(4) 日本人専門家の派遣について

（ANNEX－Ⅱ JAPANESE EXPERT）

インドネシア側は、カウンターパートの人数を明示した我が方原案を受け入れることと引き替えに、日本人専門家の人数をも明示するよう要望した。

我が方はこれに対し、日本側暫定実施スケジュール（原案）に示されている専門家人数をR／D上にも明記することでインドネシア側の了解を取り付けた。

この結果R／Dに記載された日本人専門家の分野、人数、及びこれに対応するインドネシア側カウンターパートの分野、人数は下記のようになった。

日本人専門家		インドネシア側	
Experts in the fields of;		カウンターパート	
1. Chemical Engineering	(1)	Chemical Engineering	(2)
2. Industrial Chemistry	(2)	Industrial Chemistry	(4)
3. Mechanical Engineering	(1)	Machanical Engineering	(2)
4. Instrument Engineering	(1)	Instrument Engineering	(2)
5. Coordination			

(5) 供与機材について

（ANNEX－Ⅲ LIST OF MAIN ARTICLES）

供与機材に関しては、インドネシア側より詳細なリスト（調査団試算ＣＩＦベース316百万円相当）の提出がなされたが、我が方は、1）旋盤等の工作機械の台数が多いこと、2）高級な装置が含まれていること等を考慮して、これを概算ＣＩＦベース190百万円程度に削減することを目安にして品目毎の交渉を行なった。

1）について我が方は、本センターは職業訓練センターではないこと、又、建物のスペースを勘案するとインドネシア側の要望する台数を設置する余地がないことの理由により、台数の削減を主張した。

これに対し、インドネシア側は、最終的には我が方の説明を了解し、工作機械類については、メダン近辺の職業訓練学校の機械を使用する等により台数を必要最少限にすることで納得した。

また2）については、本チームの訪問したボゴールの化学分析アカデミー・スクールの規模及び講師陣の配置状況から見ても、同センター開所当所から設置することは非常に効率が悪いため、我が方としては、機材の活用については余程慎重の構えをとるべき旨、長時間の議論の中で強く主張した。この結果、最終的にインドネシア側はこれを了解し、原側的に本センターの初期段階では必要ないが、将来必要となる可能性があるとの了解のもとに高級な機器は削除することで双方の合意をみた。

3. そ の 他

(1) インドネシア側カウンターパートの確保

本チームは、工業省次官、同省基礎化学工業総局次長等への表敬の機会をとらえて、本プロジェクトの成否はインドネシア側カウンターパートの確保にかかっており、特に本センターが外領地であるスマトラに設立されることから本センターのカウンターパートは大学、工業省傘下の研究所及びアカデミー・スクール並びに国営企業等から全国的にリクルートして欲しい旨再三にわたり要望した。

この結果、工業省教育訓練センター局のスブロト局長より具体的なリクルートメント計画は昭和56年末までに日本側に提示できる旨の言明がなされた。

また、本チームがメダンに在る北スマトラ大学を視察した際に、同大学工学部長より、本センターにおける具体的な履習科目の提示が工業省より同大学にあれば講師派遣についての協力の用意がある旨述べている。

(2) 今後のプロジェクトの推進について

今後本センターの円滑な運営を図るため、早い機会にプロジェクト推進要員として専門家の派遣が望まれるとの意向が、日本大使館の担当書記官より示されたが、本チームとしても、今回の交渉経過から、その必要性を痛感した。

4. 合意議事録及び暫定実施スケジュール

討議に基づき、最終的な合意を得て作成された合意議事録（R／D）及び暫定実施スケジュール（T.S.I）の内容は以下の通りである。

(1) 合意議事録

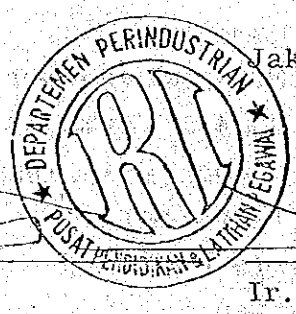
THE RECORD OF DISCUSSIONS BETWEEN THE JAPANESE IMPLEMENTATION SURVEY TEAM AND THE AUTHORITIES CONCERNED OF THE GOVERNMENT OF THE REPUBLIC OF INDONESIA ON THE JAPANESE TECHNICAL COOPERATION FOR THE PROJECT ON THE CHEMICAL INDUSTRY TRAINING AND DEVELOPMENT CENTER

The Japanese Implementation Survey Team (hereinafter referred to as " the Team ") organized by the Japan International Cooperation Agency (hereinafter referred to as JICA) and headed by Dr. Ryuzo Naito, Senior Technical Advisor, JICA, visited the Republic of Indonesia from November 5 to 21, 1981 for the purpose of working out the details of the technical cooperation program concerning the Project on the Chemical Industry Training and Development Center.

During its stay in the Republic of Indonesia, the Team exchanged views and had a series of discussions with the Indonesian Authorities concerned in respect of the desirable measures to be taken by both Governments for the successful implementation of the above-mentioned Project.

As a result of the discussions, the Team and the Indonesian authorities concerned agreed to recommend to their respective Governments the matters referred to in the document attached hereto.

Jakarta, November 19, 1981



Dr. Ryuzo Naito	Ir. Soebroto
Leader,	Chief,
Japanese Implementation Survey Team,	Education & Training Center,
Japan International Cooperation Agency,	Ministry of Industry,
Japan	The Republic of Indonesia

THE ATTACHED DOCUMENT

I. COOPERATION BETWEEN BOTH GOVERNMENTS

1. The Government of Japan and the Government of the Republic of Indonesia will cooperate with each other in implementing the Technical Cooperation Project on the Chemical Industry Training and Development Center (hereinafter referred to as " the Project ") for the purpose of training engineers and technicians in the fields of chemical engineering and preparing technical service system for the local chemical industries, thereby contributing to the development of chemical industries in the Republic of Indonesia.

2. The Project will be implemented in accordance with the Master Plan which is given in Annex I.

II. DISPATCH OF JAPANESE EXPERTS

1. In accordance with the laws and regulations in force in Japan, the Government of Japan will take necessary measures through JICA to provide at its own expense services of the Japanese experts as listed in Annex II through the normal procedures under the Colombo Plan Technical Cooperation Scheme.

2. Privileges, exemptions and benefits to be granted by the Government of the Republic of Indonesia to the Japanese experts and their families in the Republic of Indonesia will be no less favourable than those granted to experts of third countries or of international organizations performing similar missions, and will include the followings:

(1) Exemption from income tax and charges of any kind imposed on or in connection with the living allowances remitted from abroad in relation with the implementation of the Project;

(2) Exemption from import and export duties and any other charges imposed in respect of personal and household effects which may be brought into from abroad or taken out of the Republic of Indonesia;

(3) Exemption from import tax, import sales tax, sales tax, and other taxes and charges of any kind imposed on or in connection with the purchase in the Republic of Indonesia by the Japanese experts of one motor vehicle per each expert;

(4) Free local medical services and facilities to the Japanese experts and their families.

III. PROVISION OF MACHINERY AND EQUIPMENT

1. In accordance with the laws and regulations in force in Japan, the Government of Japan will take necessary measures through JICA to provide at its own expence such machinery, equipment and other materials necessary for the implementation of the Project as listed in Annex III, through the normal procedures under the Colombo Plan Technical Cooperation Scheme.

2. The articles referred to in 1 above will become the property of the Government of the Republic of Indonesia upon being delivered c.i.f. to the Indonesian authorities concerned at the ports and/or airports of disembarkation, and will be utilized exclusively for the implementation of the Project in consultation with the Japanese experts referred to in Annex II.

IV. TRAINING OF INDONESIAN PERSONNEL IN JAPAN

1. In accordance with the laws and regulations in force in Japan, the Government of Japan will take necessary measures through JICA to receive at its own expense the Indonesian personnel connected with the Project for technical training in Japan through the normal procedures under the Colombo Plan Technical Cooperation Scheme.

2. The Government of the Republic of Indonesia will take necessary measures to ensure that the knowledge and experience acquired by the Indonesian personnel from technical training in Japan will be utilized effectively for the implementation of the Project.

