JAPAN INTERNATIONAL COOPERATION AGENCY

INDUSTRIAL DEVELOPMENT BOARD OF CEYLON,
MINISTRY OF INDUSTRIAL DEVELOPMENT,
THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA

STUDY (AFTER CARE) ON INDUSTRIAL SECTOR DEVELOPMENT (ELECTROPLATING AND WASTE WATER TREATMENT) IN THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA

FINAL REPORT

FEBRUARY 1997

UNICO INTERNATIONAL CORPORATION
FUJI TECHNOSURVEY COMPANY, LIMITED

TOKYO, JAPAN

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Preface

In response to a request from the Government of the Democratic Socialist Republic of Sri Lanka, the Government of Japan decided to conduct the Study (After Care) on Industrial Sector Development (Electroplating and Waste Water Treatment) in the Democratic Socialist Republic of Sri Lanka and the study was implemented by the Japan International Cooperation Agency (JICA).

JICA sent a study team, led by Mr. Kiko Nagasawa of Unico International Corp. and organized by Fuji Technosurvey Co., Ltd. to the Democratic Socialist Republic of Sri Lanka three times from August 1996 to February 1997.

The team held discussion with the officials of the Government of the Democratic Socialist Republic of Sri Lanka, and conducted related field surveys. After returning to Japan, the team conducted further studies and compiled the final results in this report.

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

I wish to express my sincere appreciation to the officials concerned of the Government of the Democratic Socialist Republic of Sri Lanka for their close cooperation throughout the study.

February, 1997

Kimio Fujita
President
Japan International Cooperation Agency

February 28, 1997

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

Dear Mr. Fujita

Letter of Transmittal

We are pleased to submit to you the report on the Study (After Care) on Industrial Sector Development (Electroplating and Waste Water Treatment) in the Democratic Socialist Republic of Sri Lanka. The report contains the study of the current state and issues of the electroplating industry, setting of final goals for the electroplating industry, formulation of an improvement plan, and recommendations for measures for upgrading of electroplating and waste water treatment technology and their dissemination.

In the report, we recognize the important role of Electroplating Center, Industrial Development Board (IDB) for improvement of electroplating and waste water treatment technologies, and propose the programme for upgrading technology and skills of IDB Electroplating Center, for which we submit an action plan and schedule. Recommendations to public organizations concerned with relataed development measures including encouragement for the programme are also made.

The Sri Lankan Government understands it is indispensable for the electroplating industry to improve electroplating technology and waste water treatment, and recognizes the implementation of the upgrading programme of IDB Electroplating Center proposed in the report is significant. We believe the report will bring about a substantial contribution to promotion of the electroplating industry as well as development of the industrial sector in Sri Lanka.

We wish to take this opportunity to express our sincere gratitude to your Agency, the Ministry of Foreign Affairs, and the Ministry of International Trade and Industry. We also wish to express our deep gratitude to IDB, Ministry of Industrial Development, and Central Environmental Authority and other public organizations as well as private enterprises in the Democratic Socialist Republic of Sri Lanka for the close cooperation and assistance extended to us during our investigations and study.

Very truly yours

Kiko Nagasawa
Team Leader, Study (After Care) on
Industrial Sector Development
(Electroplating and Waste Water Treatment)
in the Democratic Socialist Republic of Sri Lanka

ABBREVIATIONS

ORGANIZATIONS

BOI	Board of Investment
CEA	Central Environmental Authority
CISIR	Ceylon Institute of Science and Industrial Research
EC	Environmental Council
EPC	Electroplating Center
GCEC	Greater Colombo Economic Commission (The present "BOI")
IDB	Industrial Development Board of Ceylon
JICA	Japan International Cooperation Agency
MID	Ministry of Industrial Development
MIST	Ministry of Industries, Science and Technology
MLIMD	Ministry of Lands Irrigation and Mahaweli Development
KfW	Kreditanstalt für Wiederaufbau
NDB	National Development Bank
NBRO	National Building Research Organization
SLSI	Sri Lanka Standards Institution
SMI	Small and Medium Scale Industry
UDA	Urban Development Authority

ENVIRONMENT

EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EPL	Environmental Protection License
IEE	Initial Environmental Examination
IEER	Initial Environmental Examination Report
MEIP	Metropolitan Environment Improvement Programme
PI	Preliminary Information

ECONOMIC POLICY AND FINANCE SCHEME

BOO	Build, Own and Operate
BOT	Build, Own and Transfer
PCAF	Pollution Control and Abatement Fund

ELECTROPLATING AND WASTE WATER TREATMENT TECHNOLOGY

ABS	Acrylonitrile-Butadiene-Styrene
BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand
CASS (test)	Copper-accelerated Acetic Acid Salt Spray (test)
FRP	Fiberglass Reinforced Plastic
ORP	Oxidation Reduction Potential
PR (method)	Periodic Reverse Current Plating (method)
PVC	Polyvinyl Chloride

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INTRODUCTION

Introduction

This report is the report of the Study (After Care) on Industrial Sector Development (Electroplating and Waste Water Treatment) in the Democratic Socialist Republic of Sri Lanka.

The study was, based on a request made by the Government of Sri Lanka, conducted under the agreement between Industrial Development Board of Ceylon (hereinafter referred to as "IDB") and Japan International Cooperation Agency (hereinafter referred to as "JICA") in March 1996, entitled "Scope of Work for the Study (After Care) on Industrial Sector Development (Electroplating and Waste Water Treatment) in the Democratic Socialist Republic of Sri Lanka".

The study consists of field surveys followed by additional investigation and analysis in Japan; the first field survey was between August 11 and September 14, 1996, and second field survey between November 13 and 30, 1996. This document is the final report compiling the results of the study.

It should be noted that the field surveys and subsequent work have been successfully conducted with the close cooperation and assistance of many parties involved. In particular, the study team acknowledges special support and cooperation extended by the counterparts of Industrial Development Board, including Chairman H.M.V. Jayasinghe, throughout the process including the selection of enterprises for visiting and other necessary arrangements.

1. BACKGROUND OF THE STUDY

In 1991, the Government of Sri Lanka requested the Government of Japan to conduct a study related to an industrial sector development promotion plan and an industrial park development plan, focusing on the fostering of metalworking industries, with the goals to promote the export-oriented industries and strengthen industrial structure as a whole. In response, JICA conducted a study in 1992/93 on promotion of exports and investment, the fostering of metalworking industries, and the development of industrial parks. The study proposed construction of an industrial park for metalworking industries and the establishment of a foundry and electroplating center. In August 1993, the Government of Sri Lanka requested the Government of Japan for official assistance related to the establishment of a foundry and electroplating training center. In February 1994, JICA sent a preliminary study team on a foundry and electroplating technology upgrading plan. The study team found the establishment of the training center to be difficult and instead proposed a project using existing factories under jurisdiction of IDB. In September 1995, the Record of Discussions (R/D) on

project-based technical assistance in the field of foundry technology was signed. As for electroplating technology, the Government of Sri Lanka decided to request a development study for project planning to strengthen and improve electroplating and waste water treatment technologies, and made an official request in December 1995. In response, JICA sent a preliminary study team to Sri Lanka in March 1996, and the Scope of Work (S/W) was signed by the two governments.

2. OBJECTIVE AND SCOPE OF THE STUDY

The objective of the Study is to study the current state of electroplating industries in Sri Lanka and major problems facing them, and develop a plan to improve electroplating technology and propagate waste water treatment technology and systems.

The Study is designed to cover the following items under the agreed S/W:

1) Review and field surveys on the present situation of electroplating industries in Sri Lanka,
2) Review and field surveys on the present situation of environmental pollution in Sri Lanka,
3) Identification of problems and issues of the electroplating industries in Sri Lanka,
4) Identification of appropriate technologies for the electroplating industries in Sri Lanka,
5) Formulation of programmes and projects for the dissemination and improvement of electroplating and waste water treatment technologies of electroplating industries in Sri Lanka, and
6) Measures to be taken by the Government of Sri Lanka to upgrade electroplating technology.

3. ORGANIZATION OF THE STUDY TEAM

This Study was conducted by a consortium organized by representatives of Unico International Co., Ltd. and Fuji Technosurvey Co., Ltd., consisting of the following members:

Kiko Nagasawa	Leader/general	Unico International
Syunsuke Araki	Electroplating industry /environmental measures	Unico International
Boshin Ro	Electroplating technology	Fuji Technosurvey

Hiromu Kanematsu	Electroplating technology	Fuji Technosurvey
Minoru Toyonaga	Waste water treatment technology	Fuji Technosurvey
Shozo Nasu	Electroplating solution/waste water analysis	Fuji Technosurvey
Takeshi Sekoguchi	Environmental evaluation	Unico International

The following members of IDB provided assistance for the study team as counterparts:

S.L.P. Stambo	Chief Engineer
H.F. Nanayakkara	Deputy Chief Engineer
K. Sethuramalingam	Acting Deputy Chief Engineer
A.M. Karunaratne	Assistant Director (Planning)
M.Y. Gunasena	Superintendent, Electroplating
J.S.C. Kumarasinghe	Industrial Extension Officer, Electroplating
Chandani Edirisinghe	Laboratory Assistant, Electroplating

The Study was commenced in July 1996 and completed in February 1997. In August and September, November 1996, and February 1997, field surveys and discussion with Sri Lanakan counterparts were conducted.

Chapter 1 Industrial Development Policy in Sri Lanka

Chapter 1 Industrial Development Policy in Sri Lanka

1.1 Economic Overview

Sri Lanka's economy has been founded upon a skewed trade structure where specific agricultural products (three major products, tea, rubber, and coconut) are exported and industrial products are imported, this structure having developed during the long colonial era. As a result, the nation was unable to embark on industrialization efforts for a long period of time and was subjected to chronic recessions.

To liberate the economy from its past limitations so as to enable take-off, past administrations initiated various efforts in their economic policies, with primary objectives being the improvement of standards of living, the expansion of employment opportunities, and the improvement of government finance and the international balance of payments. These policy measures began to have effect during the second half of 1989.

Table 1-1 MAJOR ECONOMIC INDICATORS OF SRI LANKA

	1989	1990	1991	1992	1993	1994	1995*
Real GDP Growth (%)	2.3	6.2	4.6	4.3	6.9	5.6	5.5
Agriculture, Forestry and Fishing	-1.1	8.5	1.9	-1.6	11.9	6.0	3.4
Mining and Quarrying	5.4	9.1	-10.0	-6.0	11.9	6.0	3.4
Manufacturing	4.4	9.5	6.8	8.8	10.5	9.1	9.2
Construction	0.6	2.9	3.1	8.1	6.5	6.0	4.9
Services	3.2	-0.3	6.2	5.3	6.3	5.2	5.1
Per Capita GNP (US$)	n.a.	469	518	556	588	652	709
Infration Rate (Colombo)	11.6	21.5	12.2	11.4	11.7	8.4	7.7
Budget Deficit (% of GDP)	n.a.	n.a.	-11.6	-7.3	-8.4	-10.0	-8.4
Exports (% of GDP)	n.a.	n.a.	22.7	25.4	27.6	27.4	n.a.
Imports (% of GDP)	n.a.	n.a.	33.7	36.1	38.8	40.8	n.a.
Current A/C Balance (% of GDP)	n.a.	n.a.	-5.4	-4.5	-3.8	-6.5	-4.2
Balance of Payments (Mil. SDR)	n.a.	138	152	133	375	173	-62
External Debts (% of GDP)	24.2	17.8	18.5	17.1	13.8	13.3	13.8
Unemployment Rate (%)	n.a.	16.3	13.8	13.3	13.8	12.1	12.7

*Provisional Source: Annual reports of Central Bank of Sri Lanka and others

As seen in Table 1-1, the growth rate of real GDP rose from 2.3% in 1989 to the average of 5.5% between 1990 and 1995, whereas the average inflation rate (Colombo) subsided from

21.5% in 1990 to 7.7% in 1995. GNP per capita increased 50% during the same period to $709, and the budget deficit as a percentage of GDP declined from 11.6% in 1991 to 8.4% in 1995. Not all the indicators are positive, however. The international balance of payments which recorded a surplus during the past few years turned into a deficit of 62 million SDR in 1995, mainly because of deterioration of public order and frequent occurrence of labor disputes since April, resulting in a 66% decrease in foreign investment that was previously booming.

Sectoral comparison of real GDP growth (Table 1-2) indicates healthy growth of the manufacturing sector, which seems to bolster recent development of the entire economy, although its share of GDP is relatively small, 15.7%. Fast-growing industries within the manufacturing sector are the factory industry, other than the processing of traditional agricultural products (tea, rubber, and coconut), and small industry. Notably, the factory industry has been steadily gaining in terms of share of the GDP, while the traditional processing sector is declining and the share of the small industry remains relatively unchanged.

Table 1-2 RECENT GROWTH OF MANUFACTURING SECTOR (%)

	1990	1991	1992	1993	1994	1995*
Industrial Production	9.5	6.8	8.8	10.5	9.1	9.2
Factory industry	14.9	9.5	13.0	11.3	8.8	10.0
Small industry, others	23.2	5.4	5.1	5.6	6.2	6.5
Processing of Tea, Rubber & Coconut Kernel Products	17.2	-5.6	-12.6	8.4	13.0	4.4
(Reference) Share (%)						
Industrial Production	14.9	14.8	15.3	15.2	15.4	15.7
Factory industry	71.9	76.9	79.6	80.9	79.7	79.4
Small industry, others	7.9	7.0	7.2	6.9	7.8	8.0
Processing of Tea, Rubber & Coconut Kernel Products	20.2	16.1	13.2	12.2	12.4	12.6

*Provisional Source: Annual reports of Central Bank of Sri Lanka and others

Table 1-3 shows industrial production by industry group. In 1995, textiles, apparel, and leather products held a dominant 40.6% share, followed by food, beverages, and tobacco, 24.8%; chemical, petroleum, rubber, and plastic products, 17.3%; and non-metallic mineral products, 7.6%. In fact, the ranking is same as that in 1990. There are no statistical data available on the electroplating industry which is the subject of this study, but its output should be minimal, as judged from the relatively small share of two sectors related to electroplating operation - basic metal products and fabricated metal products, machinery and transport

equipment - amounting to 4.4% of total industrial output.

Table 1-3 INDUSTRIAL PRODUCTION BY INDUSTRY TYPE

	1990	1991	1992	1993	1994	1995*	(Share%)
Food, beverages and tobacco	21,955	30,003	34,157	39,709	45,054	54,927	(24.8)
Textiles, wearing apparel and leather products	27,930	33,854	53,929	70,057	78,211	89,944	(40.6)
Wood and wood products	721	802	1,005	1,230	1,601	1,929	(0.9)
Paper and paper products	1,880	2,214	2,586	3,438	4,066	4,595	(2.1)
Chemical, petroleum, rubber and plastic products	21,215	20,140	23,817	28,876	34,017	38,321	(17.3)
Non-metallic mineral products	7,554	8,181	10,582	12,351	14,580	16,740	(7.6)
Basic metal products	1,006	1,264	1,424	1,497	1,909	1,736	(0.8)
Fabricated metal products, machinery and transport equipment	4,199	5,093	5,948	5,915	7,122	7,977	(3.6)
Products not elsewhere specified	296	2,373	2,658	3,402	4,083	5,271	(2.4)
Total	86,756	103,924	136,106	166,475	190,643	221,440	(100)

*Provisional Source: Annual reports of Central Bank of Sri Lanka and others

It should be noted that industrial production is expected to slow down in 1996 to a growth rate slightly below that of the previous year, partly due to frequent power outages caused by the shortage of rainfall during the Monsoon season, and partly due to the special levy for the maintenance of public security which has discouraged production activity.

