

11-3 In-company Training

11-3-1 Increase and Improvement in Training Sections

1) Establishment, increase and improvement in training sections

To smoothly carry out the manpower development, it is necessary to establish a dedicated manpower development section, or increase or improve the existing manpower development sections into the dedicated ones so that they are able to execute the following tasks.

- Establish in-house manpower development system
- Make the responsibility of the management clear for development of subordinate manpower.
- Set up a training promotion section.
- Set forth relevant in-house rules.
- Make and allocate budget.
- Draw out long-term manpower development plan
- Review and follow up respective training plans submitted from each department.

2) Reinforcement of on-the-job training

To improve the effects of on-the-job training presently under way in each enterprise, it is important to follow up halfway the progress made until then in the actual operation. In this event, however, it is necessary to check the scheduled progress in the manpower development and actual progress for any difference. And if any, it is also necessary to try to find the cause of it and moreover consider proper measures in all its aspects.

Upon completing on-the-job training, effects of the training should be evaluated and inadequate results, if any, should be put in order and reviewed so that they are reflected in setting up the next manpower development goal thereby raising the level of on-the-job training and enhancing the reliability.

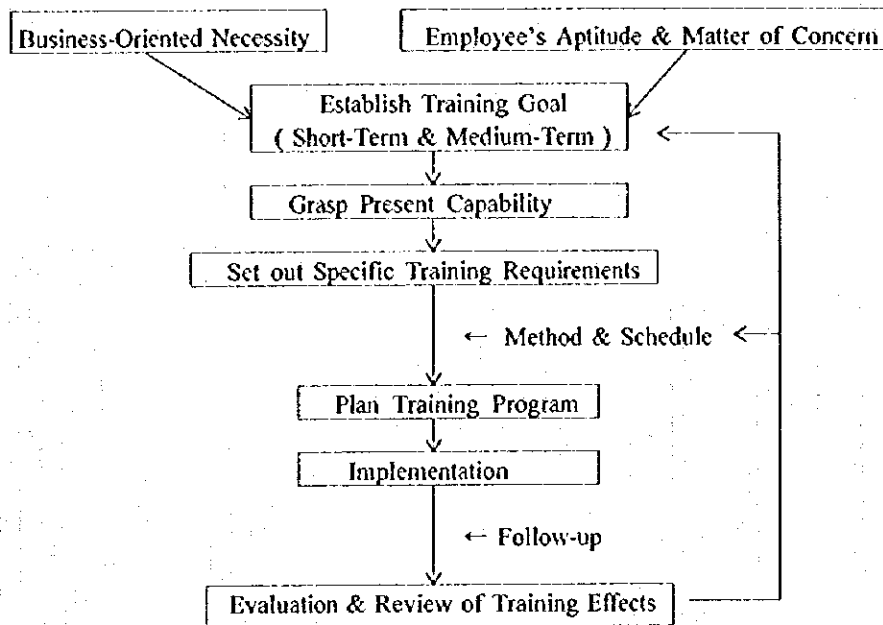


Figure 11-12 Steps in On-the-job Training

In addition, the following tasks should also be performed together with the above-mentioned tasks.

- (1) Make the management and superintendents recognize the importance of the in-company training.
 - (2) Execute the in-company training systematically.
 - (3) Make company-wide propaganda for the importance of the in-company training.
 - (4) Create an enlightening work environment.
- 3) Training equipment and teaching materials

As regards the training equipment and teaching materials, the following audiovisual aids should be adopted thus increasing the effects of the training.

- Overhead projector (OHP)
- Auto slide
- Video tape recorder (VTR)
- Sample model
- Wall map and chart
- Blackboard and whiteboard

Audiovisual aids that feature the following points are effectively used for the training.

- (1) Make the trainees understand more quickly and give a comparatively long-lasting impression.
- (2) Facilitate concentration of trainees on display, attract interest and give the trainees an incentive to study on their own initiative.
- (3) Trainees are able to rather easily create their own teaching materials for themselves as necessary.
- (4) Such a phenomenon that is practically impossible to restore can be restored to its original state thereby allowing the trainees to easily observe it in detail and concretely, thus causing the trainees to actively have an animated discussion about it.

11-3-2 Training of Full-time Instructors

To smoothly carry out the training of operators who account for more than half the total employees, it is indispensable to increase not only the number of the instructors but also their capability.

And, in the event of the actual training, it is surely necessary for the instructors to train the operators in such a manner that their production and safety technique that are directly in connection with the job-site works are much advanced. In this regard, the supervisors and skilled operators, who are the superintendents in respect

of these operators and in charge of such sectors as mining, driving, mechanical, electrical and coal preparation, should first be sent to the outside training centers to undergo the instructor training courses so that after returning to the enterprises, they are able to undertake the training of the operators belonging to various occupational categories.

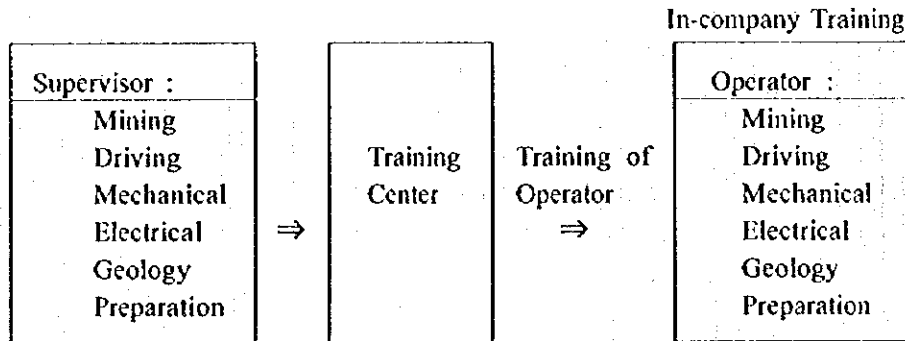


Figure 11-13 Training of In-company Training Instructor

11-3-3 Improvement in Curriculum

To train the operators and newly-hired employees, it is necessary to prepare such curricula as are in compliance with those shown in Table 11-5 and 11-16.

In this event, however, since it is very important in particular to instruct the new employees in the basic knowledge of coal mines and safety, it is desirable that the Department of General Affairs of Mines plays a central role and gives a guidance in preparing the standard curriculum to be commonly used among the coal mining enterprises.

1) New employees

Table 11-15 Newly-Hired Employee Training Curriculum (Example)

Item	Subject	Term
Orientation	<ul style="list-style-type: none"> - Outline of company - Manners to be observed in communal life - General knowledge to be commonly possessed to lead a business life in company - Hierarchical livelihood protection treatment 	Several days
Basic knowledge Instruction	<ul style="list-style-type: none"> - Disease caused by dust & health care - Prevention of dust from scattering - Ventilation, cleaning, etc. of job-site - Relevant laws & regulations 	Several days
Safety Instruction	<ul style="list-style-type: none"> - Nature of U/G accidents and preventive measure - Prevention of gas & coal dust explosion - Prevention of accident caused by water outburst - Other knowledge necessary to perform works 	Several days
Assigned Job Training	<ul style="list-style-type: none"> - Flow of works in assigned job - Method of inspection & operation of equipment - Extraction of dangerous elements in works - Works auxiliary to assigned job - Shelter in an emergency 	5 to 6 months

2) Operators

Table 11-16 Operator Training Curriculum (Example)

Item	Subject	Term
Safety Instruction	<ul style="list-style-type: none"> - Case study of extraction and analysis of dangerous elements in works - Discussion of causes and measures to be taken in respect of typical accidents - Execution of training on taking shelter - Other knowledge necessary to perform works 	Several hours / term
Basic knowledge Instruction	<ul style="list-style-type: none"> - Work improvement plan submission in term of role playing 	Several hours / term
Daily Training	<ul style="list-style-type: none"> - Direction of work & safety given when superiors make the rounds of job-sites 	All the time
Assigned job Training	<ul style="list-style-type: none"> - Raise the level of skills and discard the habit and custom 	As necessary

3) Standard work procedure

Table 11-17 Standard Works (Example)

Sector	Standard Work Item
Mining	Inspection before starting work on mining job-site, inspection of machinery & safety equipment, blasting work, support work, inspection & operation of transportation machinery, support standard
Driving	Inspection before starting work on driving job-site, inspection of machinery & safety equipment, blasting work, support work, inspection & operation of transportation machinery, loading work, support standard
Transportation	Inclined shaft winding machine, inspection & operation of storage battery type locomotive, inspection & operation hoist, track, B.C
Blasting	Transportation, control & handling of powder, measures against static electricity, loading & ignition, treatment after blasting, measures to be taken against abnormality

Works to be carried out at coal mines have been conducted manually to the most part and moreover even such mine works that were mechanized still call for manual operation to certain extent. As such, automation or automated control of the works has been seldom applied to the coal mine works.

It is well known that the human doings are under control of such factors as physical strength, capacity for locomotion, motor nerve, etc. In addition, "habit-bound" or "convention-bound" behaviors likewise have an influence on the them as well. Accordingly, only a small change in human doings such as using erroneous operation procedures or taking different posture may probably cause serious accidents quite a few times.

In view of it, it is definitely necessary to establish the standard work procedures so that the works are standardized and simplified as much as possible and the differences among individuals are eliminated thereby increasing safety as well as efficiency of the respective works.

1-4 Qualification

11-4-1 Qualification System

To cope with the increased coal production in future and anticipated forthcoming change for the worse in mining conditions, it is now certain that each enterprise proceeds with mechanization of the mining method and introduction of large-size heavy equipment. In this regard, it is necessary to secure supervisors and operators who possess a certain level of technique so that the safety is maintained as it is now.

To achieve this goal, it is indispensable that in addition to the existing state examination for the safety superintendent's license and blaster's license, such examinations and qualifications as shown in Table 11-18, which are applicable to respective occupational categories, should be introduced. In this event, however, the required qualifications to perform respective duties should clearly be written in the Coal Mine Safety Regulations so that the unqualified personnel are prevented from being on such duties.

Table 11-18 Type of Qualifications

Category	Current Qualifications	Required Qualifications
Safety Superintendent	Safety Superintendent	○ Safety Superintendent
U/G Sv. Surface Sv. Mechanical Sv. Electrical Sv.	Blasting Blasting	○ U/G technician, Blasting ○ Surface technician, Blasting ○ Mechanical technician ○ Electrical technician
Mining Op. Driving Op. Transportation Op. Mechanical Op. Electrical Op.		△ Mining machinery (operation) △ Driving machinery (operation) ○ Large-size winding (operation) △ Mine vehicle (repairs) ○ Electric equipment & appliances (installation & repairs)

Note) Qualifications & qualifying examinations marked with ○ are compulsory and with △ are recommended.
Sv. : Supervisor, Op : Operator

However, it may probably be difficult to materialize the above-mentioned examination and qualification systems at once. Accordingly, phased execution as shown below would be recommendable.

(1) First stage (for the present)

To materialize the examination and qualification systems for technicians.

(2) Second stage (in the future)

To materialize the examination and qualification systems for operators.

As regards the examinations and qualifications for the license to operate mining and driving machinery and vehicle-categorized mine machinery, they should be materialized after due consideration given to the availability of those machinery at each coal mine.