V. SERVICES FOR INDONESIAN COUNTERPART PERSONNEL AND ADMINISTRATIVE PERSONNEL

1. In accordance with the laws and regulations in force in the Republic of Indonesia, the Government of the Republic of Indonesia will take necessary measures to secure at its own expense necessary services for Indonesian counterpart personnel and administrative personnel as listed in Annex IV.

2. As to the Indonesian counterpart personnel, the Government of the Republic of Indonesia will endeavour to allocate the necessary number of suitably qualified personnel corresponding to each Japanese expert to be dispatched by the Government of Japan as specified in Annex II, for effective and successful implementation of the Project.

VI. MEASURES TO BE TAKEN BY THE GOVERNMENT OF THE REPUBLIC OF INDONESIA

1. In accordance with the laws and regulations in force in the Republic of Indonesia, the Government of the Republic of Indonesia will take necessary measures to provide at its own expense:

(1) Land, buildings and facilities as listed in Annex V;

(2) Supply or replacement of machinery, equipment, instrument, vehicles, tools, spare parts and any other materials necessary for the implementation of the Project other than those provided through JICA under III above;

(3) Transportation facilities and travel allowance for the Japanese experts for the official travel within the Republic of Indonesia;

(4) Suitably furnished accommodations for the Japanese experts and their families.

2. In accordance with the laws and regulations in force in the Republic of Indonesia, the Government of the Republic of Indonesia will take necessary measures to meet:

(1) Expenses necessary for the transportation within the Republic of Indonesia of the articles referred to in III above as well as for the installation, operation and maintenance thereof;

(2) Customs duties, internal taxes and any other charges, imposed in the Republic of Indonesia on the articles referrec to in III above;

(3) All running expenses necessary for the implementation of the Project.

VII. ADMINISTRATION OF THE PROJECT

1. The Chief of Education and Training Center will bear overall responsibility for the implementation of the Project and the Director of the Chemical Industry Training and Development Center will be responsible for the administrative and managerial matters of the implementation of the Project.

2. Japanese Chief Advisor and other experts will provide necessary recommendation and advice to the Chief of Education and Training Center and to the Director of the Chemical Industry Training and Development Center on the technical matters concerning the implementation of the Project.

3. For the effective and successful implementation of the Project, a Joint Committee (hereinafter referred to as " the Committee ") will be established as referred to in Annex VI.
The Committee will have the functions to prepare the Annual Work Plan and consult any matters related to the implementation of the Project, and will be held when necessity arises.

VIII. CLAIMS AGAINST JAPANESE EXPERTS

The Government of the Republic of Indonesia undertakes to bear claims, if any arises, against the Japanese experts engaged in the Project resulting from, occuring in the course of, or otherwise connected with the discharge of their official functions in the Republic of Indonesia except for those arising from the wilful misconduct or gross negligence of the Japanese experts.

IX. MUTUAL CONSULTATION

There will be mutual consultation between the two Governments on any major issues arising from, or in connection with this Attached Document .

X. TERMS OF COOPERATION

The duration of the technical cooperation for the Project under this Attached Document will be basically five (5) years from November 19, 1981. However, there will be a general review by the Committee on the progress of the implementation of the Project after three (3) years from the commencement of the cooperation taking account of measures to be taken by two Governments in order to decide if the cooperation should be continued for two (2) more years.

ANNEX - I

MASTER PLAN

1. Main functions of the Center are;

   (1) to establish Academy Courses to train middle class engineers in the fields of chemical engineering and mechanical engineering,

   (2) to conduct Short-Term Courses for engineers and technicians from industries and others

   and

   (3) to prepare technical service system to meet the technical requirements of the local chemical industries.

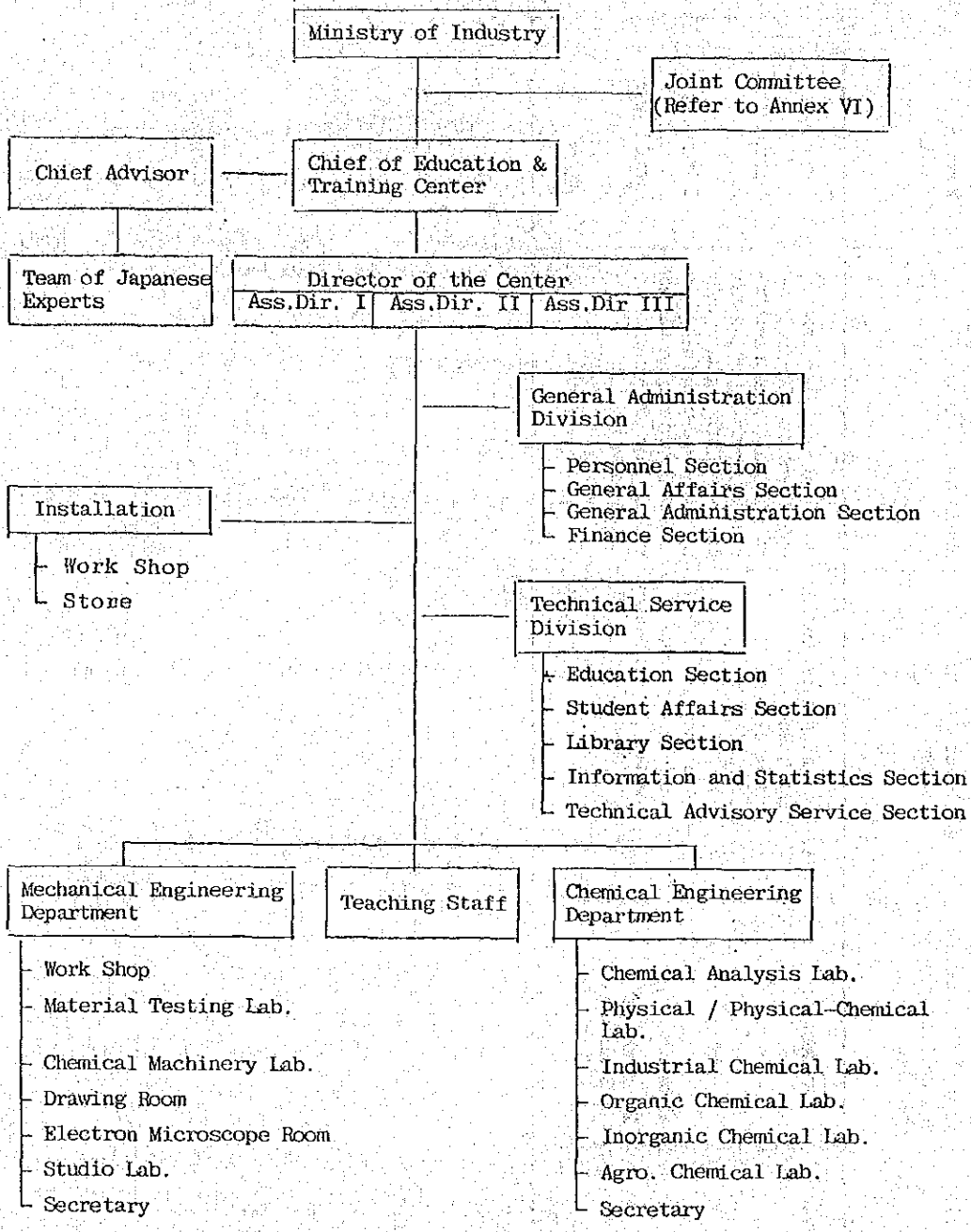
2. The training scheme of the Academy Courses is shown in the following table.

Note: Discussions on the actual planning of the Short-Term Courses are to be made between the Japanese and Indonesian authorities concerned in due course of time.

THE TRAINING SCHEME

Items / Course	Period	Number of students and trainees to be enrolled	Qualification for entry	Training Target	Number of class
Academy Courses Chemical Engineering Course Mechanical Engineering Course	3 years	Students : 150 (Maximum) 25 students x 2 classes x 3 grades	1. Graduates from senior high schools or technical high schools 2. Those who are equivalent to the graduates from senior high school	To supply middle class engineers in the fields of operation, maintenance and engineering necessary for chemical industries by means of providing basic technical knowledge and ability on chemical industries	6 classes (Maximum) 2 classes per enrollment

3. Organization for Implementation



Foot Note: - Assistant Director I : Academic Affairs

- Assistant Director II : Finance, Personnel and Administration Affairs

- Assistant Director III : Student Affairs.