1.2 Industrial Development Policy

1.2.1 Basic policy

Sri Lankan national policy is essentially set forth in the President's parliamentary speech on administrative policies which is made at the end or the beginning of each year. Policies currently implemented are founded upon the speech by Her Excellency President Kumaratunga, on January 6, 1996. In the speech, the President announced basic policies to be promoted by government, for the national economy and individual sectors including industry, trade, agriculture, fishery, and infrastructure.

Major points of general economic policy and industrial policy are summarized below.

(1) Economic policy

1) To reduce the fiscal deficit by cutting government expenditures to 3~4% of GDP by 2000,
2) To reduce the inflation rate to 5% annually (government's mid-term target),
3) To utilize private initiatives for infrastructure development, such as power plant construction, under the BOT/BOO arrangements,
4) To further promote privatization efforts, and
5) To target the annual growth rate of 8%.

These economic policies are based upon the underlying philosophy "to eradicate poverty and promote privatization" which is consistent with the past policies. More precisely, the above policy elements are closely linked to each other for the purpose of achieving the two objectives, as shown below:

Eradication of poverty → Decline in unemployment rate → Economic growth
→ Development of industrial sector → Export promotion
→ Improvement of international balance of payments

Promotion of privatization → Reduction of government expenditures
→ Building of healthy government finance
→ Utilization of private initiatives
→ Adoption of market economy principles

(2) Industrial policy

1) To devise economic policy based upon the experience of Asian countries which have achieved high economic growth,
2) To aim at environmentally friendly, sustainable economic development by good macroeconomic management,
3) To provide an open and transparent legal framework and a market-friendly investment climate to the private sector,
4) To further pursue the improvement of efficiency in the industrial sector by continuous implementation of trade liberalization policy,
5) To assist the establishment of efficient small and medium scale industries for broad-based industrialization and employment growth,
6) To educate and train an abundant labor force with technologies and skills required for industrialization and diversification, as part of government projects, for further expansion of employment opportunities,
7) To restructure the related government authorities and organizations to help disseminate standards for pricing, quality, delivery, other aspects of products required in international markets, and raise current standards to desirable levels,
8) To support and encourage non-polluting industries of varying sizes in rural regions from regional development perspective, and
9) To place priority on promotion of the agro-based industry as well as production and processing of agricultural products.

Since industrial policy is one means of embodying economic policy objectives, it primarily consists of programmes and measures designed to promote sustainable economic development. In particular, a major emphasis is placed on the manufacture of products acceptable in international markets and the encouragement and promotion of small and medium scale industries.

1.2.2 Government authorities and organizations involved in industrial policy making and implementation

(1) Responsible ministry and its organizational structure

As a result of ministerial reorganization in November 1994, principal responsibility for industrial promotion and development in Sri Lanka was transferred from the Ministry of Industries, Science and Technology to the Ministry of Industrial Development (hereinafter referred to as "MID"). The main duties mandated to MID, based on excerpts from the

National Budget for 1996, are as follows:

1) Formulation of programmes and projects based on national policy in respect of industrial development and direction of implementation of such programmes and project,
2) Development and control of industries,
3) Establishment of standards,
4) Industrial investigations, analysis and publicity,
5) Industrial development (including control and co-ordination of private industry and industrial aspects of co-operatives),
6) Regulation of industries,
7) Pricing of industrial products,
8) Supervision of all private industries and control and co-ordination of private sector industries,
9) Administration of the Industrial Development Act, No.36 of 1969
10) Promotion, financing and sponsoring enterprises,
11) Development, control and regulation of all textile industries,
12) Promotion and regulation of the export of all textile products,
13) Training of personnel for the development of textile and clothing industries.

To perform the above functions, the Ministry of Industrial Development (MID) nominated four Additional Secretaries, who are in charge of Textile, Industrial Products, Industrial Services, and Policy Review & Coordination respectively.

An additional secretary in charge of Industrial Services is to function for industrial development. Under this additional secretary there are two divisions of Small and Medium scale Industry and Regional Industrial Service, and two subordinate organizations (mentioned below) of IDB and Regional Industry Service Committees.

The organization chart of MID is as shown in Figure 1-1.

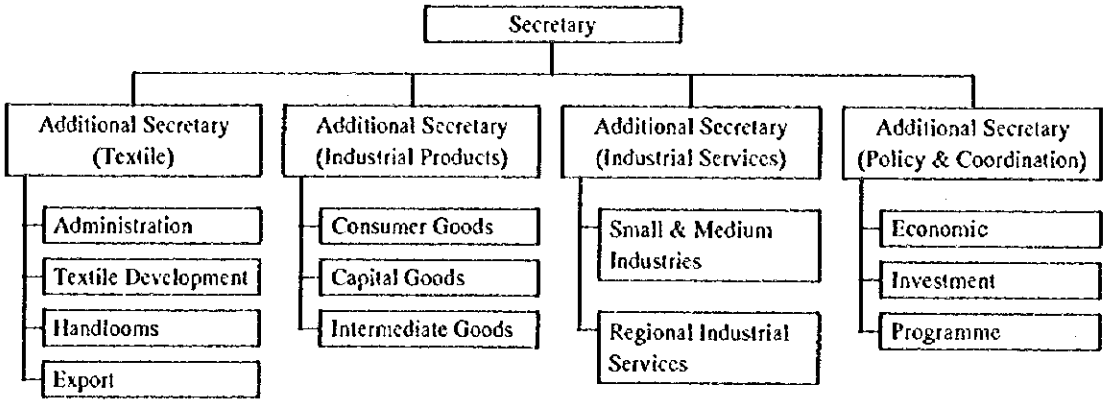


Figure 1-1 ORGANIZATION CHART OF MID

MID, at the stage of formulating industrial promotion policy, considers advice from the Industrialization Commission and the Advisory Council for Industry (both mentioned below), in addition to seeking alignment with national policy. In the implementation stage, it mainly uses IDB as a spearhead organization.

(2) Related committees and their duties

The following committees are established under the Industrial Promotion Act No.46 of 1990.

1) Industrialization Commission

The commission consists of secretaries of the related ministries, including MID, to finance, planning, trade and commerce, and agriculture, Governor of the Central Bank and Director Generals of the Export Promotion Board and the Board of Investment, as well as five to seven representatives appointed by the President from each industrial circle. The Secretary of the finance ministry takes the chair.

Under the basic policy objectives, 1) to encourage the development and growth of industries that are efficient and internationally competitive, 2) to facilitate adjustment to structural changes in the economy, and 3) to reduce to a minimum, in so far as national policy persists, the regulation of the industry, the commission's major responsibilities are summarized as follows:

(a) To advise the government on policy measures, plans, and programmes for the encouragement and promotion of industry,

(b) To ensure the provisions of institutional mechanism for industrialization,

(c) To prepare plans for the provision of industrial infrastructure and service, and

(d) To provide a comprehensive products and markets information for industries.

The commission meets once every month, discusses the current topics, and reports to the government authorities as required.

2) Advisory Council for Industry

The council is a subordinate organization of the Industrialization Commission. It is composed of commission members, and representatives of industrial associations such as the chamber of commerce and industry, private enterprises, and universities. Its responsibilities are: a) to provide a forum for the representatives of industries in Sri Lanka to discuss issues relating to government policy for industrial development, and b) to advise to the competent minister (MID) on the effectiveness of government measures taken for industrial promotion.

3) Regional Industry Service Committees

To promote rural industries, the Minister of Industrial Development selects a region or regions for industrial development in consultation with the Chief Minister of each Province and established the Regional Industry Service Committee. The committee is responsible for the following:

(a) To advise the competent ministers concerning industrial promotion in the selected region,

(b) To formulate industrial promotion plans and programmes for the selected region,

(c) To promote industries in the selected region in accordance with national policy,

(d) To ensure the provision of services and facilities required to promote industries according to the applicable regional development plan,

(e) To support investors in the selected region, and

(f) To establish a Regional Industrial Service Center in the selected region.

(3) Industrial Development Board of Ceylon (IDB)

1) Brief history

IDB was established in 1966 as a governmental organization for the purpose of setting up the industrial estates under the State Industrial Corporation Act No. 49 of 1957. However, IDB in its present form was incorporated by the Industrial Development Act No. 36 of 1969.

With introduction of the market-economy system in 1977, several changes were made in IDB. New activities such as project appraisal, the designing of production layout, advising on machinery and equipment and raw materials, and providing technical assistance were

introduced as new activities. The rubber Products Development and Services Center, Sub-contracting Exchange, Electroplating Center and so on were established at this time.

IDB has functioned under the Ministry of Industries & Scientific Affairs (MISA) as an implementing agency for industrial development since its inception and was transferred to the Ministry of Tourism and Rural Development in 1986 and was mainly in charge of rural development. In 1994 it, however, was transferred to MID.

2) Objectives and mission

Article 15 of the Industrial Development Act provides the objectives of IDB as follows and IDB is expected to assist in the encouragement, fostering, development, and promotion of all kinds of industries in Sri Lanka from all angles.

(a) To assist in the encouragement, promotion and development of industry in Sri Lanka,
(b) To assist in the proper co-ordination and in the inter-related growth of all industrial undertakings in the private and public sectors of the economy of the country,
(c) To foster industrial research with the object of utilising the natural resources of Sri Lanka, improving technical processes and methods used in industries and developing appropriate technologies and equipment for local industries, and discovering processes and methods for the better utilization of waste products,
(d) To foster export of local industrial products to overseas markets,
(e) To assist in such measures in the field of international trade and regional co-operation as are necessary or conducive to industrial development,
(f) To provide for services and facilities of every description required by or in connection with any industrial undertaking or industrial establishment in Sri Lanka, including provision of capital, credit, marketing, managerial and technical facilities and legal advice,
(g) To advise on matters relating to promotion and development of industries in Sri Lanka, and
(h) To take all such measures as may be necessary for or conducive to the attainment of the objects specified in this section.

However, in 1992 the policy of IDB was changed and its mission was made to actively promote and assist the development of the small and medium industry sector as an important and efficient element in production and employment generation and, through this, to increase the contribution to the industrial sector and above all to the Sri Lankan economy. This

mission remains unchanged at present. This is clearly mentioned in the New Industrialization Strategy (15.0 Small and Medium Industries).

The present objectives of IDB can be summarized in the following three points:

(a) Promoting the establishment of new industries and the development of existing industries in the small and medium sector, throughout the country.

(b) Creating a policy environment conducive to the development of small and medium scale industries.

(c) Achieving progressive self reliance in the IDB's finance.

IDB, to achieve the above-mentioned corporate objectives, is performing its duties with the following strategies:

(a) Promoting entrepreneurship among selected potential investors.

(b) Providing a comprehensive range of services required by potential and existing small and medium industrialists.

(c) Developing export capabilities of small and medium industries (SMIs).

(d) Establishment of industrial estates and provision of infrastructure facilities.

(e) Creating an awareness among policy makers on importance of the role of SMI's in national development.

(f) Ensuring proper IDB representation in policy making bodies.

(g) Develop IDB's in-house capabilities and earning capacity.

(h) Establishing links with domestic and international development institutions in order to secure funds for development activities.

In order to carry out the above mentioned objectives and activities the Board of Directors has been appointed and General Manager and other staff are designated under the board. The Board comprises of nine members, that is to say, a chairman, four representatives from the private sector and four representatives from the public sector --- a representative from the banking industry, a representative from each of the Ministry of Finance and Planning, the Ministry of Trade and Commerce and the General Treasury.

The total number of the staff including General Manager is 634 as of the end of September, 1996.

3) Organizational structure and functional divisions

(a) Organizational Chart (Figure 1-2)

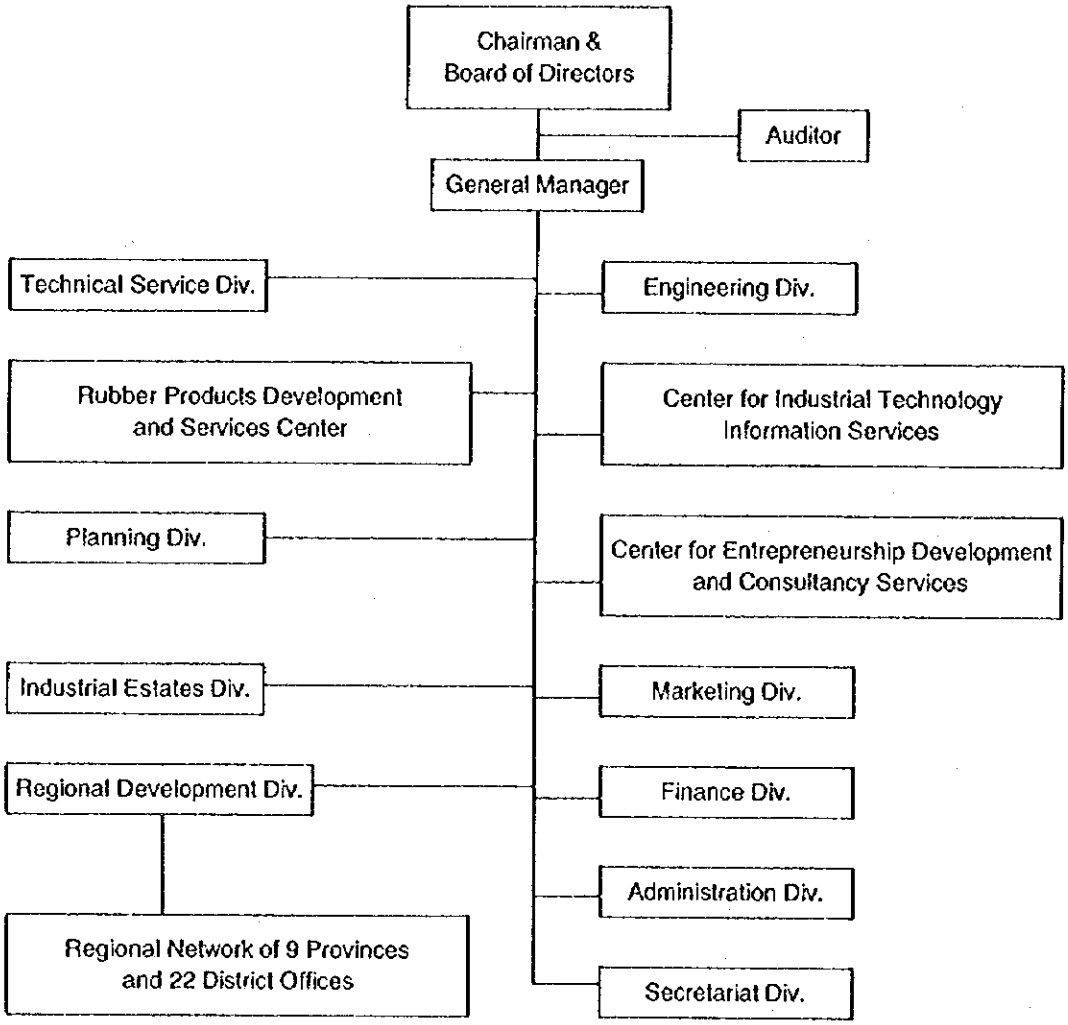


Figure 1-2 ORGANIZATIONAL CHART OF IDB

(b) Functions of each Division

a) Technical Services Division (TSD)

Acquisition of feasible technologies from local and foreign sources and the transfer of the technologies to the SMIs are the main function of TSD. In addition, this division also provides assistance for the improvement of productivity, efficiency and profitability of industries and quality of products manufactured by providing the required extension services and training.

b) Engineering Division (ED)

ED provides specific technical services to SMIs in the fields of engineering. A detail explanation on ED is given below separately.

c) Rubber Products Development and Services Center (RED & SC.)

