

5-3 イ側からの1987年度予算通知



LEMBAGA ILMU PENGETAHUAN INDONESIA
[Indonesian Institute of Science]

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Pos : 250/Jakarta 10002

Alamat Kawat : LIPI

Jakarta, May 7, 1987

to. : 3100 /SK/DTEX/8.6/1987

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 Encls.

Perihal
 Subj. Matter

Mr. Hideo Endo
 Resident Representative
 Japan International Cooperation
 Agency (J.I.C.A.)
 Japanese Embassy
 Jl. M.H. Thamrin 24
 JAKARTA.-

Dear Mr. Endo,

Referring to the minutes of discussions on the Project for Establishing the Metallurgical Laboratory for Laterite in Indonesia which was signed by Prof. Dr. Dodi Tisna Amidjaja and Dr. Kenji Tomita on February 25, 1987, particularly to point 11 of its attachment, I am pleased to inform you that the budget allocation for the said project was included in the O.I.P. of PUSPIPTX 1987/1988 which was approved by "surat pengesahan DIP 87/88, Departemen Keuangan, No.005/VIII/1987, 1 Maret 1987", amounted to Rp. 91.511.000 (ninety one millions five hundred and eleven thousand rupiahs), in Pos 01.03.6. Finishing bangunan K.I.M./L.M.L. (Laboratorium Metallurgi Laterit).

This budget is for clearing and leveling of the project site, electricity, water installations, roads, etc.

I would appreciate it very much if you could forward this information to Japan.

With best regards,

Yours sincerely,

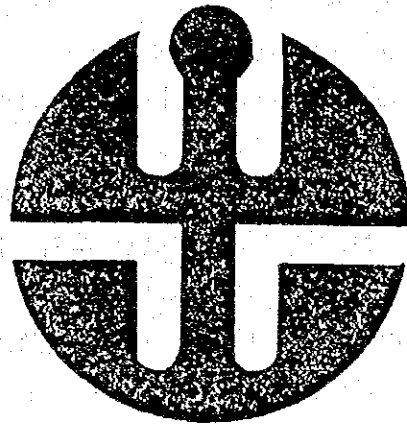


KAYATMO
 Deputy Chairman for Engineering
 Sciences, LIPI

5-4 RDCM パンフレット

PUSAT PENELITIAN DAN PENGEMBANGAN
METALURGI

RESEARCH AND DEVELOPMENT CENTRE FOR
METALLURGY



LEMBAGA ILMU PENGETAHUAN INDONESIA
INDONESIAN INSTITUTE OF SCIENCES

RIWAYAT SINGKAT

- 1963 Proyek untuk mendirikan Lembaga Metalurgi Nasional, satu diantara lima lembaga penelitian dan pengembangan yang akan didirikan dan dikelompokkan dalam sebuah Pusat Research Nasional, dilancarkan oleh Majelis Ilmu Pengetahuan Indonesia (MIPI).
- 1965 Lembaga Metalurgi Nasional diresmikan sebagai lembaga penelitian dan pengembangan di bawah MIPI.
- 1967 MIPI dihapuskan dan Lembaga Ilmu Pengetahuan Indonesia (LIPI) dibentuk untuk mengambil alih dan melanjutkan tugas MIPI. Lembaga Metalurgi Nasional kemudian dialihkan ke LIPI.
- 1986 LIPI direorganisasi dan Lembaga Metalurgi Nasional dirubah menjadi Pusat Penelitian dan Pengembangan Metalurgi (Puslitbang Metalurgi).

BRIEF HISTORY

- 1963 Project for the establishment of National Institute for Metallurgy, one of five research and development institutes to be established and grouped in a National Research Centre, was launched by Council for Sciences of Indonesia (MIPI).
- 1965 National Institute for Metallurgy was inaugurated as a research and development institute under MIPI.
- 1967 MIPI was abolished and Indonesian Institute of Sciences (LIPI) was established to take over and continue the tasks of MIPI. National Institute for Metallurgy was then transferred to LIPI.
- 1986 LIPI was reorganized and National Institute for Metallurgy was changed to Research and Development Centre for Metallurgy (RDCM).

STATUS, TUGAS & KEGIATAN

Pusat Penelitian dan Pengembangan Metalurgi adalah sebuah lembaga penelitian Pemerintah di bawah Lembaga Ilmu Pengetahuan Indonesia (LIPI), yang dibentuk berdasarkan Keputusan Presiden No. 1, 1986.

Pusat Penelitian dan Pengembangan Metalurgi mempunyai tugas melaksanakan kegiatan penelitian dan pengembangan, pembinaan dan peningkatan kemampuan masyarakat ilmiah dan industri, serta mendayagunakan hasil penelitian dan pengembangan di bidang metalurgi, sesuai dengan kebijaksanaan yang telah ditetapkan oleh Ketua LIPI.

Sejalan dengan tugasnya, ruang lingkup kegiatan Pusat Penelitian dan Pengembangan Metalurgi yang meliputi Metalurgi Ekstraksi, Teknologi Logam dan Korosi, antara lain terdiri dari :

1. Penelitian dan Pengembangan
2. Studi Kelayakan
3. Penyebarluasan Informasi
4. Pelayanan :
 - Penelitian Kontrak
 - Latihan & Kursus
 - Konsultasi
 - Pelayanan Teknis

STATUS, TASKS & ACTIVITIES

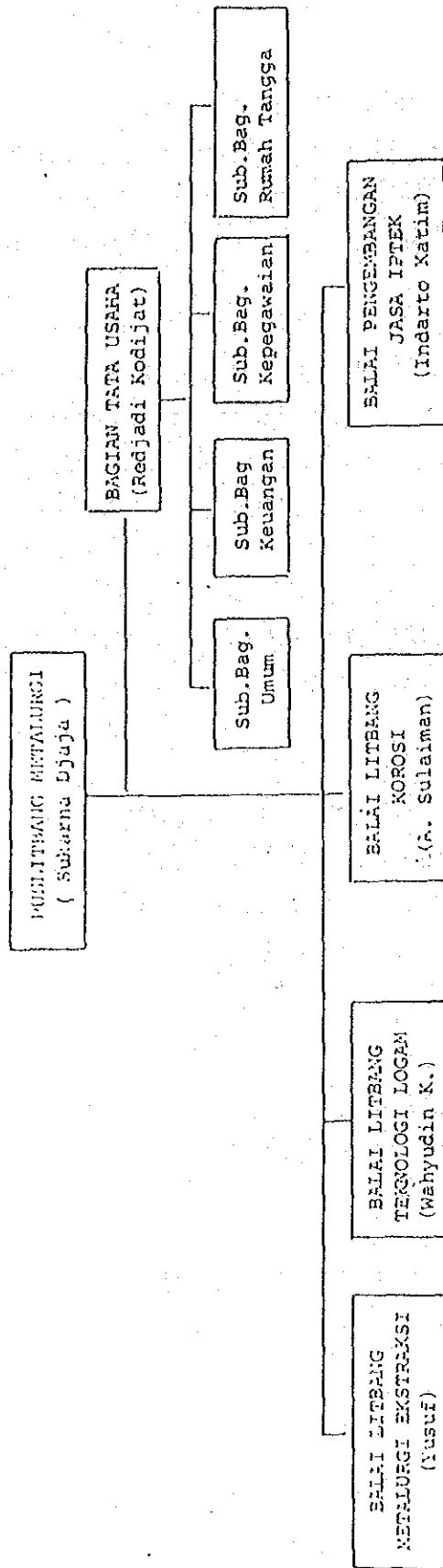
Research and Development Centre for Metallurgy is a Government research institute under the Indonesian Institute of Sciences (LIPI), which was founded by Presidential Decree No. 1, 1986.

Research and Development Centre for Metallurgy has tasks to carry out research and development activities, to build up and increase the capability of scientific and industrial communities, and to make efficient utilization of the results of research and development in the field of metallurgy, in accordance with the policy set up by the Chairman of LIPI.

In line with its tasks, scope of the activities of the Research and Development Centre for Metallurgy which covers Extraction Metallurgy, Metal Technology and Corrosion, a.o. consists of :

1. Research and Development
2. Feasibility Study
3. Dissemination of Information
4. Services :
 - Contract Research
 - Training & Courses
 - Consultancy
 - Technical Services

STRUKTUR ORGANISASI



LABORATORIUM :

1. Konsentrasi Bijih
2. Metalurgi Hidro
3. Metalurgi Piro
4. Metalurgi Elektro
5. Pengembangan Proses

LABORATORIUM :

1. Pengecoran & Paduan
2. Pembentukan Logam
3. Perlakuan Panas
4. Pengelasan
5. Pengerjaan Akhir

LABORATORIUM :

1. Korosi Dasar
2. Korosi Suhu Tinggi
3. Korosi Tegang
4. Korosi Industri & Proses
5. Korosi Atmosfir

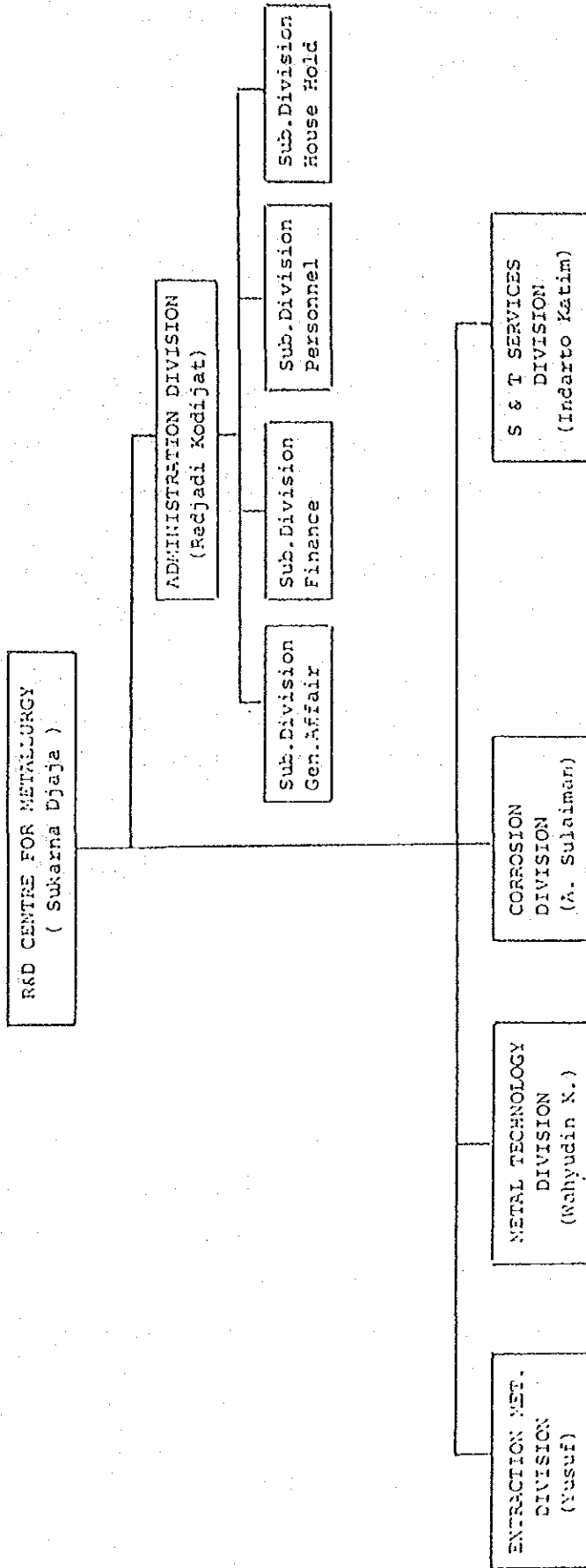
LABORATORIUM :

1. Analisis Kimia
2. Metalografi
3. Pengujian
4. Rekayasa

SEKSI :

1. Dokumentasi & Informasi
2. Jasa Mekanik, Listrik & Elektronik

ORGANIZATION STRUCTURE



LABORATORIES :	LABORATORIES :	LABORATORIES :	SECTIONS :
1. Ore Concentration	1. Basic Corrosion	1. Chem. Analysis	1. Doc. & Information
2. Hydro Metallurgy	2. High Temp. Corrosion	2. Metallography	2. Mech., Electric & Electronic Service
3. Pyro Metallurgy	3. Stress Corrosion	3. Mech. Testing	
4. Electro Metallurgy	4. Indus. & Process Cor.	4. Engineering	
5. Process Development	5. Atmospheric Corrosion		

PENELITIAN DAN PENGEMBANGAN METALURGI EKSTRAKSI

Program penelitian dan pengembangan di bidang Metalurgi Ekstraksi bertujuan untuk mengem -
bangkan teknologi pengolahan mineral/bijih, un -
tuk menghasilkan logam atau produk lain yang
berharga. Lingkup kegiatan meliputi konsentra -
si bijih, ekstraksi logam termasuk pemurnian -
nya, dan proses lain yang berkaitan.

