the end of the Plan period, of whom 22,986 will require training. A breakdown of the target trainees is given in Table 2-3 following.

Table 2-3 Breakdown of Target Trainees under the HRDP

KEY JOB TITLES FOR TRAINING	NO. TO RECEIVE TRAINING	TOTAL MAN-WEEKS
DIRECTOR	285	1140
DEPUTY DIRECTOR (TECHNICAL)	285	1140
DEPUTY DIRECTOR (FINANCE/ADMIN.)	285	570
HEAD OF PRODUCTION DEPT.	285	570
HEAD OF DISTRIBUTION DEPT.	285	570
HEAD OF PLANNING DEPT.	285	570
HEAD OF MAINTENANCE DEPT.	285	570
HEAD OF CASH DEPT.	285	570
HEAD OF BOOKKEEPING DEPT.	285	570
HEAD OF CONSUMER CONNECTIONS DEPT.	285	570
HEAD OF ADMIN./PERSONNEL DEPT.	285	570
HEAD OF BRANCH OFFICE	334	1336
HEAD OF TECHNICAL SECTION	334	1336
HEAD OF FINANCE/ADMIN. SECTION	334	668
HEAD OF LABORATORY SUBSECTION	512	1024
HEAD OF PRODUCTION SUBSECTION	334	668
HEAD OF DISTRIBUTION SUBSECTION	334	668
BOOKKEEPER	3030	6060
LEAKAGE CONTROLLER	285	570
LEAKAGE INSPECTOR	95	95
TRAINING OFFICER (PART-TIME)	285	285
ELECTRICIAN/MECHANIC	1515	3030
HEAD OF IKK UNIT	2093	4186
TREATMENT PLANT OPERATOR (BRANCH)*)	512	1024
TREATMENT PLANT OPERATOR (IKK)*)	1046	1046
PIPELAYERS (FULL-TIME)	1515	3030
PIPELAYERS (PART-TIME)	2093	2093
PIPELAYERS (CONTRACTOR) (WE)	2300	2300
PIPELAYERS (CONTRACTOR) (IKK)	1200	1200
IKK CONSTRUCTION SUPERVISOR	900	1800
MISCELLANEOUS		
CONSULTANTS	100	100
CONTRACTORS (PROJECT MANAGERS)	200	400
LOCAL GOVERNMENT STAFF	300	600
REGIONAL DWS STAFF (TRAINERS ETC.)	200	400
TOTALS	22,986	41,329

*) based on assumption that 50% of water systems will involve full treatment.

Training targeted at such persons is to be conducted at six locations around the country. The number of persons to be trained at each regional training center (training loads) is shown in Table 2-4 following.

Table 2-4 Training Load by Region, as shown in the HRDP

REGION	TOTAL ENTER-PRISE STAFF (END REP.IV)	% OF TOTAL INDO-NESIA	CLASSROOM TRAINING		PIPELAYING WORKSHOP	
			TOTAL MAN-WEEKS	MAN-WEEKS PER YEAR	TOTAL MAN-WEEKS	MAN-WEEKS PER YEAR
REGION A (MEDAN) (Aceh, N. Sumatra)	4229	10%	2050	510	862	216
REGION B (PADANG OR PALEMBANG) (W. Sumatra, S. Sumatra, Riau, Jambi, Lampung, Bengkulu)	4952	12%	2460	615	1035	259
REGION C (SEMARANG) (C. Java, Yogyakarta)	5611	14%	2870	770	1207	302
REGION D (SURABAYA) (E. Java, Bali, NTT, NTB, Timor Timur)	9294	23%	4720	1180	1983	496
REGION E (UJUNG PANDANG) (Sulawesi, Maluku, Irian Jaya, E. Kalimantan, S. Kalimantan)	6740	17%	3800	950	1466	367
NATIONAL CENTRE (JAKARTA) (Jakarta, W. Java, W. Kalimantan, Central Kalimantan)	9286	24%	4920 + 2660*	1900	2069	517

* 2660 is allowance for training Directors, Laboratory Staff, Consultants, etc.

(3) Training Achievement

The personnel training achieved thus far in the water supply sub-sector is as shown in Table 2-5 below.

Table 2-5 The Number of Staff in the Water Supply Sub-sector Trained Per Region Under REPELITA-IV

Province	Fiscal Year 1984	1985	1986	1987	Training Location	Number of Instructors
Region A						
North Sumatera	114	74	2	28	Medan	3
D.I. Aceh	79	21	6	14		-
Region B						
West Sumatera	51	37	7	26	Padang/	3
Lampung	24	57	8	12	Palembang	6
South Sumatera	84	46	9	16		
Riau	25	3	3	15		-
Bengkulu	32	16	8	12		-
Jambi	25	7	7	15		-
Region C						
Central Java	90	130	105	19	Semarang/	10
D.I. Yogyakarta	31	12	9	14	Yogyakarta	8
Region D						
East Java	140	131	130	264	Surabaya	11
Bali	49	35	17	14		4
NTT	33	22	8	12		
NTB	26	13	2	12		
Timopr Timur	4	-	-	4		
Region E						
Maluku	10	10	7	5	Ujung Pandang	-
Irian Jaya	2	5	5	11		
Sulawesi	107	73	25	33		
East Kalimantan	48	14	4	6		
South Kalimantan	39	31	13	11		
National Centre						
Jakarta	43	28	34	33	Jakarta/	11
West Java	171	58	93	154	Bandung	7
West Kalimantan	28	16	11	15		
Central Kali-mantan	19	14	13	11		
Total	1274	803	566	756		69

Source: Directorate of Water Supply

2-4-2 Environmental Sanitation

(1) Background

As in the case of water supply, human resource development in the environmental sanitation sub-sector began in the late 1970's. In those days, the present Directorates of Environmental Sanitation and Water Supply were both sub-directorates under the former Directorate of Sanitary Engineering within the Directorate General of Human Settlements. Human resource development was handled entirely by the Technical Development Sub-directorate of the Directorate. However, most of the actual programs were concerned only with the water supply sub-sector.

Human resource development in the environmental sanitation sub-sector got underway in earnest in 1984 after the environment sanitation and water supply operations were separated and elevated to Directorate status. The new Directorate of Environmental Sanitation set the scope of personnel development that would be required to meet the goals of the Fourth Five-Year Plan on the basis of methods that had been employed in the water supply sub-sector. Thus, training programs have been conducted since 1985. Table 2-6 on the following page shows actual training performance to date vis-a-vis targets.

The programs are mainly for new recruits to the environmental sanitation sub-sector and are designed to develop a proper understanding of their new duties. (This course will become the Freshman General Course in the Center program.)

From the time it became an independent agency, the Directorate of Environmental Sanitation has repeatedly stated that it required technical assistance for its human resource development. As a result, an agreement was made with the Government of the Netherlands to revise its Human Resource Development Project, and the revised HRDP was announced in June, 1987.

Table 2-6 HRDP Targets for the Five-Year Plan and Training Performance

No.	ACTIVITIES	TARGET OF REPELITA-IV	FISCAL YEAR 1985	1986	1987	1988 (PLAN)
1.	Training for Supervisory Management					
	a. Solid Waste	1,626	30	60	60	90
	b. Drainege	329	30	60	60	90
	c. Waste Water	329	30	30	60	90
2.	Training for Planner.					
	a. Solid Waste	120	-	-	39	30
	b. Drainege	120	-	-	34	30
	c. Waste Water	120	-	-	30	30
3.	Preparation of Material Planning for					
	a. Supervisory Mgt. Staffs	1 unit	1 unit			
	b. Planners	1 unit	-	-	-	1 unit
4.	Preparation of Material for Campaign	3 unit	-	1 unit	1 unit	1 unit
5.	Training Instructor of Drainage	120	-	-	30	
6.	Training for Management of Environmental Sanitation Authority	54 cities	6	8	16	20
7.	Institutional Strecthening of ESA.	20 cities	1	1	-	2

SOURCE:Directorate of Environmental Sanitation

(2) Description of the HRDP

The revised HRDP report sets the year 2000 as the target year and shows the requisite training volume and method based on a forecast of needs. This report indicates the necessity of strengthening of local government bodies working in this area and sets the kind and number of personnel required to be trained by job classification to meet the organizational improvement needs. The detailed method applied to forecast the training requirement is as follows:

1) To set a personnel model for local government involved with the environmental sanitation services, by size of city

2) To estimate the number of cities by size, based on a population forecast for the year 2000

3) To multiply the number of personnel in each job classification by the number calculated by 2) above

4) To sum up the numbers obtained through 3) above

The detailed requirements are shown in Table 2-7 following:

Table 2-7 Number of Target Trainees under the HRDP

Area	1985	2000
Solid Waste Disposal	1,224	2,377
Night Soil and Sewerage Disposal	3,464	5,684
Total	4,688	8,061

As in the case of water supply, it is proposed that staff training courses be provided by job classification. 3 regional centers are planned to be constructed to conduct these courses, as shown in Table 2-8 following:

Table 2-8 Regional Training Centers

Location	Areas to be Served	Number of Trainees
Jakarta	Java Island	5,533
Padang	Sumatra Island	1,878
Denpasar	Other areas	2,262
Total	(8,061 x 1.2 = 9,673)	9,673

The number of trainees shown in the above table are developed to establish the size of the facilities, including a 20% safety margin.

2-4-3 Problems in Implementing the HRDP

(1) Problem Areas

In the HRDP, the main programs are prepared for training freshmen and staff members. These are intended to provide basic or applied knowledge required to fulfill their respective responsibilities. In the environmental sanitation area, the primary concern is placed on strengthening the organizations concerned. There is a certain meaning in giving priority to staff training. However, looking at the water supply sub-sector, the main training focus should be placed on the technical side, because the effective operation of services relies mostly on technical matters. There is a compelling need to upgrade the skills required for everyday operations as well as for retraining to keep pace with technological advances. These technical programs are, therefore, of great importance.

The most effective method of developing technical knowledge and skills is through practical, workshop-type training programs, particularly in the areas of water treatment, water quality control, leakage control, and the operation and maintenance of electrical and mechanical equipment and pumps. However, the current HRDP offers only a limited number of such courses ,and so technical training should be strengthened.

(2) Problems in Implementing the Current HRDP

The need for human resource development has been duly recognized, and the development of software for that purpose (e.g., preparation of training programs, curricula, and instructional materials) has been moving ahead. However, since the existing training facilities are most inadequate, implementation has not been proceeding at the desired pace.

In the environmental sanitation sub-sector, there are no exclusive training facilities at all and so, at present, facilities must be leased for each course. The bulk of the training budget goes for trainee travel and accommodations and for leasing the training facilities.

The situation is not much different in the water supply sub-sector. In Jakarta, there is a small training facility that was established in 1973, but its training equipment is antiquated. Thus, good results cannot be expected from this facility, and the bulk of course given there are, of necessity, based simply on classroom training. In the provinces, training is conducted in leased facilities, just as in the case of the environmental sanitation sub-sector.

Since training in this sector has been implemented under such circumstances, it is quite difficult to conduct the training programs stipulated in the HRDP report. As a result, as of the end of 1987, there were 3,396 persons who had completed training in the water supply sub-sector and 1,453 persons in the environmental sanitation sub-sector. These figures are equivalent to only 15% and 29% of those targeted by the respective HRDPs.

(3) Need for a Central Training Center

Under the above circumstances, in order to implement the HRDP more effectively, the construction of training centers has become a pressing concern at the Directorate General of Human Settlements, and so construction has started on regional training centers for the water supply sub-sector. As for the Jakarta region, the existing training facility is far from a training center capable of providing the training programs established in the HRDP. And, given the total lack of training facilities in the environmental sanitation sub-sector, a regional training center is needed in the Jakarta area to implement the HRDP for both sub-sectors.

In addition, as discussed in Sub-section (1) above, the required technical training cannot be delivered only through the HRDP. A central training center is, therefore, required on the national level to conduct this training, develop standard instructional materials and methods, and train instructors.

To meet these needs, the Directorate General of Human Settlements has decided to construct a combined water supply and environmental sanitation training center in the Jakarta area.