Furthermore, the qualification of candidacy for the above examinations should be set out as shown in Table 11-19 taking into account the School Education Act as well as years of experience in business practice.

Table 11-19 Qualified Examinees for Examination

Qualifications	Years of Experience in Business Practice		
	University & College	High School Graduates	Secondary Graduates
Safety Superintendent	3 years or over	5 years or over	7 years or over
Supervisor	1 year or over	2 years or over	3 years or over
Operator	Nil	Nil	Nil

In addition to the above, it is recommended that the preferential treatment should be given to the qualified personnel in each enterprise in such a way as increase in pay and rise in rank thereby uplifting their sense of responsibility for the work and

giving an incentive to perform the duty thus vitalizing the operation of the coal mines.

It is further recommended that together with the execution of the above examination and qualification systems, standardized lecture and training curricula should be drawn out and commonly adopted among this newly established training center, LPPT, and MDCM where the courses in safety and blasting are already under way in preparation for the qualifying examination for the safety superintendent and blaster, and moreover a certificate of completion should be given to the graduates.

11-4-2 Establishment of Coal-related Organizations

To vitalize the coal industry and encourage the development of it, it is necessary to refurbish, rearrange and complete the various statistical materials in addition to conducting surveys of domestic and overseas coal mine situation and advanced overseas technology and technique for the prospective introduction into Indonesia. To this effect, (Foundation) Coal Association of Indonesia should be established newly thereby completing the supporting system for the sound development of the coal industry.

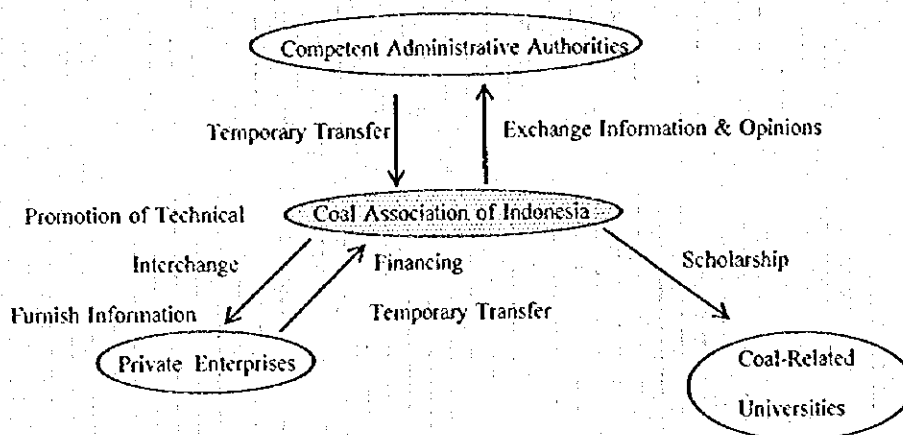


Figure 11-14 Role of Coal Association of Indonesia

Coal Association should undertake the roles mainly as shown below.

- Promote exchange of knowledge among enterprises (meeting for technical interchange and study tour of other coal mines)
- Award an honor to superior mines.
- Survey and study tour of overseas coal mines.
- Provide the industry with all the necessary production, safety, consumption, sales and labor statistical materials.
- Exchange information and opinions with competent administrative authorities.
- Secure capable personnel for the industry.

To materialize the above roles, coal enterprises should make an investment as a member in establishment of the Coal Association as a foundation for themselves.

11-4-3 Scholarship System

It is certain that the first prerequisite for the continuous development of the coal industry from now on is largely dependent on whether the capable manpower can be secured or not. However, this is very difficult because of the following reasons.

- Coal mines, the production job-sites, are located in Kalimantan and Sumatra.
- Eleven universities out of fourteen coal-related universities are located in Java.
- Accident frequency rate is higher than other industries.

Action to be taken to cope with the above situations should be:

- to establish a scholarship system in the school education.

In this event, the Coal Association of Indonesia should take a leading part in encouraging the university graduates to find a job in the coal industry by making good use of funds furnished from the enterprises in the scholarship system.

Table 11-20 Summary of Coal-Related Manpower Development Action Plan

	Main Trainees	Action Plan	Task Allocation		Action to be Taken	Effects
			Government	Private Enterprises		
School Education	Prospective manager & professional classes	<ol style="list-style-type: none"> Instructor training Implementation of joint research 	<ol style="list-style-type: none"> Universities invite capable trainees from enterprises in the coal industry. <ol style="list-style-type: none"> Ministry of Energy & Mines requests Ministry of Education & Culture to plan out the joint research system. MTRDC grasps the needs of the industry & universities, select research subjects & make request to universities for execution. MTRDC helps universities with their joint research expenses. 	<ol style="list-style-type: none"> Dispatch capable trainees to universities. <ol style="list-style-type: none"> Enterprises make request to MTRDC for a joint research. Furnish subjects of research with respect to the job-site, and competent research workers. 	<ol style="list-style-type: none"> <ol style="list-style-type: none"> Invite expatriate instructors from foreign countries. Invite prospective instructors from the coal industry. Full use of study-abroad system. Training is supported with the Institute of Technology Bandung taking a leading part in it. Technical challenges to be solved after due study, which are involved in operation of coal mines. <ul style="list-style-type: none"> High-speed driving Soft soil zone driving Thick layer mining system Selection & management of mining areas Central monitor system Gas vent & utilization Rock pressure control in deep underground mining Measures against mine waste water 	<ol style="list-style-type: none"> Rise in the level of knowledge of coal-related university students. <ol style="list-style-type: none"> Enhancement of productivity & safety of coal mines. An incentive is given to students to participate in the development of the coal industry.
Training Center	Supervisor & skilled operator classes or over	<ol style="list-style-type: none"> Reinforcement of LPPT Reinforcement of MDCM Establishment of Coal Mining Training Center 	<ol style="list-style-type: none"> Under reconstruction, a Foundation to be established. DGM provides guidance. <ol style="list-style-type: none"> Establish & operate the center Secure instructors Make a request for dispatch of trainees. Request coal enterprises to furnish funds. Establish (Foundation) Coal Association of Indonesia & temporarily transfer capable personnel to it. 	<ol style="list-style-type: none"> Help the LPPT with its financing and expenses. <ol style="list-style-type: none"> Furnish funds and bear expenses. Establish (Foundation) Coal Association of Indonesia & temporarily transfer capable personnel to it. Send instructors. 	<ol style="list-style-type: none"> Under reconstruction by JBT (Expected capacity extension: 50 → 2,000) <ol style="list-style-type: none"> Increase the manager class training course. Newly open an accident prevention technical course. <ol style="list-style-type: none"> Government undertakes the operation at the beginning. (Foundation) Coal Association of Indonesia undertakes the operation in due course in future. To be newly established in Samarinda, East Kalimantan. (Capacity extension: 1,000 → 3,000/year) To be newly established in Banjarmasin, West Kalimantan. (Capacity extension: 1,000 → 2,000/year) 	<ol style="list-style-type: none"> Rise in the technical level of coal mine located in Sumatra region to the most part. <ol style="list-style-type: none"> Improvement in business management capability. Improvement in safety supervisory capability. Rise in the technical level of coal mines located in Kalimantan region in the most part
In-Company Training	Middle & unskilled operator classes	<ol style="list-style-type: none"> Increase & improvement in training sections Training of full-time instructors Completion of curricula 	<ol style="list-style-type: none"> DOC provides guidance. DOC provides guidance. Gives guidance in drawing out a common curriculum for the newly-hired employees. 	<ol style="list-style-type: none"> <ol style="list-style-type: none"> Increase and improve training sections. Reinforce on-the-job training. Improve training equipment & teaching materials. Instructor training by sending trainees to training centers. Prepare curriculum for operators & newly-hired employees & standard work procedures. 	<ol style="list-style-type: none"> <ol style="list-style-type: none"> Establish in-house training sections Purchase training equipment & teaching materials Training for full-time instructors Prepare standard work procedures for mining, driving, transportation & blasting works. 	<ol style="list-style-type: none"> <ol style="list-style-type: none"> Thoroughgoing training up to the rank & file Fully increased capability to carry out the job-site work at each coal mine. Execution of periodic training Substantially increased & improved the training sections Increase in work efficiency & decrease in accident frequency rate by standardizing the work procedures.
System		<ol style="list-style-type: none"> Introduction of qualification system Establishment of (Foundation) Coal Association of Indonesia Establishment of scholarship system 	<ol style="list-style-type: none"> <ol style="list-style-type: none"> Amends the Safety Regulations Draft & plan put the qualifying system for the required qualifications <ol style="list-style-type: none"> Gives guidance in establishment Temporary transfer of personnel to the Foundation. 	<ol style="list-style-type: none"> <ol style="list-style-type: none"> Strictly observe the qualification system. Amends the in-house rules. Give preferential treatment to qualified personnel. Invest in the Foundation & transfer personnel temporarily. Provide funds requested from the Foundation. 	<ol style="list-style-type: none"> <ol style="list-style-type: none"> Examination system for underground, surface, mechanical & electrical technician Qualification system for mining machinery, driving machinery, large-size winding machine, vehicle-categorized machinery, electric equipment & appliances. Preferential treatment in such a way as increase in pay & promotion Establish (Foundation) Coal Association of Indonesia. Compulsory service for 5 years in coal enterprises 	<ol style="list-style-type: none"> <ol style="list-style-type: none"> Rise in the production & safety level because of rise in the technical level & standardization Rise in the level of each occupational category An incentive is given to promote production. Development of the industry is supported A certain number of graduates are secured who join the coal industry.



General Summing-up and Recommendations

In its long-term demand and supply scenario currently presented by the Indonesian government, coal production for 2008/09 has been estimated as reaching 120 million tons, and demand is forecast to reach 95.83 million tons, leaving a remainder of approximately 24 million tons for export.

As the sharp rise in coal demand is estimated to continue in the future the Japanese government has been approached with the request to review the demand forecast by extending it over a longer period, namely, up to 2020/21, and to draw up a master plan for Indonesia's personnel development to accord with the reviewed forecast.

The important issues in connection with coal production are the transition by a certain part of the 1st-generation contractors from open-pit to underground mining as well as the extent to which the 2nd- and 3rd-generation contractors will be successful in their development efforts and the way in which this will affect the forecasts for coal production. The crucial factor for personnel forecasts will be the rate at which underground coal mining will increase. We have conducted studies and analyses in close coordination with the authorities of the Indonesian government responsible for coal.

To throw light on the present situation of Indonesian coal mining and of the future vision for the collieries, we also conducted site surveys, questionnaire studies and face-to-face interviews to examine all aspects of this sector, including production, transport, management operations such as quality control, organizational issues, job classification, the status of in-house training offered by companies, and the level of technology in the various fields.

We have also made a study of the schools providing the necessary human resources and the training facilities conveying coal technology.

In view of the above, we have made the following review of the long-term demand prognosis up until 2020/21.

1. Long-Term Coal Supply and Demand Forecast

In our base scenario, annual coal production output in 2020/21 is estimated at approximately 189 million tons. This output level will be matched by a (domestic) demand volume in the region of approximately 176 million tons, leaving 13 million tons for export.

These forecasts were made by taking the following factors into consideration.