Beberapa contoh permasalahan yang ada di bi -
dang ini antara lain pengolahan dari :

- Bijih nikel laterit kadar rendah yang ba -
nyak terdapat di daerah yang luas di Sula -
wesi, Kalimantan dan Kepulauan Indonesia
bagian Timur.
- Bauksit untuk refraktori dan bahan baku in -
dustri lainnya.
- Bijih sulfida logam dasar (tembaga, timbal
dan seng).
- Mineral ikutan timah putih (mineral logam
jarang).
- Limbah atau hasil samping industri seperti
debu besi spons dari industri baja dan Zn -
dross dari industri galvanisasi.
- Batubara dalam negeri (jenis non coking) un -
tuk pembuatan kokas.
- Endapan mineral kecil seperti bijih mangan,
yarosit alam dan lain-lain.

R & D ON EXTRACTION METALLURGY

Research and development program in the field of Extraction Metallurgy is aimed at developing technology for mineral/ore processing, to produce metal and other valuable products. Scope of the activities covers ore concentration, metal extraction including its refining, and other related processes.

Some examples of the existing problems in this field a.o. are the processing of :

- Low grade lateritic nickel ores which are found in vast areas in Sulawesi, Kalimantan and Eastern part of Indonesian archipelago.
- Bauxite for refractory and other raw materials for industry.
- Base metal sulphide ores (copper, lead and zinc).
- Accessories minerals of tin (rare earth minerals).
- Industrial wastes or by products such as sponge iron dust from steel industry and Zn-dross from galvanizing industry.
- Domestic (non coking) coal for coke making.
- Small mineral deposits such as manganese ore, natural jarosite etc.

PENELITIAN DAN PENGEMBANGAN TEKNOLOGI LOGAM

Program penelitian dan pengembangan di bidang Teknologi Logam bertujuan untuk mengembangkan teknologi pengolahan/pengerjaan logam, baik untuk menghasilkan produk akhir maupun produk antara untuk industri. Lingkup kegiatan meliputi pengecoran & paduan, pembentukan logam, perlakuan panas, pengelasan dan pengerjaan akhir.

Beberapa contoh permasalahan yang ada di bidang ini antara lain adalah :

- Diversifikasi penggunaan timah putih untuk menunjang upaya Pemerintah dalam meningkatkan pemakaiannya di dalam negeri dan di dunia.
- Pembuatan berbagai jenis paduan baja dan non-ferro untuk komponen mesin/alat produksi dan suku cadang alat transport, dalam rangka program substitusi impor.
- Peningkatan mutu berbagai macam produk logam dalam negeri dan pengembangan produk "baru" di dalam negeri.
- Pengukuran keandalan dari struktur yang terbuat dari logam.
- Pengembangan paduan khusus.

R & D ON METAL TECHNOLOGY

Research and development program in the field of Metal Technology is aimed at developing technology for metal processing, to produce final products as well as intermediate products for industry. Scope of the activities covers foundry & alloying, metal forming, heat treatment, welding and finishing.

Some examples of the existing problems in this field a.o. are :

- Diversification of tin utilization to support the Government efforts in increasing it's domestic and world consumption.
- Making of various steel and non-ferrous alloys for machine/production equipment components and automotive spare parts, within the framework of import substitution program.
- Quality improvement of various domestic metal products and development of "new" products within the country.
- Measurement of the reliability of metal structures.
- Development of special alloy.

PENELITIAN DAN PENGEMBANGAN KOROSI

Program penelitian dan pengembangan di bidang Korosi bertujuan untuk mengembangkan teknologi pengendalian serangan korosi pada logam. Lingkup kegiatan meliputi penelitian dasar korosi, korosi suhu tinggi, korosi tegang, korosi industri & proses dan korosi atmosfer.

Beberapa contoh permasalahan yang ada di bidang ini antara lain adalah :

- Sistem perlindungan katodik untuk pipa dalam tanah, tangki, tiang pancang dan lain-lain di industri minyak dan gas bumi dan industri lainnya.
- Pengendalian korosi untuk industri dan instalasi yang beroperasi dalam lingkungan yang korosif seperti industri petrokimia, instalasi tenaga listrik panas bumi, instalasi minyak lepas pantai dan lain-lain.
- Pengendalian korosi untuk persenjataan milik Departemen Hankam, peralatan telekomunikasi dan transportasi dan lain-lain.
- Substitusi berbagai macam bahan kimia dan bahan lainnya untuk pengendalian korosi seperti inhibitor, anoda korban dan lain-lain.
- Pengolahan air dan air limbah untuk industri.

R & D ON CORROSION

Research and development program in the field of Corrosion is aimed at developing technology to control corrosion attack on metal. Scope of the activities covers research on basic corrosion, high temperature corrosion, stress corrosion, industry & process corrosion and atmospheric corrosion.

Some examples of the existing problems in this field a.o. are :

- Cathodic protection system for underground pipes, tanks, piles etc. in oil and gas industry and other industries.
- Corrosion control for industries and installations operating in corrosive environment such as petrochemical industry, geothermal electric power plant, offshore rigs etc.
- Corrosion control for armament belongs to Ministry of Defence, telecommunication and transportation equipment etc.
- Substitution of various chemical and other materials for corrosion control such as inhibitor, sacrificial anode etc.
- Water and waste water treatment for industry.

KERJASAMA

A. KERJASAMA DALAM NEGERI

Dengan :

- Lembaga Penelitian dan Pengembangan lain
- Universitas
- Badan dan Perusahaan Pemerintah
- Perusahaan Swasta

B. KERJASAMA LUAR NEGERI

1. Kerjasama yang sedang berjalan :

- JICA, Japan International Coopera -
tion Agency,
"Penelitian dan Pengembangan
pada Bijih Nikel Laterit Ka-
dar Rendah di Indonesia".
- JSPS, Japan Society for the Promo -
tion of Science,
"Teknologi Mineral dan Logam"
(Pengolahan Bijih Logam Ja -
rang dan Korosi).
- GIRIC, Government Industrial Research
Institute Chugoku, Japan, "Pen-
cegahan Korosi pada Bahan Lo -
gam di Daerah Tropis" (Korosi
Retak Tegang).

2. Kerjasama yang lalu antara lain dengan:

- CIDA, Kanada, mengenai pengolahan bi-
jih logam dasar
- PERANCIS, mengenai korosi
- AAECF, Australia, mengenai teknologi
batubara
- KAIST, Korea, mengenai pengolahan la-
terit.

COOPERATION

A. DOMESTIC COOPERATION

With :

- Other R & D Institutions
- Universities
- Government Bodies and Companies
- Private Companies

B. INTERNATIONAL COOPERATION

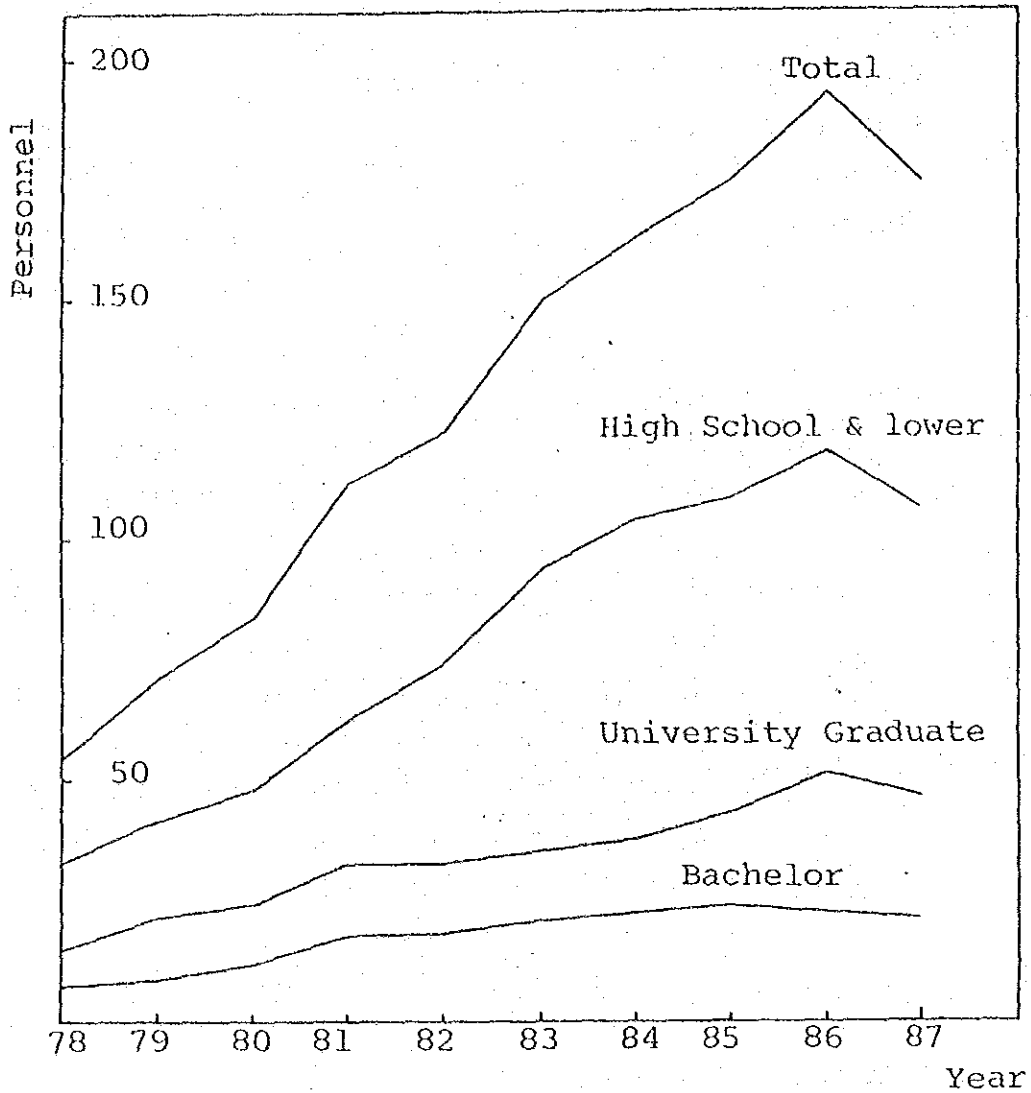
1. Current cooperation with :

- JICA, Japan International Cooperation Agency, "R&D on Indonesian Low Grade Nickel Laterite".
- JSPS, Japan Society for the Promotion of Science "Mineral and Metal Technology" (Rare Metal Ores Processing and Corrosion).
- GIRIC, Government Industrial Research Institute Chugoku, Japan, "Corrosion Prevention of Metallic Materials in the Tropics (Stress Corrosion Cracking)".