2-5 Background and Nature of the Request

2-5-1 Background of the Request

The Government of Indonesia has long recognized the need for human resource development in the water supply sub-sector and, in 1970, made a request to Japan for technical cooperation in this field. In 1973, in response to this request, a technical cooperation program for personnel training was initiated, under which Japanese experts provided training for a 3 year period. This training program was later taken over by the Directorate General of Human Settlements of the Department of Public Works, which inaugurated staff training programs centering on management personnel in the water supply sub-sector drawn from all parts of the nation. These programs were administered by the Technical Development Sub-directorate of the Water Supply Directorate of this Directorate General.

The only facility available for conducting these training programs is a small facility in Jakarta, and training facilities must be leased in the provinces. The Government of Indonesia has, for some time, had a plan to build a new training center and so, in 1982, approached the Government of Japan about the possibility of extending technical cooperation via a grant-aid for such a center.

The Government of Indonesia also attached major importance to software development for human resource development and drafted the current HRDP through technical cooperation provided by the Government of the Netherlands and financing from the IBRD. Training is currently being offered under the HRDP, and instructional materials and courses are being developed under this cooperation. However, the lack of proper training facilities, as noted above, has become a serious bottleneck in human resource development.

The longstanding concept of the Government of Indonesia for the construction of training centers is to establish a network comprising a central training center in Jakarta and various regional centers which will permit effective training on a national level. Since there were no training facilities in the provinces, construction of such

facilities outside Jakarta seemed to be the most pressing need. Based on this concept, the government constructed an initial water supply training center in Medan and has started to construct another in Surabaya. The latter facility is being built with aid from the International Bank for Reconstruction and Development (IBRD), while the feasibility of those in Ujung Pandang, Palembang, and Semarang is being examined with a view to constructing these with assistance from West Germany and the Asian Development Bank.

In line with the development of these regional training centers, it has become essential to construct a central training center to supervise the activities of regional centers and prepare uniform instructional materials and curricula on a national level. In the environmental sanitation sub-sector, given the total lack of any training facilities, the construction of such a center is most urgent.

The Government of Indonesia has, therefore, decided to build a central training center in Jakarta which will incorporate training in both the water supply and environmental sub-sectors and so, in December, 1986, made a formal request to the Government of Japan for a grant-aid to build the subject center and for project-type technical cooperation for continuing operation after completion.

2-5-2 Details of the Request

The details of the request made by the Government of Indonesia to the Government of Japan in December, 1986 are as follows:

(1) Project Title: Water Supply and Sanitation Training Centers

(2) Locations: A Central Training Center in Jakarta A Regional Training Center in Ujung Pandang

(3) Implementing Body: Directorate General of Human Settlements, Department of Public Works

(4) Objective

The objective of the project is to establish the Central Training Center in Jakarta and the Regional Training Center in Ujung Pandang for the purpose of upgrading the technological level on water supply and to spread the knowledge of environmental sanitation through training of engineers, technicians and related staff to be able to practice adequate planning, designing, construction, operation, and maintenance of facilities and proper management of water works and environmental sanitation sector.

(5) Nature of the Request:

1) To provide project-type technical cooperation with respect to the preparation of optimum training guidelines for the water supply and environmental sanitation sector, the development of standard instructional methods, and the improvement of training implementation systems.

2) To provide a grant-aid for the construction of training centers and the provision of equipment.

(6) Implementation Plan by Year:

1987-- Finalization of the requested proposal
1988-- Detailed Design
1989-- Construction of the facilities and installation of the equipment
1988-1992-- Technical cooperation for implementation of training

(7) Building Site:

The Government of Indonesia is to secure a proper site for the construction of the facilities and provide water, power, and other basic amenities.

The project site for the Central Training Center in Jakarta is located at Tangerang, some 30 km from the office of Cipta Karya. It contains 22,000 cu.m adjacent to the Tangerang water treatment plant.

A site for the Regional Training Center has been acquired within the water treatment plant at Ujung Pandang.

(8) Facility Plan:

1) The Central Training Center (Jakarta) will have the following facilities:

Main building-- total floor area (5,490 cu.m, 4 stories)
- Combination library/meeting lounge (1)
- Computer training room (1)
- Lecture rooms (8)
- Laboratories (4)
- Conference rooms (2)
- Instruments rooms (1)
- Printing room (1)
- Seminar room (1)
- Director's office (1)
- Instructors' room (1)
- Office (1)
- Lounge (1)

Dormitories-- 25 3-bed rooms (air-conditioned)

Mechanical workshop with equipment

Electrical workshop with equipment

Canteen

Training facilities for pipelaying, leakage control and repair

Small-scale water supply and environmental sanitation treatment plant for training and demonstration

Parking area, service road, landscaping, etc.

2) The Regional Training Center (Ujung Pandang) will have the following facilities:

Main building (classrooms, library, management office, etc.)
... total floor area: 1,770 cu.m)

Dormitory -- 40 beds (total area of 395 cu.m)
Canteen
Mechanical and electrical workshop
Training equipment

(9) Technical Cooperation

Long-term experts: (1 each)
- Team leader
- Expert in water purification
- Expert in pipelaying and maintenance
- Expert in mechanical equipment
- Expert in electrical equipment
- Expert in solid waste
- Expert in sanitary education
- Coordinator

Short-term experts: (1 each making 3 visits)
- Expert in water supply management
- Expert in water supply planning and design
- Expert in instrumentation
- Expert in water quality
- Expert in environmental sanitation management
- Expert in incineration
- Expert in compost
- Expert in sanitation treatment and disposal

(10) Targets:

1) The project period will run for five years, starting in 1988. The required facilities, equipment, materials, and training guidelines will be developed over this period.

2) During this 5-year period, training will be provided to 2/3 of the personnel requiring training in the subject fields.

3) Details by sub-sector are as follows:

a) Water supply:

... to provide training to about 6,000 persons annually

... to secure and train qualified teaching staff

... to provide, by means of the small-scale water treatment facility, training in operations and management, particularly in chemical dosing control and the backwashing of filters

... to provide training in techniques for controlling water leakage and preventing leakage

... to provide training in physio-chemical and biological tests for water quality

... to provide training in water meter reading and installation

b) Environmental sanitation:

... to provide training courses to about 4,500 persons annually

... to secure talented managers for the national and local governments in the areas of planning, administration, and finance

... to improve the abilities and skills of these managers

... to propagate knowledge of environmental sanitation among local communities relative to the development, operation, and management of facilities incorporating low-cost sanitary technology

CHAPTER 3 DETAILS OF THE PROJECT

CHAPTER 3 DETAILS OF THE PROJECT

3-1 Objectives of the Project

The objective of the Project is to construct a Water Supply and Environmental Training Center in the Jakarta area , under a grant-aid from Japan, for the purpose of transferring the knowledge and technology that are required for the proper planning, design, construction, operation, and maintenance of facilities in the water supply and environmental sanitation sectors. This training is to be provided for core staff in water supply and environmental sanitation services, such as staff members in water supply enterprises; key personnel in local government bodies concerned with water supply and environmental sanitation; engineers and selected technicians involved with facility planning, design, construction, operation and maintenance; engineers in private consulting firms and general contractors.

Accordingly, the objective of the Project is to advance Indonesia's human resource development program and thereby contribute to the sound development of water supply and environmental sanitation services in the country through adequate personnel training and establishing proper organizational structures.

3-2 Examination of the Request

The Preliminary Study Team and the Basic Design Study Team for the Project carefully evaluated the request presented by the Government of Indonesia, based on the results of the field survey and an analysis of the data and information gathered therein as well as discussions with concerned officials of the Directorate General of Human Settlements, Department of Public Works. As a result, the basic need for the government's plan to build water supply and environmental training centers was confirmed and the fundamental conditions for a grant-aid from Japan --viz., the objectives of the Center, training programs, management system, Project site, and implementing organization-- were deemed to be generally appropriate.

However, the Government of Indonesia had set the scope of the training activity and the size of the facilities on the assumption that project-type technical cooperation from Japan would be implemented together with a grant-aid. Accordingly, the original request was examined in the following respects:

1) the positioning and scope of the Project;

2) training program (content, scope, methods);

3) facilities and equipment

3-2-1 Positioning and Scope of the Project

(1) Technical Cooperation

As it seems to be difficult for the moment to link a project-type technical cooperation with a grant-aid for the construction of the training facilities, from the standpoint of both Japan's system of cooperative assistance and the nature of ongoing cooperation in various sectors in Indonesia. Accordingly, the Preliminary Study Team and concerned officials in the Government of Indonesia concluded, by mutual discussion, that the Project should be studied as a grant-aid project of Japan.

(2) Project Scope

Although the request from the Government of Indonesia included the construction of both a Central Training Center in Jakarta and a Regional Training Center in Ujung Pandang, the Project scope has been confined to the former facility only.

One of the initial objectives of the Center was to give it research capabilities in the water supply and environmental sanitation sector. However, this would duplicate the basic research work of the Institute of Human Settlements, which is planned to be built in Bandung, The research function has, therefore, been eliminated from the Project. The function of the Center, then, will be to provide necessary

knowledge and technical training for facility planning, operation, and management as well as the proper administration of water supply and environmental sanitation services.

3-2-2 The Training Plan

(1) Training Courses

The Government of Indonesia initially planned to provide training in the Center which would cope with 70% of the training needs outlined in the HRDP over a 5-year period starting in 1988. On this basis, the planned training was to be given to 6,000 persons a year in the water supply sub-sector and to 4,500 in the environmental sanitation sub-sector. The courses were to be divided into three classifications: basic, intermediate, and advanced, with 30 courses to be devoted exclusively to water supply, 10 exclusively to environmental sanitation, and 25 covering both fields.

The Preliminary Study Team suggested that the scope of the training program be redesigned along more feasible lines, based on previous experience in training programs. In accordance with this suggestion, the Directorates of Water Supply and Environmental Sanitation of the Directorate General of Human Settlements presented to the Preliminary Study Team a revised proposal for a training program.

The training scope which was shown in this new proposal was greatly narrowed from the original request, and so the revised request may not necessarily accurately reflect present and future training requirements. The Indonesian officials then reformulated their training plan and presented to the Basic Design Study Team a new and more specific proposal. The Basic Design Study Team discussed the new training plan with concerned officials and confirmed the following:

1) that the training courses would be divided into two groups: "General Courses" and "Advanced Courses" in both the water supply and environmental sanitation sub-sectors;

2) that the courses would provide staff training and would include basic skill training for both freshmen and staff personnel, while the advanced courses would provide specialized technical training to selected individuals.

3) that, the number of trainees per class for both the advanced courses and the general courses in skill development would be limited to ten (10) individuals so as to increase the efficiency of practical training. However, other courses for staff training would allow up to 20 persons per class.

4) that, the general courses on environmental sanitation will comprise several courses to be developed from the existing ones, because it is still difficult to execute various courses based on the classification of job responsibilities, as suggested by the revised HRDP report.

   For this, it is required to develop training modules and materiales which have not yet fully developed in this subsector due to the short history in training implementation.

5) that the types and duration of the courses would be as shown in Tables 3-1 and 3-2 following.

Although the advanced courses in the environmental sanitation division in the proposed new training plan included a 2-month and a 1-year course, these long courses would be difficult to implement at this stage in view of the lack of curricula and teaching materials. The Indonesian officials, therefore, accepted the recommendations of the Basic Design Study Team and decided to set the length of the environmental sanitation courses at 2-3 weeks, the same as for the water supply courses.

With respect to the number of courses per year, the Indonesia officials presented an annual course schedule. However, the Basic Design Study Team felt that schedules should be fixed after analyzing the training requirements, and Indonesia agreed with this approach.

(2) Instructors

With respect to the instructors for the training courses, the Indonesian officials, following the example of previous training programs, planned to rely exclusively on part-time instructors. However, the Basic Design Study Team pointed out the following problems in connection with this approach:

1) Should a technical cooperation program be implemented in some form sometime in the future, there would be no counterpart personnel on the staff for technology transfer.

2) Unless the instructors take responsibility for daily maintenance and operation of the training facilities (labs and workshops), it will not be feasible to offer effective practical training with these facilities.