- 1) Three scenarios were examined (Base, High, and Low)
- 2) Coal production output from the 1st-generation contractors was based on the results of the present study.
- 3) Coal production output from the 2nd-generation contractors (18 companies) was based on the following assumptions:
 - Success ratio: 50%
 - Production output: 2 million tons each
- 4) Coal production output from the 3rd-generation contractors (91 companies) was based on the following assumptions:
 - Success ratio: 50%
 - Production output: 1.5 million tons each

	(Million tons)		
	2000	2010	2020
Consumption	39	105	176
-Electricity	25	76	127
-Industry	11	19	33
-Household	3	10	16
Production	97	149	189
-PTBA	15	16	12
-CCOW	78	128	172
-KP	4	5	5
-KUD	-	-	-

2. Long-Term Personnel Program

Based on some of the site surveys and questionnaire studies that were carried out, we have made our estimates for the existing coal companies after consultation with the Indonesian government authorities responsible for the coal sector. In our personnel calculations, we have examined the critical productivity data for each colliery wherever possible and made reference to open-pit and underground operation and to the technical potential and scale of individual companies.

As a result, we have come to the conclusion that a total of approximately 110,000 personnel will be required in 2020/21. The situation at present is that apart from MDCM on Java, a member organization of the Directorate General of Mines which covers the mining sector in general, the only facility available is LPPT on Sumatra. To meet the training needs for the rapidly increasing number personnel required, it will therefore be necessary to establish a new training center in East Kalimantan, a region with many collieries and a high coal production output.

In the future, coal mining development will also go ahead in South Kalimantan so that the need will arise for a new training center to be established also in this region.

(1,000)

	2000	2010	2020
Management	-	-	1
Professional	2	3	5
Supervisor	2	3	5
Operator	13	29	40
Administration	2	3	5
Sub-Total	19	38	56
Sub-Contractor	23	40	56
Grand-Total	42	78	112

4. Recommendations

- 1) The Comprehensive Technology Transfer Program for Coal Resources Development in Indonesian currently being executed by the Japanese government should be promoted further.
- 2) In view of the future escalation of personnel costs, it will be absolutely imperative to upgrade production efficiency in order to achieve the operation of collieries that will be competitive on the international market. For this purpose it will be essential to secure favorable mining districts through appropriate exploration activities, and to inculcate greater cost awareness and consistent TQM.
- 3) In terms of the use of coal extraction systems suited to the natural conditions prevailing in Indonesia, it will be important to provide training in semi-mechanized coal extraction, seeing that the districts capable of fully automated mining in underground operations are limited.
In conjunction with the future economic development, it will be of critical significance to enhance productivity. For this reason, it will be essential to promote research and development in the areas of coal extraction and safety technology suited to the conditions prevailing in Indonesia. The government should therefore provide financial support for research to the research institutions.
- 4) With regard to the establishment of a safety system, it will be necessary to:
 - adopt a system of Safety Qualifications
 - Safety Supervisor, Technical Staff, Qualified Operator
 - reinforce the system of Safety Supervisors
 - Training and Increasing the number of Inspector Officer (Government)
 - develop a monitoring system
 - ... Central monitoring control system, installation of underground communication equipment
 - reinforce the rescue teams
 - Reorganization of the rescue teams and provision of rescue equipment, including oxygen respirators.

- 5) It will be necessary to reinforce environmental monitoring to meet the needs for environmental protection and to promote the reuse of reclamation sites and of environmental monitoring.

- 6) The development of low-grade coal which accounts for about half of Indonesia's coal reserves will be extremely important in view of the nation's energy balance. It will therefore be essential to promote the utilization of low-grade coal for mine-mouth power generation. And also in the future, it will need to promote the research & Development into coal gasification and liquefaction.

- 7) **Long-Term Recommendations for the Establishment of New Training Centers**
The curricular details offered by the training centers need to be modified and improved on an on-going basis by monitoring the requirement at the site. It may thus be necessary to review the curriculum in the light of appraisals considering it effective to introduce new technology to improve the efficiency of site operation in response to escalating personnel costs. In this sense, it would be desirable to organize discussion meetings with manager class staff at the collieries in the areas concerned at a rate of about twice a year in order to establish the operational situation at the site and the level of knowledge of the trainees as well as the effectiveness of training. If necessary, lecturers should then be assigned to overseas seminars to keep abreast with progress in technology.

APPENDIX

APPENDIX V-1 Comparative Study of Longwall Mining Method

		Full-Mechanized	Semi-Mechanized	Manual
Production data				
Face Length	meter	150	100	60
Working Height	meter	2	2	2
Advance rate	m/shift	3	1.2	0.6
Specific Gravity	ton/m ³	1.25	1.25	1.25
Production/face-shift	ton/shift	1,125	300	90
Face number		1	2	4
Shift/day	shift/day	3	3	3
Production/day	ton/day	3,375	1,800	1,080
Operation days(effective)	days	250	280	300
Production Longwall	ton/year	843,750	504,000	324,000
Development meter	meter/year	6,750	6,048	6,480
Production Development	ton/year	126,563	90,720	64,800
Production total	ton/year	970,313	594,720	388,800
Preparation yield				
Salable coal	ton/year	892,688	547,142	357,696
Manpower				
Productivity (direct)	ton/man-year	4,251	1,303	542
Material cost (Development) MRp/meter				
Material cost (Longwall)	Rp/ ton	1000	2000	3000
Utility	MRp/day	12.00	6.00	4.00
Labor cost	MRp/man-year	3.00	2.80	2.50
Initial investment million US\$				
		45.49	23.65	12.71
Production cost/year				
Depreciation	MRp	10,451	5,607	3,121
Parts & Maintenance		6,941	3,928	2,001
Material cost (Development)	MRp/meter	2,025	726	648
Material cost (Longwall)	MRp/ton	844	1,008	972
Utility		3,000	1,680	1,200
Labor		630	1,176	1,650
Others (10%)		2,389	1,413	959
Contingency (10%)		2,628	1,554	1,055
Total in million Rp				
Exchange Rate		2,300 Rp/US\$	2,300 Rp/US\$	2,300 Rp/US\$
Total in million US\$		12.57 MUS\$/year	7.43 MUS\$/year	5.05 MUS\$/year
Production cost/ton				
		14.1 US\$/ton	13.6 US\$/ton	14.1 US\$/ton

*Cost estimation is just for mining.
 Tax and duties are not considered.
 Straight line method is applied for depreciation.
 Land cost is not included.

APPENDIX V-II Comparative Study of Room & Pillar Mining Method

		Full-Mechanized	Semi-Mechanized	Manual
Production data				
Advance rate	m/shift	6	3	1.2
Cross Section	m ²	15	12	8
Specific Gravity	ton/m ³	1.25	1.25	1.25
Production/face-shift	ton/shift	113	45	12
Face number		2	5	15
Shift/day	shift/day	3	3	3
Production/day	ton/day	678	675	540
Operation days	days	300	300	300
Production	ton/year	203,400	202,500	162,000
Preparation yield	%	92	92	92
Salable coal	ton/year	187,128	186,300	149,040
Advance meter	meter/year	5,400	13,500	16,200
Manpower		90	210	330
Productivity (direct)	ton/man-year	2,079	887	452
Material cost	MRp/meter	0.28	0.13	0.10
Utility	MRp/day	2.00	1.80	1.20
Labour cost	MRp/man-year	3.00	2.80	2.50
Initial investment	million US\$	7.54	6.05	4.07
Production cost/year				
		MRp	MRp	MRp
Depreciation		1,608	1,364	934
Maintenance		1,196	812	490
Materials		1,512	1,755	1,620
Utility		600	540	360
Labour		270	588	825
Others (10%)		519	506	423
Contingency (10%)		571	557	465
Total in million Rp		6,276 MRp/year	6,122 MRp/year	5,117 MRp/year
Exchange Rate		2,300 Rp/US\$	2,300 Rp/US\$	2,300 Rp/US\$
Total in million US\$		2.73 MUS\$/year	2.66 MUS\$/year	2.22 MUS\$/year
Production cost/ton		14.6 US\$/ton	14.3 US\$/ton	14.9 US\$/ton

*Cost estimation is just for mining.
 Tax and duties are not considered.
 Straight line method is applied for depreciation.
 Land cost is not included.
 Supporting system of Mechanized method is Roof bolting,
 and Semi-mechanized and Manual are wooden support.

APPENDIX V-III Investment Cost and Operation Data for Longwall Method

Case A : Mechanized	Quantity	Unit price (1000\$)	Total (1000\$)	Life (year)	Depreciation /year (1000\$)	Parts & Maintenance (%/year)(1000\$)	
Investment							
Studies	1	2,000	2,000	20	100	0	0
Site Preparation	1	1,000	1,000	20	50	0	0
Power Roof Support	105	100	10,500	10	1,050	5	525
Double Ranging Drum Shearer	1	2,000	2,000	10	200	10	200
AFC	1	2,000	2,000	10	200	10	200
BSL, Crusher, Pantechicon	1	800	800	10	80	10	80
Hydraulic system	1	1,000	1,000	10	100	10	100
Longwall Electrics	1	2,000	2,000	10	200	5	100
Road Header	3	800	2,400	10	240	10	240
Shuttle car	6	400	2,400	10	240	10	240
Main Conveyor	2	1,000	2,000	8	250	8	160
Longwall conveyor	2	1,000	2,000	8	250	8	160
Development conveyor	4	800	3,200	8	400	8	256
Longwall transporter	1	2,000	2,000	10	200	5	100
Man & Material transporter	6	400	2,400	8	300	10	240
Main fan	1	400	400	15	27	5	20
Local fan	5	50	250	8	31	5	13
Drainage	1	500	500	8	63	5	25
Power supply	1	2,000	2,000	20	100	3	60
Lamp, Safety devices, etc.	1	500	500	10	50	5	25
Sub-total			41,350		4,131		2,744
Others			4,135		413		274
Total (US\$)			45,485		4,544		3,018
Total (MRp)	2,300		104,616		10,451		6,941

Case B : Semi-Mechanized	Quantity	Unit price (1000\$)	Total (1000\$)	Life (year)	Depreciation /year (1000\$)	Parts & Maintenance (%/year)(1000\$)	
Investment							
Studies	1	800	800	20	40	0	0
Site Preparation	1	600	600	20	30	0	0
Single props and Iron bar	3	300	900	10	90	10	90
Coal cutter	3	400	1,200	10	120	10	120
AFC	3	600	1,800	10	180	10	180
BSL, Crusher, Pantechicon	3	400	1,200	10	120	10	120
Hydraulic system	3	200	600	10	60	10	60
Longwall Electrics	3	800	2,400	10	240	5	120
Hydraulic Excavator	6	200	1,200	10	120	10	120
Pneumatic pick	1	100	100	5	20	10	10
Main Conveyor	2	600	1,200	8	150	8	96
Longwall conveyor	4	500	2,000	8	250	8	160
Development conveyor	8	300	2,400	8	300	8	192
Material transporter	6	200	1,200	8	150	10	120
Main fan	1	400	400	8	50	5	20
Local fan	6	50	300	8	38	5	15
Drainage	1	500	500	8	63	5	25
Power supply	1	1,500	1,500	20	75	3	45
Compressed air supply	1	600	600	10	60	5	30
Lamp, Safety devices, etc.	1	600	600	10	60	5	30
Sub-total			21,500		2,216		1,553
Others			2,150		222		155
Total (US\$)			23,650		2,438		1,708
Total (MRp)	2,300		54,395		5,607		3,928