Identification of industrial opportunities in rubber and plastic sectors, and assisting in setting up of new industries and the development of existing industries are the activities of this division.

d) Center for Industrial Technology Information Services (CITIS)

CITIS comprises of three major units such as Library, Computer Unit and Printing Press. The Center acquires, processes and disseminates information to the SMI sector and other industrial development organizations as well. Technical know-how, machinery, equipment, raw materials and markets are the key areas covered and provided as the IDB publications.

e) Planning Division

This division provides model project reports to potential industrialists, prepares industrial profiles on a district basis, and arranges for the initiation of suitable projects in industrial development for funding by local or international organizations. It helps the planning and implementation efforts of IDB.

f) Center for Entrepreneurship Development and Consultancy Services (CEDACS)

The division conducts entrepreneurship development programmes for potencial entrepreneurs and existing industrialists and provides management consultancy services to the SMI sector.

g) Marketing Division (MD)

MD promotes and facilitates the marketing function in the SMI sector, and assists in the development of sub-contracting systems between large and small industrial units and provides training/advisory services to develop the marketing skills of the staff in the SMIs.

h) Industrial Estate Division (IED)

IED ensures the proper maintenance of existing Industrial Estates and provides infrastructure facilities to industrial units in the Industrial Estates and promotes the establishment of new Industrial Estates.

i) Regional Development Division (RDD)

Through a network of 31 Provincial and District Offices, the RDD supports the establishment of new industries and development of existing industries in the districts and the provinces.

(c) Functions of the Engineering Division

The Engineering Division comprises of several units such as the Foundry, Workshop, Electroplating Center, Civil and Electrical Engineering Units and the Appropriate

Technology Research and Development Center. These units provide technical services to the SMI Sector. The division also conducts adaptive research intended to modify machinery and equipment to suit the technological and economic situation of the SMI Sector.

The organization chart for the Engineering Division is shown in Figure 1-3. and the total number of staff in the Engineering Division is 163 as of the end of August, 1996.

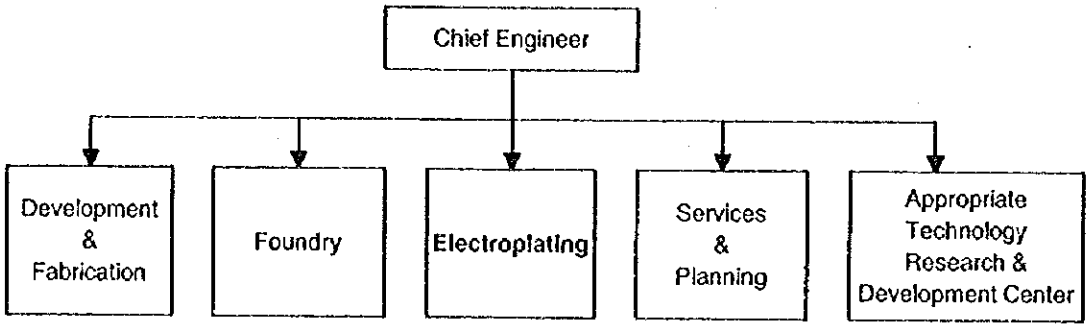


Figure 1-3 ORGANIZATION CHART OF ENGINEERING DIVISION

4) Financial situation

IDB's major fund resources are government contributions, foreign grants, and its own earnings. IDB is authorized to utilize these available funds for its own expenditures. The share of its own earnings in 1995 is about 25% of the total available funds. During the year 1995 IDB received Government Grants amounting to 84 million Rupees and the total amount of the government grants to IDB as of January 1, 1996, reached 611,246 thousand Rupees. On the other hand, IDB earned 28,002,000 rupees (25% of the total available funds) through its business activities but IDB still suffers from the big deficit of 65,675,000 rupees and the accumulated deficit reached 585,529,000 rupees as of December 31, 1995.

The balance sheet as of Dec. 31, 1995 is shown in Table 1-4 and the summary statement of income and expenditure during the year 1995 is in Table 1-5.

Table 1-4 BALANCE SHEET AS AT 31ST DECEMBER 1995

1994 (Rs.)			1995 (Rs. cts.)
	RESOURCES AVAILABLE		
527,245,975	Net Government Contribution		611,245,975.00
13,417,608	Value of Assets Transferred		13,417,608.00
81,901,924	Foreign Grants		82,009,478.96
6,243,013	Capital Reserve		6,243,012.72
5,512,250	Grants from Provincial Councils		5,512,250.00
634,320,770			718,428,324.68
518,872,460	Less : Accumulated Deficit		585,529,126.15
115,448,310	Equity Resources		132,899,198.53
	Current Liabilities		
3,795	Dues to Government	3,631.00	
692,215	Dues to Corporations	750,394.02	
	Trade & Other Creditors,		
24,977,422	Provision & Accrued Expenses	38,347,941.37	
25,673,432			39,101,966.39
141,121,742	Total Resources Available		172,001,164.92
	RESOURCES UTILIZED		
156,492,475	Fixed Assets: At Cost	160,435,056.36	
98,871,227	Less: Accumulated Depreciation	106,340,327.45	54,094,728.91
57,621,248	Written Down Value		54,094,728.91
227,813	Capital Work-in-Progress		342,773.16
227,813			
8,898,650	Longterm Investments		8,898,650.00
4,850,914	Mini Industrial Estates		2,008,121.81
	Current Assets		
11,631,615	Stocks & Work-in-Progress	13,072,975.07	
6,280,049	Debtors	8,118,035.41	
9,626,993	Deposits & Prepayments	19,145,108.35	
37,407,292	Other Current Assets	61,507,984.74	
4,577,168	Cash & Bank Balance	4,812,787.47	
83,272,681			106,656,891.04
141,121,742			172,001,164.92

Source: IDB's Accounts for the Year ended 31-12-1995

Table 1-5 SUMMARY STATEMENT OF INCOME & EXPENDITURE FOR THE YEAR ENDED 31ST DECEMBER 1995

1994 EXCESS (Deficit) Rs.		INCOME Rs. cts	EXPENDITURE Rs. cts	EXCESS (Deficit) Rs. cts
(15,733,825)	Administration Division	491,765.44	14,933,778.21	(14,442,012.77)
(1,077,121)	Printing Division	1,463,356.70	2,458,027.85	(994,671.15)
(39,425)	Finance Division	1,913,511.91	3,520,089.21	(1,606,577.30)
(1,618,268)	Planning Division	33,682.50	1,397,656.08	(1,363,973.58)
(1,671,172)	Technical Services Division	414,493.99	2,176,838.34	(1,762,344.35)
(9,451,623)	Engineering Division	1,906,017.66	9,554,772.59	(7,648,754.93)
	Engineering Division-Work Shop	1,937,271.90	3,467,653.67	(1,530,381.77)
	Engineering Division-Foundry Sec	103,474.16	763,399.73	(659,925.57)
(896,621)	Marketing Division	560,828.60	1,523,041.37	(962,212.77)
(185,467)	Laknipayum-Colombo	425,923.80	525,571.37	(99,647.57)
(107,066)	Laknipayum-Polonnaruwa	19,014.10	63,041.68	(44,027.58)
(5,116,711)	Industrial Information Division	395,061.76	4,696,847.69	(4,301,785.93)
(97,153)	Karmantha & Vidya	11,594.00	362,952.20	(351,358.20)
	Industrial Estate Division	250.00	1,032,236.47	(1,031,986.47)
466,983	Industrial Estate-Ekala	4,330,344.39	3,149,919.05	1,180,425.34
(282,944)	Industrial Estate-Pallekelle	2,423,330.19	2,722,269.92	(298,939.73)
(142,023)	Industrial Estate-Atchuvely		142,022.57	(142,022.57)
(318,058)	Industrial Estate-Horana	368,781.17	602,984.50	(234,203.33)
	Industrial Estate-Karanndeniya	43,400.65	1,103.86	42,296.79
(223,089)	Industrial Estate-Pannala	163,451.98	392,365.87	(228,913.89)
(16,875,293)	Regional Development Division	548,613.36	17,348,915.33	(16,800,301.97)
(4,143,907)	Rubber Division	8,049,530.90	11,282,629.19	(3,233,098.29)
(3,482,861)	Management Devel. Division (Cedecs)	56,314.28	3,098,499.58	(3,042,185.30)
(972,930)	Common Services Centre-Matara	753,603.02	1,616,108.43	(862,505.41)
(371,456)	Common Services Centre-A'Pura	106,836.60	475,922.75	(369,086.15)
(1,496,659)	Electroplating Centre	492,646.94	1,486,107.47	(993,460.53)
(5,378,301)	A.T.R.D.C.	988,776.34	4,882,609.41	(3,893,833.07)
(69,214,987)		28,001,876.34	93,677,364.39	(65,675,488.05)

Source: IDB's Accounts for the Year 31-12-1995

5) Current topics of IDB

(a) IDB was directed by the government to establish a "Self-Financing" system by 2000 A.D. This Self-Finance is reported to mean that the IDB's operational divisions finance their expenses (including capital expenditures) by themselves through their operational activities (without government subsidy).

Recognizing that this could not be attained without intensification of the operative divisions, IDB is now discussing its own organizational reform, placing great emphasis on re-organization of the operative divisions, and will reach a conclusion by the end of this year.

The latest ideas (as of the date of Dec. 13) for reorganization of IDB and the Engineering Department, where the Electroplating Center belongs to, are shown in Figure 1-4 (1) and Figure 1-4 (2) respectively.

(b) Since 1996 is declared to be a "year of productivity" by the government, IDB is working on productivity improvement. This activity comprises of 5S (Seiri, Seiton, Seisou, Seiketu, Situke), QC (Quality Control), and TQC (Total Quality Control), which imitates activities in Japan and Singapore. IDB is just in the initial stage of 5S activity (The IDB Productivity Committee was set up with members from among directors of the related division and facilitators) and intends to give awards to good performers through a kind of competitive contest.

(c) The Foundry section in the engineering division will be renovated in its factory under the JICA assistance. Four Japanese experts were sent over and are now engaging in assembly and installation of machinery and equipment needed for this renovation programme. After completion of the renovation the foundry is expected to play an important role under the self-financing system.

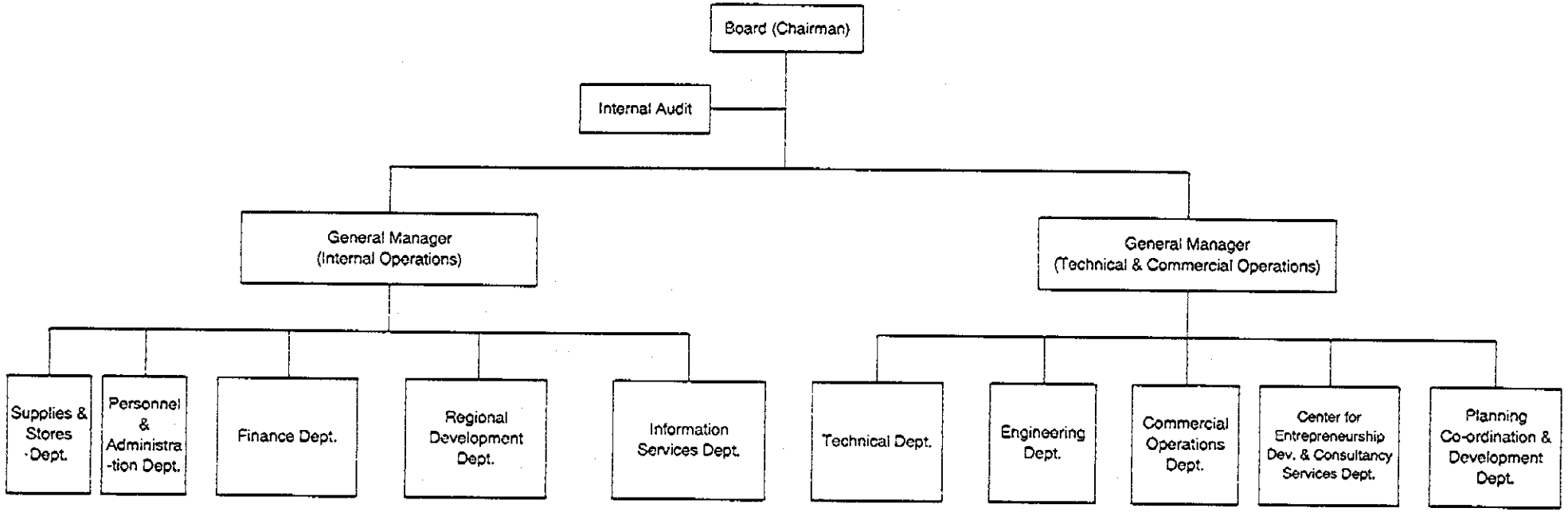


Figure 1-4 (1) THE LATEST IDEA OF RE-ORGANIZATION IN IDB

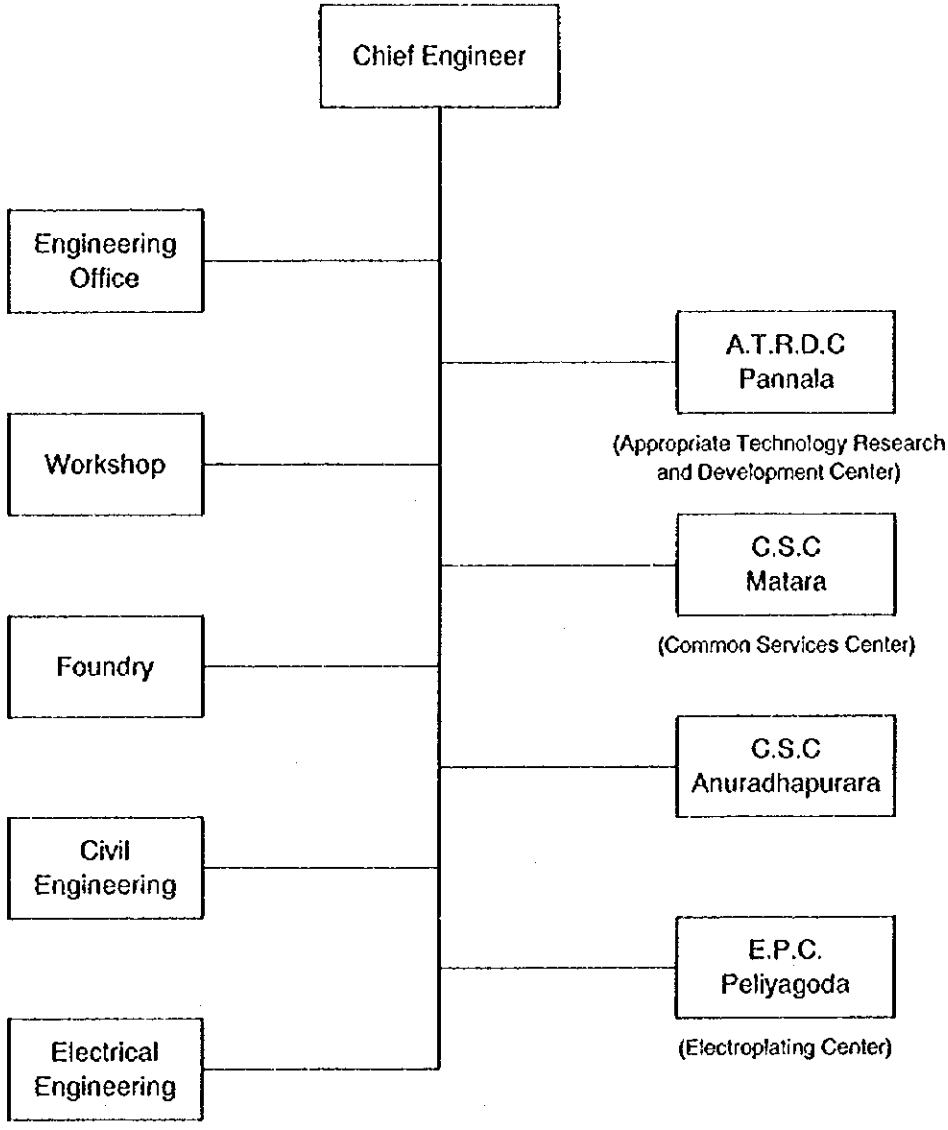


Figure 1-4 (2) THE LATEST IDEA ON ORGANIZATION OF ENGINEERING DEPARTMENT

1.2.3 Industrial development policies currently implemented

Industrial development policies currently implemented are those announced by MID in November 1995 as "New Industrialization Strategy," and their major implementation strategies are summarized as follows:

1) Creation of a macroeconomic environment conducive to rapid economic growth,

2) Creation of a business environment which enables the private sector to compete effectively in world markets,
3) Removal of administrative barriers and to provide incentives,
4) Encouraging private sector participation in infrastructure development under BOT/BOO arrangements,
5) Development of the capital market,
6) Promotion of foreign direct investment,
7) Promotion of linkages between large corporations and small- and medium-sized enterprises,
8) Development and promotion of small and medium scale industries,
9) Promotion of exports,
10) Promotion of privatization,
11) Promotion of regional industrialization,
12) Encouragement of productivity improvement,
13) Encouragement of R&D and technical innovation,
14) Encouragement of augmented mineral investment, and
15) Encouragement of backward integration in apparel industry.

Note that these strategies are basically updates of "Sri Lanka Industrialization Strategy" announced in December 1989 and implemented by the Ministry of Industries, Science and Technology (MIST), which was then responsible for industrial development. In addition to those proposed in the original strategy, the new strategy incorporates the following five actions: 1) the use of the BOT/BOO schemes which are widely adopted throughout the world as the effective means to converge infrastructure development with private initiatives; 2) development and promotion of small and medium scale industries aiming to increase employment opportunities and foster supporting industries; 3) the advocating of productivity improvement essential in efficient business operations; 4) promotion of R&D for technological advancement and innovation; and 5) the advocating of backward integration of the apparel industry aiming at further growth.

Under a market oriented economic system, the Sri Lankan government is now aiming at economic development by leveraging private initiatives which are to be spurred by privatization, deregulation, and free trade. It pursues economic development policy to allow business enterprises to act and grow freely and to provide support and assistance for such action and growth whenever required, rather than heavily and unduly protecting selected industries and enterprises. In fact, the strategic actions listed above are mostly based on

desirable directions and policies conducive to the environment to liberate private initiatives. In the meantime, the National State Assembly adopted a declaration to make 1996 "the year of productivity," and under MID's leadership, productivity improvement activities are carried out throughout all sectors including government authorities, private enterprises, and schools.

Finally, the country recognized and voiced its recognition of the need to foster and promote small and medium scale industries (SMIs) relatively early. To support financing which is the most difficult task for SMIs, the government established the Small & Medium Industry Loan Scheme in 1979 under the assistance of the World Bank and Asian Development Bank. The scheme has been implemented four times in total and loans have been extended for 15,736 projects including rural industries. Under the most recent scheme, SMI IV, all the loans were approved by May 1996. The government is now prepared for SMI V and negotiations with financing organizations are under way.

The terms of the SMI IV loans, including interest rates, loan periods, and collateral requirements, are summarized as follows:

Amount of loan:	Up to 75% of total project cost (remaining 25% to be contributed by the borrowing enterprise) of which 30% by participating banks and 70% refinanced by National Development Bank (NDB)
Loan period:	10 years including a 2-year grace period
Interest rate:	For NDB's refinancing portions, the weighted average rate of commercial bank rates (approximately 12%). For loans by participating banks, 18 - 19% per annum.
Collateral:	Freely set by each participating bank. For feasible projects, mortgage on project assets; in other cases, personal guarantee by the owner of the borrowing enterprise.
Guarantee:	Participating Banks are, in addition to the above collateral, to be guaranteed by the Central Bank of Sri Lanka under the guarantee scheme. And NDB's refinance credits are to be secured by the Promissory Notes issued by the participating banks.

Loan Scheme:

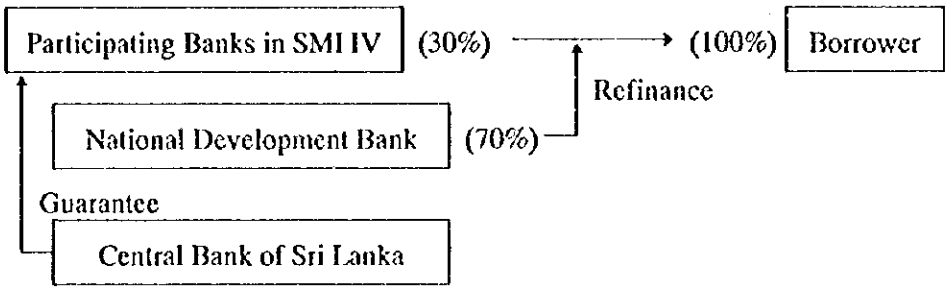


Table 1-6 SUMMARY OF SMALL & MEDIUM INDUSTRY LOAN SCHEMES (as of June 30, 1996)

	SMI I	SMI II	SMI III	SMI IV
Period implemented	1979-81	1982-88	1988-90	1991-96
Elegible enterprise (value of assets)(million Rp.)	2	4	8	16
No. of projects	1,741	2,491	2439	9,065
Total amount of loans (million Rp.)	229.5	1,058.6	1,114.0	5,322.9
No. of participating banks	5	5	8	10

Source: NDB

Chapter 2 Environmental Policy and Issues in Sri Lanka

Chapter 2 Environmental Policy and Issues in Sri Lanka

Sri Lanka is an island in the Indian Ocean, having 65,600 square km in area and is rich in various scenery and a great store of nature. Environmental issues involving industrial and social pollution, however, are becoming serious, partly due to industrialization having been concentrated in the post-independence period and partly due to population concentration in urban areas.

2.1 Government's Environmental Policy

2.1.1 Environmental law

The constitution of the Democratic Socialist Republic of Sri Lanka, enacted in 1978, stipulates in article 27 (14) that the state shall protect, preserve and improve the environment for the benefit of the community. The National Environment Act, enacted in 1980 based on this, is the sole fundamental law on the environment in Sri Lanka. Detailed regulations are given by Gazettes to supplement the National Environmental Act.

This act was drastically amended by Act No. 56 of 1988. The major points of amendment are the establishment of an environmental protection license system, the formulation of environmental norms and standards, the adoption of criminal punishment, and the formalization of environmental impact assessment (EIA). The introduction of the environmental protection license scheme is of the most importance among these amendments.

2.1.2 Environmental policy

Sir Emerson Tennent's epic 'Ceylon' written over a hundred years ago says:

"Ceylon, from whatever direction it is approached, unfolds a scene of loveliness and grandeur unsurpassed, if it be revealed, by any land in the universe. The Brahmans designated it by the epithet of "The resplendent", the Buddhist poets gracefully apostrophised it as 'a pearl upon the brow of India', the Chinese knew it as the 'Island of jewels', the Greek as 'the land of the hyacinth and the ruby'."

In fact, this excerpt forms the opening statement in "Sri Lanka National Conservation Strategy", published and presented to the Cabinet of Ministers in December 1988 as a result by a Task Force (headed by Mr. K.H.J. Wijaydasa, Chairman of the Central Environmental

Authority—hereinafter referred to as CEA—and having eight other members) organized by the former President Hon. R. Premadasa for the preparation of the national conservation strategy for Sri Lanka and this report approved by the Cabinet of Ministers is in the form of a general statement on the environment of Sri Lanka and its development.

This report mentions that it is a duty of Sri Lanka to conserve its beautiful nature and natural resources, and appeals for derivation and implementation of policy taking into consideration environmental protection, classified into the related sections of land use, water, forest and cultural resources, energy, agriculture, and industry.

The report mentions industry as follows and proposes many measures, i.e., introduction of Environmental Impact Assessment, adoption of cleaner and low-waste technologies, compulsory pollution control measures, granting incentives to industry for the installation of pollution control measures, the promotion of materials recycling, inclusion of environmental science in study course of industrial engineers and scientists, and so on.

"The industrial development of the country has to play an increasingly important role in providing employment for the large numbers of young people entering the labour force and for raising or even maintaining at present level the standard of living of its people. Industrial growth requires increasing quantities of both renewable and non-renewable natural resources as raw material. This would, however, result in the release of greater volumes of wastes into the environment. It is necessary to minimise the resultant environmental degradation and ensure sustainable industrial development."

In order to realize these strategies the Ministry of Environment and Parliamentary Affairs in October, 1991, worked out and published the National Environmental Action Plan (1992~1996) after consultations with the related ministries and governmental organizations. This action plan brought forward the problems in 12 areas namely (1) land resources, (2) water resources, (3) mineral resources, (4) coastal resources, (5) forestry, (6) bio-diversity and wildlife, (7) urban pollution, (8) industrial pollution, (9) energy, (10) environmental education, (11) culture, and (12) institutional capacity, and pointed out the recommended actions with implementation priority, cost, and implementing agency.

The industrial pollution problems and corresponding recommended actions in this Plan are as follows:

Problem 1 Tools for Environmentally-sensitive Industrial Siting

Background: Industrial siting in the urban areas of Sri Lanka is based upon the Urban Development Authority (UDA) zoning plan and for each land use category, detailed guidelines regarding proposed development actions are available.

While UDA planning controls and regulations are generally well-defined, their implementation has proved to be difficult. An important cause of that problem is the paucity of clear environmental criteria for industrial siting and industrial estate planning in these regulations. To overcome this problem, the National Building Research Organization (NBRO) prepared its Environmental Impact Assessment Manual in conjunction with UDA planners. The Manual classifies industries according to pollution levels, introduces a step-by-step procedure for evaluating different classes of industries, and provides guidelines for siting of these different classes.

Recommended Actions (Priority, and Name of Agency):

(1) To commission a study to assess the environmental suitability of sites identified under the Industrial Promotion Act (1990) and rank them in order to suitability.

(Immediate, MIST--Ministry of Industry, Science and Technology)

(2) To develop EIA guidelines and criteria for industrial development projects including estates. Such guidelines should supplement the industrial estate planning methodology prepared by NBRO.

(Immediate, CEA)

(3) To ensure that NBRO's Environmental Assessment Manual is used by project proponents and UDA in preparation and review of EIAs. Add to the NBRO Manual a description of credit institutions role in environmental assessment of small- and medium-scale industrial projects.

(Immediate, UDA)

Problem 2. Industrial Pollution Management

Background: The major tasks of the licensing scheme are the responsibility of CEA. Licensing procedures are well defined, and implementation began in July, 1990. However, there are constraints on implementation which include inadequate standards, monitoring systems, and testing facilities.

The present strategy of pollution control through regulation alone may prove burdensome and not cost-effective. Financing of pollution abatement needs to be planned. The majority of industries in Sri Lanka are small- to medium-scale

operations. Many are reluctant or unable to make any investment outlays for pollution control. An approach combining best practicable criteria and time targets with some form of financial assistance and/or incentive may be the most reasonable one for these industries.

Recommended Actions (Priority, and Name of Agency):

(1) To review and update existing discharge standards and pollution control guidelines.
(Immediate, CEA)

(2) To study and propose mechanisms---linked with CEA---for financing pollution abatement through subsidies, incentives, loans, and/or grants.
(Immediate, CEA)

Problem 3. Waste Abatement Expertise and Facilities

Background: The majority of industries in Sri Lanka discharge wastes without treatment. Among those that are equipped with waste treatment equipment, lack of technical expertise in waste abatement has led to adoption of ineffective treatment technologies. Regular monitoring of intake and effluent and record-keeping are lacking.

Recommended Actions (Priority, Name of Agency):

(1) To conduct an assessment of the requirements for pollution control technologies for the worst polluting industries in Sri Lanka. The rationale for the identification of the worst industries should be analyzed and explained. The study should also identify the amount of in-house and external expertise and facility needed.
(Immediate, CEA)

(2) To strengthen the research capabilities of Ceylon Institute of Scientific and Industrial Research (CISIR) on appropriate waste treatment technologies and process improvements and its capacity to transfer this know-how to the private sector, the Greater Colombo Economic Commission (GCEC---the Board of Investment, BOI, at present), CEA, and other agencies.
(Immediate, CISIR)

(3) To provide designs of pre-treatment facilities for at least 20 major polluting industries in the Colombo metropolis.
(Immediate, MEIP--Metropolitan Environment Improvement Programme)

(4) To study and implement the feasibility of constructing a pipeline from Biyagama to Kelani River.
(Immediate, BOI)

Problem 4. Water Quality Monitoring and Related Issues

Background: Present water quality monitoring practices are poor, and consist of scattered, irregular sampling and analysis, which neither cover all the principal water quality parameters that should be monitored in a given water body nor provide time-series data. Regular monitoring is essential to development of a cost-effective industrial pollution control strategy and effective enforcement of emission standards and best practice guidelines. To ensure that results from the monitoring are linked to standard-setting and enforcement efforts, design and implementation of a monitoring system should proceed in stages.

Recommended Actions (Priority, Name of Agency):

(1) To identify sampling points in key areas where industrial development is planned, and collect, analyze and publish quarterly water quality data.
(Immediate, CEA)

(2) To prepare and implement a workplan for development of a water quality management model for the Kelani River based on designated uses, including estimates of required staff resources, legal framework (regulations and incentives) and an analysis of the existing capacity of the institutions designated to carry out the monitoring.
(Beyond 1996, MLIMD--Ministry of Lands Irrigation and Mahaweli Development)

(3) To expand designation of beneficial uses and the water quality monitoring network to other priority water bodies in Sri Lanka.
(Beyond 1996, MLIMD)

CEA prepared its Corporate Plan (1992～1996) based upon the Action Plan. It mentions as follows:

(1) CEA, in pursuance of the regulatory role, will take steps:

1) To formulate and implement measures to control industrial production and industry related environmental degradation,
2) To secure compliance with legislative provisions on environmental protection, in respect of industry by the general public and organization, and
3) To promote the setting up of provincial district and Pradeshiya level institutions and agencies for the protection of the environment.