The Indonesian officials were convinced by this argument and decided to provide for six full-time instructors in the water supply and 5 in the environmental sanitation division.

3-2-3 Facilities and Equipment

(1) Building

The building complex envisaged in the request anticipated a main building of 5,490 sq.m. together with four other structures to serve as a workshop, dining room, dormitory, and guards on night duty. Of course, this plan was based on the original scope of the training program, but a decision was made to modify the nature and scale of these facilities on the basis of a home analysis of the basic design study.

(2) Training Facilities

1) Water Treatment Plant for Training Purposes

The request called for a water treatment plant with a treatment capacity of 300 m^3 per day, but, in consideration of maintenance costs, the water treatment plant for the Center will have a daily capacity of only 20-25m^3.

2) Experimental Facilities for Sanitary Landfill

The scale of these facilities and experimental method will be determined by the Team on the basis of a close examination of the training objectives. The number of land-fill tanks will be set at a level that would permit a comparative evaluation of test results.

(3) Equipment

1) Machine Tools

The Center will not be furnished with any machine tools or a workshop for repairing training equipment and plant. When the need for repairs arises, these will be delegated to CEVEST (Center for Vocational and Extension Service Training) located in the vicinity of the planned Center.

2) Training Equipment for Leakage Surveys

Since a leakage correlator has a complex mechanism and is not yet in general use in Indonesia, the Center will provide training using such standard type equipment as a leak noise detector.

3) Audio-visual Equipment

The Center will not include audio-visual equipment that is not directly related to the training program (e.g., video camera equipment for the preparation of teaching materials or studio equipment). This equipment will, therefore, be limited to slide projectors, overhead projectors, and VTRs.

4) Vehicles

The Team explained the principle of Japan's grant-aid that only vehicles directly required for training activity, such as jeeps, micro-buses, and garbage compaction trucks, would be considered for inclusion in the Project, but that other vehicles for daily operations should be provided by Indonesia.

3-3 The Training Program

Based on the results of the above examination and analysis of the data and information obtained during the field survey, a training plan for the Center was established as follows:

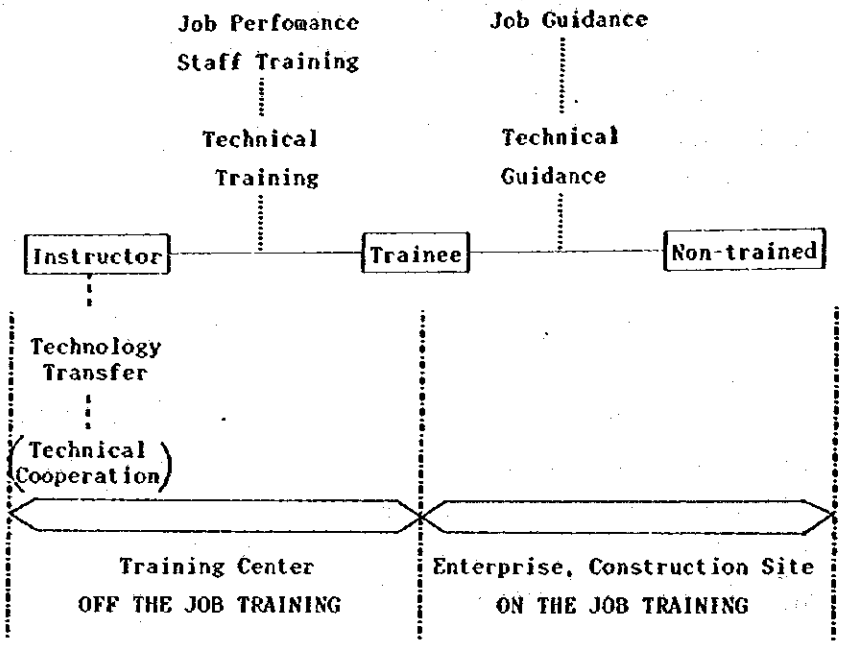
3-3-1 Positioning and Function of the Center

(1) Trainees and Spill-over Effect

The training anticipated by the HRDP is targeted at managerial staff and other key staff members in water supply and environmental services and will provide the knowledge and skills required for their respective responsibilities. The training at this Center is to be "Off-the-Job Training" away from their places of work. This system has been adopted because the vocational training for managerial staff cannot be accomplished through on-the-job training. It seeks also to avoid the transfer of faulty skills on the basis of improper experience that often results from undue reliance on on-the-job training, even allowing for the effectiveness of such training in the technical field.

Integrated off-the-job training at training centers incorporating standardized teaching materials and training methods will make possible the standardization of job descriptions, skills, and technology throughout the country. Persons completing courses at a center will be able to transfer indirectly to other colleagues the benefits from their training through instruction or guidance in the course of their regular duties at their respective working places. This sort of training benefit may be charted as follows:

Dissemination of Training Effects



(2) Central Training Center and Regional Training Centers

In addition to conducting programs for trainees, training centers also develop instructors, teaching materials, and teaching methods. The programs involve staff training and skill development courses as well as more specialized technical courses, which are to be called respectively "general" and "advanced" courses.

Given Indonesia's large size, rather than concentrating the training in just one central training center, it would be more effective to disperse centers throughout the country. In that sense, a network is to be built comprising both a central training center (CTC) and various regional training centers (RTCs), offering integrated training programs over the whole country. The roles of the central training center and regional training centers and of the implementing bodies for water supply and environmental sanitation enterprises may be classified as follows:

CTC : Conduct of advanced course training; development of teaching materials and methods; training of instructors; guidance and supervision of the RTCs

RTCs : Conduct of general course training

Implementing Bodies : Dispatch of trainees and implementation of on-the-job training

Regional training centers in the water supply sub-sector are to be established in Medan, Palembang (or Padang), Semarang, Surabaya, Ujung Pandang, and Jakarta. In the environmental sanitation sub-sector, the HRDP calls for regional training centers in Jakarta, Padan, and Denpasar, with the Jakarta Center to cover Java Island, the Padang unit to cover Sumatra Island, and the Denpasar facility to serve the remaining areas. However, for the time being, only the Jakarta Center is to be built.

(3) Function of the Center

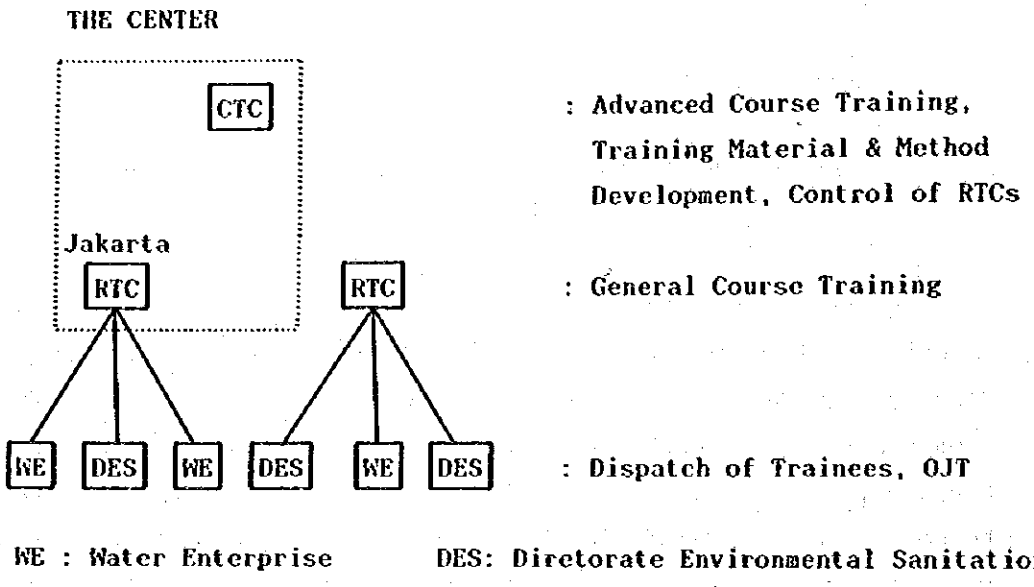
This Center will be an integrated training center, incorporating both the Central Training Center and the Jakarta Regional Training Center programs, and its functions will be as shown in Figure 3-1 The areas to be covered by the Center will be as follows:

CTC : Nationwide

RTCs: Water Supply: Jakarta Metropolitan, West Java Province, West Kalimantan Province, Central Kalimantan Province

Environmental Sanitation: Java Island (however, for the time being, it will service the entire country)

Fig. 3-1 Functions of the Central Training Center and Regional Training Centers



WE : Water Enterprise DES: Diretorate Environmental Sanitation

The training courses at the subject Center will incorporate the following:

Water supply sub-sector:
- General course (4 sections) --18 courses
- Advanced course (4 sections) --12 courses

Environmental sanitation sub-sector:
- General course (2 sections) -- 6 courses
- Advanced course (2 sections) -- 3 courses

Specific details on the various courses will be given in the next section. In the case of three of the general courses for director classes and the instructor courses, the Jakarta RTC will accept trainees from all parts of the country. This is because RTC's other than those at Surabaya and Medan have not yet been built, the need for these courses is more pressing, and because, even using standardized methods and teaching materials, it is preferable and more effective to conduct trainings at the same location for core persons.

(4) Training Methods

From the standpoint of training efficiency and economics, all students will be required to board at the Center for the following reasons:

1) Many trainees will come from the provinces in the above areas sent by water supply enterprises, the water supply directorates of local governments and private consultants or contractors.

2) The Center will be located 30 km from the center of Jakarta, which would mean long commuting times in the morning rush hour as well as the burden of high bus fares (900 Rp round-trip).

3) The trainees will be individuals who play important roles in the services of their organizations. The effect of the courses will be significantly raised if they can exchange opinions and help each other with their homework after the training sessions.

The teaching staff will be composed of part-time instructors qualified by the Department of Public Works and full-time instructors. The certified instructors for the water supply sub-sector include employees of the Department of Public Works, employees of public water enterprises, university professors, and private consultants. As of 1988, 69 persons have been registered from all parts of the country.

In the environmental sanitation sub-sector, a qualification system has not yet been established, but some 25 names exist of staff members, university professors, and private consultants currently giving courses in this field.

3-3-2 Details of the Training Program

(1) Training Courses

Tables 3-1 and 3-2 following summarize the various training courses of the Center together with maximum enrollments and course durations.

Table 3-1 Training Courses of Water Supply Division

Section	Courses	Capacity (pers.)	Duration (week)
	General Courses		
	1. General Manager	20	2+2
Directors	2. Technical Director	20	2+2
	3. AdministrativeDirector	20	2
	4. Bookkeeping Sec.	20	2
	5. Production Sec.	20	2
	6. Distribution Sec.	20	2
Chiefs of	7. Planning/Supervision Sec.	20	2
Sections	8. Workshop/Maintenance Sec.	20	2
	9. Customer Relations Sec.	20	2
	10. Finance/Budget Sec.	20	2
	11. Gen. Administration Sec.	20	2
	12. Part-time Instructor	20	1
Instructors	13. Full-time nstructor	20	1
	14. Training Officer	20	1
	15. Pipe laying Skill Development	10	2
Technicians	16. Electrical Skill Development	10	2
	17. Mechanical Skill Development	10	2
	18. Unaccouted Water control S. D.	10	2
	Advanced Courses		
	1. Physio-Chemical Analysis	10	4
Water	2. Bacteriological Analysis	10	4
Quality	3. Heavy Metals Analysis	10	4
	4. Micro Organic Substances Anal.	10	8
Water	5. Water Treatment Technology	10	8
Treatment	6. Water Parameters Technology	10	4
Elec./Mech.	7. Water Treatment Technology	10	2
Technology	8. Water Parameters Technology	10	2
	9. Pipe laying Technology	10	2
Distribution	10. Leakage Control Technology	10	4
Hydraulics	11. Watermeter Testing Technology	10	2
	12. Design/ Distribution System	10	3