Case C : Manual	Quantity	Unit price (1000\$)	Total (1000\$)	Life (year)	Depreciation /year (1000\$)	Parts & Maintenance (%/year)(1000\$)	
Investment							
Studies	1	600	600	20	30	0	0
Site Preparation	1	500	500	20	25	0	0
Single props and iron bars	5	200	1,000	10	100	10	100
Chain conveyor	5	150	750	10	75	10	75
Hydraulic system	5	100	500	10	50	10	50
Pneumatic pick	1	200	200	5	40	10	20
Main Conveyor	2	400	800	8	100	8	64
Longwall conveyor	4	300	1,200	8	150	8	96
Development conveyor	8	200	1,600	8	200	8	128
Material transporter	5	200	1,000	8	125	10	100
Main fan	1	300	300	8	38	5	15
Local fan	10	50	500	8	63	5	25
Drainage	1	300	300	8	38	5	15
Power supply	1	600	600	20	30	3	18
Compressed air supply	1	1,200	1,200	10	120	5	60
Lamp, Safety devices, etc.	1	500	500	10	50	5	25
Sub-total			11,550		1,234		791
Others			1,155		123		79
Total (US\$)			12,705		1,357		870
Total (MRp)	2,300		29,222		3,121		2,001

APPENDIX V-III Investment Cost and Operation Data for Room & Piller

Case A : Mechanized	Quantity	Unit price (1000\$)	Total (1000\$)	Life (year)	Depreciation /year (1000\$)	Parts & Maintenance (%/year)(1000\$)	
Investment							
Studies	1	500	500	20	25	0	0
Site Preparation	1	500	500	20	25	0	0
Road Header	2	800	1,600	10	160	10	160
Shuttle car	3	400	1,200	10	120	10	120
Conveyor system	3	400	1,200	8	150	8	96
Material transporter	2	200	400	8	50	10	40
Main fan	1	200	200	15	13	5	10
Local fan	3	50	150	8	19	5	8
Drainage	1	100	100	8	13	5	5
Power supply	1	800	800	20	40	3	24
Lamp, Safety devices, etc	1	200	200	10	20	5	10
Sub-total			6,850		635		473
Others			685		64		47
Total (US\$)			7,535		699		520
Total (MRp)	2,300		17,331		1,608		1,196

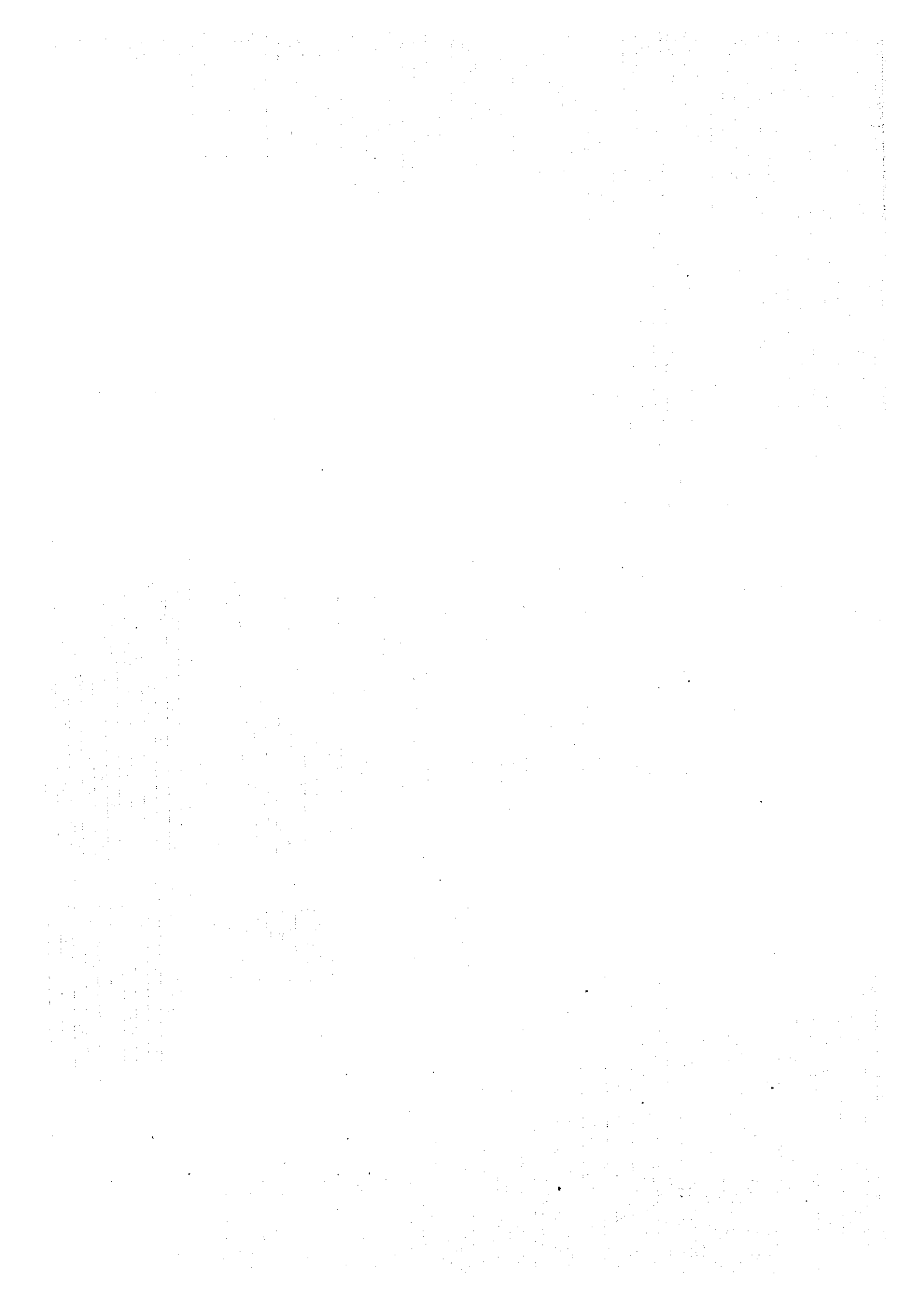
Case B : Semi-Mechanized	Quantity	Unit price (1000\$)	Total (1000\$)	Life (year)	Depreciation /year (1000\$)	Parts & Maintenance (%/year)(1000\$)	
Investment							
Studies	1	400	400	20	20	0	0
Site Preparation	1	400	400	20	20	0	0
Hydraulic Excavator	5	200	1,000	10	100	10	100
Pneumatic pick	1	50	50	5	10	10	5
Baby conveyor	15	20	300	10	30	10	30
Conveyor system	3	300	900	8	113	5	45
Material transporter	3	200	600	8	75	10	60
Main fan	1	200	200	8	25	5	10
Local fan	6	50	300	8	38	5	15
Drainage	1	100	100	8	13	5	5
Power supply	1	600	600	20	30	3	18
Compressed air supply	1	400	400	10	40	5	20
Lamp, Safety devices, etc	1	250	250	10	25	5	13
Sub-total			5,500		539		321
Others			550		54		32
Total (US\$)			6,050		593		353
Total (MRp)	2,300		13,915		1,364		812

Case C : Manual	Quantity	Unit price (1000\$)	Total (1000\$)	Life (year)	Depreciation /year (1000\$)	Parts & Maintenance (%/year)(1000\$)	
Investment							
Studies	1	300	300	20	15	0	0
Site Preparation	1	300	300	20	15	0	0
Pneumatic pick	1	100	100	5	20	10	10
Baby conveyor	25	20	500	10	50	10	50
Conveyor system	3	200	600	8	75	5	30
Material transporter	3	100	300	8	38	10	30
Main fan	1	200	200	8	25	5	10
Local fan	5	20	100	8	13	5	5
Drainage	1	100	100	8	13	5	5
Power supply	1	300	300	20	15	3	9
Compressed air supply	1	600	600	10	60	5	30
Lamp, Safety devices, etc	1	300	300	10	30	5	15
Sub-total			3,700		369		191
Others			370		37		19
Total (US\$)			4,070		406		210
Total (MRp)	2,300		9,361		934		490

APPENDIX VI-1 Summary of Coal Production Forecast in Indonesia

(百万ト)