ANNEX - II

JAPANESE EXPERTS

Experts in the fields of:

1. Chemical Engineering (1)
2. Industrial Chemistry (2)
3. Mechanical Engineering (1)
4. Instrument Engineering (1)
5. Coordination (1)

Note: (1) One of the above-mentioned experts will be appointed as the Chief Advisor.

(2) Short-term experts may be dispatched, if necessary, for the installation of the equipment and machinery provided by the Government of Japan and for other purposes.

ANNEX - III

LIST OF MAIN ARTICLES

1. Chemical Analysis Lab.

   (1) Potentiometer
   (2) Centrifuge
   (3) Magnetic Stirrer
   (4) Drying Oven
   (5) Rough Balance
   (6) Glasswares and Chemicals for Chemical experiments

2. Physical/Physical Chemical Lab.

   (1) Technical Balance weight set.
   (2) Specific heat specimen set
   (3) Optical benches with accessories
   (4) Hook's law apparatus
   (5) Wheatestone bridge
   (6) Thermostat
   (7) Equilibrium distillation still
   (8) Victor Meyer apparatus
   (9) Glasswares and Chemicals for Chemical experiments

3. Industrial Chemical Lab.

   (1) Electrolysis apparatus
   (2) Electro plating apparatus
   (3) Pressure/Vacuum Pump
   (4) Variable transformer
   (5) Absorption apparatus
   (6) Glasswares and Chemicals for Chemical testing

4. Material Testing Lab.

   (1) Ultrasonic Flaw detector
   (2) Metallurgical microscope
   (3) Montring (mixer)

ANNEX - III
(cont'd)

5. Chemical Machinery Lab.

(1) Analytical balance
(2) Wet tester
(3) Heat exchanger
(4) Abbe refractometer
(5) Drying Oven

6. Drawing Room

(1) Drawing Instrument with accessories;
- triangles, scales, ruling pens, dividers, compass, adjustable curves, lettering sets, electric erraser, templetes.

7. Inorganic Chemical Lab.

(1) Furnace (muffle)
(2) Thermal gravimetric analyser
(3) Glasswares and Chemicals for Chemical testing

8. Organic Chemical Lab.

(1) Distillation apparatus with accessories
(2) Ultra filtration apparatus with accessories.
(3) Rotary viscosimeter
(4) Surface tensiometer
(5) Refractometer
(6) Glasswares and Chemicals for Chemical testing.

9. Agro Chemical Lab.

(1) Incubator
(2) Autoclave
(3) Fermentator
(4) Refrigerator
(5) Titrimeter
(6) Glasswares and Chemicals for Chemical testing.

ANNEX - III
(cont'd)

10. Electron Microscope Room

(1) Developer (film) with accessories
(2) Glasswares and Chemicals for chemical experiments

11. Workshop

(1) Frash machine
(2) Lathe
(3) Drill press
(4) Milling machine
(5) Power Hack Saw

12. Vehicles

13. Other Necessary Equipment

ANNEX - IV

LIST OF INDONESIAN STAFF

1. Director of the Center

2. Counterpart personnel to the Japanese experts

   (1) At least ten (10) engineers corresponding to the fields of the experts as listed in Annex II.

(i)	Chemical Engineering	(2)
(ii)	Industrial Chemistry	(4)
(iii)	Mechanical Engineering	(2)
(iv)	Instrument Engineering	(2)

   (2) Necessary number of technicians mutually agreed upon.

3. Administrative Staff

   (1) Administration
   (2) Accounting
   (3) Clerical work

4. Other personnel mutually agreed upon as necessary.

ANNEX - V

LIST OF LAND, BUILDINGS AND FACILITIES

1. Space of land and buildings when necessity arises

2. Office rooms for the experts

3. Conference rooms

4. Library

5. Others

ANNEX - VI

MEMBERS OF THE JOINT COMMITTEE

1. Chairman: Director General of Basic Chemicals Industry, Ministry of Industry

2. Indonesian Side

(1) Chief of Education and Training Center
(2) Director of the Center
(3) Officials of the Ministry of Finance
(4) Officials of BAPPENAS
(5) Officials of SET/KAB
(6) The other personnel concerned

3. Japanese Side

(1) Chief Advisor
(2) The other experts and personnel concerned to be dispatched by JICA, if necessary
(3) Resident Representative of Jakarta Office, JICA.

Note: Officer-in-charge of the Embassy of Japan will be able to attend the Joint Committee meetings as an observer.

(2) 暫定実施スケジュール

TENTATIVE SCHEDULE OF IMPLEMENTATION AND TECHNICAL COOPERATION PROGRAM OF THE TECHNICAL COOPERATION FOR THE PROJECT ON THE CHEMICAL INDUSTRY TRAINING AND DEVELOPMENT CENTER

The Japanese Implementation Survey Team and the representatives of the Education and Training Center have jointly formulated the Tentative Schedule of Implementation and the Technical Cooperation Program of the Project as annexed hereto.

These have been formulated in connection with 1-2 of the Attached Document of the Record of Dicsussions signed between the Japanese Implementation Survey Team and the Education and Training Center for the Technical Cooperation Project of the Chemical Industry Training and Development Center in the Republic of Indonesia on the conditions that necessary budget will be allocated for the implementation of the Project, and are subject to change within the framework of the Record of Discussions when necessity arises in the course of implementation of the Project.

Jakarta, November 19, 1981

Ryuzo Naito

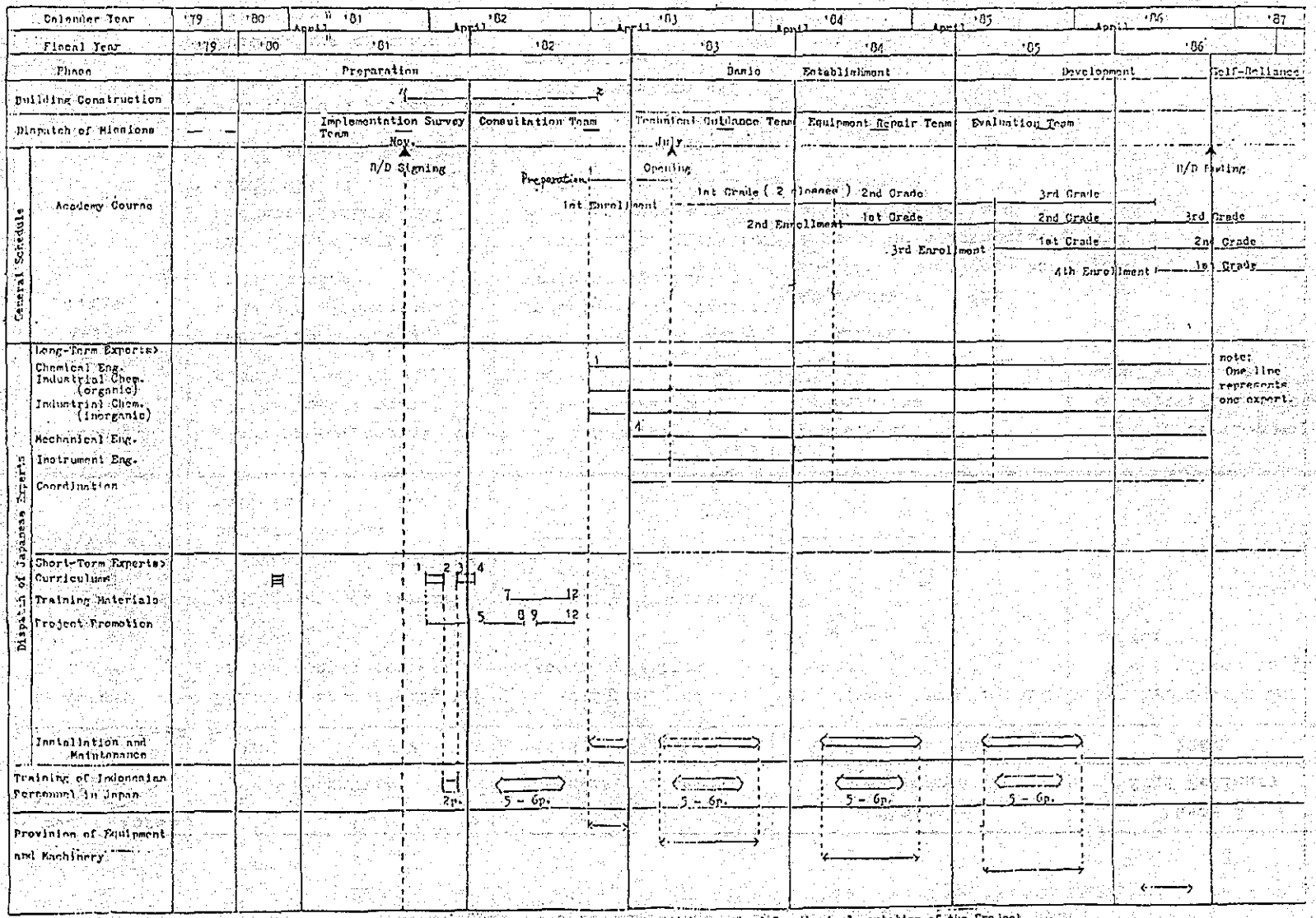
DR. RYUZO NAITO
Leader,
Japanese Implementation Survey Team,
Japan International Cooperation Agency,
Japan