2. Previous cooperation a.o. with :

- CIDA, Canada, on base metal ore processing.
- FRANCE, on Corrosion
- AAECF, Australia, on coal technology
- KAIST, Korea, on laterite processing

PERSONNEL

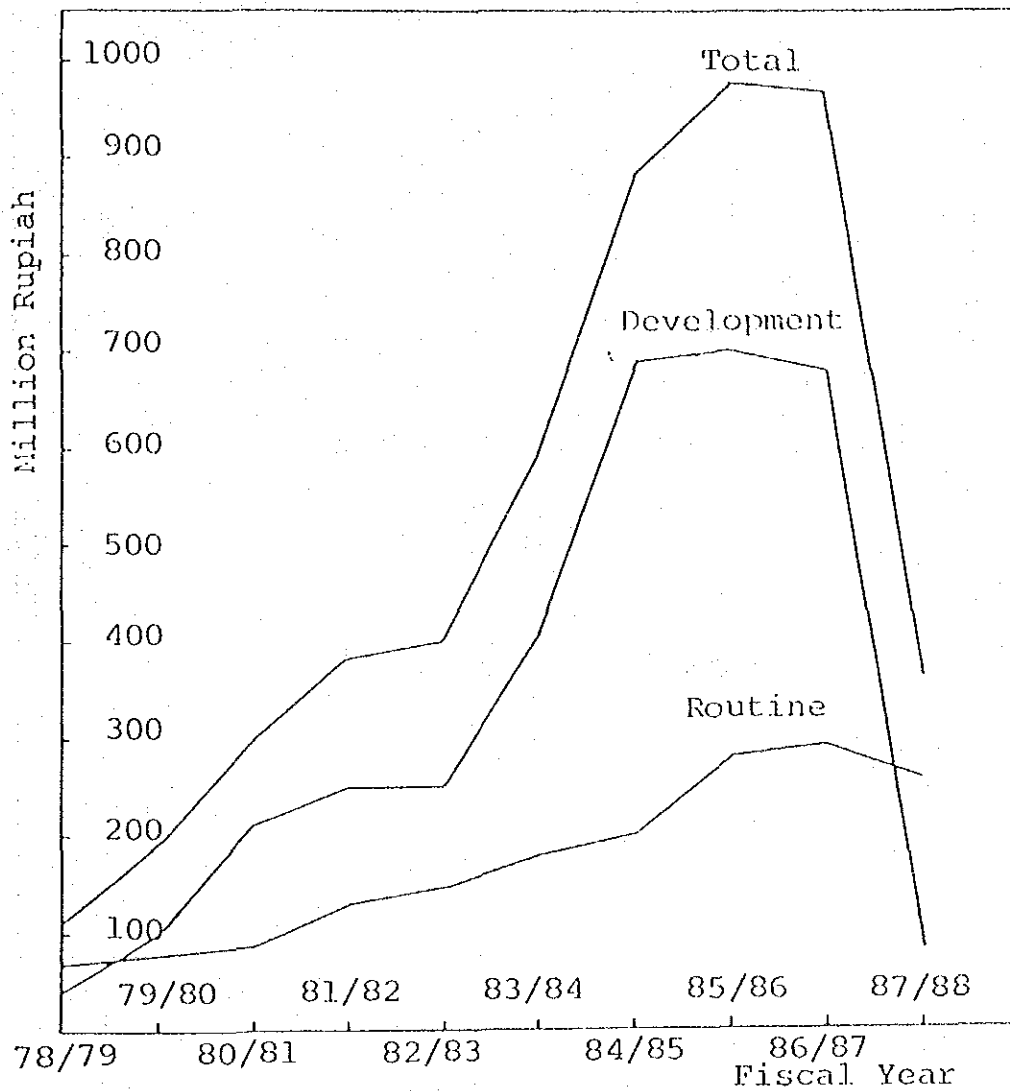


Personnel in 1987

- University Graduate : 47
- Bachelor : 21
- High School & lower : 106

Total : 174

BUDGET



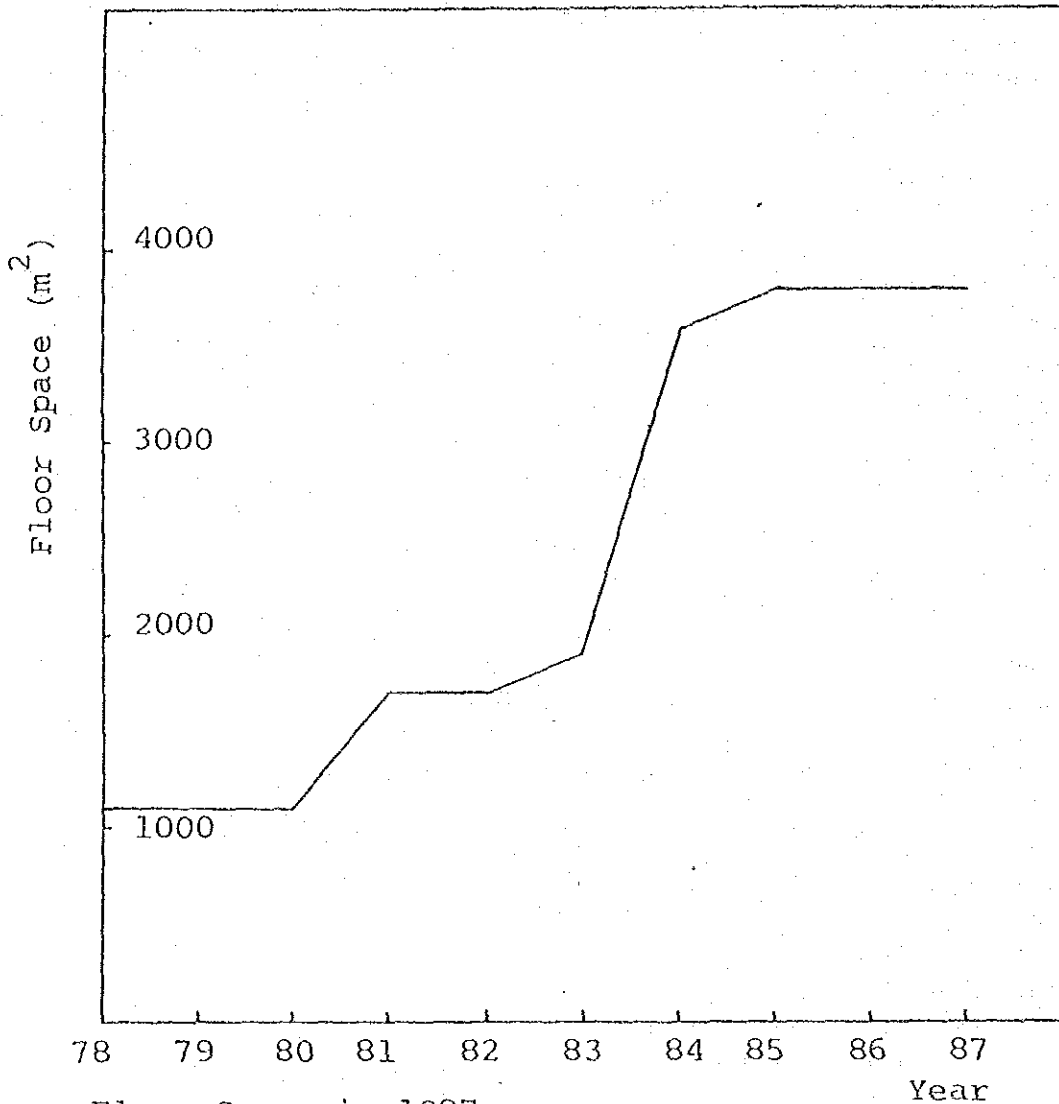
Budget for 1987/1988

- Routine (including salary) : Rp. 257 million

- Development (research & equipment) : Rp. 98 million

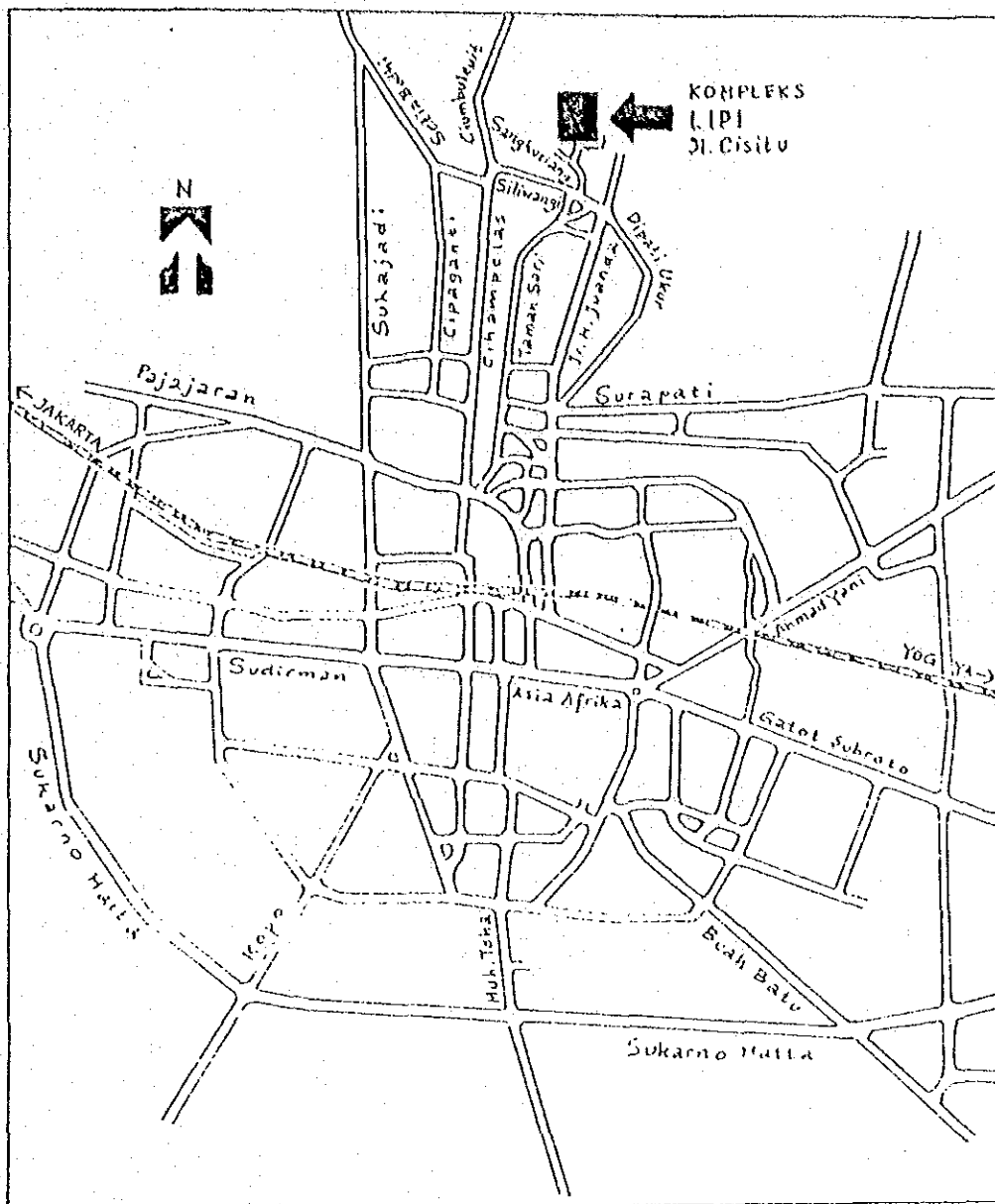
Total : Rp. 355 million

FLOOR SPACE



Floor Space in 1987

	Year
- Administration & guest room	: 580 m ²
- Staff room, library & meeting room	: 373 m ²
- Laboratory, pilot plant & Work shop	: 1,928 m ²
- Storage, open hall etc.	: 920 m ²
Total	: 3,801 m ²