Name of Company	Area (Coal Seam Condition)	Reserves (Millit.)			Coal Quality H.V.Kcal/Kg.(Ash, S)	Provenance T/Mon/Da	Production (Mill.tps)				
		Meas.	Indi.	Inf.			Minobl.	1995	1998	2000	2020
PTBA Ombilin	Ombilin 1 : U/G (A 2.0m; 10' ±) Ombilin 2 : (A 1.5m, C 4-15m; <10') Ombilin 3 : (A 1.5m, C 1.5m; <10') O/P Tanah Hitam, Kandi (A 1.5m, C 5.5m; 10-23') Total	0.65 8.0 110.0 7.1 125.55			0.45 8.0 20.0 6.7 35.15	2.17	0.06 1.11 1.17	0.05 0.60 0.65	0.07 0.40 1.17	1.00 0.30 1.30	1.00 0.50 1.50
PTBA Tanjung Enim	Air Laya (A1 8.0, A2 9, B1, 10, B 23m; <10') N.Muara Tiga Besar (A1 8, A2 12, B 18m; 15') West Banko (A1 7.0, A2 10, B1 12; <19') Bukit Kendi (A 10, B 13.5, C1 4.0; <72') South M.T.B. Total	103 371 560 14 26 1074	25	10	112 82 165 154 30 389	2.93 2.30 2.76	4.48 2.30 6.78	3.00 4.00 3.90 0.60 0.50 12.00	5.00 4.00 4.50 1.00 0.40 14.90	4.50 4.00 5.30 0.80 14.60	12.10
PTBA Total		156	206		154	7.86	7.95	16.07	15.90	22.00	12.10
PT Kalimantan Prima Coal	Pinang (O/P) (1020 seams; 2.4 ~ 6.5m; 9' ±) Bengalon (O/P) Total	156 156	206 206		154 154	5.75 6.65	10.21 10.21	16.00 16.00	22.00 22.00	22.00 22.00	9 4 22.0
PT Arutmin Indonesia	Senaikin (O/P) (1 seam; 6-7m; 2-12') Sabu (O/P) (2 seams; 3, 4.7m; 15') Maia (O/P) (7') Asam Asam (O/P) Bapulicim Total	112 114 336 155 85 802	12 108 22 96 64 306	5	77 590 736 1397	12.88	5.55 5.55	7.00 7.00 2.00 16.00	6.00 8.00 6.00 20.00	10.00 10.00 10.00 20.00	10.00 10.00 20.00
PT Adaro Indonesia	Petangin (O/P) (1 seam; 20-40m; 5-15') Tutupan (O/P) (multiple; 40m; 35-40') Wans (O/P) (3 seam; 25m; 35-40') Total	50 570 160 780	12 20 260 292	15	77 590 736 1397	11.22	1.02 1.02	1.00 1.00	1.00 1.00	1.00 1.00	1.00 1.00
PT. Kendito Coal Indonesia	Petangin (O/P) (1 seam; 4.0 m; 15')	30	(100m) 45 10 75	11 11		11.22	1.02 1.02	1.00 1.00	1.00 1.00	1.00 1.00	1.00 1.00
PT. Muli Hampan Utama	Busang (O/C) (7 seams; 1.5-6m; 8.0') Jonggon (1.1m; 4') Gian, Senuik (1.5m; 20') Lokulu (1.4m; 40') Belumpur (1.4m; 45') Puak Total	77.4 31.8	22.6 5.9	15.5 44.8	74.3	6.70 3.94	1.40 1.11	1.40 1.40 0.50	1.00 1.50 0.50	0.50 1.50 0.50	0.50 1.50 0.50
PT. Taito Harum Mine	Busang (O/P) (4 seams; 1.5-6m; 2-50') Pondok (O/P) Sutodadi (U/G) Mine 1 (O/P) (2 seams; 3.5-1m; 3-15') Total	39.6 71.4	2.2 8.1	42.9 87.7	55.8	3.71	0.67 0.67	2.00 1.70 3.70	4.50 3.20 7.70	6.00 4.00 10.00	6.00 4.00 10.00
PT. Berau Coal	Lab (O/P) (4 seams; 3m ±; 5') Benungan (O/P) (13 seams; 15-20') Other areas Total	150 103 300 553	253 253	525		4.81	2.50	4.00	5.00	5.50	5.50
PT. Kideco Jaya Agung	Reto (O/P) (8 seams; 3.5-23; 70-80') Samu (30-75') Sudabong (30-75') Samarangan (8 seams; 3.5-23; 15-40') Pinang (25-40') Total	31.0 85.1 362 714.0 42.1 908.4	44		31.2 17.2 194.0 33.0 270.5	4.06	1.19 1.19	1.20 1.20	1.00 1.00	1.00 1.00	1.00 1.00
PT. Allied Indo Coal	O/C Parumbahan (B, B, C, C, C, 3-8m; 12-20') Rau Baraburum Total	14.1 14.1			9.6 9.6	4.06	1.19 1.19	1.20 1.20	1.00 1.00	1.00 1.00	1.00 1.00
PT. Chung Hua Overseas	Coal Belt 5 (1.5-7m; 18-34') Coal Belt 4 (2.5-4m; 18-34') Coal Belt 1 (4-6m; 18-34') Total	300 300			39 39			0.50 0.50	1.00 1.00	1.00 1.00	1.00 1.00
PT. Indomineo Mandiri	Western Block (13, 1.6-9.7, 0-15') Eastern Block (19, 1.5-8.9, 0-24') Total				94 107 201			1.00 1.00	1.00 1.00	3.50 3.50	3.50 3.50
CCOW Total						6.30	29.58	55.10	74.89	87.80	85.70
PT. Kinatun	Mine 1 (U/G) (#9; 2.1, 10; 1.5m; 30') Mine 2 (*) (#7; 1.7m; 28') Mine 3 (*) (#3; 2.0, 4; 1.2m; 30') O/P (#19; 5.0m ±; 9-20') Total	9 2 11		2.2 2.2		0.98 0.98	0.42 0.30 0.72	0.40 0.10 0.50	0.50 0.50	0.50 0.50	0.70 0.70
P.T. Fajar Bumi Sakti	Mine 1 (D; 1.4m; 6-9') L/W C; 2-2.3m; 6-9') R+P LooUlung (AA; 2 A; 1.8 B; 2.3 C; 1.1 / 11' - 5') Total	11				1.25	0.58	0.10	0.80 (17.00)	0.80	0.80
P.T. Bukit Sunur	Arangis Sulatan (US; 4, MS; 7-8m; 8') Lubuk Bungan Utara (US; 4, MS; 7-8m; 10') Salung Barat (US; 4, MS; 7-8m; 8') Total	(1.7) 0.7 0.7 0-uc				5.35 5.35	0.70 0.10 0.80	0.70 0.30 1.00	0.70 0.30 1.00	0.70 0.30 1.00	0.70 0.30 1.00
PT. Bukit Baiduri	Monegdaik (A; 1.2, B; 3.0, C; 1.8, D; 4.0/9-12') Galax Tehik Dalam N. Total	3.8 12.0 2.0 17.8		3.8 12.0 2.0 17.8		3.07 3.07	0.75 0.75	0.30 0.40 0.30 1.00	0.30 0.40 0.30 1.00	0.30 0.40 0.30 1.00	0.60 0.60
PT. Dewu Mas Hitam	Simpun (US; 2.0 LS; 4.5m/18') Kandis (Sim; 1-1.7m; 1-5.5m ±; 37') Telang Begimim Total	2.4	4.7 4.7	7.0 7.0	2.4 2.4	7 7	0.67 0.67	0.50 0.50	0.50 0.50	0.50 0.50	0.60 0.60
Others							0.70	0.50	0.50	0.50	0.50
KP Mines Total						1.90	4.22	3.95	4.30	4.30	4.50
KUD Mines Total						2.18	0.23	0.30	0.30	0.30	0.30
New Contract Total											21.10
Grand Total							41.98	72.00	100.36	122.40	123.70



APPENDIX VI-II Summary of Questionnaire and Hearing

Company	Mines	Reserves (Mill. tons)		Coal Seams (m)	Dip	Mining	Manpower (Dir./Cont./T.)	Production (Mill. tons)								
		Min.	Infer.					1985	1986	1988	2000	2005	2010	2015	2020	
PT Bukit Asam	Sawahleng Umbilin Sigalat Tanah Hitam Kendit, etc. Tanjung Enim (Air Layu Pt) // (North Muara Tiga Besar) // (West Bank) // (Bukit Kendit) // (South Muara Tiga Besar)	0.45	-	0.45	A2.0.B.1.0.C.6.0	13~18°	U/G	415/38/453	0.06	0.05	0.05	0.07	0.50	1.40	1.00	1.00
		110	-	7	A1.5.B.1.0.C.3.5	13~18°	U/G		1.1	0.90	0.60	0.40	0.50	0.57	0.50	
		7.1	-	6.7	A1.5.B.1.0.C.5.5	10~23°	O/P(1.9)		4.48	3.00	3.00	5.00	6.00	3.00	-	-
		103	25	10	A1.7.5.A.2.1.1.B.1.10.B.2.4.5.C.7	10~20°	O/P(1.2.5)	1645/431/2076	2.30	4.00	4.00	4.00	4.00	4.00	4.00	4.00
		371	-	82	A1.8.3.A.2.1.2.B.1.7.7.C.8.8	10~40°	O/P(1.2.5)	1616/163/1779	-	3.90	3.90	4.50	5.00	5.00	5.60	5.60
		560	-	165	A1.7.3.A.2.1.0.B.1.12.7.B.2.4.5.C.1.5.C.2.6.2	5~19°	O/P(1.7)	338/163/499	-	0.30	0.60	0.60	1.00	1.00	1.00	1.00
PT Bukit Asam Total	O/P (Tanjung Enim) U/G (Umbilin) U/G (Umbilin, Sigalat) T.P.TSA	26	60	90	A1.8.2.A.2.1.2.4.8.18.4.C.8.1	15~60°	O/P(1.2.3)	6.78	7.90	12.00	14.90	15.80	13.00	10.60	10.60	
		112	12	5	S1.95-3.03.SL.0.68-1.45	2~12°	O/P	1211/1317/2528	5.36	4.00	4.00	4.00	4.00	-	-	
		114	108	79	S2.75.SL-4.70	15°	O/P		-	2.00	2.00	2.00	2.00	4.00	4.00	
PT Andamin Ind.	Senui Mulia Asam Asam Batulicin Total	336	22	80				-	-	0.60	1.50	4.00	4.00	4.00	4.00	
		155	96	158					-	-	0.33	1.20	1.20	1.20	1.20	
		85	63	64					-	-	0.50	1.00	2.00	2.00	2.00	
PT Kindia Coal	Peranga Bundu Total	802	301	385				5.36	6.00	7.10	8.89	13.20	11.20	7.20	7.20	
		30	45	10	KA4.0.KB.0.5	15°	O/P	71/156/227	1.02	1.00	1.00	1.00	1.00	1.00	1.00	
		1117	470	619					1.02	1.00	1.00	1.00	1.00	1.00	1.00	
PT Bereau Coal	Lati Binungan Other Area (Derepaten, Kelai) Total	150	253	525	R3.C.2.E.3.1.3	5°	O/P(1.4)	0.67	1.10	2.00	4.50	5.90	6.00	6.00	6.00	
		103	253	525	R1.3.beams	15~20°	O/P(1.6)		-	0.50	1.70	3.20	3.60	4.00	4.00	
		563	253	525					0.67	1.60	3.70	7.70	9.50	10.00	10.00	
PT Multi Harapan Utama	Jongkon Gitan (Senuik) Lokula (T. Dalam) La Han (Belumpur) Putek (Baruas) Total	77.4	22.6	15.5	#21.2.#31.2.#71.5	8°	O/P(1.9)	967/100/1067	1.40	1.40	1.00	1.00	0.50	-	-	
		431.7	11.1		A3.1.#11.1	4°		1996-195/14/800	0.57	0.70	1.00	1.50	1.00	-		
		74.3	15.5	74.3	A3.1.5	20°			-	-	-	-	-	0.50	0.80	
		40°			A3.1.4	40°		2005-250/25/800	-	-	-	0.80	1.00	1.00	1.00	
		45°			A3.1.4	45°			-	-	-	-	0.50	1.20	1.20	
		45°			A3.1.4	45°			-	-	-	-	-	-	0.50	
PT Kidaco Jaya Agung	Roto I / II Senui Sububang Samarangau Pinang Total	31.0	44		#10.9.#12.15.#18.14.#5.7.5.#4.12.#3.8	70~80°	O/P(1.7.8)	700/187/887	1.97	2.10	2.40	2.80	3.00	3.00	3.00	
		85.1	-	31.2			30~75°	O/P		2.50	2.80	4.00	5.00	5.50	5.50	
		36.2	-	12.3			30~75°	O/P		-	0.50	1.00	1.50	1.50	2.00	
		714.0	-	194.0			15~40°	O/P(1.7.8)		-	-	0.50	1.00	1.50	2.00	
		42.1	-	33.0			25~40°	O/P		-	-	0.20	1.00	1.50	2.50	
		908.4	44	270.5						2.50	2.80	4.50	7.00	10.00	11.00	13.00
PT Kalimantan Prima Coal	Pinang Area (Pt. Hatan, Surya, Bintang, C North, C South, H North, K, D, J) Bengalon Prospect Sapar-Santan Prospect Total	156	206		10/20beams(2.4~6.5)	9°	O/P(1.7)	2200/D	-	-	-	-	-	-	-	
		405.1	152	0				400/D	-	-	-	-	-	-	-	
		405.1	152	0				2400/SC	-	-	-	-	-	-	-	
PT Allied Iudo Coal	Perambahen Total	391	152	158					10.21	11.50	16.00	22.00	22.00	22.00	22.00	
		14.1	-	9.9	B1.2.B.3.1.C1.3.C.2.3	5~10°	O/P(1.9)	885/870	1.19	1.20	1.00	1.00	1.00	1.00		
		405.1	152	0					1.19	1.20	1.00	1.00	1.00	1.00		
PT Tanco Harum	Mine I (Susang Tenga) (Pondak Lobu/Sukodadi 1998-U/G) Mine II (Sabulu/Sihary/ Katapang Total	31.8	5.9	44.8	POL.2.5.CB.3.0.SK0.2.0	5~12°	O/P(1.10)	845/47/892	1.11	1.30	1.40	1.50	1.50	1.50	1.50	
		39.0	2.2	42.9	SB.2.0.SC.1.5.KIP.1.5	10~24°	O/P(1.10)		-	-	0.50	0.50	0.50	0.50		
		71.4	8.1	87.7					1.11	1.30	1.70	2.00	2.00	2.00		