(2) The programme on environmental protection will be implemented through six sub-programmes as listed below:

1) Implementation of the National Environmental Action Plan in relation with Industry,
2) Implementation of Environmental Standards,
3) Monitoring and Rehabilitation of Water Bodies,
4) Hazardous Materials Management,
5) Coastal Pollution, and
6) Domestic and Solid Waste Disposal.

(3) Three Action Committees will be set up to monitor, co-ordinate, and direct the activities of environmental protection. These committees are:

1) Industry and Environment Co-ordination Committee,
2) Environmental Standards Committee, and
3) Technical Committee on Industrial Pollution and Licensing.

CEA is now on the way of translating them into action with assistance by the related organizations.

2.1.3 Environmental administration system

The National Environmental Act provides establishment of the Central Environmental Authority (CEA) as an implementing agency and the Environmental Council (EC) as an advisory body to CEA, and CEA and EC were established based on this provision.

CEA, which has been only an advisory organization on environmental issues till then, became the appraisal unit of Environmental Impact Assessment (EIA), the issuing agency of Environmental Protection License and the decision-making body of Environmental Norms and Standards as well through amendment of the National Environmental Act in 1988 and the present CEA is a central organization with a wide range of competence on environmental administration.

CEA is now under the control of the Ministry of Transportation, Environment and Women's Affairs.

2.1.4 Outline of Central Environmental Authority (CEA)

(1) Organization and Staff

CEA is a council body being consisted of three members appointed by the President in consultation with the related minister and there are officers and staff, at the top of which is a Director General, under the Chairman appointed by the President. The organization chart of CEA is shown in Figure 2-1.

Since CEA has been changed to become an implementing agency by the Amendment Act in 1988, it has suffered from shortage of staff. CEA now expects to double the number of staff by the end of 1997 under the approval by the National Assembly (The total number of staff at the end of 1995 was 125).

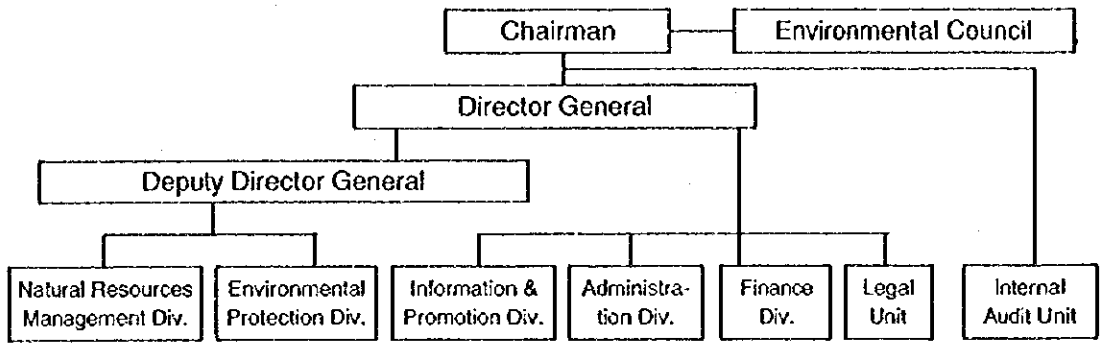


Figure 2-1 ORGANIZATION CHART OF CEA

The major functions of the divisions in CEA are as follows:

Natural Resources Management Division:

To evaluate EIA (Environmental Impact Assessment).

Environmental Protection Division:

To issue the Environmental Protection License and to monitor environment.

(This division has Laboratory to inspect, test and examine the polluting items.)

Information & Promotion Division:

To make people recognize importance of environmental protection.

(2) Functions and Duties

The powers, functions, and duties of CEA are provided in Article 10 of the National Environmental Act. The major functions and duties are as follows:

1) To administer the provisions of the National Environmental Act and the regulations made thereunder,
2) To undertake surveys and investigations as to the causes, nature, extent and prevention of pollution and to assist and co-operate with other persons or bodies carrying out similar surveys or investigations,
3) To specify standards, norms and criteria for the protection of beneficial uses and for maintaining the quality of the environment,
4) To regulate, maintain and control the volume, types, constituents and effects of waste, discharge, emissions, deposits or other sources and subsources of pollution which are of danger or potential danger to the quality of environment of any segment of the environment,
5) To require the submissions of proposals, for new projects and changes in or abandonment of existing projects, for the purpose of evaluation of the beneficial and adverse impacts of such proposals on the environment, and
6) To be responsible for the co-ordination of all regulatory activities relating to the discharge of wastes and pollutants into the environment and the protection and the improvement of the quality of the environment.

CEA transfers its functions and duties to the local governments and the Board of Investment (BOI) and strives to help the regional enterprises and BOI industries thoroughly understand the law and regulations on environmental protection. This transfer to the local governments is limited to the Low Polluting Industries listed in Table 2-1. All industries not in the Low Polluting Industry Category are defined to be the High Polluting Industry and the Electroplating Industry, the objective of this report, is therefore classified to the High Polluting Industry.

Table 2-1 LISTS OF LOW POLLUTING INDUSTRIES

1.	Timber Mills	Production capacity less than 150 cubic meters per day
2.	Rice Mills	Production capacity less than 10,000 kg per day
3.	Metal Crushers	Metal crushing manually or by machine less than 50 Mt./day
4.	Bakeries	All
5.	Grinding Mills	All
6.	Garment Factories	All
7.	Powerloom Textile Mills	Having less tha 5 power looms
8.	Animal Farms (Poultry Farms)	Less than 5,000 birds
	(Pigs and Cattle)	Less than 500 head
9.	Lime Kilns	All
10.	Brick & Tile Factories	All
11.	Welding Workshops	
12.	Garages	All
13.	All Tea Factories	All
14.	Printing Presses (those not producing letter press)	
15.	Lathe Workshops	

2.1.5 Member and function of the Environmental Council (EC)

The Environmental Council (EC) is composed of thirty members representing the related ministries, the person holding office for the time being as the Director General of CEA, the person(s) representing the interests of voluntary agencies in the field of environmental affairs, and the person(s) having adequate expertise or experience in environmental protection and management. The functions of EC are generally to advise CEA on matters pertaining to its responsibilities, powers, duties, and functions and to advise CEA on any matters referred to EC by CEA.

2.1.6 Environmental protection license and environmental norms and standards

The Gazette dated January 8, 1990, stipulates that no person shall, on or after July 1, 1990, discharge, deposit or emit waster into the environment which will cause pollution, or cause noise pollution, except (a) under the authority of a license issued by CEA and (b) in accordance with the norms and standards specified in Schedule I thereto and clarified the details on obtaining License and the environmental norms and standards.

(1) Matters relating to the environmental protection license

The stipulations on the Environmental Protection License in the Gazette are as follows;

1) Application for the License shall be made:

(a) Separately, in respect of each premises at which the acts authorized by the license are carried out,

(b) Substantially in Form A in Schedule II thereto,

(c) Accompanied by a receipt for the payment of the fee,

(d) At least 30 days prior to the relevant date or to the date on which the applicant is required to have the license, whichever is earlier, and

(e) Applicant should furnish all such particulars and any other information that may be called for by CEA.

2) Every license issued by CEA shall be valid for a period of one year, subject to any suspension or cancellation of the license under section 23D of the Act (National Environmental Act) and renewed.

3) CEA shall issue the license only if it is satisfied that:

(a) The license will not be used to contravene the provisions of the Act or these regulations,

(b) No irreversible damage or hazard to man and environment or any nuisance will result from the acts authorized by the license, and

(c) The applicant has taken adequate steps for the protection of the environment in accordance with the requirements of the Law.

4) An application for a renewal of a license shall be made:

(a) At least one month before the date of expiry of the license or one month before effecting any changes, alterations or extensions to the premises at which the acts authorized by the license are carried out, as the case may be,

(b) Accompanied by a receipt for the payment of the fee for the renewal of license, and

(c) Every applicant for a renewal of the license should furnish all such particulars and any other information that may be called for by CEA for the purpose of deciding on the application.

(2) Issuing Procedure of the Environmental Protection License (See Figure 2-2(1) & (2))

1) In case of the existing enterprises

a) Any existing enterprises are required to submit an application to CEA.

b) CEA investigates whether the public complains about the applicant or not. If yes, CEA investigates the applicant more in details, and conducts site inspection. In case of no, CEA conducts site inspection. After the site inspection, CEA prepares report on site inspection. In both cases the site inspection is done after the inspection fee (750 Rupees Per Application) collected from the applicant.

c) CEA judges whether the present site location is suitable or not. If not suitable, the Environmental Protection License (EPL) is not issued.

d) In case of being judged suitable, CEA classifies the applicants into low polluting industry or high polluting industry categories.

[for Low Polluting Industry]

e) CEA checks whether the applicant complies with standards or not. If yes, EPL is issued.

f) If not, CEA notifies the applicant of conditions for the mitigation of pollution given with a time frame.

g) Upon expiry of a given time, CEA evaluates of the progress and, if judged to comply with standards, EPL is issued to the applicant.

h) If judged not to comply with standards, CEA takes legal action against the applicant.

[for High Polluting Industry]

e) CEA checks whether the applicant complies with standards or not. If yes, EPL is issued.

f) If not, CEA prepares a proposal for pollution mitigation as a time bound programme and presents it to the applicant.

g) After expiry of a given time, CEA evaluates of the progress and, if judged to comply with standards, EPL is issued.

h) If judged not to comply with standards, CEA takes legal action against the applicant.

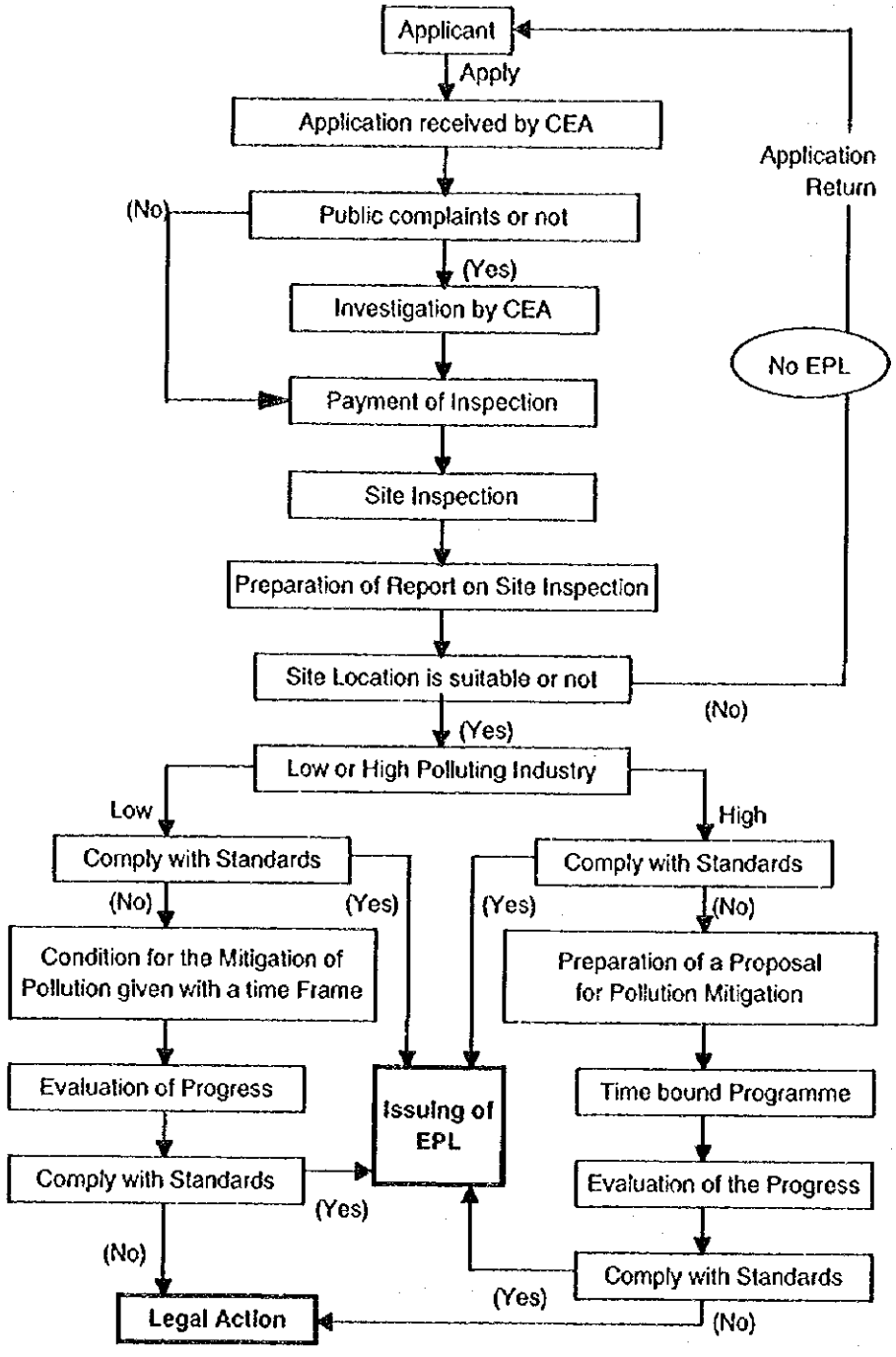


Figure 2-2 (1) FLOWCHART OF PROCEDURE ON ISSUANCE OF ENVIRONMENTAL PROTECTION LICENSE (In case of the existing enterprises)

2) In case of the newly established enterprises and/or projects

a) Any enterprise or Project Developer which intends to get EPL is required to first submit to CEA an answer to Questionnaire on Environmental Impact Identification in due form.

b) CEA screens it and decides whether an Environmental Impact Assessment (EIA) report is to be submitted or not.

(Note) Necessity of the EIA report submission depends on whether the proposed project is a high polluting industry or not, the scale of the project and so on.

c) When the EIA report is required to be submitted, the applicant should take steps for EIA procedures. When not required, CEA takes steps for site inspection after the inspection fee (750 Rupees per application) collected from the applicant.

(Note) EIA procedure is mentioned later.

d) CEA works out the site inspection report.

e) When the proposed site is judged appropriate, the applicant can start the construction work with conditions for mitigation of pollution given to.

When judged inappropriate, the applicant is asked for drawing up the alternatives and has to take the first step (the above a) procedure).

f) When the construction work started, the applicant submits the Application for Environmental Protection License (EPL) before one month prior to the commencement of the operation.

g) CEA conducts the field inspection.

h) When the conditions are found to be fulfilled at the field inspection, EPL is issued.

When found not fulfilled, CEA notifies the applicant to implement the conditions for mitigations. And if the conditions are found to be implemented and acceptable to CEA in the second field inspection, EPL is issued.

If the conditions found still not implemented, CEA warns the applicant to do it again. And if it was not done even with the second warnings, this application shall be brought to the court.