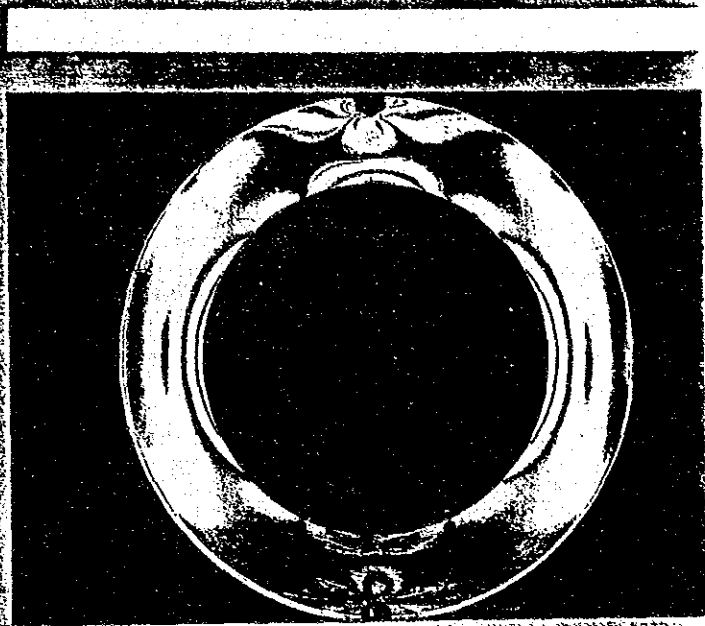


RESEARCH AND DEVELOPMENT CENTRE FOR METALLURGY

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Bandung 40135
INDONESIA

Phone : (022) 81055, 84371

5-5 PUSPIPTEK パンフレット



PUSPI TEK

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Published by:

The Minister of State for Research and Technology of
the Republic of Indonesia

The National Center for Research, Science and
Technology, Serpong

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- PUSPIPTEK Complex, Serpong, Tangerang, West Java,
Phone 516165, Telex 45512 PPIT IA
- 43 A Jalan Raden Saleh, Jakarta 10330
Phone 323209, Telex 45387 PPIT IA

INDONESIA



The Republic of Indonesia is an archipelago situated between the continents of Asia and Australia, and between the Indian and the Pacific ocean. This country consists of more than 13,500 islands which, if they are measured from the west to the east, have the same distance as that from New York to San Francisco or from Ireland to Moscow.

It covers a territory of 6.8 million square metres and at present has a population of 160 million and in the year 2000 it is estimated to become 200 million. This tropical country has an abundance of natural resources and with its strategic location is a country which ranks fifth in the number of population in the world.

During many centuries Indonesia was colonized. Various countries struggled with each other for domination of Indonesia. Only on August 17, 1945 at the end of the Second World War, the representatives of the Indonesian people, Soekarno and Hatta, succeeded in proclaiming the independence of the Republic of Indonesia.

And, the struggle for the independence of Indonesia has reached the happy end safely and quietly bringing the Indonesian people to the gate of independence within an Indonesian state which is free, united, sovereign, justice and prosperous.

However, many tumultuous political events had to be experienced by this young country during the first years of its existence.

Only in the era of the New Order under the leadership of President Soeharto since 1967 a situation was created making it possible to implement a planned and continuous national development in order to achieve a just and prosperous Indonesian society based on Pancasila.

During the era of the New Order significant progress has been attained. Political stability has been secured and the economy has grown properly. These achievements form the basis for the Indonesian development in the future. In the past, the economic growth of Indonesia was based on the export of raw materials while in the next stage economic development should be supported by industries producing goods and services, for the domestic market as well as for export.

The Fourth Five Year Development Plan emphasizes the development in the agricultural sector continuing the efforts to be self-supporting in food, and preparing for industries manufacturing machinery, heavy as well as light industry, which will be implemented within the next Five Year Development Plans.

In this connection, in the state of the nation address on August 16, 1984 President Soeharto stated among others :

... the Industrialization process shall require the mastery of technology based on modern science, therefore many and a variety of experts and skills in all sectors shall be required

... the main thrust of the industrialisation process which we are planning, does not involve its physical state only, but of much more importance are the quality and the capability of the human beings, primarily their technological and engineering comprehension; their designing capabilities; their management, expertise and professional know how; their skills; and their entrepreneurship

It is with these thoughts in mind that the Government of Indonesia decided to develop the national centre for research, science and technology having a supporting and enhancing role to national development.

The National Centre for Research, Science and Technology, at present, provides facilities for non Departemental Research and Development institutes such as :

- The Indonesian Institute of Sciences (LIPI)
- The National Atomic Energy Agency (BATAN)
- The Agency for the Assessment and Application of Technology (BPPT)

the facilities of which are described in the following pages .

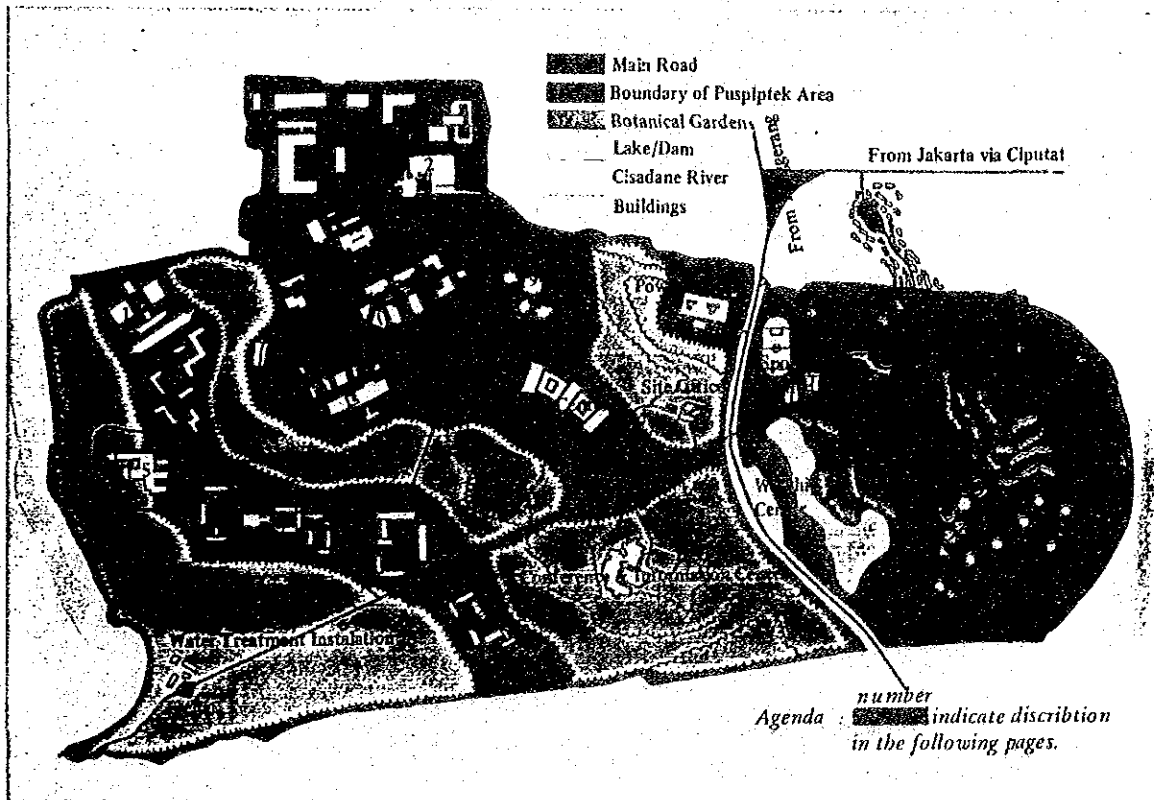
PUSPIPTEK

(National Centre for Research, Science and Technology)

The National Center for Research, Science and Technology developed based on Presidential Decree no. 43 dated 1st of October 1976, is situated about 27 km South West of Jakarta at Serpong with an area of 350 hectares. The area will be expanded to 500 hectares in conjunction with the development of the surrounding area for education and training facilities (150 hectares) and for high technology industries (350 hectares), such that the combined facility will become a centre for the development and application of high technology in Indonesia.



Administrative Territory of the Districts in Jakarta, Bogor, Tangerang and Bekasi (Jabotabek).



1

Aerodynamics, Gasdynamics, and Vibration Laboratory (LAGG) (a BPPT facility)

This laboratory is intended to study the problems of aerodynamics, aeroacoustics, and vibration which are very necessary for the industrial and technical development in various fields such as aviation, navigation, and transportation, offshore platform, building construction, city planning, windmill, propeller, and others.

LAGG consists of the following sub-laboratories :

- Low speed wind tunnel
In order to conduct various aerodynamics experiments, this closed circuit wind tunnel is equipped with exchangeable test section for various

Indonesian Low Speed Tunnel - LAGG.

purposes. The application can be used for various purposes of aerodynamic studies, for instance for vehicles, aircrafts, buildings, city and the like.

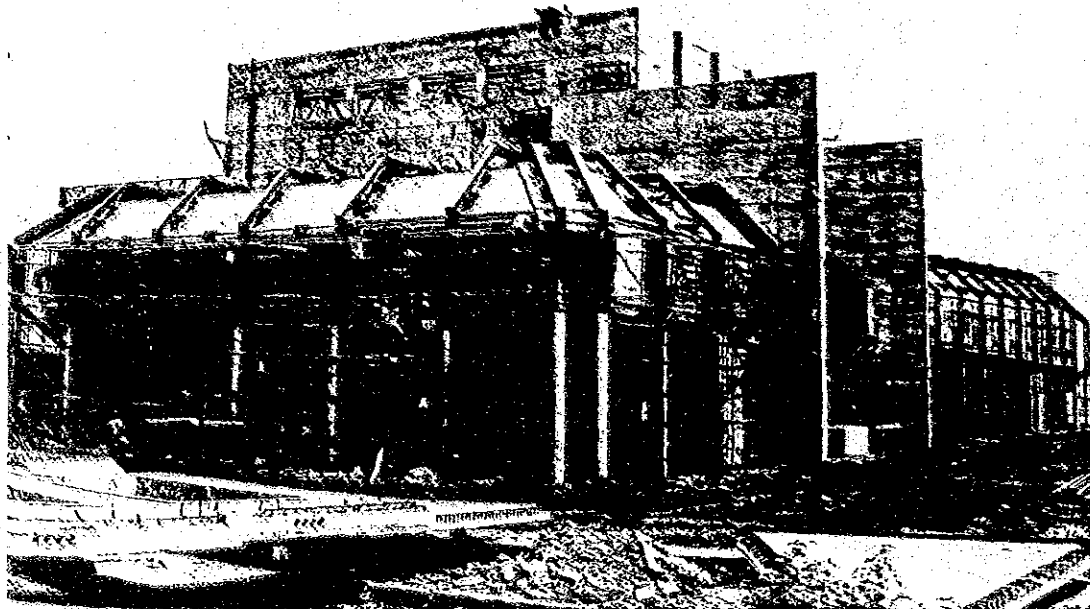
Data : Test section profile 3m x 4m,
Wind speed 90 m/second
(nominal)
and 110 m/second (maximal)

- High speed wind tunnel
For various high speed aerodynamics experiments required for the development of very high speed aircraft.
- Flight dynamics laboratory
- Acoustics and Vibration laboratory.

Personnel

The total of personnel estimated in 1986 will be consist of :

- 117 senior scientist (research staff)
- 30 administrative staff
- 20 supporting staff-technicians
- 10 supporting staff - administrators



2

Strength of Materials, Components and Structures Laboratory (LUK) (a BPPT facility)

This laboratory conducts testing and research on various types of structures as well as components, either made of metal, concrete, plastics or other materials used in the construction of vehicles, trains, ships, aircrafts, buildings, roads, bridges, and the like.