APPENDIX VI-II Summary of Questionnaire and Hearing

Company	Mines	Reserves (Mill. tons)		Coal Seams (m)	Dip	Mining	Manpower (Dir/Cont./T)	Production (Mill. tons)									
		Meas. Indic.	Infer. Minib					1995	1996	1998	2000	2005	2010	2015	2020		
PT Adaro Indonesia	Panggih	50	12	77	5~15°	O/P(1:2)	200/1200/1400	5.55	7.20	7.00	6.00	-	-	-	-	-	
	Tuluhan	570	20	590	35~40°	O/P(1:2)		-	-	7.00	8.00	10.00	10.00	10.00	10.00	10.00	
	Ware	160	290	310	35~40°	O/P(1:2)		-	-	7.00	8.00	10.00	10.00	10.00	10.00	10.00	10.00
	Total	780	292	977				5.55	7.20	16.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
PT Chung Hua Overseas (PT. Baradatra sarya)	Coal Belt III	300	-	39	18~34°	O/P(1:4)	100/340 S-O/940	-	-	-	-	-	-	-	-	-	-
	Coal Belt V	300	-	39	0~15°	O/P(2)	125	-	0.20	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PT Indonindo Mandiri	Western Block	300	94	13 Seams: 1.0~9.7, 11.8, 1	0~24°	O/P(2)		-	0.86	1.00	3.50	3.50	3.50	3.50	3.50	3.50	3.50
	Eastern Block	107	107	19 Seams: 1.05~8.9, 1.50, 6				29.58	33.76	54.80	74.39	85.70	85.20	85.20	85.20	85.20	85.20
	Total	-	-	201				-	-	-	0.90	0.50	0.50	0.50	0.50	0.50	0.50
CCOW (O/C) (U/G)		178	(10.6)	17.8 (9.5)				29.58	35.76	55.10	74.39	86.20	85.70	85.70	85.70	85.70	85.70
	Total	9	-	22				37.47	44.56	67.46	89.69	101.50	98.80	93.80	93.80	95.80	95.80
PTBA (O/C) (U/G)		2	-	22				0.06	0.06	0.35	0.57	1.05	2.43	2.57	2.00	2.00	2.00
	Total	11	-	22				37.53	44.61	67.75	90.26	102.55	101.23	96.37	96.37	97.80	97.80

APPENDIX VII-b Summary of Questionnaire and Hearing with KP Mines

Company	Mines	Reserves (Mill. tons)		Coal Seams (m)	Dip	Mining	Manpower (Dir/Cont./T)	Production (Mill. tons)									
		Meas. Indic.	Infer. Minib					1995	1996	1998	2000	2005	2010	2015	2020		
PT Bukit Baiduri Ent.	Maraen di (O/P)	3.8	3.8	A1,2,3,4,1~3,0	11°	O/P(1:6)	360/840(S/C)	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	Galaxy (O/P)	12.0	12.0	A6~162~7,0	16°	B Seam	/1200	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
	Teluk Dalam North (O/P)	2.0	2.0	A2~8,2~3	12°			0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	Total	17.8	(10.6)	17.8 (9.5)	(8~12°)		2486/270/2756	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PT Kitadin (U/G)	Mine 1,2 (U/G)	9	-	7:1.6, 8:2.0, 9:2.1, 10:1.5	20~28°			0.42	0.40	0.40	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	Mine 3 (U/G)	2	-	13:2.0, 14:1.2	30°			0.30	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
	#19 O/P	11	-	19:5.0	9~20°	O/P(1:8)		0.72	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	Total	22	0	44				0.67	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
PT Danau Maa Hitam (Bengkulu)	Simpur (O/P)	2.4	4.7	7.0	2.4			0.67	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	Kandis (O/P)	11	-	11	A, A1, 2, A1, 1, 9, 2, 3, C, 1, 1			0.58	0.60	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
	Talang Sagim	11	-	11	A, A1, 2, A1, 1, 9, 2, 3, C, 1, 1			0.58	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
	Total	24	4.7	7.0	2.4			0.58	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
PT Fajar Bumi Sakti	Mine 1 (U/G)	11	-	11	8~9°			0.58	0.60	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
	Loa Ulung (U/G)	11	-	11	11~5°			0.58	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
	Total	22	-	22				0.58	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
PT Bukit Sunar	Araniza Sulatan (O/P)	11	-	11	8°	O/P(1:8)	159/337(S1C)	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
	Lubuk Bungin Utara (U/G)	11	-	11	10°	U/G	1496	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
	Sulung Barat (U/G)	11	-	11	8°	Short -W		0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
	Total	33	-	33				0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
PT Bukit Bara Utama		0.08	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
	Total	0.08	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
PT Karbindo		0.36	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
	Total	0.36	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Other Mines		1.00	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
	Total	1.00	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
KP Mines (U/G)		3.22	2.90	2.90	2.90	2.90	2.90	3.22	2.90	2.90	3.00	3.00	3.20	3.20	3.00	3.00	3.00
	Total	4.22	3.95	3.95	3.95	3.95	3.95	4.22	3.95	3.95	4.30	4.30	4.60	4.60	4.30	4.30	4.30

APPENDIX VI-II Summary of Questionnaire and Hearing

Company	Mines	Reserves (Mill. tons)		Coal Seams (m)	Dip	Mining	Manpower (Dir/Cont./T)	Production (Mill. tons)											
		Meas.	Infer.					1995	1996	1998	2000	2005	2010	2015	2020				
PT Barasentosa Lestari (SS)	Muara Kitan (O/P)			200 12~22 seams, 1~10	18°	O/P(1/3)													
	Total																		
PT Wahana Barutama Mining (SK)	Setau No.1 Mine (U/G)	230	270	500		U/G													
	Setau No.2 Mine (U/G)	-	415	415		U/G													
	Setau No.3 Mine (U/G)	-	380	380		U/G													
	Setau No.4 Mine (U/G)	-	340	340		U/G													
Total		230	1405	1635															
PT Turbaendo (EK)	Muara Lewa					O/P	80/123												
Total																			
PT Astaka (SS)	Babatomen (1700ha)	101	4.1	105		O/P													
	Suban Burning (500ha)					O/P													
Total																			
PT Yamahumi Palaka (NWK)	Nengmeratai (A)	-	-	50		O/P	100/2												
	Senaning (B)	-	-	50		O/P													
Total				100															
PT Bara Premulya Abadi	Muara Uya	-	-	30		15~40°													
	Total			30															
PT Antang Gunung Moratus (SK)	Rampah Block	4.9	4.5	4.2		30~45°													
	Madang Block	7.8	8.0	7.1		29~87°													
	Miawa Block	2.8	2.6	2.7		14~68°													
	Pulau Block	6.7	8.0	7.9		35~48°													
Total		25.6	24.3	25.7															
PT Generalindo Prima Coal	Bulurejo	2.6	3.1	5.7		15°													
	Total		2.6	3.1	5.7														
PT Ramdany Coal Mining (SS)	Gn. Meraksa	2.4	5.3	8.0		15°													
	Batumarta	4.9	11.8	17.5		17°													
	Muncakubal	5.9	17.3	31.4		7°													
	Tenuaan/Kurup	0.5	1.5	2.5		9°													
Total		13.9	36.3	59.8															
PT Duraputra Tamarata (SS)	Block I	11.7	25.1	35.2		14°													
	Block II	15.9	25.7	38.9		19°													
	Block III	6.4	16.6	27.9		7°													
Total		34.0	67.4	102.0															

Remarks: Questionnaire - 1996/1~7; Hearing - 1996/1~2 & 7

APPENDIX VIII-1 Curricula of the Department of Mining Engineering

<u>CURRICULA OF THE DEPARTMENT OF MINING ENGINEERING</u>		<u>MINING EXPLORATION</u>	
<p>SEMESTER I¹⁾ Calculus I 4 shts²⁾ Physics I 4(1) Chemistry I 3(1) English 2 Social Studies (Military Science) 2 Sport Education I 1 Introduction to Mineral Technology 2 18</p> <p>SEMESTER II Calculus II 4 Physics II 4(1) Chemistry II 3(1) Bahasa Indonesia 2 Mechanical Engineering 2 Environmental Science 1 Sport Education II 1 19</p> <p>Pancasila 2</p>	<p>SEMESTER III Social Studies (Religion) 2 Matrices & Vector Analysis 3 Analytical Chemistry 4(2) Physical Geology 2 Crystallography 2(1) Surveying 3 Elementary Statistics 3 19</p> <p>SEMESTER IV Social Studies (Ethics) 1 Physical Chemistry II 4(1) Dynamic Geology 2(1) Research Methodology 2 Mineralogy 2(1) Numerical Analysis & Simulation 3 Geomorphology & Photogeology 3(1) 17</p> <p>SEMESTER V Labor Law & Industrial Regulation 2 Structural Geology 3(1) Petrology 3(1) Principles of Stratigraphy 2 Fluid Mechanics & Applied Hydrology 3 Mineral Genesis 2(1) Mineral Processing 3(1) 18</p> <p>SEMESTER VI Economics & Industrial Minerals 2 Mineral Exploration Technique 3 Optical Mineralogy 2 Geophysical & Exploration Mapping 2 Hydrogeology 3 Geotechnics 3 Seismic & Electric Exploration 3 18</p>	<p>SEMESTER VII Exploration Drilling 2 Geostatistics 2 Magnetic & Gravity Exploration 2 Ore Microscopy 2 Mine Management 2 Petrography 3(1) Elective Courses 6 19</p> <p>SEMESTER VIII Geochemistry & Ore Analysis 2 Ore Reserves Analysis 2 Thesis 5 Elective Courses 6 15</p> <p>ELECTIVE COURSES Elective Courses of Odd Semester : Rock Mechanics 2 Geothermal Resources Exploration and Valuation 2 Well Logging 2 Mine Examination & Valuation 3 Surface Mining 2 Coal & Cokes 2 Hydrochemistry 2 Groundwater Mapping 2 Exploration Geophysics 3(1) Structural Geology of Indonesia 2 Petroleum Geology 3(1) Instrumentation System 3</p> <p>Elective Courses of Even Semester Underground Mine Development 2 Earth Moving 2 Coal Mining 2 Mine Plan Design 2 Soil Ability Improvement 2 Coal Exploration 2 Seismic & Integration Geophysical Exploration 2 Coal Geology 2 Industrial Minerals 2 Ore Texture Analysis 2 Electrical & Electronics 2</p>	

¹⁾ Semester I and II belong to Common First Year of the whole ITB, except for the course of Introduction to Mining Engineering.
²⁾ shts : semester hours