Table 3-2 Training Courses of Environmental Sanitation Division

Section	Courses	Capacity (pers.)	Duration (week)
	General Courses		
Solid Waste	1. Freshman Course	20	1
	2. Supervisory Manager Course	20	2
	3. Planner Course	20	3
Night Soile	1. Freshman Course	20	1
	2. Supervisory Manager Course	20	2
	3. Planner Course	20	3
	Advanced Courses		
Solid Waste	1. Snitary Landfill Course	10	3
	2. Collection & Transportation C.	10	3
Night Soil	3. Night Soil Disposal Course	10	3

(2) Course Descriptions, Methods, and Trainees

1) General Courses in the Water Supply Division

a) Courses for Directors

Course for heads of water enterprises

Description: Acquisition of general knowledge of administration, finance, technology, and personnel control in the management of water supply enterprises

Methods: Lectures, audio-visual, exercises, discussion, inspection tours

Trainees: Heads of water enterprises from around the country; heads of branch offices in the Jakarta area

Technical Director Course

Description: Understanding of overall technological operations in water supply and of the manager's role therein

Methods: Audio visual, exercise, discussion, field trips, practical training

Trainees: Technical directors of water supply enterprises around the country and heads of

technical sections of enterprises branches in the Jakarta RTC area

Administrative Director Course

Description: General knowledge of administration, centering on financial and budgetary management, personnel control, and operations of water supply enterprises; understanding of the manager's role therein

Methods: Lectures, audio-visual, exercise, discussion

Trainees: Administrative directors in water supply enterprises throughout the country

b) Courses for Managerial Staff

Course for chiefs of bookkeeping sections

Description: Knowledge of methods of bookkeeping in water supply enterprises; understanding of the role of section chiefs in this area

Methods: lectures, audio-visual, exercise, discussion

Trainees: Chiefs of bookkeeping sections and bookkeepers in water enterprises within the Jakarta RTC area

Course for Chiefs of Treatment Sections

Description: Knowledge and technology related to construction, operation, management, and budgetary requests in connection with treatment facilities; understanding of the role of section chief

Methods: Lectures, audio-visual, exercise, practice

Trainees: Chiefs of treatment sections and heads of production sub-sections in branch offices of enterprises within the Jakarta RTC area

Course for Section Chiefs in Water Distribution Sections

Description: knowledge and techniques of leak detection procedures in water distribution networks;

construction and management of distribution facilities; manager attitudes

Methods: lectures, audio-visual, exercise, practice

Trainees: Chiefs of water distribution sections and heads of distribution sub-sections in branch offices of water enterprises in the Jakarta RTC area

Course for Chiefs of Planning and Supervisory

Description: Knowledge and technology relating to planning and construction supervision of water supply facilities; manager attitudes

Methods: Lectures, audio-visual, exercises, practical training

Trainees: Chiefs of planning and construction sections of enterprises within the Jakarta RTC area

Course for Chiefs of Workshop and Maintenance Sections

Description: Knowledge, technology, and manager attitudes in the maintenance and repair of water supply facilities and equipment

Methods: Lectures, audio-visual, exercises, practice

Trainees: Chiefs of workshop and maintenance sections and heads of laboratory sub-sections in water enterprises within the Jakarta RTC area

Course of Chiefs of Public Information Sections

Description: Knowledge and management attitudes regarding public relations activities to provide better understanding of water use among customers

Methods: Lectures, audio-visual, exercises, discussion

Trainees: Chiefs of customer relations sections in water supply enterprises plus IKK project chiefs in the Jakarta RTC area

Course for Chiefs of Finance and Budget Sections

Description: Knowledge of budgetary planning and controls and financial reports

Methods: Lectures, audio-visual, exercises

Trainees: Chiefs of accounting sections, heads of finance and administrative sub-sections of branch offices, and IKK project chiefs in the Jakarta RTC area

Course for Chiefs of General Administration Sections

Description: Knowledge and managerial attitudes regarding general and personnel administration in water supply enterprises

Methods: Lectures, audiovisual, exercises

Trainees: Chiefs of general administration sections and IKK project chiefs within the Jakarta RTC area

c) Courses for Training Officers:

Course for Part-time Instructors

Description: Training techniques for part-time instruction at training centers

Method: Lectures, audio-visual, exercises, discussion

Trainees: Persons intending to be qualified as a part-time instructor for training centers-comprising engineers of consulting and construction firms and officers of local governments around the country

Course for Full-time Instructors

Description: Training techniques for full-time instruction at training centers

Methods: Lectures, audio-visual, exercises, discussion

Trainees: Persons intending to be qualified as a full-time instructor who are employees of consulting firms and local governments around the country; prerequisite: completion of course for part-time instructor

Course for Training Officers:

Description: To develop officers to assist the training effort of the Center in their respective water supply enterprises by preparing plans for the dispatch of staff to the Center's programs

Methods: Lectures, audio-visual, exercises, discussion

Trainees: Employees of water supply enterprises throughout the country who are to be given training responsibilities

d) Courses for Technicians

Skill Development Course for Pipelayers

Description: Knowledge and skills of pipelaying for transmission and distribution pipes

Methods: Lectures, pipelaying workshop training, and outdoor training

Trainees: Pipelayers in charge of water pipe construction work in the Jakarta RTC area (employees of enterprises and contractors; construction supervisors of IKK projects

Skill Development Course for Electricians

Description: Knowledge and skills required for the operation and maintenance of electrical installations in water supply facilities

Methods: Lectures plus audio-visual, practical training at electrical, mechanical and pump workshops,outdoor exercises

Trainees: Treatment plant operators and electricians in the Jakarta RTC area

Skill Development Course for Mechanics

Description: Knowledge and skill required for the operation and maintenance of mechanical installations in water supply facilities

Methods: Lectures plus audio-visual, practical training at electrical, mechanical, and pump workshops, outdoor exercises

Trainees: Treatment plant operators and mechanics in the Jakarta RTC area

Skill Development Course for Unaccounted Water Control

Description: Knowledge and skill required to prevent leakages in water distribution networks

Methods: Lectures plus audio-visual, workshop exercises, practical training through the leakage survey yard

Trainees: Leakage controllers and inspectors in the Jakarta RTC area

2) Advanced Courses in the Water Supply Division

a) Technical Course on Water Quality Analysis

Course on Physio-chemical Analysis

Description: Specialized knowledge and technology on physio-chemical analysis of raw water, treated water, and hydrant water

Methods: Lectures plus audio-visual, computer training, laboratory training, practical outdoor training

Trainees: Engineers and technicians concerned with physio-chemical water analysis attached to water treatment or water quality testing sections of water enterprises around the country

Course on Bacteriological Analysis

Description: Specialized knowledge and technology on bacteriological parameter testing of raw water, treated water, and hydrant water

Methods: Lectures plus audio-visual, computer training, laboratory training, outdoor training

Trainees: Engineers and technicians concerned with water testing for bacteria attached to water treatment or water quality testing sections of water enterprises across the country

Course on Heavy Metal Analysis

Description: Specialized knowledge and technology on conducting analyses for heavy metals in raw water, treated water, and hydrant waters

Methods: Lectures plus audio-visual, computer training, laboratory training, practical outdoor training

Trainees: Engineers and technicians involved with heavy metals analysis for water attached to water quality testing sections in water enterprises throughout the country

Course on Micro-organic Substance Analysis

Description: Specialized knowledge and technology concerning analysis of micro-organic substances in raw water, treated water, and hydrant water

Methods: Lectures plus audio-visual, computer training, laboratory training, practical outdoor training

Trainees: Engineers and technicians involved in daily testing of water for organic substances attached to water quality testing sections of water enterprises across the country

b) Technical Courses on Water Treatment

Course on Water Treatment Technology

Description: Specialized knowledge and technology for water treatment

Methods: Lectures plus audio-visual, laboratory training, practical training at the water treatment workshop, outdoor training

Trainees: Engineers and technicians concerned with water quality control at water enterprises and certain operators concerned with the operation of water treatment plants around the country

Course on Water Parameter Technology

Description: Specialized knowledge and technology regarding water treatment parameters required for the operation of water treatment plants

Methods: Lectures plus audio-visual, laboratory training, training at the water treatment workshop, and outdoor training

Trainees: Engineers and technicians concerned with water quality control at water enterprises and certain operators concerned with the operation of water treatment plants around the country

c) Technical Courses on Electrical and Mechanical Technology

Electrical Facility Course

Description: Specialized knowledge and technology on electrical installations of water supply systems

Methods: Practical training at the electro-mechanical and pump workshops, outdoor training

Trainees: Electrical engineers concerned with the operation and maintenance of electrical/mechanical facilities at water enterprises throughout the country and electricians who have completed the skill development course

Mechanical Facility Course

Description: Specialized knowledge and technology on mechanical facilities in water supply networks

Methods: Practical training at electrical, mechanical, and pump workshops, outdoor training

Trainees: Mechanical engineers concerned with the operation and maintenance of electrical/mechanical facilities at water enterprises across the country and mechanics who have completed the skill development course

d) Technical Courses in Distribution Technology and Hydraulics

Course in Pipelaying Technology

Description: Specialized knowledge and technology for pipelaying of water transmission, distribution, and supply pipes

Methods: Practical training at the piping workshop and outdoor training

Trainees: Engineers involved in construction work on piping networks and pipelayers who have completed the skill development course

Course on Leakage Control Technology

Description: Specialized knowledge and technology concerning leakage detection and prevention

Methods: Practical training at the pump workshop, piping workshop, outdoor training in the leakage yard

Trainees: Engineers responsible for leakage control in water enterprises throughout the country; other technicians who have completed the skill development course for leakage control

Course on Water Meter Testing Technology

Description: Specialized knowledge and training in the area of water meters

Methods: Lectures plus audio-visual, practical training in the electrical, mechanical, and pump workshops, outdoor training

Trainees: Engineers and technicians attached to maintenance or distribution sections in water enterprises across the country

Course in Design/Distribution Systems

Description: Specialized knowledge and technology in the planning and design of systems and facilities for water distribution

Methods: Lectures plus exercises, computer training, outdoor training

Trainees: Engineers and technicians involved in the planning and design of water supply facilities at water enterprises throughout the country

3) General Courses in the Environmental Sanitation Division

a) Solid Waste Courses

Freshman Course

Description: Basic knowledge and technology required for solid waste management in local government

Methods: Lectures, practical training in workshops, outdoor training

Trainees: Individuals with less than 3 years' service in environmental sanitation services in local government

Supervisors' Course

Description: Knowledge and technology in the collection, treatment, and disposal of solid waste

Methods: Lectures plus audio-visual, exercises, workshop training, outdoor training

Trainees: Supervisory personnel concerned with management and operations for the treatment of solid waste in local government

Planners' Course

Description: Knowledge and training concerning the drafting of plans for the treatment of solid waste

Methods: Lectures plus audio-visual and exercises practical workshop training, outdoor training

Trainees: Supervisory personnel concerned with planning for solid waste management at local governments

b) Courses in Night Soil Disposal

Freshman Course

Description: Basic knowledge and technology for night soil management in local government

Methods: Lectures plus audio-visual and exercises, workshop training, outdoor training

Trainees: Employees with less than 3 years of service in environmental sanitation services in local government

Supervisors' Course

Description: Knowledge and technology regarding the collection, treatment, and disposal of night soil

Methods: Lectures plus audio-visual and exercises, workshop training (15%), and outdoor training

Trainees: Supervisory personnel in local government involved in the management of night soil treatment activities

Planners' Course

Description: Knowledge and technology regarding the collection, treatment, and disposal of night soil

Methods: Lectures plus audio-visual and exercises, computer training, outdoor training

Trainees: Management personnel in local government concerned with planning for night soil management

4) Advanced Courses in Environmental Sanitation

a) Technical Courses on Solid Waste

Course on Sanitary Landfill Technology

Description: Specialized knowledge and technology on sanitary landfill for solid waste

Methods: Lectures, workshop training, analytical training, outdoor training

Trainees: Engineers and technicians concerned with sanitary landfill for solid waste in local governments throughout the country

Course on Collection and Transport Management

Description: Specialized knowledge and technology concerning operations and planning for the collection and transport of solid waste

Methods: Lectures, audio-visual, exercises, outdoor training

Trainees: Engineers and technicians concerned with the collection and transport of solid waste at local governments around the country

b) Course on Night Soil Disposal

Description: Specialized knowledge and technology regarding the collection, transport, and treatment of night soil

Methods: Lectures, audio-visual, exercises, practical analytical training, outdoor training

Trainees: Technicians involved in night soil treatment operations in local government

3-3-3 Determination of Training Volume

(1) Basic Policy

The training capacity of the Center must be set at the minimum level consistent with the training requirements, taking into account the training programs that have been carried out to date. In determining the capacity, the following points shall also be taken into consideration:

1) The larger the training capacity, the larger the scale of required facilities and the higher the costs of operation.