According to the characteristics of testing, the facilities of LUK are divided into :

- Non Destructive Test Laboratory, and
- Destructive Test Laboratory.

Under the existing research, LUK is able to conduct tests and research of construction in various aspects :

- Strength
- Deformation
- Fatigue
- Corrosion
- Fracture mechanics
- Stress analysis

- Critical threshold analysis

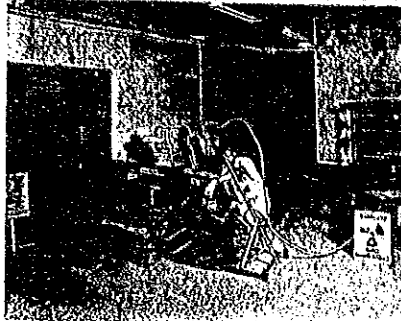
In various conditions, among others :

- Static load,
- Dynamic load, which may be computer programmed,
- Special environments, namely temperature and humidity.

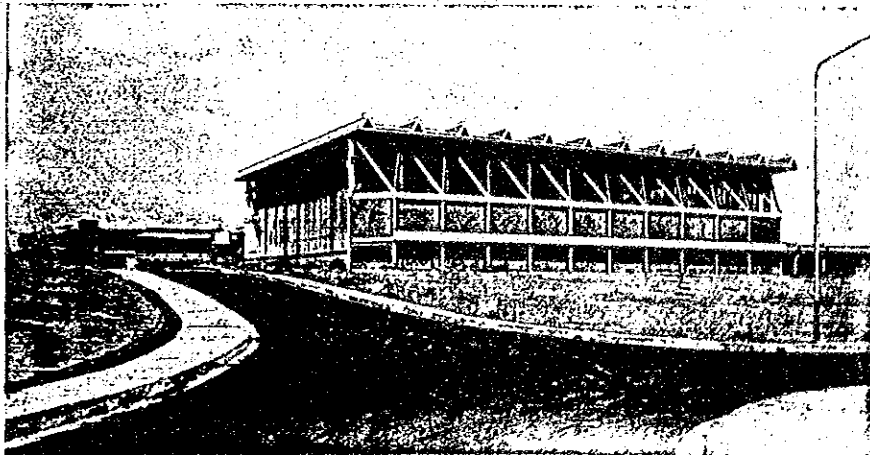
Test evaluation may be carried out completely due to very sensitive instruments in the fields of metallography and fractography.

The main facilities of LUK are among other things :

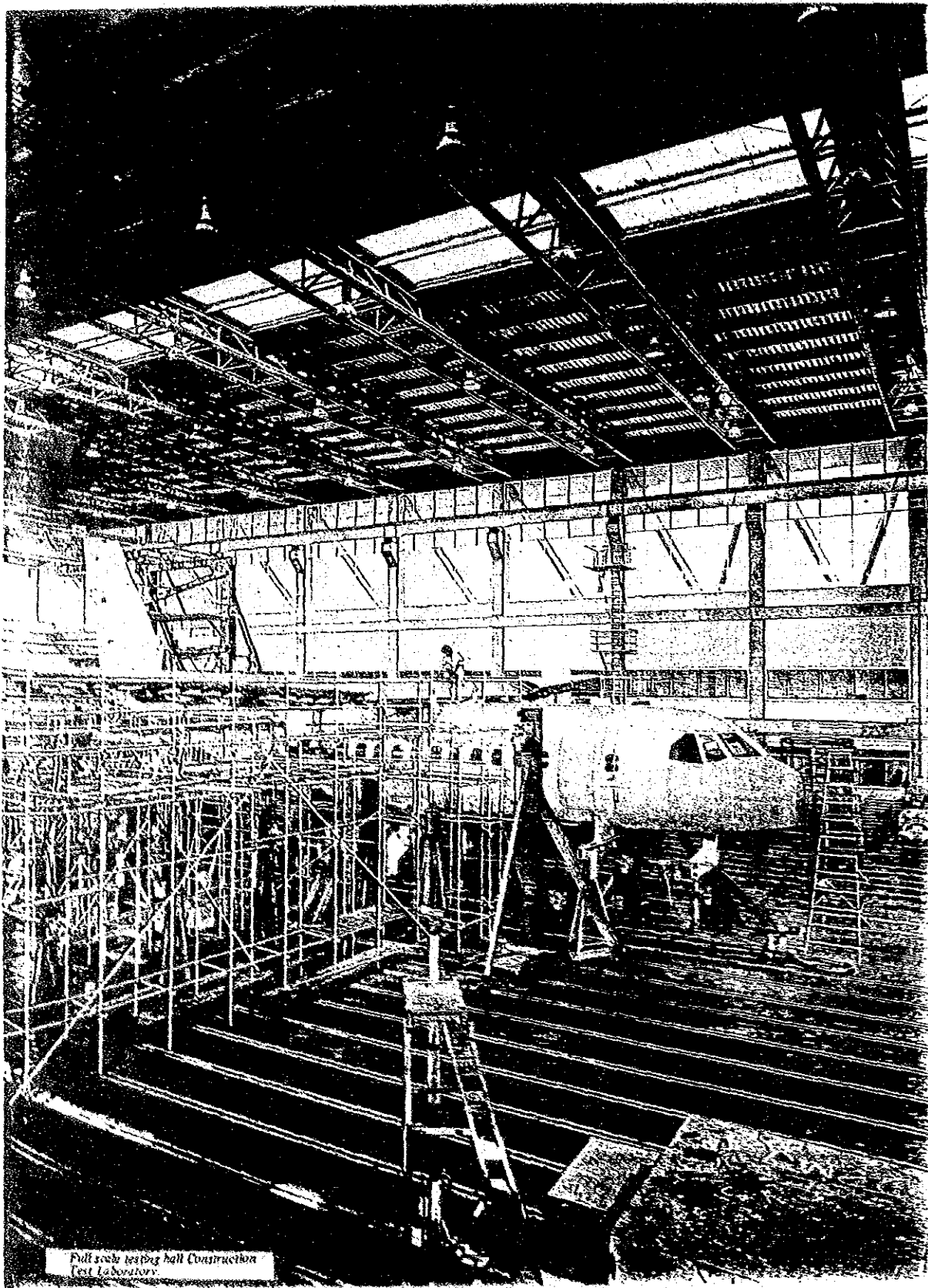
- Testing Hall to the extent of about 1800 m² with a strong floor able to bear the compressive/tensile load



Non Destructive Test — LUK.



Strength of materials, components and structure laboratory.



Full scale testing hall Construction
Test Laboratory.

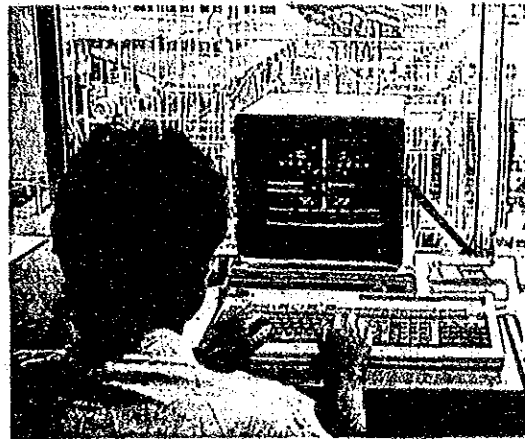
up to 500 KN. It is equipped with an overhead Crane of 20 tons in capacity.

- Hydraulic Loading System which may be regulated by computer, consisting of 6/4 hydraulic power generator units with Hydropuls Servohydraulic Actuators respectively having capacity of 25 – 400 KN with variable stroke.
- Hydraulic Universal Testing Machine with the capacity of 200 KN and 1,000 KN.
- Hydraulic Tensile Testing Machine, with the capacity of 4,000 KN.
- Creep and Stress Relaxation Testing Machine, capacity of 10 KN.
- X-ray instrument, 200 KV, 5mA.
- Ultrasonic test equipment.
- Scanning Electron Microscope, with a magnification to 75,000 times.
- The whole extent of the buildings is 13,500 m² with the installed electrical load about 4 MVA and water consumption 5–6 m³/hour.

Personnel

For the activities outlined above LUK will be staffed adequately. The financial staff will comprise :

- 45 engineers with Dr, Ir, or Dipl. Ing degrees
- 13 engineers with BE of similar degrees
- 65 technicians operators
- 20 skilled workers
- 47 administrative staff



Control Computer Space Construction Test Laboratory (LUK).

3

Thermodynamics, Engine, and Propulsion Systems Laboratory (LTMP) (a BPPT facility)

LTMP, a large group of laboratories, will be equipped with very modern equipment which are able to conduct extensive testing, research and development in the field of machinery.

The facilities consist of :

A. Thermodynamics and Heat Transfer Group :

- Working materials and liquid laboratory which constitutes the facility of research and testing of chemical and physical properties of various working materials and liquids.
- Energy Conversion System laboratory which conducts research and testing on various models, components, and prototype of energy conversion system.
- Heat Conversion Laboratory, equipped with the facilities for research and testing of various components, piping systems and heat screen of heat converting instrument.
- Cryogenics and Environmental Conditioning Laboratory, equipped with the facilities of research and testing of various systems of cooling, heating, air conditioning and supplementary systems.

B. Fluid Machineries Group :

- Pump and Piping Laboratory, which can undertake research and testing of static pressure pump, dynamic pressure pump, piping system, and hydraulic system.
- Water Turbines and Hydraulud Transmission System Laboratory, equipped with the facilities of research and testing of reaction turbines, impulse turbines, aeroplane

propellers, and hydraulic transmission instruments.

- Compressor laboratory, to observe and to test static pressure as dynamic pressure of compressors, fans, blowers, and the like.
- Fluid Mechanics and Cascade Tunnels Laboratory, to observe and to test characteristics of fluids through cascades and dynamics of fluids.

C. Engines and Propulsion System Group :

- Energetics and Emissions Laboratory, to observe and to test various fuels, combustion substances, combustion chamber and its combustion process, gas emission system of piston engine, gas turbines, boiling engine, gas propulsion engine and rocket.
- Piston Engines laboratory, to observe and to test gasoline engine, diesel engines, Wankel engine, STirling engine as well as their supplementary components.
- Steam and Gas Turbines laboratory, to observe and to test various turbine systems, steam as well as gas of open or close cycles.
- Jet Propulsion and Propeller Laboratory, equipped with the facilities of research and testing of turbo-prop engines, turbo-fan, turbo-jet, turbo shaft, ram jet and water jet.
- Rocket fuel laboratory, to observe and to test various forms, characteristics and working reference of rocket fuel.
- Propeller and Components laboratory, to observe and to equalize propellers and driving fan of aircraft or helicopter or hovercraft; air ventilation system, fuel system, lubricating, lighting systems, supercharges and their accessories.

4

Applied Electronics Laboratory (LET) (a LIPI facility)

The development in the field of electronics has now touched many facets of human life. Industrialization is impossible without any support of progressive electronic development. In that framework, the Applied Electronics Laboratory is intended to conduct research and development which will be required within the circle of PUSPIPEK as well as industries in general.

Facilities of LET consist of :

A. Circuit and Instrumentation Group, covering :

- Sub-laboratory of Microwave and Radio wave propagation
- Sub-laboratory of Telephone and Wire Transmission system
- Sub-laboratory of Electronic circuits and instrumentation
- Sub-laboratory of Radio Telecommunication and Broadcasting systems
- Sub-laboratory of Computer and Control system.

B. Electronic Materials and Components Group, covering :

- Electronic materials sub-laboratory
- Sub-laboratory of Components Processing and Devices.