Soebroto

IR. SOEBROTO
Chief
Education and Training Center,
Ministry of Industry,
The Republic of Indonesia

Ryuzo Naito

ANNEX -(1) TENTATIVE SCHEDULE OF IMPLEMENTATION



Foot Note: 1. This Schedule is subject to conditions that necessary budget will be acquired for the implementation of the Project.
2. This scope of Technical Cooperation is subject to change within the scope of the provisions given in the Record of Discussion.

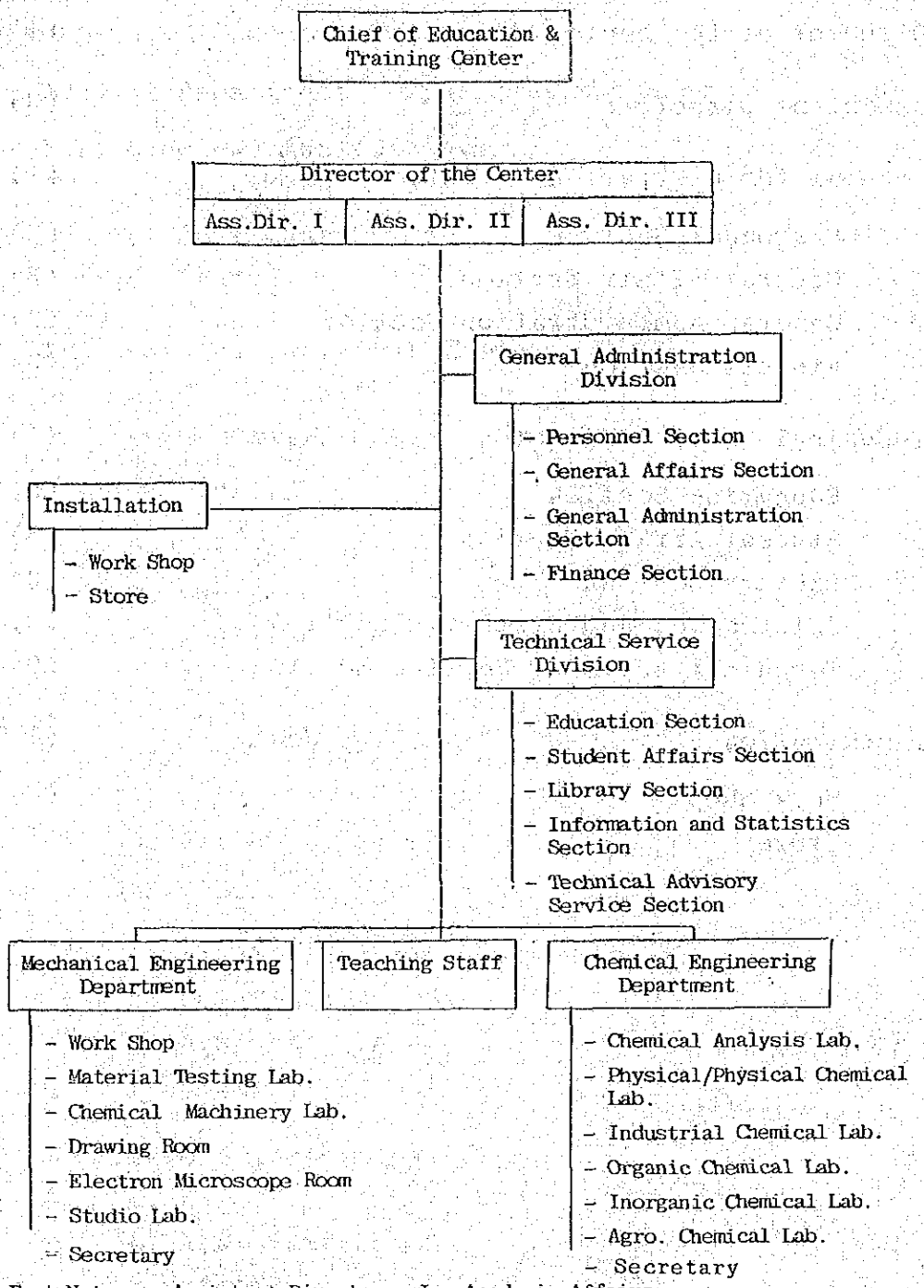
ANNEX - II

Technical Cooperation Program of the Project

Item \ Phase / fiscal year	Phase 0 Preparation		Phase 1 Basic Establishment		Phase 2 Development		Phase 3 Self-Reliance
	1981	1982	1983	1984	1985	1986	1987
A. Target	* Planning and preparation of the center operation policy * Arrangement of personnel * Preparation of training curriculums and materials		* Establishment of the center operation policy * Mastering of training methodology		* Improvement of training method		* Further development of activities of the center
B. Technical Fields Academy Course	* Planning and preparation of the center operation policy * Recruitment of staff and establishment of organization * Recruitment of staff and establishment of organization * Preparation of curiculums * Planning and procurement of training facilities * Preparation of training materials		* Establishment of the center operation policy * Mastering of training techniques by practical training facilities * Mastering of operation & maintenance techniques of training facilities * Master of the basic concept of chemical plant operation and maintenance		* Improvement of curriculums * Improvement of training techniques * Acquirement of the practical knowledge and techniques of chemical plant operation and maintenance		* Further development of activities of the academy course

ANNEX - III

1. Organization



Foot Note: - Assistant Director I : Academic Affairs
- Assistant Director II : Finance, personnel and Administration Affairs
- Assistant Director III : Student Affairs

2. Staffing Plan

Director of the center		(1)
Assistant Directors		(3)
General Administration Division	Head	(1)
Personnel Section		(3)
General Affair Section		(3)
General Administration Section		(3)
Finance Section		(3)
Technical Service Division	Head	(1)
Education Section		(3)
Student Affair Section		(3)
Library Section		(2)
Information and Statistic Section		(3)
Technical Advisory Service Section		(3)
Installation	Head	(1)
Work Shop		(3)
Store		(1)
	Total	(37)

Staffing for the chemical engineering, mechanical engineering, and development department, and teaching group.