2) The training activity cannot be carried out only with instructors and adequate facilities; a wide range of supporting services will also be required. An increase in the training capacity would, therefore, lead to an increase in the number and complexity of these support functions.

3) Generally speaking, 2-3 years are required before a new organization can operate as planned. Even if 100% of the required personnel were available from the outset, a 100% operating rate cannot be expected from the start of operations.

4) It is essential that the rate of operating efficiency vis-a-vis operating costs be maximized, so the former rate must be set at the highest possible level.

(2) Method to Determine Training Capacity

1) General Courses

The training capacity for general courses will be determined on the basis of the following flow:

a) Analysis of needs
b) Evaluation
c) Calculation of training requirement
d) Calculation of the training capacity of the Center, taking into consideration the functions of the Center, planned course capacities, and training terms of each course.:

2) Advanced Courses

The advanced courses are intended to provide specialized technical training for engineers and technicians engaged in technical services. The training capacity of the advanced courses will be determined on the basis of the above flow chart by first listing the numbers of target technical sections and target technicians and then estimating the total training requirements by totaling the listed figures.

3-3-4 Training Scope

(1) General Courses in the Water Supply Division

1) Basic training needs:

REPELLITA IV intends to increase the number of house connections in urban areas to 3,030,000 homes while developing new water supply facilities in 1,800 IKK's. On the basis of the HRDP analysis, it is estimated that a total of 40,651 persons will be required to operate these expanded facilities, with training required for a total of 22,986. As explained in Chapter 2, the Government of Indonesia has already embarked on a training program, based on the HRDP.

For purposes of projecting the training capacity of the Center, it is essential to first develop a good understanding of basic training needs. These needs can be expressed as the total number of individuals that will have to be trained during the planned period. This will be set up on the following basis:

a) The plan period is set at 5 years from the opening of the Center (1990-1994).

b) The projected number of house connections at the end of 1994 will be estimated by applying the average rate of growth over the past 4 years.(1984-1989)

c) The target number of trainees as of the end of 1994 will be calculated by a proportional method, following the same assumption that the number of target trainees is proportionate to the total number of house connections. The HRDP anticipates training 22,986 persons to serve 3,030,000 service households. In terms of trainees per household, this works out to:

22,986/ 3,030,0000 persons

Thus, the number of target trainees (A) is derived on the basis of the following equation, where B= the projected number of service households:

$$A = B \times \frac{22,986}{3,030,000}$$

d) Trainees that will have already taken courses up to the opening of the Center are, of course, included in the above figure. Thus, the true needs to be met by the new Center will be the figure after deduction of the trainees that will have been served prior to the opening of the Center.

Table 3-3 following shows the trend in the number of house connections over the 1983-1987 period along with the projected growth from 1988 to 1994. The projections have been made by applying the average growth of the past 4 years (115,000/year).

Table 3-3 Number of House Connections and Cumulative Number of Individuals Completing Training

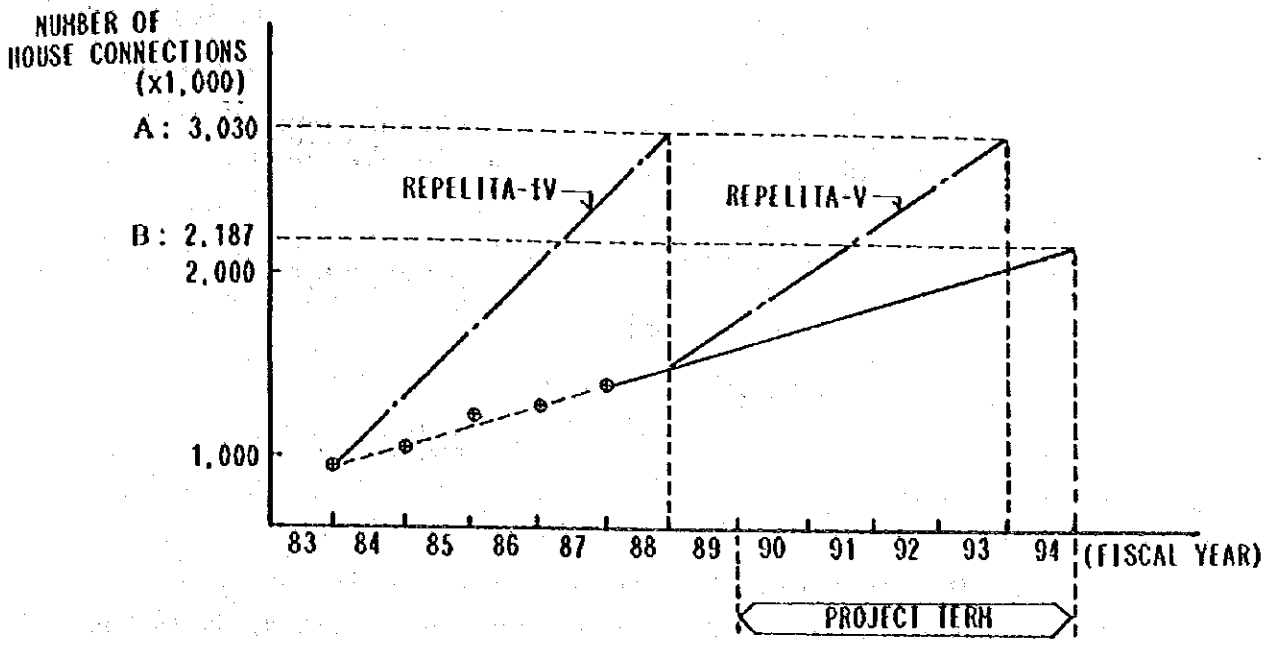
Year	House Connections	Training Compltd	Year	House Connections	Training Compltd
1983	922,954		1988	1,497,000	4,250
1984	1,049,406	1,274	1989	1,612,000	5,100
1985	1,204,457	2,974	1990	1,727,000	
1986	1,297,183	2,640	1991	1,842,000	
1987	1,382,380	3,396	1992	1,957,000	
			1993	2,072,000	
			1994	2,187,000	

Figures for 1983 to 1987 are given by a statistic data of the Directorate of Water Supply, but those for 1988 to 1994 are forecasted

The figures in this table have been charted in Figure 3-2 following. The broken lines show the planned number of house connections in the Five-Year Plans.
Assuming that the investment levels under REPELLITA V exceed the past actual growth rates and that the planned construction program meets all targets, the projected number of house connections at the end of fiscal 1994 will be at the level "A" shown in Figure 3-2.

If, on the other hand, one assumes merely a continuation of the trends of the past 4 years, the projected number of house connections will be at the "B" level (2,187,000). It may, in principle, be assumed that the rate of development will not be faster than shown in the National Development Plan nor will it fall below the levels of past performance. It may be presumed, accordingly, that the actual number of homes receiving water service in 1994 will fall somewhere between the "A" and "B" levels. Thus, for purposes of calculating the number of trainees as well, it would perhaps be proper to use a figure between the "A" and "B" estimates.

Fig. 3-2 Projected Number of House Connections



Nevertheless, since it has been decided to hold training capacity to the minimum required levels, the "B" figure of 2,187,000 house connections should be used in the calculations.

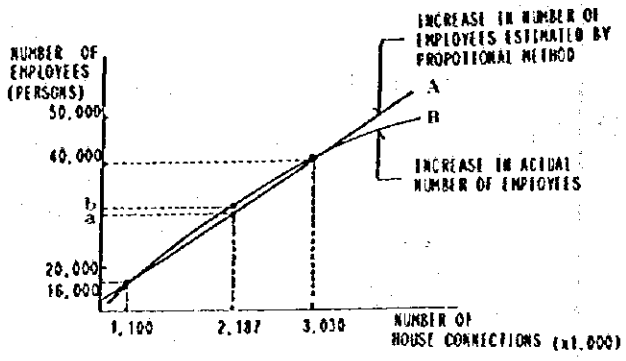
On the basis of method c) above, the target number of trainees by fiscal 1994 becomes:

$$2{,}187{,}000 \text{ households} \times \frac{22{,}986}{3{,}030{,}000} = 16{,}590 \text{ trainees}$$

Based on 22,986 trainees vs. 3,030,000 house connections, the number of trainees at 2,180,000 house connections is calculated above by a proportional method. This method can be judged to be appropriate on the basis of the following observations:

a) While the water supply service level is still low, the growth in the number of house connections is proportionate to the growth in the size of water enterprises. Because of this relationship, the number of house connections will grow almost proportionately. However, the number of house

connections per employee is not constant but can be expected to grow gradually and so, strictly speaking, growth will not be proportional, as shown in the following graph.



In this graph, the line "A" represents the number of employees derived via the proportional method, while the curve "B" is the actual number of employees. B>A but the difference is quite small.

b) The share of target trainees to total employees will be a constant, since the trainees under HRDP cover a broad spectrum, from managers performing various tasks to engineers and technicians. The number of target trainees and total employees will be directly proportional.

c) From the above, the number of trainees derived via the proportional method will be slightly smaller than the actual figure.

The above figure of 16,590 persons includes trainees under the present program, assuming a continuation of this program to 1989. Thus, estimating the number of already trained persons, by applying the average growth, at 5,100, the number of non-trained target trainees becomes;

16,590 - 5,100 = 11,490 persons

In this plan, this number is set as the basic training need, giving top priority to the above non-trained group (11,490 persons).

2) Retraining Potential:

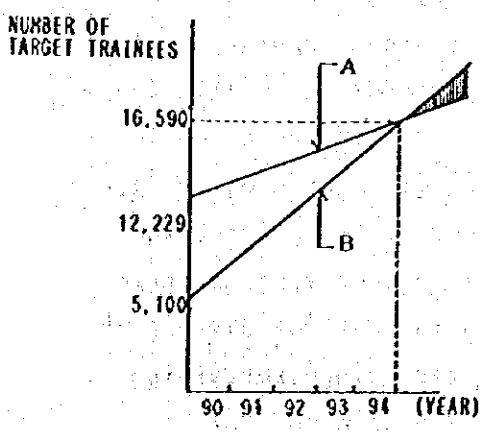
It is essential that provision be made for continuing retraining of personnel for the proper operation of water supply services. This sort of retraining will be required because, as a result of personnel transfers or retirement, there will be changes in positions, while, as a result of changes in management systems, there will be changes in duties. Technological improvements may also create a need for retraining.

At the end of fiscal 1989, just prior to the start of Center operations, based on a projection of 1,612,000 house connections by that date, the number of target trainees will be:

$$1{,}612{,}000 \times \frac{22{,}986}{3{,}030{,}000} = 12{,}229 \text{ trainees,}$$

while the target for fiscal 1994, as determined above, is 16,590. The number of target trainees for each fiscal year is shown by the solid line "A" in Figure 3-3.

Fig. 3-3 Number of Target Trainees and Cumulative Number of Trainees



Line A $Y_1 = \frac{16{,}590 - 12{,}229}{5} \cdot X + 12{,}229$

$= 872X + 12{,}229$

Line B $Y_2 = \frac{16{,}590 - 5{,}100}{5} \cdot X + 5{,}100$

$= 2{,}298X + 5{,}100$

Since the Project period covers 5 years, if 11,490 individuals are to receive training from fiscal 1990-1994, the annual training requirement becomes 2,298 persons. On this basis, the cumulative number of individuals completed training may be shown as Line "B" in Figure 3-3 on the previous page.

At the end of fiscal 1994, the cumulative number of persons who have completed courses will reach the number of total target trainees. This means that non-trained target persons will disappear as of the end of fiscal 1994 (excluding retirees). In other words, there will still exist a pool of non-trained target persons up to that time. Therefore, if priority is given to these non-trained individuals, retraining will not be provided at the Center before the end of 1994.