APPENDIX VIII-I Curricula of the Department of Mining Engineering

MINING ENGINEERING

SEMESTER III	
Social Studies (Religion)	2
Matrices & Vector Analysis	3
Analytical Chemistry	4(2)
Physical Chemistry I	4(1)
Physical Geology	2
Crystallography	2(1)
Elementary Statistics	3
20	
SEMESTER IV	
Social Studies (Ethics)	1
Modern Physics	3
Physical Chemistry II	4(1)
Dynamic Geology	2(1)
Research Methodology	2
Mineralogy	2
Numerical Analysis & Simulation	3
17	

SEMESTER V	
Mineral Genesis	2
Rock Mechanics	3(1)
Mining Law & Mine Safety	2
Structural Geology	3(1)
Petrology	3(1)
Surveying	3(1)
Introduction to Fluid Mechanics & Machines	2
18	

Elective Courses of Even Semester

Geotechnics	3
Mine Hydrology	2
Tunneling	2
Industrial Minerals	2

METALLURGICAL ENGINEERING OPTION

MINERAL PROCESSING

SEMESTER III	
Analytical Chemistry	4(1)
Physical Chemistry I	4(1)
Matrices & Vector Analysis	3
Crystallography	2(1)
Introduction to Metallurgy	2
Social Studies (Religion)	2
17	

SEMESTER IV	
Modern Physics	3(1)
Physical Chemistry II	4(1)
Mineralogy	2(1)
Numerical Analysis & Simulation	3
Introduction to Material Science	2
Elementary Statistics	3
or	
Applied Mathematics	3
17	

SEMESTER V	
Metallurgical Thermodynamics	3(1)
Transport Phenomena	3
Unit Operation	3
Comminution	3(1)
Extractive Metallurgy I	3
Ore Microscopy	2
Elective Courses	2
19	

SEMESTER VI	
Mechanical Engineering	2
Electrical Power Engineering	3
or	
Basic Electronics	3
Metallurgical Kinetics	3
Concentration I	3
Extractive Metallurgy II	3(1)
Surface & Interfaces	2
Elective Courses	3
19	

SEMESTER VII	
Concentration II	2
Hydrometallurgy	3
Coal & Cokes	2
Labor Law & Industrial Regulation	2
Mine Management	2
Elective Courses	6
17	

SEMESTER VIII	
Mill Plan Design	3
Engineering Economics	3
Thesis	5
Social Studies (Ethics)	1
Elective Courses	5
17	

APPENDIX VIII-1 Curricula of the Department of Mining Engineering

EXTRACTIVE METALLURGY

SEMESTER III		17
Analytical Chemistry	4(1)	
Physical Chemistry I	4(1)	
Matrices & Vector Analysis	2(1)	
Crystallography	2	
Introduction to Metallurgy	2	
Social Studies (Religion)	2	
SEMESTER IV		17
Modern Physics	3(1)	
Physical Chemistry II	4(1)	
Mineralogy	2(1)	
Numerical Analysis & Simulation	3	
Introduction to Material Science	2	
Elementary Statistics	3	
or		
Applied Mathematics	3	
SEMESTER V		17
Metallurgical Thermodynamics	3(1)	
Transport Phenomena	3	
Solid State Physics	3	
or		
Unit Operation	3	
Extractive Metallurgy I	3	
Physical Metallurgy I	3(1)	
or		
Communication	2	
Fuel & Furnaces	2	
Elective Courses	2	

PHYSICAL METALLURGY

SEMESTER III		17
Analytical Chemistry	4(1)	
Physical Chemistry	4(1)	
Matrices & Vector Analysis	3	
Crystallography	2(1)	
Introduction to Metallurgy	2	
Social Studies (Religion)	2	
SEMESTER IV		17
Modern Physics	3(1)	
Physical Chemistry II	4(1)	
Mineralogy	2(1)	
Numerical Analysis & Simulation	3	
Introduction to Material Science	2	
Elementary Statistics	3	
or		
Applied Mathematics	3	
SEMESTER V		19
Metallurgical Thermodynamics	3(1)	
Transport Phenomena	3	
Solid State Physics	3	
Physical Metallurgy I	3(1)	
Extractive Metallurgy I	3	
Metallurgy	2	
Elective Courses	2	
SEMESTER VI		19
Metallurgical Kinetics	3	
Engineering Mechanics	2	
or		
Structure of Materials	3	
Electrical Power Engineering	3	
or		
Electronics Basic	3	
Physical Metallurgy II	3	
Extractive Metallurgy II	3(1)	
Foundry Engineering	2(1)	
Elective Courses	3	

APPENDIX VIII-I Curricula of the Department of Mining Engineering

SEMESTER VII	17	17	17	17	17	17	17
Metal Forming Engineering	2						
Powder Metallurgy	2						
Metal Heat Treatment	2						
Labor Law & Industrial Regulation	2						
Mine Management	2						
Elective Courses	7						
SEMESTER VIII							
Phase Transformation	2						
Non Destructive Testing	2						
Engineering Economics	3						
Thesis	5						
Social Studies (Ethics)	1						
Elective Courses	4						
ELECTIVE COURSES							
Elective Courses of Odd Semester:							
Unit Operation	3						
Solid State Physics	3						
Comminution	3						
Extractive Metallurgy I	3(1)						
Physical Metallurgy I	3(1)						
Fuel & Furnaces	2						
Metallurgy	2						
Concentration II	2						
Metallurgy of Iron and Steel I	2						
Metal Forming Engineering	2						
Mineral Processing	3(1)						
Metal Refining	2						
Coal & Cokes	2						
Hydrometallurgy	3						
Powder Metallurgy	2						
Special Topic	2						
Pyrometallurgy	3						
Metal Heat Treatment	2						
Aqueous Corrosions	2(1)						
Diffusion in Solids	2						
Alloys Design	3						
Metal Failure Analysis	2						
Elective Course of Even Semester:							
Research Methodology	2						
Elementary Statistics	3						
Applied Mathematics	3						
Concentration I	3						
Extractive Metallurgy II	3(1)						
Physical Metallurgy II	3						
Surface & Interfaces	2						
Foundry Engineering	2(1)						
Metallurgy of Iron and Steel II	2						
Phase Transformation	2						
Boundary Layer Theory	3						
Electrometallurgy	3						
Non Destructive Testing	2						
Refractory	2						
Special Topic	2						
Industrial Minerals	2						
Mill Plan Design	3						
Ceramics Engineering	2						
Strengthening Mechanism	2						
High Temperature Corrosion	2						
Sampling Techniques	2						
Surface Treatment	2						
Metallurgy of Rare Metals	2						

APPENDIX VIII-II Entrants and Graduates of the LPP?

DATA LULUSAN LPPPT Graduated LPPPT

Tahun 1991 (Program Pendidikan 4-th)

• Jurusan Tambang	: 11 orang	Number of mining student
• Jurusan Mesin Tambang	: 15 orang	Number of Mechanical student
• Jurusan Listrik Tambang	: 11 orang	Number of Electrical student
Jumlah		: 37 orang

Penerimaan : Recruitment

• PT Kideco Jaya Agung	: 7 orang
• PTSA Tanjung Enis	: 15 orang
• PTSA Ombilin (UPG)	: 15 orang

Tahun 1992 (Program Pendidikan 4-th)

• Jurusan Tambang	: 17 orang	
• Jurusan Mesin Tambang	: 15 orang	
• Jurusan Listrik Tambang	: 14 orang	
Jumlah		: 47 orang

Penerimaan :

• PTSA Tanjung Enis	: 34 orang
• PTSA Ombilin (UPG)	: 13 orang

Tahun 1993 (Program Pendidikan 4-th)

• Jurusan Tambang	: 12 orang	
• Jurusan Mesin Tambang	: 13 orang	
• Jurusan Listrik Tambang	: 12 orang	
Jumlah		: 37 orang

Penerimaan :

• PTSA Tanjung Enis	: 8 orang
• PTSA Ombilin (UPG)	: 31 orang

Tahun 1994 (Program Pendidikan 2-th)

• Jurusan Tambang	: 15 orang	
• Jurusan Mesin Tambang	: 25 orang	
• Jurusan Listrik Tambang	: 13 orang	
Jumlah		: 53 orang

Penerimaan :

• PTSA Tanjung Enis	: 32 orang
• PTSA Ombilin (UPG)	: 21 orang

Tahun 1995 (Program Pendidikan 2-th)

• Jurusan Tambang	: 14 orang	
• Jurusan Mesin Tambang	: 17 orang	
• Jurusan Listrik Tambang	: 14 orang	
Jumlah		: 45 orang

Penerimaan :

• PTSA Tanjung Enis	: 25 orang
• PTSA Ombilin (Sawahlunto)	: 4 orang
• PT Baradisanjaya	: 7 orang
• LPPPT Ombilin	: 9 orang

RENCANA LULUSAN TAHUN 1996 (PROGRAM 2 TH)

Graduate planing

• Jurusan Tambang	: 13 orang	
• Jurusan Mesin Tambang	: 13 orang	
• Jurusan Listrik Tambang	: 14 orang	
Jumlah		: 40 orang

APPENDIX VIII-III Curricula by Semester for 2 Years Program

**LIST OF SUBJECT LESSONS
TWO YEARS PROGRAMME
SEMESTER I (GENERAL)**

Num	MATA KULIAH / SUBJECT LESSONS	MKS
1	Pengantar Teknologi Pertambangan (Introduction to Mining Technology)	4
2	Pengantar Teknologi Permesinan Tambang (Introduction to Mining Mechanical Technology)	4
3	Pengantar Teknologi Kelistrikan Tambang (Introduction to Mining Electrical Technology)	4
4	Pengantar Pemanfaatan Batubara (Introduction to Coal Utilization)	2
5	Pengantar Komputer (Introduction to Computer)	2
6	Keselamatan Kerja (Working Safety)	2
7	Administrasi Perkantoran dan Penulisan Laporan (Office Administration and Report Writing)	2
8	Bahasa Inggris Terapan (Applied English Programme)	2
9	Etika (Etiquet)	2
10	Sikap Perilaku (Mental Attitude)	0
11	Ekstrakurikuler (Extracurricula)	0
JUMLAH / total		24

**LIST OF SUBJECT LESSONS
TWO YEARS PROGRAMME
SPECIALIZATION : MINING
SEMESTER II**

Num	MATA KULIAH / SUBJECT LESSONS	MKS
1	Teknologi Tambang Bawah Tanah I (Underground Mining Technology I)	4
2	Teknologi Tambang Terbuka I (Surface Mining Technology I)	4
3	Ilmu Ukur Tanah (Surveying)	4
4	Alat-alat Mesin Tambang Bawah Tanah (Underground Mining Equipment)	4
5	Perpetaan (Mapping)	1
6	Geologi Dasar (Introduction to Geology)	2
7	Geologi Struktur (Geology Structure)	2
8	Perencanaan Tambang (Mine Planning)	2
9	Bahasa Inggris Terapan (Applied English Programme)	1
10	Sikap Perilaku (Mental Attitude)	0
11	Ekstrakurikuler (Extracurricula)	0
JUMLAH / total		24