I. Department of Chemical Engineering

1.	Head of Department Professor/Engineer	(1)
1.1.	Chemical Analysis Lab.	
	a. Chief Lab.	(1)
	b. Assistant Chief	(2)
	c. Staff	(2)
1.2	Physical/Physical Chemical Lab.	
	a. Chief Lab.	(1)
	b. Assistant Chief	(2)
	c. Staff	(2)
1.3	Industrial Chemical Lab.	
	a. Chief Lab.	(1)
	b. Assistant Chief	(2)
	c. Staff	(2)
1.4	Organic Chemical Lab.	
	a. Chief Lab.	(1)
	b. Assistant Chief	(2)
	c. Staff	(2)
1.5	Inorganic Chemical Lab.	(1)
	a. Chief Lab.	(1)
	b. Assistant Chief	(2)
	c. Staff	(2)
1.6	Agro. Chemical Lab.	
	a. Chief Lab.	(1)
	b. Assistant Chief	(2)
	c. Staff	(2)
1.7	Secretary	(2)
	Total	(33)

II. Department of Mechanical Engineering

1. Head of Department	Professional/Engineer	(1)
1.1 Work Shop		
a. Chief Lab.		(1)
b. Assistant Chief		(2)
c. Staff		(2)
1.2 Material Testing Lab.		
a. Chief Lab.		(1)
b. Assistant Chief		(2)
c. Staff		(2)
1.3 Chemical Machinery Lab.		
a. Chief Lab.		(1)
b. Assistant Chief		(2)
c. Staff		(2)
1.4 Drawing Room		
a. Chief Lab.		(1)
b. Assistant Chief		(2)
c. Staff		(2)
1.5 Electron Miscroscope Lab.		
a. Chief Lab.		(1)
b. Assistant Chief		(2)
c. Staff		(2)
1.6 Studio Lab.		
a. Chief Lab.		(1)
b. Assistant Lab.		(2)
c. Staff		(2)
1.7 Secretary		(2)
	Total	(33)
	Grand Total	(103)

ANNEX - IV ANNUAL WORK PLAN FROM NOVEMBER 1981 to MARCH 1983

Calender Year	1981			1982				1983
Fiscal Year / Scope of Technical Cooperation	Apr. - Jan.			Apr. - Jan				Jan
	1/4	2/4	3/4	4/4	1/4	2/4	3/4	4/4
1. Indonesian Side			Signing of R/D					
(1) Receiving of Japanese Experts				(Preparation of A-/Form, etc.)				
(2) Training of counterpart persn. in Japan				(Preparation of A-2 and A-3 Form, etc.)				
(3) Acceptance of mach. and equipment							(Preparation of A-4 Form, etc.)	
(4) Staff recruitment								
(5) Organizational set-up								
(6) Preparation of text book								
2. Japanese Side								
(1) Dispatch of Japanese experts								
a) Survey on curriculums								
b) Survey on training materials								
c) Project promotion								
d) Chemical Eng.								
e) Industrial Chemistry (organic)								
d) Industrial Chemistry (inorganic)								
(2) Training of counterpart personnel in Japan						5 - 6 persons		
(3) Provision of machinery and equipment								
a) Procurement&shipping								
b) Installation								

Foot Note : 1. This schedule is subject to conditions that necessary budget will be acquired for the implementation of the Project.

2. This Scope of Technical Cooperation is subject to change within the scope of provisions given in the Record of Discussions

V 現地調査

1. センター建屋建設状況

本センターは、北スマトラ州メダン市の中心より約4㎞郊外に建設されるものであるが、本チームがメダン訪問中の11月17日にプロジェクト・サイトに於いて、北スマトラ州知事在メダン総領事、工業省教育訓練センター局長等の出席の下に盛大な起工式がとり行なわれ、本チーム一行も列席の機会を得た。

プロジェクト・サイトは、約7.5㏊の平地で環境の優れたところであるが、地盤が軟弱な上、排水不良のため、雨期には工事の難航することが予想される。

なお建屋全体の完成は昭和58年2月が予定されている。

2. プロジェクト関連機関の視察

(1) ボゴール化学分析アカデミー・スクール

本センターの組織、設備など運営全般についての参考資料を得るため、工業省傘下の5カ所のアカデミー・スクールの中で最もレベルの高いと言われるボゴールの化学分析アカデミー・スクールを視察した。

本アカデミー・スクールは学生数約300名、講師は27名であるが、専任教授は僅か3名に過ぎず、残りはバンドン工科大学等を含む他所からの出張教授である。

これらの講師の他、当校の卒業生である助手が14名程おり、実験指導を行なっている。

実験設備は、化学分析の基礎学力をつけることが目的であるため、あまり高級な機器は置いていないが、化学天秤等は最近型のものが、かなり台数設置されている。

(2) 北スマトラ大学（ＵＳＵ）

北スマトラ大学は国立総合大学26校の中の1つでメダン市にあり、本センター設立後、人材交流等の点で緊密な関係を保つことが望まれるので、機械工学科と化学工学科をもつ工学部を中心に視察した。

1）自然科学部実験室

物理、化学、薬学、分析等の実験室を見学したが、機器機材の充当は十分と言えない状況である。

2）機械工学科実習場の見学

旋盤、フライス盤、その他一般工作用機器及び研究用ないし実験用装置はかなり整備されている。

3）化学工学科実験室見学

学科設立が約2年半前と比較的新しいため、実験設備は不十分であった。

なお、本チームとの会見席上で工学部長より、本センターにおける具体的な履習課目の提示が工業省よりあれば講師派遣についての協力の用意がある旨の発言があった。

(3) インドネシア・アサハン・アルミニウム(株)(INALUM)精錬工場視察

アサハン・プロジェクトは大別して、次の3つの事業からなっている。即ちトバ湖を水源とする発電所の建設、マラッカ海峡に面するクアラ・タンジュンに於けるアルミニウム精錬工場の建設、同工場より14Km内陸に入った場所における2000余戸のニュータウンの建設である。

本チームは、発電サイトを除き、他の2カ所を視察したが、特に本センターで実施する研修内容や、センター卒業者の就職先等の参考とするため製錬工場を重点的に視察した。

工場は1982年1月第一期工事が完成し、7.5万t/年のアルミ・インゴットの生産を開始するが、引き続き1984年まで第2、第3期工事を継続し、最終22.5万t/年(従業員2,200人)の生産を予定している。

メインとなる電解工場に付属して、電極の製造工場、インゴットの鋳造工場等があり、大部分の製造工程は自動化されているが、それらの制御機器の操作、設備のメインテナンス等で高度熟練技術を必要とするため、既に幹部となる現地職員60名の日本における工場訓練を終わり、現在企業内で一般職員の指導を行なっている。

今後本センターから基礎学力を修得した人材が供給されるならば、企業内訓練も非常にやり易くなり、また原材料、製品の分析等による品質管理の面においても、本センターからの支援を期待したいとの意向が示された。本チームとしても、本センターのアカデミーコースに設けられるChemical Engineering Courseの卒業生は、主として分析及び運転技術者として又、Mechanical Engineering Courseの卒業生は工務系メインテナンス技術者として雇用の可能性があるものと思料する。

Ⅵ 資　　料

1. 北スマトラ州における化学工業関連資料（ 1969 ～ 1975 ）
2. 工業省北スマトラ工業局提出資料
3. 供与機材リスト (案)

資料－1 北スマトラ州における化学工業関連資料（ 1969 ～ 1975 ）

年	企 業 数	労働者数 （人）	投資額（百万ルピア）
1969	181	2,617	1,700
1970	141	2,776	1,500
1971	200	3,168	3,002
1972	198	—	1,978
1973	192	4,478	5,197
1974	199	4,485	7,449
1975	109	2,017	11,173

Source : North Sumatra Figures 1969 — 1972
Office of Industrial Service, North Sumatra
1973 — 1975

資料 2 DAFTAR: PERUSAHAAN PADA SUB DINAS INDUSTRI KIMIA DASAR DINAS PERINDUSTRIAN PROP. DAERAH TK.I SUM. UTARA

No.	Jenis perusahaan	Jumlah Perusa-haan	Kapasitas		Satuan	Tenaga Kerja	Investasi (Rp. 1000)	Keterangan
			Potensil	Riel				
1.	Pab. Kertas Rokok	2	1.200	-	Ton	152	6.693.882	Dialihkan menjadi kertas HVS.
2.	Pab. Zat Asam (O_2)	4	1.800.000	540.499	m^3	104	1.079.909	
3.	Pab. Dry Ice (CO_2)	1	1.800	75.7	Ton	5	120.000	
4.	Pab. Alkohol Spritus	1	5.220.000	3.387.000	Ltr	38	130.310	
5.	Pab. Asam Sulfat	1	10.800	-	Ltr	25	283.445	Tarap pembangunan
6.	Pab. Pupuk Kompos	3	83.800	2.363	Ton	70	1.045.000	2 buah yang jalan
7.	Pab. Pupuk Phospate	4	50.000	-	Ton	219	2.324.109	Tarap pembangunan
8.	Pengantongan Pupuk	1	130.000	-	Ton	89	-	
9.	Pab. Herbisida	1	4.800	1.329	Ton	45	2.184.847	
10.	Formulating Insektisida	2	180.000	80.000	Klg	12	103.920	Tarap pembangunan
11.	Pab. Ban Speda Motor	4	67.000	35.000	Psng	75	761.100	Yang berproduksi 1 bh
12.	Pab. Ban Mobil Bus & Traktor	1	766.000	-	Psng	980	12.645.000	Dalam rencana
13.	Pab. Gas Acetylene	2	684.000	199.500	m^3	23	407.600	
14.	Pab. Sheet Glas	1	10.000	-	Ton	131	3.600.000	Dalam rencana
15.	Pab. Semen	2	500.000	-	Ton	-	28.712.160	Dalam rencana
16.	Pab. Barang Glas	5	46.745	24.378	Lsn	460	914.972	
17.	Pab. Damar	2	4.840	1.067	Ton	206	173.718	