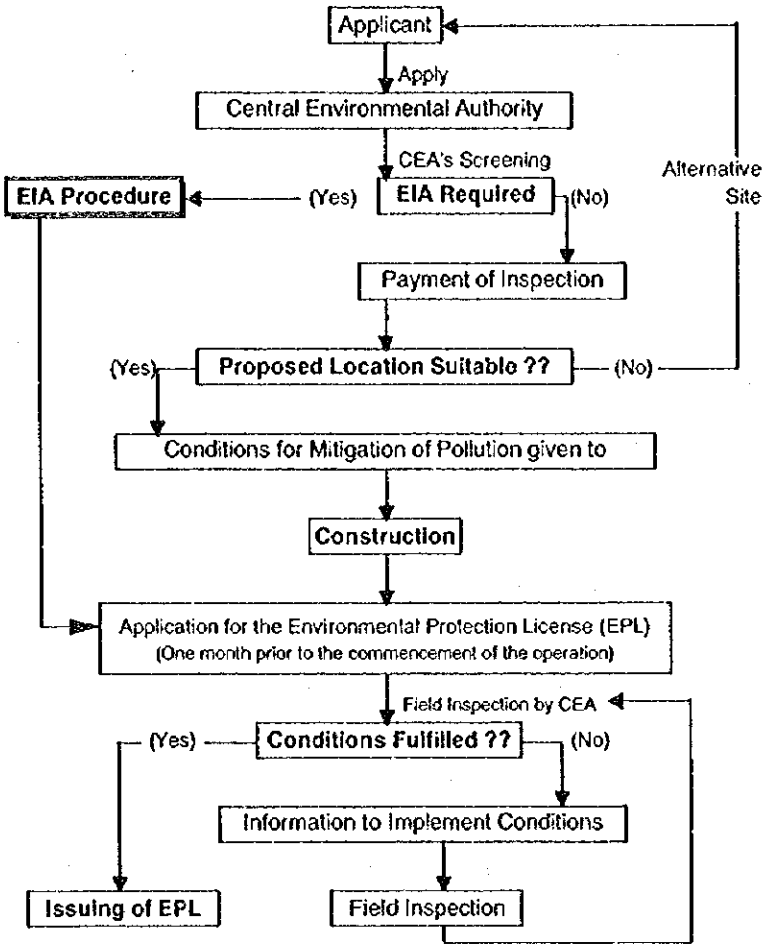


Figure 2-2 (2) FLOWCHART OF PROCEDURE ON ISSUANCE OF ENVIRONMENTAL PROTECTION LICENSE (In case of the newly established enterprises)

(3) EPL (Environmental Protection License) Issues

CEA is reported to have issued more than 3,000 EPLs in all and only 5 to electroplating units so far. Taking into consideration the fact that there are about 80 electroplating units in Sri Lanka as mentioned earlier, the number of EPL issues to the electroplating units is quite small in relative terms.

CEA's explanations on the small scale of the EPLs issued to the electroplating units are as follows;

1) CEA has not received applications for EPL from other electroplating units.
2) CEA cannot encourage them to apply for EPL, because it does not have good knowledge about the electroplating units due to their being very small in terms of business scale.

3) CEA is working hard with assistance of the related governmental organizations but it is impossible to perform its duties as expected due to having limited staff.

(4) The Environmental Norms and Standards

The environmental norms and standards, classified by items of waste water, air pollution, noise and so on, are promulgated by the Gazette and carried into effect. The beforementioned Gazette (Schedule I) dated January 8, 1990, lays down the environmental norms and standards on waste water in each case as follows; Out of these standards, 1) and 3) are reproduced in Table 2-2 and 2-3.

1) General standards for discharge of effluents into inland surface waters,
2) Tolerance limits for industrial effluents discharged on land for irrigation purpose,
3) Tolerance limits for industrial and domestic effluents discharged into marine coastal areas,
4) Tolerance limits for effluent from rubber factories discharged into inland surface waters,
5) Tolerance limits for effluents from textile industry discharged into inland surface waters, and
6) Tolerance limits for effluents from tanning industry.

On air pollution the National Environmental (Ambient Air Quality) Regulation, 1994 was promulgated by the Gazette dated October 5, 1994, and on noise the National Environmental (Noise Control) Regulations No.1 of 1996 was by the Gazette dated May 21, 1996.

In addition, Industrial Pollution Control Guidelines were prepared for the following eight industrial sectors, considered as major polluters in Sri Lanka;

1. Metal finishing industry,
2. Concentrated latex industry,
3. Desiccated coconut industry,
4. Leather industry,
5. Dairy industry,
6. Textile processing industry,
7. Pesticide formulating industry, and
8. Natural rubber industry.

In the guidelines some environmental standards are presented for each industry but they are reported not legally effective so far.

Table 2-2 GENERAL STANDARDS FOR DISCHARGE OF EFFLUENTS INTO INLAND SURFACE WATERS

No.	Determinant	Tolerance limit
1.	Total Suspended Solids, mg/l, max	50
2.	Particle size of total suspended solids	shall pass sieve of aperture size 850 micro m.
3.	pH value at ambient temperature	6.0 to 8.5
4.	Biochemical Oxygen Demand-BOD_5 in 5 days at 20°C, mg/l, max	30
5.	Temperature of discharge	shall not exceed 40°C in any Section of the Stream within 15 m down stream from the effluent outlet.
6.	Oils and greases, mg/l max	10.0
7.	Phenolic Compounds (as phenolic OH) mg/l, max	1.0
8.	Cyandes as (CN) mg/l, max	0.2
9.	Sulfides, mg/l, max	2.0
10.	Flourides, mg/l, max	2.0
11.	Total residual chlorine mg/l, max	1.0
12.	Arsenic, mg/l, max	0.2
13.	Cadmium total, mg/l, max	0.1
14.	Chromium total, mg/l, max	0.1
15.	Copper total, mg/l, max	3.0
16.	Lead, total, mg/l, max	0.1
17.	Mercury total, mg/l, max	0.0005
18.	Nickel total, mg/l, max	3.0
19.	Selenium total, mg/l, max	0.05
20.	Zinc total, mg/l, max	5.0
21.	Ammoniacal nitrogen, mg/l, max	50.0
22.	Pesticides	undetectable
23.	Radio active material	
	(a) Alpha emitters micro curie/ml	10^{-7}
	(b) Beta-emitters micro curie/ml	10^{-8}
24.	Chemical Oxygen Demand (COD), mg/l, max	250

Note 1: All efforts should be made to remove colour and unpleasant odour as far as practicable.

Note 2: These values are based on dilution of effluents by at least 8 volumes of clean receiving water. If the dilution is below 8 times, the permissible limits are multiplied by 1/8 of the actual dilution.

Note 3: The above mentioned General Standards shall cease to apply with regard to a particular industry when industry specific standards are notified for that industry.

Table 2-3 TOLERANCE LIMITS FOR INDUSTRIAL AND DOMESTIC EFFLUENTS DISCHARGED INTO MARINE COASTAL AREAS

No.	Determinant	Tolerance limit
1.	Total Suspended Solids, mg/l, max.	
	(a) For process waste waters	150
	(b) For cooling water effluents	Total suspended matter content of influent cooling water plus 10 per cent.
2.	*Particle size of–*	
	(a) Floatable Solids, max	3 mm
	(b) Settlable solids, max	850 micro m.
3.	pH range at ambient temperature	6.0 – 8.5
4.	Biochemical Oxygen Demand (BOD_5) in 5 days at 20℃, mg/l, max	100
5.	Tempeature, max	45℃ at the point of discharge
6.	Oils and grease, mg/l, max.	20
7.	Residual Chlorine, mg/l, max.	1.0
8.	Ammonical Nitrogen mg/l, max.	50.0
9.	Chemical Oxygen Demand (COD) mg/l, max.	250
10.	Phenolic compounds (as phenolic OH) mg/l, max.	5.0
11.	Cyanides (as CN) mg/l, max.	0.2
12.	Sulfides (as S), mg/l, max.	5.0
13.	Fluorides (as F), mg/l, max.	15
14.	Arsenic (as As) mg/l, max.	0.2
15.	Cadmium (as Cd) Total, mg/l, max.	2.0
16.	Chromium (as Cr) Total, mg/l, max.	1.0
17.	Copper (as Cu) total, mg/l, max.	3.0
18.	Lead (as Pb) total, mg/l, max.	1.0
19.	Mercury (as Hg) total, mg/l, max.	0.01
20.	Nickel (as Ni) total, mg/l, max.	5.0
21.	Selenium (sa Se) total, mg/l, max.	0.05
22.	Zinc (as Zn) total, mg/l, max.	5.0
23.	Radio active material	
	(a) Alpha emitters, micro curie/ml, max.	10^{-8}
	(b) Beta emitters, micro curie/ml, max.	10^{-7}
24.	Organo-Phosphorus compounds	1.0
25.	Chlorinated hydrocarbons (as Cl), mg/l, max.	0.02

Note 1: All efforts should be made to remove colour and unpleasant odour as far as practicable.

Note 2: These values are based on dilution of effluents by at least 8 volumes of clean receiving water. If the dilution is below 8 times, the permissible limits are multiplied by 1/8 of the actual dilution.

2.1.7 Environmental Impact Assessment (EIA)

The National Environmental Act provides that all prescribed projects that are being undertaken in Sri Lanka will be required to obtain approval under this Act for the implementation of such prescribed projects and the approval shall have to be obtained from the appropriate project approving agencies concerned (Article 23 AA) and that it shall be the duty of all project approving agencies to require an initial environmental examination report or an environmental impact assessment report (Article 23 BB).

The purposes of environmental impact assessment (EIA) are considered to ensure that development options under consideration are environmentally sound and sustainable and that environmental consequences are recognized and taken into account early in project design.

The Gazette dated June 18, 1993, announced the names of the project approving agencies, the list of projects and undertakings for which approval shall be necessary and the National Environmental (Procedure for approval of projects) Regulations as follows;

(1) The project approving agencies

(The project approving agencies announced by the above Gazette were amended by reasons of re-organization in the government offices by the Gazette dated February 23, 1995.)

1) The respective ministries to which the following subjects are assigned:
   (a) National Planning, (b) Irrigation, (c) Energy, (d) Agriculture, (e) Lands, (f) Forests, (g) Industries, (h) Housing, (i) Construction, (j) Transport, (k) Highways, (l) Fisheries, (m) Aquatic Resources, (n) Plantation Industries,
2) The Department of Coastal Conservation,
3) The Department of Wild Conservation,
4) The Urban Development Authority established by the Urban Development Law, No. 41 of 1978,
5) The Central Environmental Authority established by the National Environmental Act, No. 47 of 1980,
6) The Geological Survey and Mines Bureau established by the Mines and Minerals Act, No. 33 of 1992,
7) The Ceylon Tourist Board established by the Ceylon Tourist Board Act, No. 10 of 1966,
8) The Mahaweli Authority of Sri Lanka established by the Mahaweli Authority of Sri Lanka Act, No. 33 of 1979, and

9) The Board of Investment of Sri Lanka established by the Greater Colombo Economic Commission Law, No. 4 of 1978 as amended inter alia by Act, No. 49 of 1992,

(2) Prescription of the projects or undertakings

The Gazettre dated June 24, 1993 (as partly amended on February 23, 1995), prescribed the projects or undertakings for which approval by the project approving agencies are necessary as shown in Table 2-4.

According to this list projects or undertakings meeting with designated requirements and in almost all sectors except service industry are required to be approved by the project approving agencies before implementation. The electroplating industry is not prescribed in this list.

(3) EIA procedure

1) The implementing body of any proposed prescribed project shall submit as early as possible to the project approving agency preliminary information (PI) on the project.

2) The project approving agency shall in consultation with CEA subject such preliminary information to environmental scoping, in order to set the Terms of Reference for the Initial Environmental Examination Report (IEER) or the Environmental Impact Assessment Report (EIAR).

3) The project approving agency shall convey in writing to the project implementation body the Terms of Reference within fourteen days in the case of an IEER and thirty days in the case of an EIAR from the date of acknowledging receipt of the preliminary information.

4) In case of IEER

(a) The project implementation body shall submit the project approving agency the IEER with the required number of copies.

(b) Upon receipt of the IEER, the project approving agency shall submit a copy thereof to CEA and publishes it in the Gazette and the newspaper for public hearing for thirty days.

- Where, if on environmental scoping the project approving agency considers that the PI is adequate to be the IEER, the project approving agency shall proceed to the above (b).

(c) The project approving agency, upon completion of the period of public inspection, shall forward to the project implementation body the comments received from the public for review and response within six days.

(d) The project implementation body shall in writing respond to such comments to the project approving agency.

(e) Upon receipt of such responses the project approving agency shall within a period of six days either;

i) grant approval for the implementation of the proposed project subject to specified conditions, or

ii) refuse approval for the implementation of the proposed project with reasons for doing so.

5) In case of EIAR

(a) The project implementation body shall submit the project approving agency the EIAR with the required number of copies.

(b) Upon receipt of the EIAR the project approving agency shall, within fourteen days, determine whether the matters referred to by the Terms of Reference are addressed, and if the EIAR is determined to be inadequate the project approving agency shall require the project implementation body to make necessary amendments and re-submit the report.

(c) The project approving agency shall submit a copy thereof to CEA and publishes it in the Gazette and the newspaper for public hearing for thirty days.

(d) The following procedures are the same as in the case of the IEER.

6) The project approving agency shall publish in the Gazette and the newspaper the approval of any project.

The flowchart of the procedures on the above-mentioned Environmental Impact Assessment is shown as in Figure 2-3.

CEA prepared the Guideline for the implementation of the procedure on the Environmental Impact Assessment for referrence to the project approving agency.

Table 2-4 PROJECTS AND UNDERTAKINGS FOR WHICH APPROVAL SHALL BE NECESSARY TO IMPLEMENT (1/4)

PART 1

Projects and Undertakings if Located Wholly or Partly Outside the Coastal Zone as Defined by Coast Conservation Act, No.57 of 1981

(1) All river basin development and irrigation projects excluding minor irrigation works (as defined by Irrigation Ordinance chapter 453).

(2) Reclamation of Land, wetland area exceeding 4 hectares.

(3) Extraction of timber covering land area exceeding 5 hectares.

(4) Conversion of forests covering an area exceeding 1 hectare into non-forest uses.

(5) Clearing of land areas exceeding 50 hectares.

(6) *Mining and Mineral Extraction.*
- Inland deep mining and mineral extraction involving a depth exceeding 25 meters.
- Inland surface mining of cumulative areas exceeding 10 hectares.
- All off shore mining and mineral extractions.
- Mechanized mining and quarrying operations of aggregate, marble, limestone, silica, quartz, and decorative stone within 1 kilometer of any residential or commercial areas.

(7) *Transportation Systems*
- Construction of national and provincial highways involving a length exceeding 10 kilometers.
- Construction of railway lines.
- Construction of airports.
- Construction of airstrips.
- Expansion of airports or airstrips that increase capacity by 50 percent or more.

(8) *Port and Harbour Development*
- Construction of ports.
- Construction of harbours.
- Port expansion involving as annual increase of 50 percent or more in handling capacity per annum.

(9) *Power Generation and Transmission*
- Construction of hydroelectric power stations exceeding 50 Megawatts.
- Construction of thermal power plants having generation capacity exceeding 25 Megawatts at a single location or capacity addition exceeding 25 Megawatts to existing plants.
- Construction of nuclear power plants.
- All renewable energy based electricity generating stations exceeding 50 Megawatts.

(10) *Transmission Lines*
- Installation of overhead transmission lines of length exceeding 10 kilometers and voltage above 50 kilovolts.