However, from fiscal 1995 on, the number of trainees will be increasing by only 872 persons per year (16,590-1229)/5- 872) from solid line "A" and so, even assuming that training will be given each year to all new staff-members, a total of 1,426 persons per year can be retrained. (2,298 -872= 1,426 persons)

The cumulative total of retrainees per year from 1995 on is shown in the hatched portion of Figure 3-3. The retraining capacity from 1995 on amounts to 1,426 persons. Therefore, the training probability as of 1995 against a total retrainee population of 16,590 becomes; 16,590 persons / 1,426 persons/year = 11.6 years

In other words, retraining programs can be given once every 11.6 years, or to 1 out of 11.6 persons. Of course, the persons who have completed their initial training will directly become target retrainees, meaning that there will be an increase of 872 persons per year in retraining requirements. However, since retraining capacity each year is 1,426 persons, the annual number of retrainees that can be accommodated per year will decrease by 554 persons per year: (1,426 - 875= 554)

That is to say, the retraining capability may be shown as:

1,426/ (16,590 - 554 x) where, x= years from 1995

Accordingly, it will not be until 1999 (4 years later) that retraining can be provided to all previous trainees once every decade:

1/10 = 1,426 / 16,590-554) x = 4.2

Based on the above, assuming that initial training is provided to 11,490 persons over the 5-year period, there should be ample capacity for retraining programs from fiscal 1995 on. It will be appropriate, therefore, to set 11,490 as the basic training need.

3) Training Load per Course

In the HRDP report, the number of trainees throughout the country, classified by job category, are as shown in Table 3-4 following. The total training requirement shown in this report is 22,986 persons.

Table 3-4 Number of Target Trainees in HRDP

Job Titles	Number	Target Courses to be assigned to
Director	285	General Manager C.
Deputy Director (Technical)	285	Technical Director C.
Deputy Director (Finace/Admin.)	285	Administrative Director C.
Head of Production Dept.	285	Chief of Production C.
Head of Distribution Dept.	285	Chief of Distribution C.
Head of Planning Dept.	285	Chief of Planning/Supervision C.
Head of Maintenabce Dept.	285	Chief of Workshop/Maintenance C.
Head of Cash Dept.	285	Chief of Finace/Budget C.
Head of Bookkeeping Dept.	285	Chief of Bookkeeping C.
Head of Consumer Connection Dept.	285	Chief of Customer Relations C.
Head of Admin./Personnel Dept.	285	Chief of Gen. Administration C.
Head of Branch Office	334	General Manager C.
Head of Technical Section	334	Technical Director C.
Head of Finance/Admin. Section	334	Chief of Finace/Budget C.
Head of Laboratory Subsection	512	Chief of Production C.
Head of Production Subsection	334	Chief of Production C.
Head of Distribution Subsection	334	Chief of Distribution C.
Bookkeeper	3,030	Chief of Bookkeeping C.
Leakage Controller	285	Unaccouted Water Control S.K. C.
Leakage Inspector	95	Unaccouted Water Control S.K. C.
Training Officer	285	Training Officer C.
Electrician/Mechanic	1,515	Elec. S.K. C. & Mech. S.K.C.

Table 3-4 Number of Target Trainees in HRDP (continued)

Job Titles	Number	Target Courses to be assigned to
Head of IKK Unit	2,093	Chief of Customer Relations C. (1/4), Chief of Finace/Budget C. (1/2), Chief of Gen. Administration C. (1/4)
Branch Plant Operator	512	Elec. S.K. C. & Mech. S.K.C.
Treatment Plant Operator(IKK)	1,046	Elec. S.K. C. & Mech. S.K.C.
Pipe Layer (Full-time)	1,515	Pipe Laying Skill Develop. C.
Pipe Layer (Part-time)	2,093	Pipe Laying Skill Develop. C.
Pipe Layer (Contractor)(WE)	2,300	Pipe Laying Skill Develop. C.
Pipe Layer (Part-time)(IKK)	1,200	Pipe Laying Skill Develop. C.
IKK Construction Supervisor	900	Pipe Laying Skill Develop. C.
Consultant	100	C. of Planning/Supervsn C. (20), Part-time Instructor C. (40) Full-time Instructor C. (20)
Contractor (Project Manager)	200	Chief of Production C., Chief of Distribution C., Chief of Planning/Supervsn C., Part-time Instructor C. 50 each
Local Government Staff	300	Chief of Production C., Chief of Distribution C., Chief of Planng/Supervsn C., Part-time Instructor C., Chief of Workshop/Maintenance C., Chief of Customer Relations C..50 each
Regional DWS Staff (Trainers ETRC.)	200	Chief of Planning/Supervsn C., Chief of Workshop/Maintenance C. Part-time Instructor C.,Full-time Instructor C., 50 each
Total	22,986	

Table 3-4 also shows the course assignment for each job classification, as developed during discussions with Indonesian officials. The basic training need is to train 11,490 persons, which corresponds to 50% of HRDP's requirement of 22,986 persons. In calculating the training load by course for the Center, it should be sufficient to set the number of trainees at 50% of the number for each job classification shown in Table 3-4. (11,490/22,986 = 0.5).

In the HRDP Reprt, training at the Center will be extended to a considerable number of bookkeepers, electricians, mechanics, plant operators, and pipelayers (one per 1,000-2,000 service households). However, this will overload the technical training targeted at technicians and will not conform to the objective of training core staff. And, since all of the above classifications can be handled through on-the-job training, the training for such persons should be limited to 1/3 of the total targeted by HRDP. The final training requirements by course are summarized in Table 3-5 following.

Table 3-5 Training Requirment for Each Course

Courses	HRDP Target	Basic Needs	Transfer to OJT	Target Trainee
1. General Manager	285+334	143+167		143+167
2. Technical Director	285+334	143+167		143+167
3. AdministrativeDirector	285	143		143
4. Chie of Bookkeeping Sec.	3,315	1,658	1,010	648
5. Chie of Production Sec.	1,231	616		616
6. Chie of Distribution Sec.	729	365		365
7. Chie of Planning/Supervision Sec.	455	228		228
8. Chie of Workshop/Maintenance Sec.	385	193		193
9. Chie of Customer Relations Sec.	858	429		429
10. Chie of Finance/Budget Sec.	1,666	833		833
11. Chie of Gen. Administration Sec.	808	404		404
12. Part-time Instructor	190	95		95
13. Full-time nstructor	90	45		45
14. Training Officer	285	143		143
15. Pipe laying Skill Development	8,008	4,004	2,670	1,334
16. Electrical Skill Development	1,537	769	512	257
17. Mechanical Skill Development	1,536	769	512	257
18. Unaccouted Water control S. D.	380	190		190
Total	22,986	11,504	4,704	6,800

4) Determination of the Training Capacity of the Center

A portion of the national training requirements for the general courses in the water supply division will be given at the Jakarta

area RTC at the new Center. Based on the HRDP,. the Jakarta RTC is to handle 24% of the national requirement. Applying this ratio to the course breakdown shown in Table 3-6, training loads will be calculated for the Jakarta RTC over the 5-year period. The courses for directors and instructors will all be conducted at the Jakarta RTC and so a 100% load should be applied to these courses.

Calculating the annual course requirements derived from the requirements over this 5-year period, and based on the maximum course capacity shown in Tables 3-1 and 3-2, the number of courses to be offered per year will be determined.
Accordingly, the training capacity of the general courses for the water supply division will be as presented in Table 3-6 following.

Table 3-6 Training Capacity for General Courses

Courses	A	B	C	D	E	F
1. General Manager	143+167	143+ 40	37	20	2+2	40
2. Technical Director	143+167	143+ 40	37	20	2+2	40
3. AdministrativeDirector	143	143	29	20	2	40
4. Chief of Bookkeeping Sec.	648	156	32	20	2	40
5. Chief of Production Sec.	616	148	30	20	2	40
6. Chief of Distribution Sec.	365	88	18	20	1	20
7. Chief of Planning/Supervision Sec.	228	55	11	20	1	20
8. Chief of Workshop/Maintenance Sec.	385	47	10	20	1	20
9. Chief of Customer Relations Sec.	429	103	21	20	1	20
10. Chief of Finance/Budget Sec.	833	200	40	20	2	40
11. Chief of Gen. Administration Sec.	404	97	20	20	1	20
12. Part-time Instructor	95	95	19	20	1	20
13. Full-time nstructor	45	45	9	20	1	20
14. Training Officer	143	143	29	20	2	40
15. Pipe laying Skill Development	1,334	321	65	10	7	70
16. Electrical Skill Development	257	62	13	10	2	20
17. Mechanical Skill Development	257	62	13	10	2	20
18. Unaccouted Water control S. D.	190	46	10	10	1	10
Total	6,800	2,250	455		37	540

A = Target Trainee
B = Trainee in Jakarta = A 24%
C = Yearly Target Trainees (B / 5 years)
D = Course Capacity (Persons)
E = Course Opening Frequency (Times per Year)
F = Yeary Training Capacity

(2) Advanced Courses in the Water Supply Division

1) Target Trainees

The objective of the advanced course is to provide more specialized knowledge and technical training in the technical aspects of water supply services. They will be offered to technical personnel to be dispatched from the technical sections of water supply enterprises around the country as well as to technicians who have completed general technical courses.

The job classifications (sections) targeted by course are given in Sub-section 3-3-2 (2), 2). Based on the evaluation in (1) 3) above, the number of target sections and persons will be 50% of those shown in the HRDP. The final requirements are presented in Table 3-7 following.

Table 3-7 (1) Target Sections for Advanced Courses

Course Division	Courses Name	A 310	B 256	C 143	D 310	E 143
Water Quality	1. Physico-Chemical Analysis	O	O			
	2. Bacteriological Analysis	O	O			
	3. Heavy Metals Analysis		O			
	4. Micro Org. Substances Analysis		O			
Water Treatment	5. Water Treatment Technology	O	O			
	6. Water Parameters Technology	O	O			
Elec./Mech. Technology	7. Electrical Facilities	O		O	O	
	8. Mechanical Facilities	O		O	O	
Distribution Hydraulics	9. Pipe laying Technology			O	O	O
	10. Leakage Control Technology			O	O	O
	11. Watermeter Testing Technology			O	O	
	12. Design/ Distribution System			O	O	O

(Figures indicate the Total Number of Sections)

A : Production Section
B : Laboratory Section
C : Workshop/Maintnance Section
D : Distribution Section
E : Plqnning/Supervision Section

Table 3-7 (2) Target Technicians for Advanced Courses

Course Division	Courses Name	F 253	G 260	H 1334	I 190
Water Quality	1. Physico-Chemical Analysis				
	2. Bacteriological Analysis				
	3. Heavy Metals Analysis				
	4. Micro Org. Substances Analysis				
Water Treatment	5. Water Treatment Technology		O		
	6. Water Parameters Technology		O		
Elec./Mech. Technology	7. Electrical Facilities	O	O		
	8. Mechanical Facilities	O	O		
Distribution Hydraulics	9. Pipe laying Technology			O	
	10. Leakage Control Technology				O
	11. Watermeter Testing Technology				
	12. Design/ Distribution System				

(Figures indicate the Total Number of Technicians)

F : Electrician/ Mechnic
G : Plant Operator
H : Pipe Layer
I : Leakage Controller/Inspector

2) Determination of Training Capacity

With respect to implementing training more efficiently, the determination of training scope, it would be ideal to dispatch all trainees to the courses from their respective sections, but this would result in an excessive training load. It is, therefore, proposed that every section concerned be able to dispatch one trainee to one of the advanced courses.

About one in every 5 technicians completing a general course will move on to an advanced course. The final training requirements are given in Table 3-8 following, with the training capacity shown in Table 3-9.