No.	Jenis perusahaan	Jumlah Perusa-haan	Jumlah		Satuan	Tenaga Kerja	Investasi (Rp. 1000)	Keterangan
			Potensil	Riel				
18.	Pab. Kosmetik	26	448.570	142.625	Lsn	103	105.908	
19.	Pab. Tepung Clay	1	1.200	1.080	Ton	24	31.500	
20.	Pab. Pambuatan Garem	2	1.810.614	815.220	Kg	107	84.208	
21.	Yodisasi Garam	2	36.000	28.741	Ton	46	90.800	
22.	Pab. Penggilinagn Garam	16	32.410	14.128	Ton	157	24.490	
23.	Pembotolan Spritus	16	96.500	50.250	Ltr	57	21.166	
24.	Pab. Formadehide	1	36.000	-	Ton	94	3.794.855	Tarap persiapan.
25.	Pab. Caustik Soda	1	11.400	-	Ton	111	1.175.500	Tarap persiapan.

Medan, 12 Nopember 1981.

SUB DINAS INDUSTRI KIMIA DASAR.

資料3. 供与機材リスト(案)

LIST OF EQUIPMENT

FOR THE CHEMICAL INDUSTRY TRAINING & DEVELOPMENT CENTER IN MEDAN

I. Chemical Analysis Laboratory

Name of Equipment	Specification	Quantity
1. Drying oven 乾燥器(オーブン)	Operating temperature range: up to 250°C, with thermoregulator	1
2. Water bath 水 槽	Operating temperature range: up to 95°C, with thermoregulator	20
3. Constant temperature water bath 恒温水槽	Operating temperature range: up to 80°C Temperature control accuracy: ± 0.1°C	1
4. Magnetic stirrer 電磁攪拌機	Stirring capacity: 100 -- 3,000 ml	3
5. Stirrer 攪拌機	Revolution speed: about 200 -- 3,000 rpm Max, torque: 1 kg-cm	2
6. Vaccum pump 真空ポンプ	Ultimate vacuum: 10^{-3} Torr Displacement: 50 l/min	1
7. Centrifugal machine 遠心分離器	Max, revolution speed: 5,000 rpm	1
8. Potentiometric titrator 電位差滴定装置		
9. Spectrophotometer 光電比色計	Covering wavelength range: 200 -- 1,000 nm 1,000 nm	1
10. Gas detector ガス検知管	Kitagawa's method	1
11. Stop watch ストップウオッチ	Minimum graduation: 0.2 second	30
12. Balance 天 秤	Weighing capacity: 2kg Readability : 0.1g	1
13. " 〃	Weighing capacity: 300g Readability : 0.01g	4
14. Glass wares and others for chemical analysis experiment 化学分析実験用ガラス器具類		1 lot

II. Industrial Chemistry Laboratory

Name of Equipment	Specification	Quantity
1. Electrolysis apparatus 電解実験装置	Hoffman's method	3
2. Vacuum constant temperature drying oven 真空定温乾燥器	Temperature range: 40 -- 160°C Vacuum range: 760 -- 1 Torr	1
3. Hot plate ホットプレート	300 -- 600W, 110V 50Hz	5
4. Water bath ウオーターバス	Operating temperature range: up to 95°C, with thermoregulator	10
5. Oil bath オイルバス	Operating temperature range: up to 200°C, with thermoregulator	6
6. Stirrer 電動攪拌機	Revolution speed: about 200 -- 3,000 rpm Maximum torque: 1 kg-cm	3
7. Magnetic stirrer 電磁攪拌機	Stirring capacity: 100 -- 3,000 ml	3
8. Vacuum pump 真空ポンプ	Ultimate vacuum: 10^{-3} Torr Displacement: 50 l/min	3
9. Aspirator アスピレーター	Ultimate vacuum: 10°C 9.2 Torr, 20°C 17.5 Torr, 30°C 30.8 Torr	2
10. Heating mantle マントルヒーター	For 500 ml flask	5
11. 〃 〃	For 1,000 ml flask	5
12. Fractional distillation apparatus 分留装置		3
13. Vacuum distillation apparatus 真空蒸溜装置		3
14. Steam distillation apparatus 水蒸気蒸溜装置		3
15. Manometer マノメーター		5
16. Steam generator 水蒸気発生器		2
17. Extraction apparatus 脂肪抽出器	Soxhlet type	1

Name of Equipment	Specification	Quantity
18. pH meter pHメーター	Measuring range: pH 0 -- 14 Accuracy: ± 0.03 pH	2
19. Balance 天　秤	Weighing capacity: 300g Readability: 0.01 g	6
20. Balance	Weighing capacity: 2 kg Readability: 0.1 g	2
21. "	Weighing capacity: 10 kg Readability: 1 g	2
22. Stop watch ストップウオッチ	Minimum graduation: 0.2 second	10
23. Flush point tester 引火点試験器	Pensky-martens type	2
24. Support frames 組立て式架台		1 lot
25. Transformer 変　圧　器	Input voltage 220 V Output voltage 100 V	8
26. Small stirrer 小型攪拌機	35 W motor	20
27. Small pump 小型ポンプ		2
28. Glass wares and others for industrial chemical experiment 工業化学実験用ガラス器具及びその他		1 lot

III. Physical Chemistry Laboratory

Name of Equipment	Specification	Quantity
1. Specific gravity specimen set 比重計		4
2. Specific heat specimen set 比熱計		4
3. Hydrometer 密度測定器	Range: 0.700 -- 1.850	4
4. Calorimeter 熱量測定計	Capacity: 200 ml	2
5. 〃 〃	Nenken type, adiabatic	2
6. Thermometer 温 度 計	-5 -- 105°C, -20 -- 50°C	80
7. Magnifier 拡 大 器	20X	5
8. Resonance experiment unit 共鳴実験装置	Tuning forks and resonance columns	3
9. Free fall experiment unit 落下実験装置		3
10. Hook's law experiment unit フックの法則の実験装置（スプリングの伸び）		3
11. Pendulum experiment unit 振り子実験装置		3
12. Spherometer 曲 率 計	Measuring range: -20 -- +20 mm	4
13. Goniometer 角 測 計		2
14. Hygrometer 湿 度 計	Temperature range: 0 -- 50°C	8
15. Psychrometer 湿 度 計	Assmann type	3
16. Photoelectric tube hygrometer 光電管湿度計	Dewpoint range: -45 -- +50°C	1
17. Equillibrium distillation apparatus 平衡蒸溜装置		3