(11) *Housing and Building*
- Construction of dwelling housing units exceeding 1,000 units.
- Construction of all commercial buildings as defined by Urban Development Authority established by the Urban Development Authority Law, No.41 of 1978 having built up area exceeding 10,000 square meters.
- Integrated multi-development activities consisting of housing, industry, commercial infrastructure covering a land area exceeding 10 hectares.

Table 2-4 PROJECTS AND UNDERTAKINGS FOR WHICH APPROVAL SHALL BE NECESSARY TO IMPLEMENT (2/4)

(12) *Resettlement*
- Involuntary resettlement exceeding 100 families other than resettlement effected under emergency situations.

(13) *Water Supply*
- All ground water extraction projects of capacity exceeding 1/2 million cubic meters per day.
- Construction of water treatment plants of capacity exceeding 1/2 million cubic meters.

(14) *Pipelines*
- Laying of gas and liquid (excluding water) transfer pipelines of length exceeding 1 kilometer.

(15) *Hotels*
- Construction of Hotels or holiday resorts or projects which provide recreational facilities exceeding 99 rooms or 40 Hectares, as the case may be.

(16) *Fisheries*
- Acquaculture development projects of extent exceeding 4 hectares.
- Construction of fisheries harbours.
- Fisheries harbour expansion projects involving an increase of 50 percent or more in fish handling capacity per annum.

(17) All tunneling projects.

(18) *Disposal of Waste*
- Construction of any solid waste disposal facility having a capacity exceeding 100 tons per day.
- Construction of waste treatment plants treating toxic or hazardous waste.

(19) Development of all Industrial Estates and Parks exceeding an area of 10 hectares.

(20) *Iron and Steel Industries*
- Manufacture of iron and steel products of production capacity exceeding 100 tons per day using iron ore as raw material.
- Manufacture of iron and steel products of production capacity exceeding 100 tons per day using scrap iron as raw material.

(21) *Non-Ferrous Basic Metal Industries*
- Smelting of aluminum or copper or lead of production capacity exceeding 25 tons per day.

(22) *Basic Industrial Chemicals*
- Formulation of toxic chemicals of production capacity exceeding 50 tons per day.
- Manufacture of toxic chemicals of production capacity exceeding 25 tons per day.

(23) *Pesticides and Fertilizer*
- Formulation of pesticides of combined production capacity exceeding 50 tons per day.
- Manufacture of pesticides of combined production capacity exceeding 25 tons per day.

(24) *Petroleum and Petrochemicals*
- Petroleum refineries producing gasoline, fuel oils, illuminating oils, lubricating oils and grease, aviation and marine fuel and liquefied petroleum gas from crude petroleum.
- Manufacture of petro-chemicals of combined production capacity exceeding 100 tons per day from raw materials obtained from production processes of oil refinery or natural gas separation.

(25) *Tyre and Tube Industries:*
- Manufacture of tyre and tubes of combined production capacity exceeding 100 tons per day from natural or synthetic rubber.

Table 2-4 PROJECTS AND UNDERTAKINGS FOR WHICH APPROVAL SHALL BE NECESSARY TO IMPLEMENT (3/4)

(26) *Sugar Factories*
- Manufacture of refined sugar of combined production capacity exceeding 50 tons per day.

(27) *Cement and Lime*
- Manufacture of Cement.
- Manufacture of lime employing kiln capacity exceeding 50 tons per day.

(28) *Paper and Pulp*
- Manufacture of paper or pulp of combined production capacity exceeding 50 tons per day.

(29) *Spinning, Weaving and Finishing of Textiles*
- Integrated cotton or synthetic textile mills employing spinning, weaving, dyeing and printing operations together, of combined production capacity exceeding 50 tons per day.

(30) *Tanneries and Leather Finishing*
- Chrome tanneries of combined production capacity exceeding 25 tons per day.
- Vegetable (bark) of combined production capacity exceeding 50 tons per day.

(31) Industries which involve the manufacture, storage or use of Radio Active Materials as defined in the Atomic Energy Authority Act, No.19 of 1969 or Explosives as defined in the Explosives Act, No.21 of 1956, excluding for national security reasons.

Provided however, where the projects and undertakings set out in items 20 to 30 are located within Industrial Estates and parks as described at (19) above, the approval shall not be necessary under the provisions of Part IVC of the Act.

PART II

(32) All projects and undertakings listed in Part I irrespective of their magnitudes and irrespective of whether they are located in the coastal zone or not, if located wholly or partly within the areas specified in Part III of the Schedule.

The following industries if located wholly or partly within the areas specified in Part III of the Schedule:

(33) Iron and Steel.

(34) Non-Ferrous Basic Metal.

(35) Basic Industrial Chemicals.

(36) Pesticides and Fertilizers.

(37) Synthetic Resins, Plastic materials and Man-made Fibres.

(38) Other Chemical Products.

(39) Petroleum and Petro-chemical Products.

(40) Tyres and Tubes.

(41) Manufacturing and Refining of Sugar.

Table 2-4 PROJECTS AND UNDERTAKINGS FOR WHICH APPROVAL SHALL BE NECESSARY TO IMPLEMENT (4/4)

(42) Alcoholic Spirits.

(43) Malt Liquors and Malt.

(44) Cement and Lime.

(45) Non-metallic Mineral Products.

(46) Paper, Pulp and Paperboard.

(47) Spinning, Weaving and Finishing of Textiles.

(48) Tanneries and Leather Finishing.

(49) Shipbuilding and Repairs.

(50) Railroad Equipment.

(51) Motor Vehicles.

(52) Air Craft.

PART III

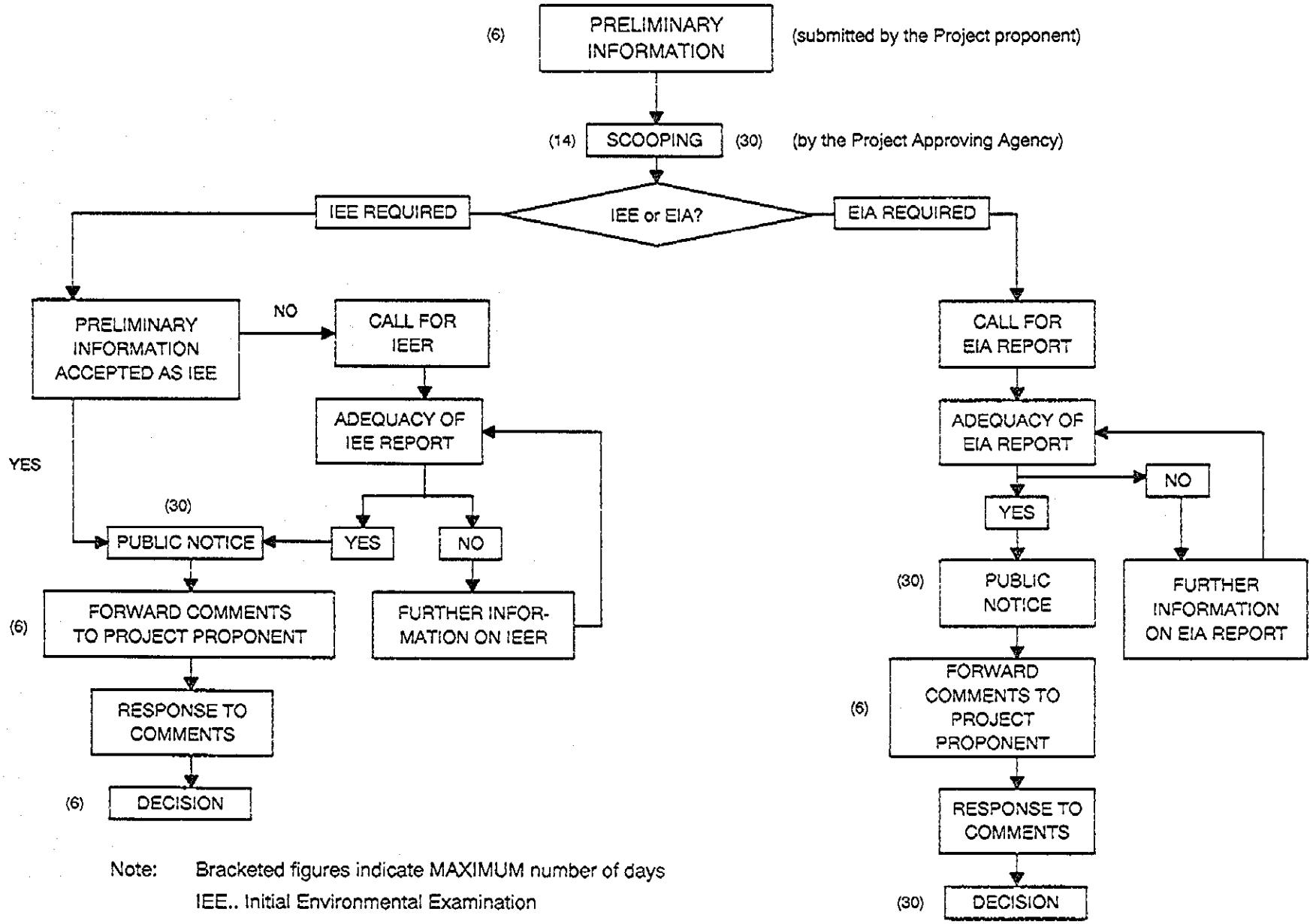
1. Within 100m from the boundaries of or within any area declared under--
   - the National Heritage Wilderness Act, No.3 of 1988,
   - the Forest Ordinance (Chapter 451).
   - whether or not such areas are wholly or partly within the Coastal Zone as defined in the Coast Conservation Act, No.57 of 1981.

2. Within the following areas whether or not the areas are wholly or partly within the Coastal Zone:
   - any erodable area declared under the Soil Conservation Act, (Chapter 450).
   - any Flood Area declared under the Flood Protection Ordinance (Chapter 449) and any flood protection area declared under the Sri Lanka Land Reclamation and Development Corporation Act, No.15 of 1968 as amended by Act, No.52 of 1982.
   - 60 meters from the bank of a public stream as defined in the Crown Lands Ordinance (Chapter 454) and having a width of more than 25 meters at any point of its course.
   - any reservation beyond the full supply level of a reservoir.
   - any archaeological reserve, ancient or protected monument as defined or declared under the Antiquities Ordinance (Chapter 188).
   - any area declared under the Botanic Gardens Ordinance (Chapter 446).

In these regulations unless the context otherwise requires--

"hazardous waste" means any waste which has toxic, corrosive, flammable, reactive, radio active or infectious characteristics.

"reservoir" means an expanse of water resulting from man made constructions across a river or a stream to store or regulate water. Its "environs" will include that area extending up to a distance of 100 meters from full supply level of the reservoir inclusive of all islands falling within the reservoir.



Note: Bracketed figures indicate MAXIMUM number of days
IEE.. Initial Environmental Examination
IEER.. Initial Environmental Examination Report

Figure 2-3 FLOWCHART ON ENVIRONMENTAL IMPACT ASSESSMENT PROCEDURE

2.1.8 Finance scheme for equipment and technology for pollution protection

Most enterprises do not install environmental protection equipment or obtain the technology related to environmental protection and improvement, even if they recognize their necessity and importance, because such environmental protection efforts, in general, requires a high investment that gives no return in the form of profits. This can be said to be generally applicable in any country and any enterprise and the countries which intend to positively go forward with environmental protection and improvement, therefore, set up as a supplemental financial scheme, through operation of national budget and foreign aid, with a lower rate of interest and longer repayment terms than usual. Some countries simultaneously take other possible and cordial measures like tax exemption for a certain period.

Sri Lanka has the same financial scheme which enjoys popularity among the users. The outline of this financial scheme is as follows;

(1) Inauguration of the financial scheme

As mentioned earlier, the Gazette dated January 8, 1990, announced the environmental norms and standards and all enterprises in Sri Lanka are required to obtain the environmental protection license from CEA. Upon the issuance of this Gazette, the Industrialization Commission, which was established based upon the Industrial Promotion Act, made detailed investigations covering all enterprises about the prospects for their meeting the environmental norms and standards, the need for installing the equipment and/or obtaining technologies in relation to environmental protection, the total required amount of funds for the above equipment and technologies (this amount was estimated about 50~60 million dollars at that time) and the possibility for raising fund for them. Then the Industrialization Commission reported this investigation result to the National Environmental Steering Committee and the ministries concerned as well and strongly requested them to establish the financial scheme with the more fovorable terms of repayment, adopt tax measures, and set up some systems for granting supportive incentives, as earlier as possible. The below-mentioned financial scheme came into operation in April, 1996.

(2) Outline of the financial scheme

This financial scheme is called Pollution Control and Abatement Fund (PCAF) and is handled by the National Development Bank (NDB) as a leading bank and four other banks (Development Finance Corporation of Ceylon Ltd., the Commercial Bank of Ceylon Ltd., Hatton National Bank Ltd., and the Sampath Bank Ltd.).

1) Total Amount of the Financial Scheme

The financial resource of this scheme is grant money of 7.5 million marks extended by the Kreditanstalt für Wiederaufbau (KfW) in Germany, out of which 1.5 million marks is allocated for technical assistance and the remaining 6.0 million marks for loan under the governmental agreement.

NDB is entrusted to allocate 7.5 million marks by the Sri Lankan government to the appropriate projects subject to the KfW's approval. As for the loan amount of 6.0 million marks NDB borrows it from the Sri Lankan government with repayment in forty years at no interest and lends directly or through the other four banks to the borrower enterprises. About 50% of the total amount in this scheme is reported to be already committed by the end of August, 1996 (77%, the pipeline projects included).

2) Type and Purpose

A: Fund for technical assistance: Cost of consultancy services that are directly related to the investigation of waste reduction, the preparation of designs, the selection and supervision of installation or operations of the equipment will be granted. An industrial enterprise will be entitled to a reimbursement of up to 75% of the cost, subjected to a maximum limit of Rs. 600,000.

B: Fund for loan: The following investments are eligible for loans and will be extended by NDB and other related banks;

a) Equipment that will lead to reduced emissions or to a lower pollution of wastes by the enterprises thereby enabling them to comply with the National Environment Act,

b) Equipment that will substantially improve the safety of work places, especially with regard to the exposure of workers to potentially hazardous substances,

c) Investments related to the relocation of highly polluting industries to special estates that are equipped with waste water treatment plants and investments by enterprises that set up and operate such treatment plants (with no limitations as to the start of operations),

d) Equipment for the monitoring of pollutants in connection with a), b) or c) above.

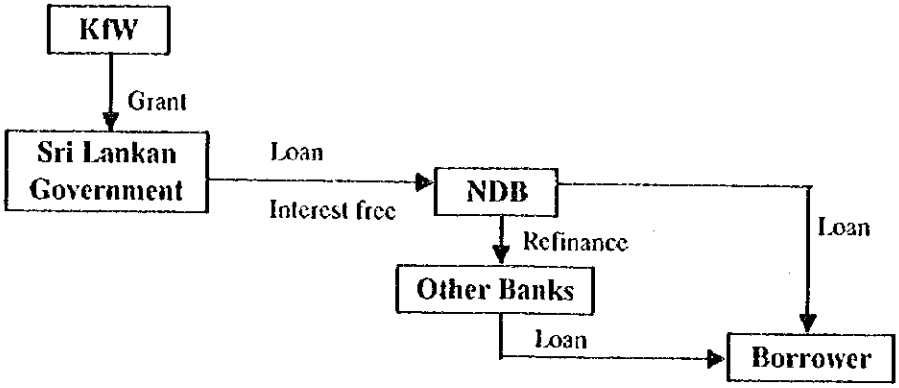
3) Enterprises eligible for the financial scheme

Financially viable industrial enterprises which have been in operation before January 1, 1994.