Table 3-8 Training Requirements for Advanced Courses

Courses	A	B	C	D	E	F	G	H	I	Total
1. Physio-Chemical Analysis	52	43								95
2. Bacteriological Analysis	52	43								95
3. Heavy Metals Analysis		43								43
4. Micro Org. Substances Analysis		43								43
5. Water Treatment Technology	52	43					13			108
6. Water Parameters Technology	52	43					13			108
7. Electrical Facilities	52		24	52		26	13			167
8. Mechanical Facilities	52		24	52		26	13			167
9. Pipe laying Technology			24	52	43			267		386
10. Leakage Control Technology			24	52	43				38	157
11. Watermeter Testing Technology			24	52						76
12. Design/ Distribution System			24	52	43					119
Total	312	258	144	312	143	52	52	267	38	1521

A : Production Section
B : Laboratory Section
C : Workshop/MaintnanceSection
D : Distribution Section
E : Plqnning/Supervision Section
F : Electrician/ Mechnic
G : Plant Operator
H : Pipe Layer
I : Leakage Controller/Inspector

Table 3-9 Training Capacity of Advanced Courses

Courses	A	B	C	D	E
1. Physio-Chemical Analysis	95	19	10	2	20
2. Bacteriological Analysis	95	19	10	2	20
3. Heavy Metals Analysis	43	9	10	1	10
4. Micro Org. Substances Analysis	43	9	10	1	10
5. Water Treatment Technology	108	22	10	2	20
6. Water Parameters Technology	108	22	10	2	20
7. Electrical Facilities	167	34	10	4	40
8. Mechanical Facilities	167	34	10	4	40
9. Pipe laying Technology	386	78	10	8	80
10. Leakage Control Technology	157	32	10	3	30
11. Watermeter Testing Technology	76	16	10	2	20
12. Design/ Distribution System	119	24	10	3	30
Total	1,521	309		34	340

A : Total Target Trainee
B : Yearly Target Trainee (A / 5 years)
C : Course Capacity (Persons)
D : Course Opening Frequency (Times per year)
E : Yearly Training Capacity (Persons)

(3) General Courses in the Environmental Sanitation Division

1) Basic Needs

An HRDP has also been prepared for the environmental sanitation sub-sector and training needs therein can be referred to this report. Environmental sanitation services in Indonesia are handled by local bodies as a proper activity; it is only recently that the development of environmental sanitation services has been taken up in a coordinated manner under a National Plan. Thus, the Government of Indonesia has not grasped the specific activities, scope, and facilities of local bodies or the precise number of their employees.

In preparing the HRDP, a few representative local bodies of different size were first sampled and their operations and staffs were surveyed to get an idea of the number of people and job classifications requiring training. Then a model of current national training needs was developed as of 1985 by applying the sampling results, in terms of area size and the number of employees by work classifications, to urban areas of the same size.

With regard to the forecasting of future needs, based on the population forecasts for cities, towns, and villages, a forecast was made of the number of cities by population class in the year 2000 and a needs projection was made in the same manner as for the survey of current conditions. In this way, the potential trainee populations among employees in 1985 and 2000 were established at 4,688 and 8,061 persons respectively.

Courses are presently being offered in the environmental sanitation sector which will correspond to the general freshmen courses at the new Center. In addition, courses for managers and planning sub-officers will be newly offered as general courses. The number of trainees served from 1985 to 1989 (estimated) are given in Table 3-10 following.

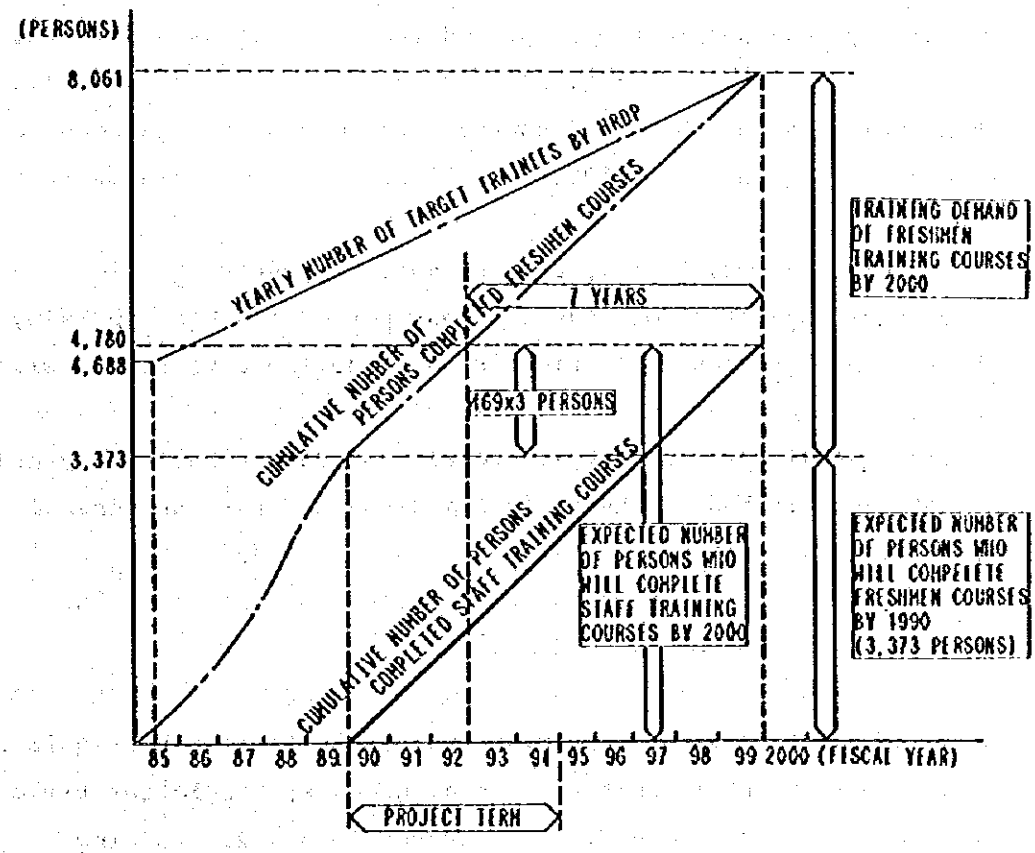
Table 3-10 Number of Staff Trained

Year	No.of Trained Pers.	Cumulated Number
1985	270	270
1986	420	690
1987	763	1,453
1988	960(Plan)	2,413 (Plan)
1989	960(Forecast)	3,373 (Forecast)

The 1988 figure is a planned value but, if the training level in 1989 is set at this level, by the start of Center operations in early 1990, a total of 3,373 individuals will have completed the freshmen course.

The figures in the above table together with the HRDP forecasts of training needs are charted in Figure 3-4 following.

Fig. 3-4 HRDP Forecasts of Training Needs



The HRDP forecasts that the 4,688 target trainees in 1985 will increase to 8,061 in 2000. Based on a 3,373 growth in the number of trainees over the 15 year period, the number of target trainees will grow by 285 persons per year. Completion of the HRDP, which has set 2000 as its Plan target, means that, by 2000, the entire pool of trainees will have completed the freshmen and staff training courses. To meet this goal, freshmen courses will be required over a 10-year period, starting in 1990, for all persons who have not yet received training plus new recruits during the period. Therefore, the total number of trainees for the Freshmen Course is: 8,061- 3,773 = 4,688 persons (469 per year) for the 10 year period.

In the HRDP, it is stipulated that freshmen courses will be given to those who have employed in their organizations for less than 3 years, but participation in staff courses will be limited to those with 10 or more years of service. Thus, if the necessary training in the general courses must be completed by 2000 for the target trainees of the year, those who will have completed the freshmen courses by 1993 shall have completed the staff courses as well.

Thus, trainees for the staff courses would comprise persons who have already taken courses by 1990 as well as freshmen trainees from 1990-1993.

469 x 3 + 3,373 = 4,788 persons (478/year)

Since the project is to cover a 5-year period starting in 1990, the number of persons requiring training during this period will come to:

(478 + 469) persons/year x 5 years = 4,735 persons (947/year)

This is established as the basic training need for the general courses.

2) Retraining Potential

As in the case of water supply, retraining will also be required in the environmental sanitation area. However, the latter field is quite new in Indonesia and, as discussed in 3-3-2, training courses are not yet refined. That is, courses have not yet been

prepared with retraining in mind. Therefore, no consideration will be given to retraining in the environmental sanitation sub-sector.

However, after 1995, there will be a definite need to develop training courses based on the results attained by the Center's operations over 5 years. Assuming that future training is carried out to meet the above training requirements, the retraining potential after 2000 at the national level would be as follows:

Training demand from 2000 on --

Freshman training	- New recruits	285 persons/year
Staff training	- New employees per year from 1993 on	285 "
Total		570 persons

Training capacity -- Capacity to satisfy basic training needs per year 947 persons

Retraining potential in 2000 --

8,061 persons (947 - 570) persons/year = 21.4. years

This means that a retraining program can be offered once in 22 years, or to one in 22 persons per year.

3) Training Load per Course

According to an explanation given to the Team, the ratio of demand for the managers' and planners' courses, based on existing staffing patterns should be about 5:1. However, at the present time, the strengthening of organizational structures and the planning of necessary facilities are being accorded a higher priority for spreading environmental sanitation services. In the plan for fiscal 1988, the above ratio is 3:1, and so we have also set the demand ratio for the above 2 courses at 3:1.

According to the HRDP, the number of target trainees in the areas of solid waste and night soil is as shown in the table of the following page:

Area	Number of Target Trainee			
	FY 1985	(Ratio)	FY 2000	(Ratio)
Solid Waste Disposal	1224	(26%)	2377	(29%)
Night Soil Disposal	3464	(74%)	5684	(71%)
Total	4688	(100%)	8061	(100%)

Taking the average of the two years as the ratio of demand between the two types of courses, based on--

(26 + 29) / 2 = 27.5, (74 + 71) / 2 = 72.5, then,

the proportion becomes:

solid waste disposal/ night soil disposal = 275:725

From the analysis in 1) above, the ratio of freshmen to staff training becomes 469:478. On this basis, the training requirements for all 4,735 persons will be divided as shown in Table 3-11 following.

Table 3-11 Training Requirement around the Country

Total Needs	4,735			
Solid Waste	1,320	Freshman Training	645	
		Staff Training	657	
			Supervisory Manager	493
			Planner	164
Night Soil	3,433	Freshman Training	1,699	
		Staff Training	1,734	
			Supervisory Manager	1,300
			Planner	434

4) Determination of the Training Capacity of the Center

The HRDP calls for the establishment of RTC's in Padang and Denpasar, as well as Jakarta, to administer general courses. As discussed in 3-3-1, the Center will, for the time being, cover the entire country but, in determining the scale of the facility, it is assumed that the RTCs will be built sometime in the future. Thus, the training load for the Center is intended to meet only the training requirements of the Jakarta RTC.

In the HRDP, the training load for the Jakarta RTC is set at 57% of national requirements. This Project excludes training related to urban sewers. Therefore, an amount equivalent to urban sewers will be subtracted from the training requirement at the Jakarta RTC. This amount is considered to be 50% based on the ratio of training results to date.

On the above basis, the training load for the general courses for the environmental sanitation sub-sector will be as shown in Table 3-12 following.

Table 3-12 Training Capacity of General Courses

Courses	A	B	C	D	E	F	G
Solid Waste							
Freshman Training	645	368	368	74	20	4	80
Supervisory Manager	493	281	281	57	20	3	60
Planner	164	94	94	19	20	1	20
Night Soil							
Freshman Training	1,699	969	485	97	20	5	100
Supervisory Manager	1,300	741	371	77	20	4	80
Planner	434	248	124	25	20	2	40
Total	4,735	2,701	1,723	349		19	380

A : Total Training Requirements
B : Training Load to Jakarta RTC
C : Trainig Load after Deduction of Urban Sewage
D : Yearly Training Requirements
E : Course Capacity
F : Course Opening Frequency
G : Yearly Training Capacity

(4) Advanced Courses in the Environmental Sanitation Division

1) Trainees

The advanced courses are intended to provide more specialized knowledge and training to employees engaged in the technical phases of environmental sanitation services. Trainees will be dispatched from the technical sections of local autonomous bodies around the country concerned with environmental sanitation services.