C. Electrical Power Engineering Group, covering :

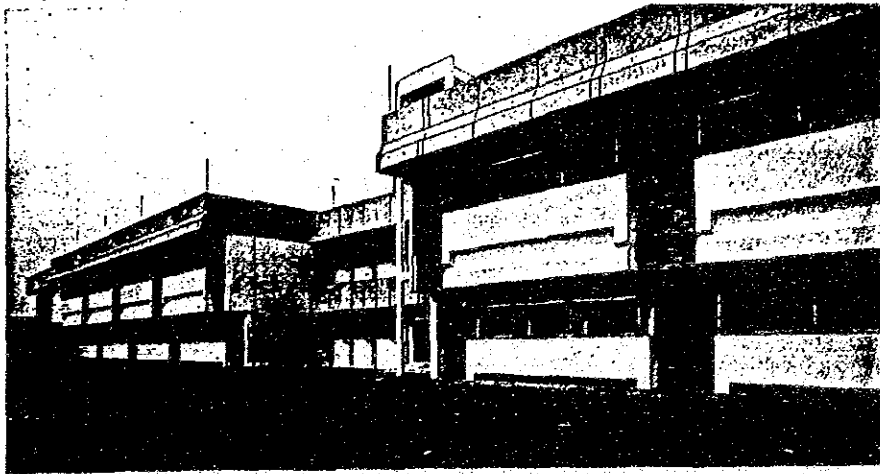
- Sub-laboratory of Electrical Power Engineering
- Sub-laboratory of Utilization of Electric Power Traction Engineering
- Sub-laboratory of Mechanical Engineering.

D. Standardization, Normalization, and Quality Control Group, covering :

- Sub-laboratory of Testing, Quality Control and Standardization
- Sub-laboratory of Application, Development and Industry
- Sub-laboratory of Technical Services Division of Affiliation and Cooperation

E. Personnel :

At the time being there is about 230 personnel at this institute and expected that in 10 years these amount will increase to 700 people approximately.



*Applied Electronics
Laboratory (LET)*

5

Applied Chemistry Laboratory (LKT) (a LIPI facility)

In the world of industry, the role of chemistry is very great, in the chemical industry as well as other industries. The Applied Chemistry Laboratory conducts research and development from basic chemistry to its application to support other laboratories within the circle of the National Centre for Research, Science, and Technology as well as the world of industry in general.

Facilities of LKT consist of :

A. Chemical Analysis Group consisting of the following sub-laboratories :

- General Chemical Analysis
- Basic Chemical Analysis

- Instrumental Chemical Analysis

B. Basic Chemistry Group consisting of the following sub-laboratories :

- Organic chemistry
- Anorganic chemistry
- Physical chemistry
- Polymeric chemistry
- Biochemistry

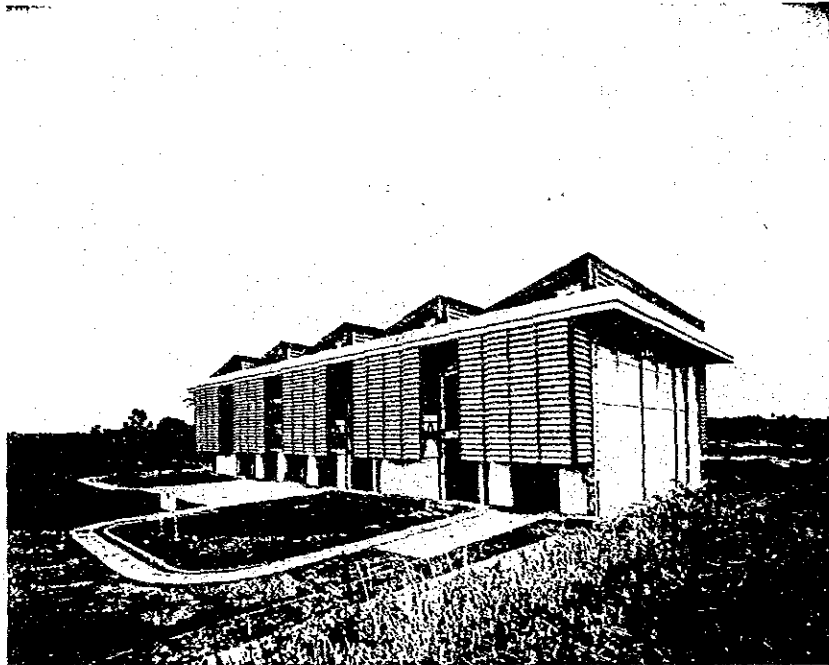
C. Food Chemistry Group consisting of the following sub-laboratories :

- Food technology
- Fermentation
- Microbiology
- Food Evaluation

D. Applied Chemistry Group consisting of the following sub-laboratories :

- Chemistry Technology Operation Unit
- Chemical Processing
- Testing Workshop

Applied Chemistry Laboratory (LKT)



6

Applied Physics Laboratory (LFT) (a LIPI facility)

In order to support the development of various laboratories within PUSPIPTEK as well as industry in general, research and development of fundamental and applied physics are very necessary. It is within this framework that the Applied Physics Laboratory will be equipped with various facilities which will make the research and development possible in the fields of :

- Pure and Applied Physics
- Science and Technology of Materials, such as metal, metal fusion, polymers, ceramics, glass and the like
- Use and application of materials in technical instruments

The available facilities consist of :

A. Sub-laboratory of structure and physical properties which cover aspects of structure and spectrometry, optics, electronics, magnetic field, cryogenics, thermal and mechanical properties, semi-conductor and the like.

B. Sub-laboratory of Solid Technical and Mechanical Properties.

It includes the aspects of Fracture Mechanics, Plasticity, and Elasticity, Materials fatigue, creep, and relaxation, and the like.

C. Sub-laboratory of Technology of Materials

It is to cover metallurgical physics, ferrous and non-ferrous metal, and the like.

D. Sub-laboratory of Polymeric Technology

It includes rheology and its processing, natural polymer, and the like.

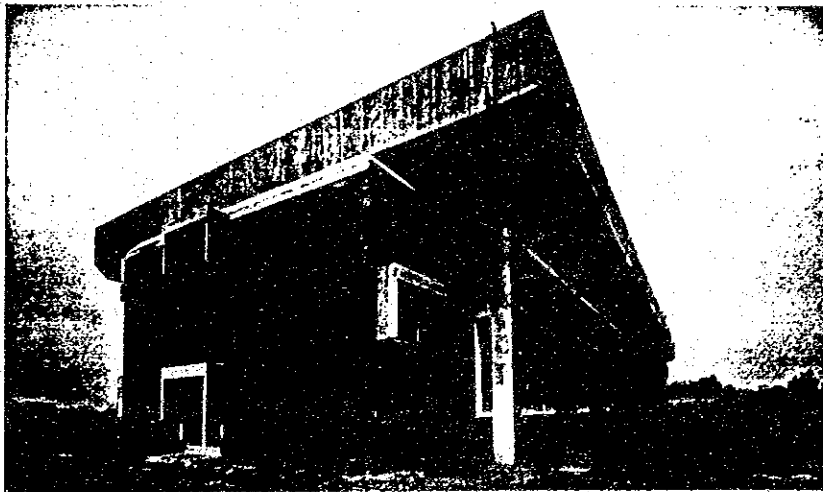
E. Sub-laboratory of Ceramics Technology

It includes high temperature technology, special ceramics for electronic/magnetic/nuclear use, special glasses, glass of ceramics/filters, photo sensitive, optical fibres and the like.

F. Personnel

The total personnel estimated in 1990 will be 500 persons consist of :

- 150 research scientist
- 350 technicians and administrators.



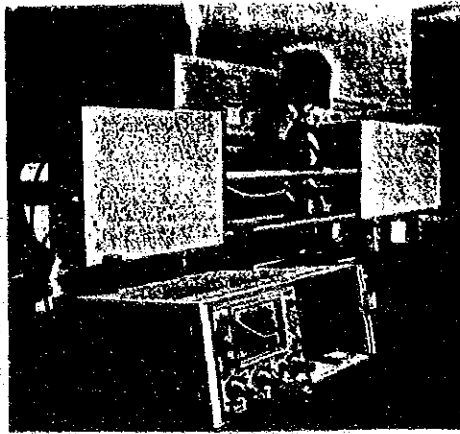
Applied Physics
Laboratory (LFT)

7

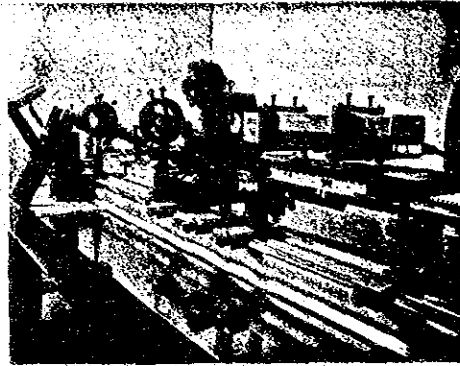
Calibration, Instrumentation and Metrology Laboratory (LKIM) (a LIPI facility)

This laboratory is the main part of the activities of the National Instrumentation Institute – Indonesian Institute of Sciences which has the following basic duties :

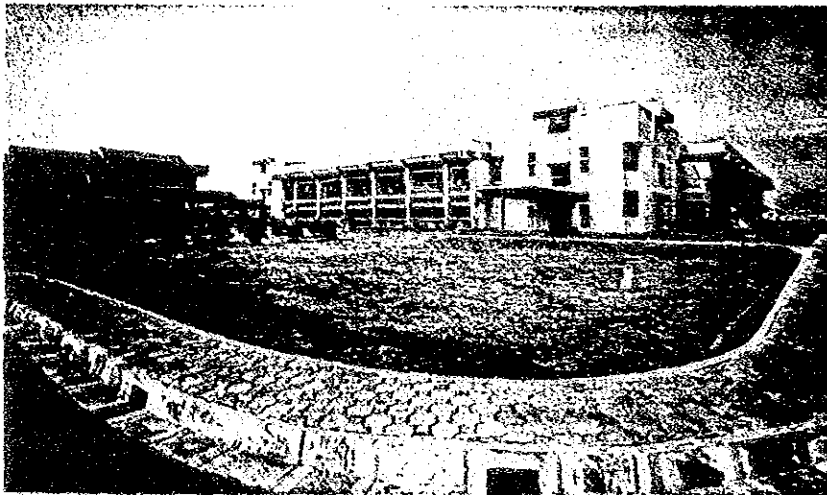
- To conduct research and development in the field of physics and technical metrology especially to realize, to maintain as well as to develop physical and technical units in order to secure national and international standard of measurement.
- To conduct research and development of instrumentation technology and to render services to institutes and industries in the aspects of research, development, design, manufacturing, construction, repair, maintenance, testing calibration and instrument plant.
- To encourage the establishments of instrument industries in Indonesia and to guide them.



Lens Quality Testing – Calibration, Instrumentation and Metrology Laboratory.



Optical testing by means of Laser ray – Calibration, Instrumentation and Metrology Laboratory.



Calibration, Instrumentation and Metrology Laboratory (LKIM)



Lathe (Computerized Numerical Control)

-
- To provide education and training of professionally skilled personnel in the field of instrumentation.
 - To render services of reliable technical documentation and information in the field of instrumentation.

The implementation of the duties will be possible due to the existence of the following facilities :

A. Instrumentation Laboratory

B. Metrology Laboratory

C. Workshops : electronics, optics, mechanics, design, and construction.

The activities of calibration and metrology which can be carried out in this Calibration, Instrumentation and Metrology Laboratory cover almost all the fields such as :

- **Mechanics :**
 - measuring of lengths, angles, pressure, volume, fluid flow, hardness and engineering metrology.
- **Electricity :**
 - measuring of direct current, alternative current, electric magnification, frequency, and time.
- **Thermal :**
 - measuring of temperature, viscosity, and humidity.
- **Optics :**
 - photometry, calorimetry, radiometry, and optoelectronics.
- **Acoustics :**
 - measuring of noise, vibration, ultrasonics, and sound analysis.