4) Maximum amount of loan

Rs. 10.0 million per enterprise.

5) Financial Scheme



6) Repayment terms of Loan

Rate of interest: No interest but a borrower should pay the amount equivalent to the official inflation rate as published by the Central Bank of Sri Lanka.

(Remarks) The official inflation rate for the periods from January to June and from July to December, 1995, were 5% and 9% respectively.

Repayment terms: Be decided project by project. (The longest terms of repayment will be seven (7) years including the grace period of one (1) year).

Security for Loan: A mortgage over the project assets will be set by NDB and Other banks. In case of NDB's refinance, other banks refinanced are required to issue Promissory Notes addressed to NDB.

Revolving fund: The repaid amount will be used as a revolving fund to the other eligible investments.

7) Amount of Commitment and Disbursement (As of the end of August, 1996)

Unit: Million Rupees

	No. of Project	Project Cost	Loan Amount	T.A. Fund
NDB	28	179.333	120.93	8.416
DFCC	3	11.854	11.05	1.05
SB	1	1.225	1.225	0
Total	32	192.412	133.205	9.466

Remarks: T.A. means Technical Assistance Source: NDB

2.2 Environmental Standards and Issues related to the Electroplating Industry

2.2.1 Environmental standards applicable to the electroplating industry

(1) Law and regulations

The Constitution of Sri Lanka sets forth that the state must protect, preserve and improve the environment for the interest of society, based on which the National Environment Act was established as the basic environmental law. The act was amended in 1988 when provisions were added, requiring environmental protection license for operation of a business, the establishment of internal environmental standards, and environmental impact assessment. In January, 1990, enforcement regulations for the environmental protection license and the establishment of environmental standards were established and have been in force from June, 1990.

The electroplating industry is designated as a high polluting industry and is prohibited from discharging wastes which may cause environmental pollution unless the environmental protection license is obtained from CEA and statutory standards are complied with.

(2) Effluent standards

Existing effluent standards include general standards for discharge of effluents into inland surface waters, tolerance limits for industrial effluents discharged on land for irrigation purpose, and tolerance limits for industrial and domestic effluents discharged into marine coastal areas.

Effluent standards are set at levels when effluents are diluted by eight times and, if less, they are adjusted downward. General standards do not apply to effluents from specific industries for which separate standards are announced.

The specific industries include natural rubber, coconuts, leather, dairy products, textiles, pesticides, and metal finishing. Proposed standards for the metal finishing industry are indicated in Industrial Pollution Control Guideline No.8 Metal Finishing Industry established in 1992/93 (still to be legally enforced). The metal finishing industry under this definition includes hot-dip zinc plating, anodizing, and chromate treatment, in addition to electroplating.

Table 2-5 indicates effluent standards applicable to the metal finishing industries in Sweden and France, general standards and proposed standards for the industry in Sri Lanka, and general standards in Japan.

The method of analysis, according to Sri Lanka Standard 652:1984 "General Standards for Discharge of Effluents into Inland Surface Water," complies with American Public Health Association "Standard Methods for the Examination of Water and Waste Water," which are widely used in Southeast Asian countries.

Table 2-5 STANDARDS FOR DISCHARGE OF EFFLUENT (mg/l)

Component	Sweden	France	Sri Lanka		Japan
			(general)	(proposed)	(general)
Cd	0.1	0.2	0.1	0.2	0.1
Cr^{6+}	0.1	0.1	-	-	0.5
CN (free)	0.1	0.1	-	-	-
CN (total)	1	1.2	0.2	1.0	1.0
Pb	1	0.2	0.1	1.5	0.1
Cr (total)	1	2	0.1	-	2.0
Cr^{3+}	-	-	-	1	-
Ni	-	1	3	1.5	-
Cu	1	2	3	1	3.0
Zn	2	5	5	1.5	5.0
Fe	2	5	-	-	10
Al	2	5	-	-	-
F	15	-	2	-	15
Oil	5	10	10	10	5/30
S.S.	10	50	50	50	200 (250)
COD	150	250	250	250	160 (120)
pH range	6.5 - 9	6 - 8.5	6 - 8.5	6 - 9	5.8 - 8.6

(3) Major issues on effluent standards

1) Basic standards on electroplating chemicals

General standards in Sri Lanka are stricter than those of other countries in CN, Total Cr, and F. This general standards specifies CN (total) at 0.2ppm or less, which is equivalent to 0.025ppm in the environment where effluents are diluted by 1:8. This is below the limit of detection by the applicable method of analysis.

It is a more realistic approach to set environmental standards at levels which is taken into account the current situation of industry and can be cleared by all the units if they make maximum efforts, and then to raise them gradually in stages. It is quite important to prevent release of pollutants caused by industrial development, as clean-up of contaminated rivers take much longer than the period of contamination. Nevertheless, strict controls which far exceed the ability of existing units to comply with has been failed to meet the purpose of environmental betterment in many cases.

General standards do not regulate Cr^{6+}, while Total Cr is strictly controlled below 0.1ppm. Other countries regulate both of the items, which should also be practiced in Sri Lanka.

Effluent standards for designated units should have less items than general standards, with less strict levels. However, while the standard value for CN is less strict in Sri Lanka, stricter standards are set for heavy metals such as Cu, Ni, and Zn. On the other hand, Cr is regulated by Cr^{3+} only. Cr^{6+} and Total Cr should be included.

2) Mitigation of regulations applicable to small scale units

Industrial Pollution Control Guidelines for the metal finishing industry sets forth detailed measures and waste water treatment methods to reduce the discharge from each process and source. Furthermore, according to the basic guideline in the Netherlands, small units (discharging 20kg or less of heavy metal) which do not discharge Cd, CN or Cr^{6+} are not required to perform special treatment to reduce the discharge. Units not complying with the 20kg standard are required to install their own wastewater treatment plants, while they may store the concentrate to be sent to a centralized treatment facilities. Large units discharging 250kg or larger are allowed to discharge up to 50kg. In Japan, units with daily effluent discharge of $50m^3$ or less are exempted from effluent regulation other than toxic substances affecting human health, such as Cd, CN, and Cr^{6+}.

As for toxic substances such as CN and Cr^{6+}, such measures that small electroplating units with less than certain volume of chemical use or effluent are exempted from regulations needs to be clarified in Sri Lanka.

3) Effluent standards and dilution

Effluent standards from factories in Sri Lanka are specified on the basis that effluents are to be diluted by at least 8 volumes of clean water. If the dilution ratio is lower than 8 times, the permissible limits are multiplied by 1/8 of the actual dilution ratio (See Table 2-2 and Table 2-3). If the dilution ratio is not precisely given, it will not be possible set standard values. In general, however, it is not clear by what times effluents from individual units are being diluted, owing to fluctuation of effluents according to the season and other conditions. If the dilution ratio is not precisely given, it will not be possible to set effluent standards as the basis of effluent control in units, or for the authorities to provide guidance and regulation. From the aspect of actually applying the regulation, effluent standards should be specified regardless of the dilution ratio.

4) Issuance of environmental protection license (EPL)

Electroplating industry is designated as a high-polluting industry and businesses in this industry are required to obtain environmental protection licenses (EPL) from CEA. However, only three units among all electroplating units surveyed, were issued EPL and

effluent analysis of their compliance was not conducted by CEA.

EPL should be issued after effluent analysis as set forth in the regulations. When EPL is issued under such a judgument that there may not be a problem due to small volume of sewage as determined through a field survey or submitted documents, environmental standards are better not to be applied to small units with discharge of heavy metals less than certain volumes under the condition of no discharge of toxic substances such as CN and Cr, provided that it is clearly set forth and applied that units which discharge toxic substances like CN and Cr, even small in volume, be regulated.

It is the present situation that environmental standards have generally been set forth, but are not observed. If any problem exists on the regulations and standards, they should be reviewed and revised to enable full observation of them.

(4) Actual examples of Japan and Indonesia

1) Case of Japan

Contamination of rivers, lakes, and oceans by industrial effluents or municipal wastewater disturbs the use of water resources for drinking, farming, and fishery purposes, and/or damages the ecosystem and natural scenery. To prevent deterioration of water quality which would adversely affect the use of water, the government establishes and enforces a variety of regulations.

Environmental standards should be established in terms of the target quality of water in natural water. In particular, standard values should be specified for toxic substances which need to be strictly controlled to protect human health, such as CN, Cd, Cr^{6+}, and Pb. And items required to protect the quality of living environment from heavy metals, organic suspended matters, BOD, COD, N, and P etc. should be determined according to the use of water resources in each water body.

Once environmental standards are established, effluent standards applicable to each water body are established. In Japan, effluent standards for toxic substances are at levels ten times of environmental standards. Effluent standards seem to be established under the assumption that effluents flow into a water body and are diluted to at least one tenth.

Table 2-6 shows environmental standards for toxic substances and general effluent standards in Japan, as intended to protect human health.

Table 2-6 ENVIRONMENTAL STANDARDS FOR HAZARDOUS SUBSTANCES AND GENERAL EFFLUENT STANDARDS IN JAPAN (EXCERPT)

Component	Environmental standard	Effluent standard	Limit of detection (Ordinance of Prime Minister's Office)
Cd	0.01mg／l or less	0.1mg／l or less	0.001mg／l
CN (Total)	Not to be detected	1mg／l or less	0.1mg／l
Cr^{6+}	0.05mg／l or less	0.5mg／l or less	0.04mg／l
Pb	0.01mg／l or less	0.1mg／l or less	0.005mg／l

2) Case of Indonesia

Indonesia establishes effluent standards for the environment, and specific industries. Explanations on the case of Indonesia are given below.

In Indonesia, effluent standards are established to achieve water quality standards which are established on the basis of current water qualities in rivers and oceans, and desirable water qualities according to the use of water resources, such as potable with or without treatment, fishery, and agriculture. This water quality standards are classified into four, which are applied to copper, nickel, chromium, and zinc platings respectively. General standards for inland water in Sri Lanka are uniformly applied to all types of water body. It is particularly true that water quality requirements must vary according to the purpose of water usage except for toxic substances which affect human health e.g., desirable water quality may be different in a given river, upstream and downstream, and different water quality standards must be established for coastal waters according to the purpose of regulation. Environmental standards which effectively reflect local conditions are called for in Sri Lanka.

Originally, uniform standard values were applied to every industry type, resulting in unfair treatment, e.g., some industries required advanced technologies to meet the standards, while others could dilute effluents by cooling water. They were later revised and new standards based on best-available technology were established for existing units in fifteen industries including electroplating, and paper and pulp manufacturing. Also, to prevent dilution, pollution loads per unit production volume, namely g/m^2, were specified, rather than concentration standards.

Environmental control items are focused, and standard values are less strict than those in general standards and can be accomplished without excessive efforts. Table 2-7 shows effluent standards for the electroplating industry in Indonesia.

Table 2-7 STANDARDS FOR EFFLUENT FROM ELECTROPLATING INDUSTRY IN INDONESIA (maximum water volume 100 l/m²)

mg/l(g/m²)

Component	Cu plating	Ni plating	Cr plating	Zn plating
Cd	0.05 (0.005)	0.05 (0.005)	0.05 (0.005)	0.05 (0.005)
CN	0.5 (0.05)	0.5 (0.05)	0.5 (0.05)	0.5 (0.05)
Cr^{6+}	-	0.3 (0.03)	0.3 (0.03)	-
Cu	3.0 (0.3)	-	-	-
Ni	-	-	-	-
Cr (total)	-	2.0 (0.2)	2.0 (0.2)	-
Zn	-	-	-	2.0 (0.2)
Metal (total)	8.0 (0.8)	8.0 (0.8)	8.0 (0.8)	8.0 (0.8)
S.S.	60 (6.0)	60 (6.0)	60 (6.0)	60 (6.0)
pH	6 - 9	6 - 9	6 - 9	6 - 9

2.2.2 Environmental issues

Because the electroplating industry is quite small in size, it is not comparatively taken seriously in Sri Lanka in regard to environmental issues. There are, however, a great number of actual examples of environmental pollution caused by discharged water from electroplating units. Some explanations are given below citing Japanese examples.

(1) Environmental pollution by the electroplating industry

The electroplating industry plays an important role in supporting growth of the metalworking and electronics industries.

Electroplating is classified into copper, nickel or chromium plating for decoration, plating using precious metals such as gold and silver, and zinc plating for anti-corrosion. Most copper plating as well as gold and silver plating and zinc plating processes use a toxic cyanide compound as a plating solution. In many countries including Japan, zinc plating has been partially converted from cyanide to non-cyanide bath out of environmental considerations. In Sri Lanka, all the zinc plating processes are still using cyanide bath.

Chromium plating uses concentrated chromic acid as a plating solution, which is toxic Cr^{6+}. Cr^{6+} is also used, after the zinc plating process, for chromate treatment in some cases to improve anti-corrosiveness after nickel plating, although it is not highly concentrated.

In addition, the electroplating process discharges acid and alkaline used for pretreatment, metals such as Fe, Cu, etc. and oil dissolved in the pretreatment solution, heavy metals such as Cu, Ni, Zn, Cr in the plating solution, dissolved oil, reducing chemicals in the solution, and

BOD and COD sources including organic matter.

(2) Japanese cases of environmental pollution and health hazards

Examples of environmental pollution caused by effluents from electroplating units are abundant. In Japan, electroplating was once criticized in the media that reported it to be a prime source of pollution.

Most of these pollution cases were caused by CN, Cr^{6+}, and Cd. CN flowed into rivers and killed fish, permeated into ground to contaminate ground water and make wells unusable, and flowed into sewers and reacted with acidic effluents to generate HCN gas which killed workers.

Cr^{6+} discharged into rice fields and withered rice plants, and has accumulated in soil and still contaminates ground water.

Cd, also discharged into rice fields, contaminated rice. Above all, Cd caused itai-itai disease in Toyama Prefecture, which is painfully remembered as a historic case of pollution.

Heavy metals, concentrated through the marine life chain, have created health hazards. Similarly, organic chlorine-based solvents used for pretreatment, such as trichloroethylene, have permeated into ground and made deep wells for potable water unusable in various areas, resulting in establishment of effluent standards for chlorine-based solvents as toxic substances. Later, electroplating units were forced to change cleaning solutions.

Thus, electroplating units use a variety of toxic and hazardous chemicals, which are discharged into the environment and cause pollution. In particular, substances harmful to human health, such as CN, Cr^{6+}, Pb, and Cd, run a high risk of causing serious pollution.

While the industry was small in size and thus discharged a relatively small amount of toxic substances, they were diluted in the natural environment or did not cause a serious problem. As the industry evolved and units grew in number and size, much more toxic substances were discharged to pollute the environment extensively and caused serious problems.

Pollution control measures for the electroplating industry in Japan were undertaken as concerted efforts of industrial and academic circles and government organizations, manifested as the development of effluent treatment technologies, transitional regulatory measures, exemption according to factory size, and loans and tax incentives for installation of pollution control facilities.

As a result, the industry, which was once singled out as a despicable source of pollution, has successfully reduced pollution under the recognition that it could not survive without effective pollution control.