Name of Equipment	Specification	Quantity
18. Vacuum pump 真空ポンプ	Ultimate vacuum: 10^{-3} Torr	3
19. Victor meyer apparatus 〃ビクターマイヤー〃の装置		3
20. Constant temperature drying oven 恒温乾燥器	Temperature range: 50 -- 300 °C	1
21. Constant temperature water bath 恒温水槽	Temperature range: room temp + 5°C to 80°C portable	1
22. Cooling unit 冷却装置	Including temperature regulator	2
23. Thermostat 自動温度調節器		5
24. Standard thermometer 標準温度計	Temperature range: -50 - - 360 °C	1
25. Bimetallic thermometer 〃バイメタル〃温度計	Temperature range: 0 -- 100 °C, 0 -- 200 °C	4
26. Abbe refractometer 〃アッベ〃の屈折計	Measuring range: nD 1,300 -- 1,7000	1
27. Polarimeter 偏 光 計	Graduation range of rotation angle: 0 -- 360 °C	1
28. Polarograph 水銀電極滴定装置	Measuring range: 0.5 -- 500 μA	1
29. Beckmann's molecular weight measuring unit		2
30. Kohlrausch bridge 〃ウイートストン〃ブリッジ（電気抵抗測定装置）	Measuring range: 10 Ω - - 1 M Ω	1
31. Analog-digital conversion 〃コールラウシ〃ブリッジ(	Measuring range: 0.005 - - 50 K Ω 〃)	1
32. Analog-digital conversion study unit アナログーデジタル変換実験装置		1
33. Positive displacement flow-meter 置換型流量計	Flor range: 200 -- 650 l/hr	2
34. Rotameter ロータメーター（流量計）	For water and gas	12
35. Bourdon gauge ブルドン管	Pressure range: 0 -- 10 kg/cm^2	5

	Name of Equipment	Specification	Quantity
36.	Diaphragm type manometer ダイアフラム式圧力計	Pressure range: 0 -- 10 kg/cm	2
37.	Differential manometer 差 圧 計	Measuring range: 300 -- 0 -- 300 mmHg	8
38.	Vacuum gauge 真 空 計	Measuring range: 0 -- 300 Torr	8
39.	Digital flow meter 計数式流量計	Flow range: 0.15 -- 1.5 m /hr	2
40.	Pitot tube ピトー管（流速測定）	Tube diameter: 9 mm	3
41.	Venturi tube ベンチュリ管（流量測定）	Tube diameter: 9 mm	2
42.	Orifice オリフィス（流量測定）	Diameter: 50 mm	4
43.	Seybalt viscometer 〝セイボルド〞粘度計		2
44.	Redwood viscometer 〝レッドウッド〞粘度計		2
45.	Standard electric battery 標準電池	Electromotive force: 1.0188 - - 1.0195V	2
46.	Electric battery 電 池	Capacity: 20 Ah/5 H.R., 6V	5
47.	Charger チャージャー	Charging battery capacity: 10 -- 70 Ah	1
48.	DC regulated power supply 直流整流器	Output voltage range: 0 -- 50 V	1
49.	AC constant voltage power supply 交流・定電圧供給器	Output power: 1 KVA	1
50.	Shunt for DC potentiometer 直流電位計用分流器	Rated current: 2A, 5A, 10A	3
51.	Three-phase transformer 三相変圧器	Output voltage range: 0 -- 400 V	2
52.	Single-phase transformer 単相変更器	Output voltage range: 0 -- 240 V	6
53.	Variable resister 可変抵抗器		5

	Name of Equipment	Specification	Quantity
54.	Universal AC bridge ユニバーサル交流ブリッジ	Measuring range: induction 10μH -- 200H allowance 10pF -- 200μF Resistance 0.1Ω -- 2MΩ	1
55.	Low frequncy oscillator 低周波発振器	Oscillation frequency: 5Hz -- 500 KHz	1
56.	AC voltmeter 交流電圧計	Measuring range: 0 -- 150 V	8
57.	DC voltmeter 直流電圧計	Measuring range: 0 -- 100 V	8
58.	DC potentiometer 直流電位差計	Measuring range: 11 mV -- ± 111 V	1
59.	Milli-voltmeter ミリ電圧計	Measuring range: 0 -- 10 V	1
60.	AC ammeter 交流電流計	Measuring range: 0 -- 10 A	8
61.	DC ammeter 直流電流計	Measuring range: 0 -- 30 mA, 0 -- 3 A	8
62.	Point galvanometer 点式検流計	Current sensitivity: 0.9 μA Voltage sensitivity: 540 μV	2
63.	AC wattmeter 電　力　計	Single phase, three phase	4
64.	Power factor meter 力　率　計	Measuring range: Load 0.5 -- 1.0 -- 0.5 Lag	2
65.	Tester テスター	Measuring range: DC voltage 0 -- 1,200V DC current 0 -- 1,200mA Resistance 0 -- 20,000KΩ	4
66.	Insulation resistance meter 絶縁抵抗計	Rated voltage: 500V Rated resistance: 1,000 MΩ	4
67.	Flux meter フラックスメーター(電磁フラックス)	Measuring range: ± 1×10^2 -- 1×10^5kMx, Turns/F.S.	1
68.	Knife switch ナイフ型スイッチ		30
69.	Oscilloscope オッシロスコープ		1
70.	Glasswares and others for physical chemistry experiment 物理科学実験用ガラス器具及びその他		1 lot

	Name of Equipment	Specification	Quantity
71.	Tachometer タコメーター（回転計）	Electric model	4
72.	Surface roughness tester 表面滑度計	Movable magnet model	1
73.	Liquid level gauge	Displacement model and differential pressure model	2
74.	Process feedback control study unit	Control object: flow, level, pressure and temperature	1

IV. Material Testing Laboratory

Name of Equipment	Specification	Quantity
1. Universal testing machine 万能試験機	Capacity 20 ff	1
2. Charpy's impact tester シャルピー衝撃試験機	Capacity 30 kgf.m	1
3. Ultra-sonic flaw detector 超音波探傷器	Operating range: 2 -- 10.000 mm thickness	2
4. Magnetic flaw detector 磁粉探傷器	Magnetomotive force: 5.900 AT	2
5. Ultra-sonic thickness meter meter 超音波厚み計	Measuring range: 1.2 to 200 mm	3
6. Magnetic thickness meter 磁気式膜厚計	Measuring range: 0 -- 5 mm	3
7. Metallurgical microscope 金属顕微鏡		1
8. Metallographic grinding and polishing machines 金属組織研究用研磨装置		1
9. X-Y recorder X－Yレコーダー	Available recording size: 180 × 254 mm	1
10. Change-over switch box 切換え用スイッチボックス	Number of change-over terminal: 10	1
11. Strain gauge ひずみゲージ		100
12. Measuring microscope 読み取り顕微鏡	Measuring range: horizontal length 200mm vertical length 160mm	1

V. Chemical Machinery Laboratory

Name of Equipment	Specification	Quantity
1. Small pump 小型ポンプ	1/15 HP	5
2. "	1/3 HP	2
〃		
3. Compressor コンプレッサー（空気圧縮機）		1
4. Blower ブロワー（送風機）	0.75 KW	1
5. "	1.5 KW	1
〃		
6. Thermocouple 熱 電 対	CA	10
7. Thermocouple wire 熱電対用導線		50 m
8. Thermostat 温度調節器		2
9. Temperature recorder 温度記録計	6 point recording	1
10. Electric surface heating equipment テープ状電気ヒーター		9
11. Pipe type heater パイプヒーター		5
12. Stirrer 電動攪拌機	Revolution speed: about 200 -- 3,000 rpm Maximum torque: 1 kg-cm	3
13. Heating mantle マントルヒーター	For 100 ml flask	2
14. "	For 300 ml flask	2
〃		
15. "	For 500 ml flask	2
〃		
16. "	For 1,000 ml flask	2
〃		
17. AC watthourmeter 積算電力計	Single phase	2
18. "	Three phase	1
〃		

	Name of Equipment	Specification	Quantity
19.	Tower packings 充 填 材	Raschig ring, ceramic ball, glass granule	1 lot
20.	Heat insulating materials 断 熱 材	Rockwool	1 "
21.	Vibrometer 振 動 計	Vibration frequency: 5 -- 1.000 Hz	4
22.	Andreasen pipet アンドリアゼンピペット	Measuring range of particle size: 0.2 -- 30 μ	1
23.	Constant temperature drying oven 定温乾燥機	Temperature range: 40 -- 250 °C	1
24.	Hammer crusher ハンマーミル	0.4 KW	1
25.	Ball mill ボールミル		1
26.	Balance 天 秤	Weighing capacity: 100 kg Readability: 50 g	1
27.	" 〃	Weighing capacity: 10 kg Readability: 1 g	1
28.	" 〃	Weighing capacity: 2 kg Readability: 0.1 g	1
29.	Plastic pipes プラスチックパイプ		1 lot
30.	Steel pipes 鋼 管		1 "
31.	Valves バ ル ブ		1 "
32.	Joints フランジ		1 "
33.	Filter press experimental apparatus フィルタープレス実験装置		1
34.	Fluid circuit friction experimental apparatus 流体圧損実験装置		1
35.	Heat exchange experimental apparatus 熱交換実験装置		1
36.	Gas/liquid absorption experimental apparatus ガス－液体吸収実験装置		1