8

Applied Metallurgy Laboratory (LMT) (a LIPI facility)

This laboratory specializes in research and development in the field of metallurgy which is very necessary in the world of industry.

The research and development in metallurgy include various aspects, among other things :

- Extractive Metallurgy, covering the cultivation of mining produces, extraction and refining of metals and the like.
- Metal, covering various aspects of treatment of crude metals to produce semi-finished or finished products, for instance casting, welding, metals working and metal finishing.
- Metal conservation, covering techniques and methods of prevention and protection of corrosion on metal.
- Non metal materials, covering refractory materials, materials for metal substitutes and the like.

Facilities of the Applied Metallurgy Laboratory consist of :

A. Extractive Metallurgy Group consisting of the following sub-laboratories :

- Mineral cultivation
- Pyrometallurgy
- Hydrometallurgy
- Chemicals analysis

B. Metal group consisting of the following sub-laboratories :

- Metal alloy
- Metal castings
- Metal refining
- Metal properties
- Electrometallurgy

C. Corrosion Group consisting of the following sub-laboratories :

- Atmospheric corrosion
- Marine corrosion
- Underground corrosion
- Industrial corrosion
- Painting
- Specific corrosion

D. Non-metal materials group consisting of the following sub-laboratories :

- Refractory materials
- Fuels and reducing agents
- Industrial minerals
- Coating and substitution materials

E. Personnel

The laboratory will be staffed with about 250 personnel, in which about 30% is professionals

9

Processing Technology Laboratory (LTP) (a BPPT facility)

This laboratory conducts research and development of various necessary processing technology to support the industrial development.

Under the available facilities, various kinds of research and development may be conducted, in respect of :

- Methods of production of materials, for instance polymers, composite materials, and other materials.
- Mechanical working of materials.
- Chemical and/or physical processing, of materials.
- In Process Material Handling Methods.
- Methods of storing, packaging, and transportation of products.

10

Multipurpose Reactor and its Supporting Laboratories (RSG-LP) (Batan facilities)

Built on land to the extent of about 25 Ha in the central part of PUSPIPTEK, RSG-LP complex constitutes the most completed and integrated facilities for research and development of nuclear technology. Due to these facilities, RSG-LP is able to play the role as motivator and supporter for the effort of the development of nuclear industry for the purpose of peaceful application in Indonesia.

The role is played through the following measures :

- Mastery and development of nuclear science and technology
- Education and training of experts and skilled personnel in the field of nuclear
- Production of basic elements for nuclear processes.

The main facilities of RSG-LP consist of :

A. Multipurpose Reactor

It is a nuclear multipurpose reactor plant (MPR-30) completed with its supporting system. With the capacity of thermal power 30 MW, the reactor has several irradiation facilities used for fuel element test, production of radioisotope, and several experiments.

B. Radioisotope Production Installation, functioning to process radioisotope of irradiation in the terrace of MPR-30 into various kinds of isotopes and indicated compounds for industry, hydrology, medical science and the like.

C. Experimental Fuel Element Installation, functioning to observe and to produce nuclear fuel element for the Nuclear Power Generating Plant of heavy water.

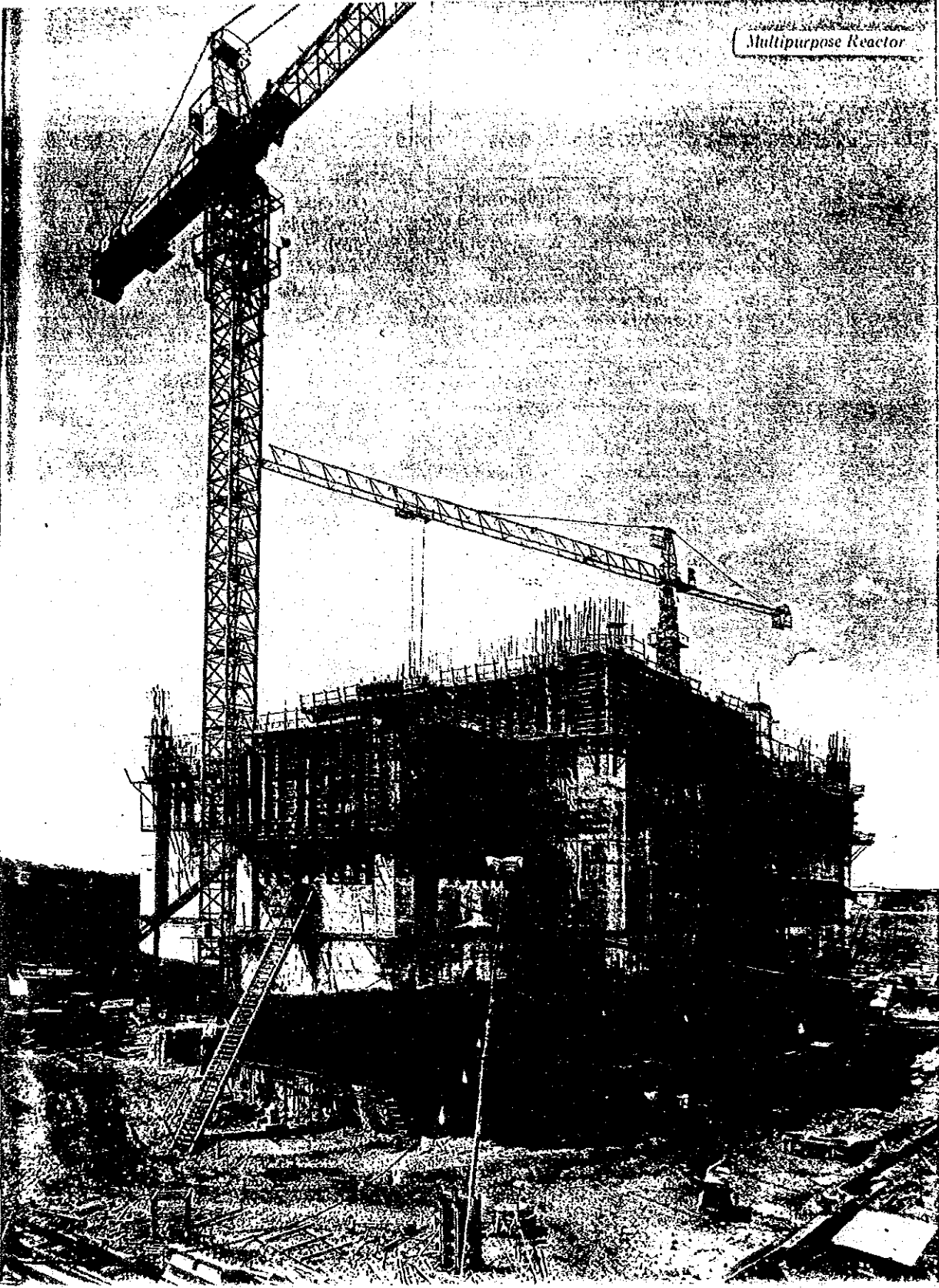
• Research Reactor Fuel Element Production Installation, functioning to produce nuclear fuel element to meet the demand for fuel of MPR-30, namely $UAlx$ and $U_3O_8 Al$.

D. Radiowaste Installation, in addition to functioning to process radioactive substances of RSG-LP complex, also being a facility to conduct research and development of technology of radioactive waste processing.

E. Radiometallurgy Laboratory, functioning to examine the properties of metallurgy of nuclear substances as the reactor components after irradiation test in the terrace of MPR-30. This facility has the capacity for non-destruction test (NDT) as well as destruction test.

F. Engineering and Safety Laboratory, functioning to test power reactor components in the field of transfer of heat, cooling water chemistry and thermohydraulics.

Multipurpose Reactor



This test is also required to obtain information on the reliability and safety of the components or system of the reactor.

G. Nuclear Mechano-electronics Laboratory, functioning to carry out maintenance, development, and production of nuclear instrumentation components. The laboratory equipped with mechanic, electric, electronic and computer shops may also be used for the development of mechanic and electric components in supporting nuclear experiments as well as data processing system.

II. Fundamental Research Laboratory, functioning to conduct basic research in the field of nuclear physics/chemistry. This facility is a supplement to the similar research facility owned by BATAN at an other place.

I. Personnel

The total estimated in 1985 will be 430 persons, which consist :

- 148 graduate degrees
- 195 technicians
- 87 personnel administration

11

Natural Disasters Mitigation Laboratory (LMBA) (a BPPT facility)

Natural disasters such as earthquake, flood, typhoon, landslide, and volcanic eruption always give rise to disasters and very great damages to the community and life.

Efforts should be directed to avoid negative impacts of disasters.

Within that framework it is necessary to conduct a profound research on the nature and behaviour of the natural disasters in order to understand and to find the right methods of safety.

The function of LMBA is directed to be used as :

- Natural Disasters Data Centre.
- Advisory Agency in the case of means, techniques, and methods of safety against natural disasters.

- Research centre on the application of science and technology of natural disaster resistance construction.
- Education and Training Centre for Experts in overcoming natural disasters.

Facilities of LMBA consist of :

- Natural Disasters Instrumentation and Data Collecting Centre.
- Bad Weather Mitigation Sub-laboratory.
- Earthquake Mitigation Sub-laboratory.
- Volcanic Mitigation Sub-laboratory.

12

Energy And Energy Resources Laboratory (LSDE) (a BPPT facility)

The general role/function of the Laboratory for Energy and Energy Resources (LSDE) :

1. To help in developing of national capability in the energy technologies, in order to meet the energy demand for the future.
2. To contribute integrated thinking for national energy policy.
3. To contribute strategic planning for energy industry development.
4. To support national efforts in the field of sectoral energy development.

Activities of LSDE :

The laboratory for Energy and Energy Resources (LSDE) will conduct research in energy technologies such as alternative energy sources (to oil) which has a wide effects in a short period of time for the national development program and the future energy technology; special software

research in the energy conservation and energy economic and also (software & hardware) research in the equipment system of the present and future energy industry technology.

The activities which have to be developed are :

1. Alternative energy sources which have immediate effect for the national development.

The programs that are included in the activity such as :

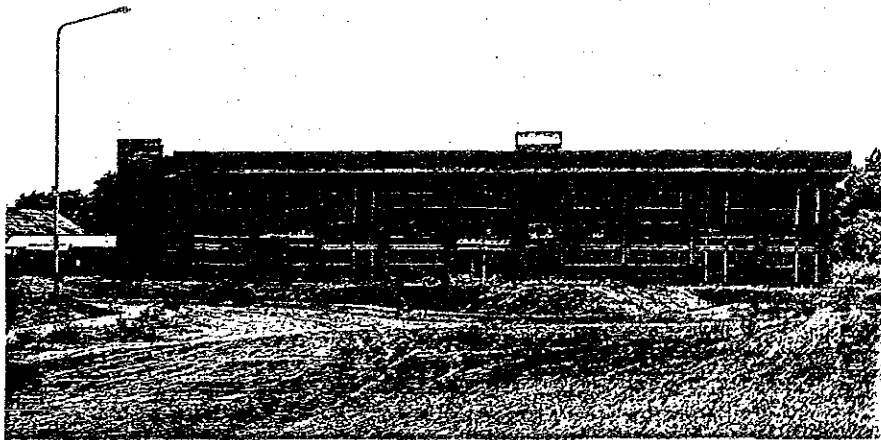
- Solar & Wind energy
- Biomass energy
- Gasification & liquification
- and rural energy technology.

2. Energy technologies for the future, such as :

- M H D (Magneto Hydro Dinamics)
- O T E C (Ocean Thermal Energy Conversion)
- e t c.

3. Energy conservation for :

- Transportation, industry & household
- Combined cycles in the power station
- e t c.