The HRDP has forecast the number of technical sections and of technical staff members in the year 2000 as follows:

Table 3-13 Number of Target Sections and Technical Staff

Section or Job title	Numbers of Sections or Staff	
	Solid Waste	Night Soil
1. Planning/Design Sec.	52	105
2. Research/Development Sec.	23	23
3. Collection Sec.	105	401
4. Transport Sec.	105	105
5. Treatment Sec.	52	23
6. Maintenance Sec.	23	401
7. Construction Supervisor	52	529
8. Treatment Plant Operator	75	46
9. Chief Workshop Technician	52	105

From the above table, the number of technical sections that possess technical staff members to become the targets of the courses to be offered at the Center can be derived as shown in Table 3-14 below:

Table 3-14 Target Sectors for Advanced Courses

Name of Section	Solid Waste		Night Soil
	A	B	C
1. Planning/Design Sec.	52	52	105
2. Research/Development Sec.	23		23
3. Collection Sec.		105	
4. Transport Sec.		105	
5. Treatment Sec.	52		23

A: Sanitary Landfill Course B: Collection and Transportation Course
C: Night Soil Disposal Course

2) Determination of Training Capacity

In determining the training capacity, it is assumed that at least one person in each technical section will have completed a course by 1994..The number of sections shown in Table 3-14 are as of the year 2000. The number of trainees in 1994, as shown in Chart 3-4, is 6,712, which corresponds to 83% of the 8,061 trainees projected for 2000. Thus, the number of trainees in the advanced courses at the Center can be set at 83% of the figures shown in Table 3-14.

Sections responsible for sewerage are also included in the sections listed for the night soil disposal course and so, as in the case of the general course, this figure will be reduced by half. On this basis, the capacity of the advanced courses will be as shown in Table 3-15.

Table 3-15 Training Capacity of Advanced Courses

Courses	A	B	C	D	E	F	G
Sanitary Landfill	127	127	106	21	10	2	20
Collection & Transportation	262	262	218	44	10	4	40
Night Soil Disposal	151	76	63	13	10	2	20
Total	540	465	387	78	30	8	80

A : Number of target trainees to be trainted by 2000.

B : Number of target trainees after deduction of the urban sewage.

C : Training load by 1994 (B X 83%)

D : Yearly taining load (C / 5)

E : Course Capacity

F : Course opening frequency (Times per year D / E)

G : Yearly training capacity

(5) Overall Training Load of the Center

From the foregoing, the overall training capacity at the Center will be as shown below:

Table 3-16 Training Capacity of the Center

Courses	Number of trainees per Year	Training Capacity Man-Week
Water Supply		
General Course	540	1,080
Advanced Course	340	1,090
Sub-total	880	2,170
Environmental Sanitation		
General Course	380	640
Advanced Course	80	240
Sub-total	460	880
Grand Total	1,340	3,050

3-3-5 Schedule for Training Implementation

The training schedule constitutes the framework of Center operations. . Accordingly, the schedule must be developed on the basis of an examination of training priorities, the convenience of part-time instructors, conditions at the trainees' organizations, the state of curriculum development, and the constraints of budgetary timing.

However, there is a need for a year-by-year implementation schedule to determine the size of facilities, which will vary with the training capacity and the methods of implementation. In particular, the number of lecture and dormitory rooms will essentially be determined on the basis of this training schedule.

There is, therefore, a clear need to prepare annual schedules as the foundation for facility planning. Table 3-17 following represents one possible schedule plan, but it has been developed with a view toward effective use of the facilities and achieving optimum balance in course scheduling.

In developing this schedule, the following factors have been taken particularly into account:

1) Training will be offered for a full 4 weeks per month, with provision for 2-3 days per per month for preparations or facility maintenance.

2) During the one-month Ramadan period, which occurs once a year, training efficiency would decline and so, in principle, no courses will be run during that period.

Table 3-17 Yeary Training Schedule

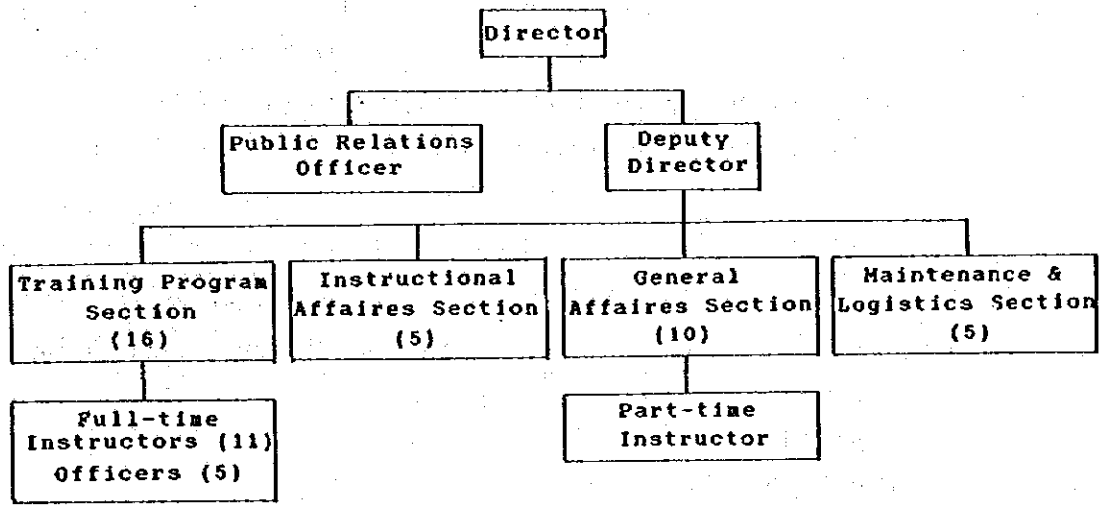
		Period (Week)	Times per Year	Course Cap.	JAN 1 2 3 4	FEB 1 2 3 4	MAR 1 2 3 4	APR 1 2 3 4	MAY 1 2 3 4	JUN 1 2 3 4	JUL 1 2 3 4	AUG 1 2 3 4	SEP 1 2 3 4	OCT 1 2 3 4	NOV 1 2 3 4	DEC 1 2 3 4
A WATER SUPPLY GENERAL COURSE																
Directors	1. General Manager	2+2	2	20												
	2. Technical Director	2+2	2	20												
	3. Administrtv Director	2	2	20												
Chiefs	4. Bookkeeping Sec.	2	2	20												
	5. Production Sec.	2	2	20												
	6. Distribution Sec.	2	1	20												
	7. Planning/Supervision	2	1	20												
	8. Workshop/Maintenance	2	1	20												
	9. Customers Relations	1	1	20												
	10. Finance/Budget Sec.	1	2	20												
	11. General Admn. Sec.	1	1	20												
Instructors	12. Part-time Instructor	1	1	20												
	13. Full-time Instructor	1	1	20												
	14. Training Officer	1	2	20												
Technicians Skill Develp.	15. Pipe Laying Skill	2	7	10												
	16. Electrical Skill	2	2	10												
	17. Mechanical Skill	2	2	10												
	18. Unaccounted W. Cont.	2	1	10												
Number of Participants (×10 persons)					4 4 3 3	2 3 3 2	3 3 2 3	3 2 2 3	3 2 2 2	2 2 2 2	3 3 2 3	3 2 3 3	3 3 3 3	3 3 3 3	2 2 2 2	0 0 0 0
B WATER SUPPLY ADVANCED COURSE																
Water Quality Analysis	1. Physio-Chemical Anal.	4	2	10												
	2. Bacteriological Anal.	4	2	10												
	3. Heavy Metal Anal.	4	1	10												
	4. Micro Organic Subst.	8	1	10												
Water Treatment	5. Water Treatment Tech.	8	2	10												
	6. Water Parameter Tech.	4	2	10												
Electrical/ Mechanical T.	7. Electrical Facility	2	4	10												
	8. Mechanical Facility	2	4	10												
Distribution /Hydraulics	9. Pipe Laying Tech.	2	8	10												
	10. Leakage Control Tech.	4	3	10												
	11. Water Meter Testing	2	2	10												
	12. Design/Distrbtn Syst.	3	3	10												
Number of Participants (×10 persons)					1 1 2 2	3 3 1 2	3 2 3 3	2 3 3 1	3 3 3 3	3 3 3 3	2 1 3 3	2 2 2 1	3 3 3 3	3 3 3 3	3 3 2 2	0 0 0 0
C ENVIRONMENTAL SANITATION GENERAL COURSE																
Solid Waste	1. Freshman	1	4	20												
	2. Supervisory Manager	2	3	20												
	3. Planner	3	1	20												
Night Soil	4. Freshman	1	5	20												
	5. Supervisory Manager	2	4	20												
	6. Planner	3	2	20												
D ENVIRONMENTAL SANITATION ADVANCED COURSE																
Solid Waste	1. Sanitary Landfill	3	2	10												
	2. Collect. & Transport.	3	4	10												
Night Soil	3. Night Soil Disposal	3	2	10												
Number of Participants (×10 persons)					2 2 2 2	2 2 2 2	2 2 2 2	3 3 3 2	2 2 2 2	2 3 3 3	3 3 3 2	2 3 3 3	1 1 1 1	1 1 1 1	1 1 1 1	0 0 0 0
Total Number of Participants (×10 persons)					7 7 7 7	7 8 6 6	8 7 7 8	8 8 8 6	8 7 7 7	7 8 8 8	8 7 8 7	7 7 8 7	7 7 7 7	7 7 7 7	6 6 5 5	0 0 0 0

3-4 Operation of the Center

3-4-1 Operating Structure

The operating structure for the Center will be as shown in Figure 3-5 below:

Fig. 3-5 Table of Organization for the CTC



The Center will be operated as an organization of the Directorate General of Human Settlements in the Department of Public Works and positioned under the jurisdiction of the Training Section of this Directorate.

Center operations will be directed by an Executive Board to be formed for this purpose, under the chairmanship of the Director General, who will be the responsible executive for the Center. The Executive Board will also include the Directors of Planning, Water Supply, and Environmental Sanitation and the Secretary of the Directorate General of Human Settlements.

3-4-2 Personnel Plan:

The personnel requirements for the Center will be as shown below:

(1) Training Program Section (16 persons)

In addition to the Section Chief, 4 members of the staff will concentrate on planning and administering training programs. The six(6) full-time instructors in the water supply division and the five(5)in the environmental sanitation division will belong to the Training and Program Section. All full-time instructors will be required to have a technical background to permit them to receive technical transfer in the event that a technical cooperation program is eventually instituted. Instructor responsibilities will be as shown below:

Responsibe Facility	Number of Instructos	
	Water Supply	Env Sanitation
Laboratoris	2	1
Water Supply Workshop	1	
Elec. Mech./ Pump Workshop	2	
Piping Workshop	1	
Environmnt. Sanitation Workshop		4
Total	6	5

(2) Instructional Affairs Section (5 persons)

This Section will be composed of a Chief and 4 staff members to look after trainees. They will also control the use of the library, lecture rooms, computer training room and the dormitories.

(3) General Affairs Section (10 persons)

In addition to the Section Chief, the staff of this Section will comprise 9 persons, including a typist, who will be concerned with accounting, general affairs, and public relations.

(4) Maintenance and Logistics Section (5 persons)

The staff for this Section will comprise a Section Chief and a staff of four who will be responsible for the maintenance and management of the facilities. Their duties will also include procurement as well as the provision of guard, housekeeping , other cleaning, and restaurant services which are expected to be contracted out.

Drivers for the Center's vehicles are not included in the above five staff members, but it is recommended that one driver should be employed per vehicle.

(5) Other Staff

Services in the areas of cleaning, security, meal services, housekeeping, and gardening will be contracted out, but it can be anticipated that the number of contract workers on the premises at any given time will be as follows:

Cleaning	: 5 Pers. X 1 Shift =	5 Pers./ Day
Security Guard	: 4 Pers. X 3 Shift =	12 Pers./ Day
Meal Service	: 6 Pers. X 2 Shift =	12 Pers./ Day
Housekeepers	: 2 Pers. X 1 Shift =	2 Pers./ Day
Gardeners	: 2 Pers. X 1 Shift =	2 Pers./ Day
Total	: 17 Pers./ Day (Simultaneously)	31 Pers./ Day (Cumulatively)