	Name of Equipment	Specification	Quantity
37.	Mass and heat transfer experimental apparatus 質量、熱移動実験装置（実際には、冷却塔実験装置）		1

VI. Studio

	Name of Equipment	Specification	Quantity
1.	16mm Projecter 16㎜映写機		1

VII. Drawing Room

	Name of Equipment	Specification	Quantity
1.	Drawing instruments 製図用具	Triangle, scale, rolling pen, divider, compass, adjustable curve, lettering set, electric eraser and templete	30 set

VIII. Work Shop

Name of Equipment	Specification	Quantity
1. Lathe 旋　盤	Swing over bed: 400 mm Swing over carriage: 210 mm	1
2. Shaping machine シェイパー（形切削機）	Max, stroke: 550 mm	1
3. Universal grinding machine 万能研磨機	Swing over table: 250 mm Distance between centers: 450 mm	1
4. Milling machine フライス盤	Working surface of table: 210 × 950 mm	1
5. Sawing machine 切　断　機	Cutting capacity: 180 mmϕ	1
6. Drilling machine 孔あけ機	Bench model	
7. 〃	Floor model	
8. Power grinder 強力グラインダー	Bench model, wheel 10 mmϕ	
9. Hand grinder 手持グラインダー	Max, wheel diameter 32 mmϕ	
10. Sander 研磨機（荒研磨機）	Rotary surface	
11. Electric drill 電動ドリル	Capacity: Steel 10 -- 13 mm	
12. 〃	Capacity: Steel 6.5 mm, Wood	
13. Jig saw 上下動ノコ	380W, Capacity: Wood 60 mm	
14. Circular saw 円形ノコ	670W, Blade external dia 16	
15. Planer 平削り機	570W, Cutting width 82 mm	
16. Air compressor 空気圧縮機	750 W, Max, pressure 9.5 kg	
17. Vernier caliper ノ　ギ　ス	Range: 150, 200, 300, 600m	
18. Depth gauge 深さゲージ	Range: 150, 200 mm	

Name of Equipment	Specification	Quantity
19. Hight gauge 高さゲージ	Range: 300, 600 mm	
20. Outside micrometer 外周測定マイクロメーター	Range: 0 -- 150 mm	
21. Inside micrometer 内周測定マイクロメーター	Range: 50 -- 150 mm	
22. Dial indicator ダイアル式表示器 (ダイアルゲージ)	Range: 1, 5 mm	
23. Magnetic stand 磁石式支持台		12
24. Gauge block 組ゲージ	18 pieces/set	1
25. Optical flat 研磨面検査鏡		1
26. Thickness gauge スキミゲージ	Range: 0.04 -- 3 mm	10
27. Calipers 測 径 器	Outside, inside and dividing	36
28. Rules 巻 尺	Steel tape	30
29. Level 水 準 器		7
30. Squares T定規、L定規		2
31. Surface plate 定 盤	1,000 × 1,000 mm	2
32. Spanner ス パ ナ	12 sizes/set	10
33. Wrenches レ ン チ	10 sizes/set	10
34. Adjustable angel wrench 調整付角レンチ(モンキーレンチ)	3 sizes/set	10
35. Pipe wrench パイプレンチ	4 sizes/set	5
36. Torque wrench トルクレンチ	Capacity: 60, 900, 2,800, 10,000 kgf.cm	8

	Name of Equipment	Specification	Quantity
37.	Hexagon wrench 六角頭レンチ		10
38.	Pliers ヤットコ		4
39.	Cutting plier 切断ヤットコ		20
40.	Nipper ハサミ器 Nippers ヤットコ、クギヌキ		5
41.	Snips 金切りハサミ		7
42.	Bolt clipper ボルトハサミ		1
43.	Screw driver ネジ廻し	10 sizes/set	10
44.	Gear puller 歯車取外し器	Range of diameter for work: 75 -- 300mm	5
45.	Hammer ハンマー		86
46.	Scraper コスリ道具		10
47.	Chisel タガネ		60
48.	Center punch ポンチ（中心線型押し器）		5
49.	File ヤスリ		100
50.	Abrasive cloth 研磨布		600
51.	Hack saw 弓ノコ（金属切断用）		10
52.	Hand magnet 手持磁石		2
53.	Arc welder 電弧溶接機	Power input 10 KVA	3
54.	Pressure regulator 圧力調節器	For N_2, O_2	10

Name of Squipment	Specification	Quantity
55. Pressure regulator 圧力調節器	For acetylene	3
56. Soldering iron (Soft solder) ハンダ用コテ		8
57. Parallel bench vice 並行式作業台万力	Jaw opening 150 mm	10
58. Pipe vice パイプ万力	Capacity: up to 2-1/2	10
59. Screw cutting machine for pipes パイプネジ切り機	Capacity: 1/4 -- 1-1/2 "	1
60. Tap and disc kit タップ、ジスクセット		10
61. Pipe bending tool パイプ曲げ工具	Capacity: 1/2 -- 2"	1
62. Bar bender 棒曲げ機	Hand powered	1
63. Chain pipe tongs チエン式パイプレンチ	Capacity: 1/4 -- 3 "	2
64. Anvil 金 床	20 kg, 150 kg	3
65. Chain block チエン式滑車	Capacity: 1.5 ton	2
66. Tool case 工 具 箱	Baked enamel finish	15
67. Work gloves 作業用手袋		80
68. Apron 作業用前カケ		20

IX. Practical Training Facilities

Auxiliary Materials for Training by the Practical Training Facility 1 lot

(1) Spare parts
(2) Consumables
(3) Analysis tools
(4) Protecting and safety goods
(5) Teaching materials (samples and cut models)
(6) Text books
(7) Video tapes

X. Inorganic Chemistry Laboratory

	Name of Equipment	Specification	Quantity
1.	Thermal gravimetric analyzer 熱 天 秤		1
2.	Muffle furnace 電 気 炉	Temperature range: 100 -- 1,150 °C	1

XI. Organic Chemistry Laboratory

Name of Equipment	Specification	Quantity
1. Fractional distillation apparatus apparatus 分留装置		2
2. Vacuum distillation apparatus apparatus 真空蒸留装置		2
3. Steam distillation apparatus 水蒸気蒸留装置		2
4. Extraction apparatus 脂肪抽出装置	Soxhlet type	2
5. Ultra filtration 限外濾過器	Capacity: 200 ml	1
6. Rotary viscosimeter 回転粘度計	Ceneral use type and higher viscosity type	2
7. Surface tensionmeter 表面張力計	Measuring range: 0 -- 100 dyne/cm	1
8. Refractometer 屈 析 計	Abbe	1
9. Vacuum pump 真空ポンプ	Ultimate vacuum: 10^{-3} Torr	2
10. Manometer マノメーター		2
11. Elemental analyzer 有機元素分析装置	Analysis capacity: 4 -- 8 times/hr	1
12. Direct reading micro balance 微量直視てんびん		1
13. Thermometer 温 度 計		30
14. Electric stirrer 電動攪拌機	Revolution speed: about 200 -- 3,000rpm Max. torque: 1 kg-cm	2
15. Variable transformer 可変変圧器		2
16. Heating mantle マントルヒーター	For 500 ml flask	3
17. 〃 〃	For 1,000 ml flask	3

XII. Agrochemistry Laboratory

	Name of Equipment	Specification	Quantity
1.	Incubator インキュベーター（培養器）		1
2.	Autoclave オートクレーブ（耐圧容器）		1
3.	Fermentator ファーメンター（培養器）		1
4.	Refrigerator 冷　蔵　庫	Capacity: 440 l	1
5.	Heating Mantle マントルヒーター	For 500 ml flask	3
6.	〃	For 1,000 ml flask	3

VI. Chmeicals for experiment

1 lot

VII. Others

1.	Copier	1
2.	Typewriter	3