Energy and Energy Resources Laboratory (LSDE)

4. Energy economics, energy modelling for the development strategy.
5. Development of energy industri, such as :
 - Coal combustion e.g Fluidized bed
 - Geothermal energy sistem
 - Micro hydro system
 - e t c.
6. Development of energy sectoral, such as :
 - Energy and transportation
 - Energy & development of remote areas
 - e t c.

And the present activities which have been carried out in BPPT are :

- a. Utilization of solar energy and rural energy sources
- b. Production & application of Methanol as energy
- c. Utilization of agricultural product as energy
- d. Utilization of geothermal energy
- e. Research on utilization of coal
- f. Ethanol from sweet potatoes
- g. Energy modelling
- h. Alternative energy sources for rural development.

Laboratory Building & Facilities

The building lay out was designed to accomodate laboratories and workshop facilities efficiently. Offices are located in a separated building. The designed buildings are made in a modular system, which can be built gradually with high usage flexibility.

All the building complex will be devided according to this purpose :

1. Laboratory
2. Workshop & supporting facilities
3. The building for pilot plants
4. Open space facility
5. Administration building, containing :
 - A. Working facilities for scentist & staff
 - B. Library
 - C. Computer Center
 - D. Conference & meeting rooms
 - E. Administration offices.

The total complex area is approx 21.000 m², that consist of :

- Laboratory complex area : 10.000 m²
- Offices complex area : 5.000 m²
- Open space complex area : 6.000 m²

1. Laboratory

The laboratories which are planned, i.e :

- a. Special Chemical laboratory, for supporting the biomass & gasification/liquifaction programs and Physical * Biological Chemistry activities
- b. Laboratory for solar energy & solar physics
- c. Physics laboratory for heat, plasma and electric
- d. Special biological laboratory.

2. Workshop

Some special workshop are planned, i.e :

- a. Mechanical workshop to support pilot plants & hardware development
- b. Instrumentation and electronic workshop
- c. Glassware workshop
- d. Fine mechanics workshop

Total area of this workshops is approx 1000 m².

3. Open space facilities

The open space facilities consists of :

- a. Hard yard that is needed to support pilot plants (1000 m²)
- b. Grass yard for some experiment in solar energy, such as solar reflector, photovoltaic, etc (300 m²)
- c. Ponds for biogass experiment purposes (2000 m²).

Personnel & Organization Plan

Generally the personnel of LSDE will consist of principal investigators, senior scientist, junior scientist, trainees and supporting personnel. Experts from various fields will be grouped together to do the project. The group consist of a principal investigator, senior & junior scientist and trainees.

The field of expertise which have to be developed are :

1. Solar energy
2. Biomass
3. Gasification/liquifaction
4. Heat & Mechanics
5. Plasma & Electric
6. Energy economics

The laboratory staff requirments are as follows :

- 14 principal investigators
- 28 senior scientist
- 84 junior scientist
- 110 trainees
- 226 supporting personnels.

Supporting Facilities

A. Conference & Information Centres (in planning stage)

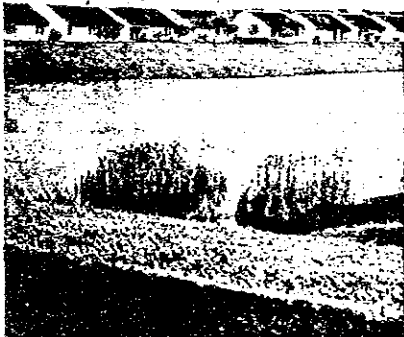
This centre functions to organize various scientific activities such as lectures, discussions, workshops, seminars, conferences, and the like. This centre is also equipped with the facilities to carry out scientific documentation displays usually conducted within the framework of scientific meetings. With a building to the extent of about 5,000 m² there is a main hall with a capacity of 500 persons, in addition to other small conference rooms.

In addition, accommodation facilities are also required for visiting scientists who attend scientific meetings or stay at PUSPIPTEK within the framework of research cooperation.

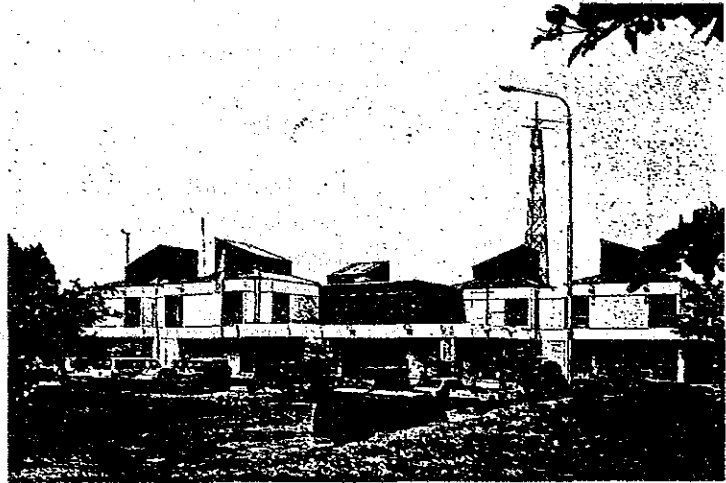
The scientists accommodation facilities with a capacity of 150 rooms are also equipped with the main veranda, room and other facilities as those made available at hotels in general.

B. Office Centre (in planning stage)

As the centre for the improvement of coordination of planning and implementation of policies in the field



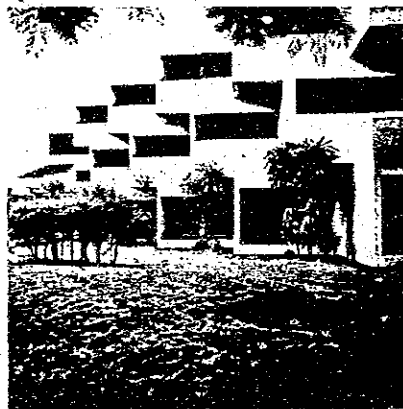
Housing



Project Management Office

of research, science and technology, its function are :

- To evaluate the development of science and technology.
- To evaluate resources of Indonesia.
- To study and to evaluate the perspective of long term development.
- To establish operational policies in the field of research of science and technology.
- To prepare plans and to follow the progress of the realization of the policies.



Guest House

Offices for the Indonesian Academy of Sciences (AIPI) the National Research Board (DRN) and other National Policy and Advisory Bodies will be located in this area.

The head office of the management of PUSPIPTEK area organizing the operation and maintenance of public utilities and other facilities of the PUSPIPTEK complex will also be located in this area.

C. Botanical Garden (under construction)

A botanical garden is developed as an integral part of PUSPIPTEK area, making use of the parts of slopes and valleys found in various parts of PUSPIPTEK area. The botanical garden which emphasizes scarce species in Indonesia is very beneficial its preservation species, but at the same time it is useful within the framework of researches by the National Botany Agency which manages it. The existence of this Botanical Garden does not only make PUSPIPTEK area more beautiful, but also is very helpful for the everlasting environment around PUSPIPTEK area. As a whole, the land of this botanical garden is to the extent of about 10 Ha.

D. Scientists Residence (partially finished)

Success of PUSPIPTEK is not also determined by its laboratory facilities.



Botanical garden

but also the facilities for personal life of the scientist and other employees. Therefore, the scientists residence is prepared to create a conducive atmosphere enhancing social communication amongst the scientists.

The residence area located on the area to the extent of about 120 Ha to the east of PUSPIPTEK complex provides about 700 units of houses which constitute single houses, couple houses or arcades. There are various types with a floor area of 50 m², 70 m², 90 m², and 120 m² allocated for various classifications of personnel as determined by the prevailing government regulations.

E. This residence area is also equipped with various supplementary facilities which offer much convenience in daily family life such as :

- School buildings; kindergarten, state elementary school and state junior public high school, all of which are located within the complex of PUSPIPTEK residence area.



Water tower

- Community Centres, shopping centre providing various daily needs such as market, shop, restaurant, meeting hall, post office, bank, barber shop, tailor, and the like.
- Worship Centres, which provide the facilities of religious services for Moslems, Catholics, and Protestants. They are equipped with the facilities of religious education and discussion.
- Sports Centres, which provide various sports facilities such as football, athletics, tennis, badminton, basket ball, volley ball and swimming.

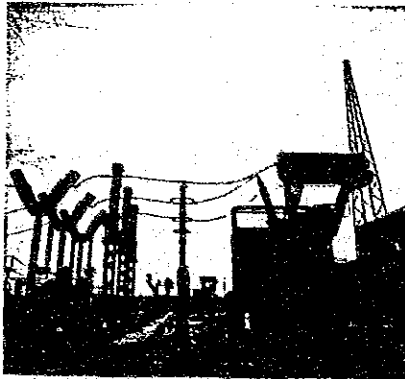
Infrastructure (partially in operation)

The whole PUSPIPTEK area is equipped with various infrastructures, namely :

A. Electric Power

It is supplied by the State Electricity Enterprise (PLN) by means of a central switch yard especially built within the area of PUSPIPTEK under the installed power of 2 x 60 MVA with the tension of 20 KV. In order to secure the reliability of the switch yard, it is connected to the main grid of Jawa under the extra-high tension line of 300 KV.

The distribution within the area of PUSPIPTEK is carried out by means



PLN Transformer switch yard for PUSPIPTEK

of 2 (two) connecting cubicles of 20 KV organized in circle networks. Especially for the improvement of the reliability of the electricity supply to the Nuclear Reactor, the third special line was added directly from the main switch yard to the electrical cubicle within the reactor.

B. Drinking Water Supply

It is produced by the Drinking Water Purification Unit of PUSPIPTEK using the water of the river Cisadane as raw material. The two existing units have respectively a capacity of 100 litres/second.

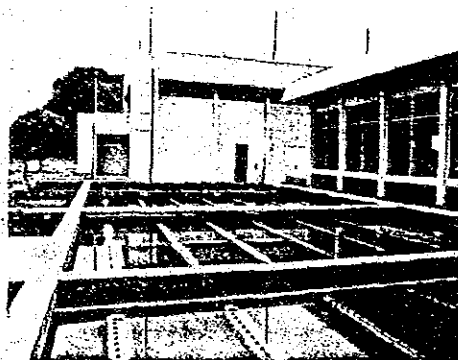
The distribution network has its centre at the water tower of 600 m³ with circular network to every sector which secures the smooth supply of drinking water at any time.

As the main network of distribution is also utilized as fire extinguishment network, at certain spots hydrant poles are installed.

The capacity of the network is also adjusted to the need of fire extinguishment.

C. Cooling Water of Machines

They are especially supplied for the laboratories which require cooling water in high quantity and continuously, namely : reactor and LTMP. The cooling



Water Purification Unit

water is processed from water of the river Cisadane by means of a special processing unit of 3,30 m³/day and was kept in an artificial reservoir of about 18,000 m³.

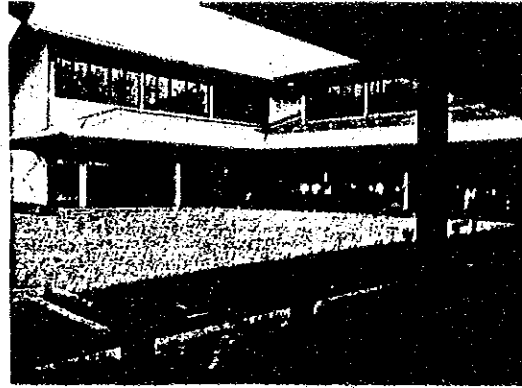
D. Telephone system

Telephone system is centralized through PUSPIPTEK telephone centre which is to be distributed to the necessary places. Thus, any and all conversations within the area will not be liable to fee by Perumtel. The connection capacity is to the maximum number of 3,500 sets with the maximum number of 360 Perumtel lines.

E. Waste Processing System

The waste processing system is centralized while the waste water is processed first to meet the requirement for discharge to the river Cisadane. The solid waste is collected and settled by means of land fill or burned according to their respective properties.

F. Road/parking area/Road illumination/water drainage are constructed according to the need.



Elementary School