**LIST OF SUBJECT LESSONS
TWO YEARS PROGRAMME
SPECIALIZATION : MINING
SEMESTER III**

Num	MATA KULIAH / SUBJECT LESSONS	MKS
1	Teknologi Tambang Bawah Tanah II (Underground Mining Technology II)	4
2	Teknologi Tambang Terbuka II (Surface Mining Technology II)	4
3	Studi Kasus Pertambangan (Mine Case Study)	3
4	Pengolahan Batubara (Coal Preparation)	2
6	Supervisi I (Supervision)	2
6	Perlindungan Pertama Pada Kecelakaan (P3K) (Safety Aids)	2
7	Teknik Pemboran dan Eksplorasi (Drilling and Exploration)	2
8	Ekonomi Teknik (Technical Economy)	2
9	Bahasa Inggris Terapan (Applied English Programme)	1
10	Teknologi Sipil Tambang (Civil Work for Mining)	2
11	Sikap Perilaku (Mental Attitude)	0
12	Ekstrakurikuler (Extracurricula)	0
JUMLAH / total		24

**LIST OF SUBJECT LESSONS
TWO YEARS PROGRAMME
SPECIALIZATION : MINING
SEMESTER IV**

Num	MATA KULIAH / SUBJECT LESSONS	MKS
1	Undang-undang Tambang dan Lingkungan (Mine Regulation and Environment)	2
2	Supervisi II (Supervision)	2
3	Bahasa Inggris Terapan (Applied English Programme)	1
4	Pembimbingan dan Presentasi Karya Tulis (Writing and Presentation Task)	5
5	Praktek Kerja Lapangan (PKL) (General Field Work)	5
6	Pemantapan Materi (Subject Comprehension)	2
7	Sikap Perilaku (Mental Attitude)	0
8	Ekstrakurikuler (Extracurricula)	0
JUMLAH / total		20

**NOTE : MKS = MATERI KREDIT SEMESTER
(Value for Credit per Semester)**

APPENDIX VIII-III Curricula by Semester for 2 Years Program

**LIST OF SUBJECT LESSONS
TWO YEARS PROGRAMME
SEMESTER I (GENERAL)**

Num	MATA KULIAH / SUBJECT LESSONS	MKS
1	<i>Pengantar Teknologi Pertambangan</i> (Introduction to Mining Technology)	4
2	<i>Pengantar Teknologi Permesinan Tambang</i> (Introduction to Mining Mechanical Technology)	4
3	<i>Pengantar Teknologi Kelistrikan Tambang</i> (Introduction to Mining Electrical Technology)	4
4	<i>Pengantar Pemanfaatan Batubara</i> (Introduction to Coal Utilization)	2
5	<i>Pengantar Komputer</i> (Introduction to Computer)	2
6	<i>Keselamatan Kerja</i> (Working Safety)	2
7	<i>Administrasi Perkantoran dan Penulisan Laporan</i> (Office Administration and Report Writing)	2
8	<i>Bahasa Inggris Terapan</i> (Applied English Programme)	2
9	<i>Etika</i> (Etiquet)	2
10	<i>Sikap Perilaku</i> (Mental Attitude)	0
11	<i>Ekstrakurikuler</i> (Extracurricula)	0
JUMLAH / total		24

**LIST OF SUBJECT LESSONS
TWO YEARS PROGRAMME
SPECIALIZATION : MINING MECHANICAL
SEMESTER II**

Num	MATA KULIAH / SUBJECT LESSONS	MKS
1	<i>Hidrolik dan Pnevmatik I</i> (Hydraulic and Pneumatic I)	4
2	<i>Motor Bakar</i> (Internal Combustion Engine)	4
3	<i>Alat-alat Mekanik Tambang Terbuka I</i> (Heavy Earth Moving Mechanical Equipment I)	4
4	<i>Alat-alat Mekanik Tambang Bawah Tanah I</i> (Underground Mining Mechanical Equipment I)	4
5	<i>Gambar Teknik</i> (Technical Drawing)	2
6	<i>Teknologi Bengkel I</i> (Basic Workshop Technology I)	4
7	<i>Pengetahuan Alat-alat Mesin I</i> (Mechanical Element Technology I)	1
8	<i>Bahasa Inggris Terapan</i> (Applied English Programme)	1
9	<i>Sikap Perilaku</i> (Mental Attitude)	0
10	<i>Ekstrakurikuler</i> (Extracurricula)	0
JUMLAH / total		24

**LIST OF SUBJECT LESSONS
TWO YEARS PROGRAMME
SPECIALIZATION : MINING MECHANICAL
SEMESTER III**

Num	MATA KULIAH / SUBJECT LESSONS	MKS
1	<i>Hidrolik dan Pnevmatik II</i> (Hydraulic and Pneumatic II)	4
2	<i>Alat-alat Mekanik Tambang Terbuka II</i> (Heavy Earth Moving Mechanical Equipment II)	4
3	<i>Alat-alat Mekanik Tambang Bawah Tanah II</i> (Underground Mining Mechanical Equipment II)	4
4	<i>Teknologi Bengkel II</i> (Basic Workshop Technology II)	4
5	<i>Pengetahuan Alat-alat Mesin II</i> (Mechanical Element Technology II)	2
6	<i>Manajemen Perawatan Mesin II</i> (Management and Preventive Maintenance)	1
7	<i>Supervisi I</i> (Supervision I)	2
8	<i>Bahasa Inggris Terapan</i> (Applied English Programme)	1
9	<i>Pertolongan Pertama Pada Kecelakaan (P3K)</i> (First Aid)	2
10	<i>Sikap Perilaku</i> (Mental Attitude)	0
11	<i>Ekstrakurikuler</i> (Extracurricula)	0
JUMLAH / total		24

**LIST OF SUBJECT LESSONS
TWO YEARS PROGRAMME
SPECIALIZATION : MINING MECHANICAL
SEMESTER IV**

Num	MATA KULIAH / SUBJECT LESSONS	MKS
1	<i>Undang-undang Tambang dan Lingkungan</i> (Mine Regulation and Environment)	2
2	<i>Supervisi II</i> (Supervision)	2
3	<i>Bahasa Inggris Terapan</i> (Applied English Programme)	4
4	<i>Pembimbingan dan Presentasi Karya Tulis</i> (Writing and Presentation Task)	5
5	<i>Praktek Kerja Lapangan (PKL)</i> (General Field Work)	5
6	<i>Pemanlapan Materi</i> (Subject Comprehension)	2
7	<i>Sikap Perilaku</i> (Mental Attitude)	0
8	<i>Ekstrakurikuler</i> (Extracurricula)	0
JUMLAH / total		20

**NOTE : MKS = MATERI KREDIT SEMESTER
(Value for Credit per Semester)**

APPENDIX VIII-IV Progress in the LPPT Ombilin's Facilities Development for Practical Training

1. DORMITORIES (2 Buildings)

- a. First Dormitory (four floors) ; number of rooms = 32
- b. Second Dormitory (three floors) ; number of rooms = 24
- c. Multi Purpose Building ; include 21 table and 129 chairs
There are 2 or 3 beds for student in every single room.

2. LABORATORIES

- a. Mining Science Laboratory
- b. Mechanical Laboratory :
 - Laboratory of Mechanical Engineering Technology
 - Laboratory of Hydraulic and Pneumatic Technology
- c. Electrical Laboratory
- d. Computer Laboratory with 111 units computer.
Every laboratory is suitable for 15 students.

3. MEETING / AUDIO VISUAL ROOMS

Suitable for 20 persons. It's completed with audio visual facilities e.g. TV Monitor, Video Player, Radio Cassette Player, Over Head Projector, Slide Projector.

4. UNDERGROUND TRAINING GALLERIES

(at the 9th Block Sawah Rasau V, Ombilin Coal Mine)

5. CLASS ROOMS

- a. 4 (four) class rooms, every class suitable for 30 student.
- b. Drawing room , using 12 drawing tables.

6. OFFICE

- a. Manager Office Rooms = 4 rooms
- b. Lecturer or Instructor Rooms
- c. Administration Office

7. LIBRARY

8. WORKSHOP

- a. Mechanical Work Section :
 - Bench work and Machining section
 - Fabrication section
 - Automotive section
- b. Electrical Section
- c. Mining Section

APPENDIX VIII-V Course Programmes on Manpower Development for Mines

- Geologic of Indonesia
 - Petrology of Igneous, Sedimentary and Metamorphic Rocks
 - Structural Analysis
 - Stratigraphy of Indonesia
 - Geophysics and Volcanology
 - Remote Sensing for Geology
 - Geochronology
 - Surveying and Mapping
 - Cartography
 - Writing Report and Presentation Technique
 - Quaternary Geology
 - Marine Topography and Seafloor Structure
 - Seafloor Stratigraphy
 - Onshore and Coastal Delineation of Mineral Resources (Tin, Gold, Diamond, etc.)
 - Marine Mineral Resources
 - Applied Geophysics
 - Remote Sensing for Exploration
 - Coal Geology
 - Information on Mineral Exploration Management for Mining Concessionary
 - Information on Industrial Mineral Exploration for Pemda
 - Bappeda Officials
 - Geochemical Exploration
 - Drilling Exploration Technique
 - Advanced Course of Tectonic and Mineral Resources
 - Terrain Analysis for Mining Development
 - Terrain Analysis for Planning Natural Electric Power Plant Site Plan
 - Seminar on Mineral Exploration Result
 - Advanced Volcanology
 - Volcano Monitoring
 - Geovisualization Mapping
 - Volcanic Eruption Forecasting
 - Mapping and Zonation of Volcanic Hazard Risk
 - Monitoring and Zonation of Earthquake Hazard Risk
 - Monitoring and Zonation of Landslide Hazard
 - Information on Geological Hazard for Pemda (Regional Authority) Officials
 - Geordination System on Geological Disaster Mitigation
 - Geohydrology Course
 - Ground Water Drilling Technique
 - Geotechnic Course
 - Terrain Analysis and Environmental Geology for Land Use Planning
 - Seminar on the Result of Geological Hazard and Environmental Studies
 - Geological Exploration Instrumentation
 - Drilling Instrumentation
 - Volcanological Investigation Instrumentation
- General Geology Instrumentation
 - Marine Geology Instrumentation
 - Geocomputing/GIS
 - Seminar and Display of Equipment for Earthscience.
- Mining Engineering Manpower Division :**
- Miners
 - Mine Inspector
 - Regional Mine Inspector
 - Mine Plan Design
 - Second Class Blasting
 - First Class Blasting
 - Mining Engineering
 - Mine Supervisor
 - Safe and Efficiency Blasting
 - Blasting Environment
 - Mine Ventilation
 - Mine Support
 - Mine Transportation
 - Soil Mechanics and Rock Mechanics
 - Slope Stability
 - Earth Moving
 - Tunneling
 - Mine Surveying
 - Geology and Mining for Regional Government Official
 - Geology and Mining for Regional Mining Concession Holders
 - Preparation and Rock Commission
 - Gravity Concentration
 - Flotation
 - Magnetic and Electrostatic Concentration
 - Pyrometallurgical Extraction
 - Hydrometallurgical Extraction
 - Electrometallurgical Extraction
 - Gold Processing
 - Tin Processing
 - Coal Washing
 - Coal Briquetting
 - Coal Carbonisation
 - Coal Liquefaction
 - Lime Burning With Coal
 - Brick and Roof tile Burning
 - Carbide Manufacturing
 - Kaolin Processing
 - Bentonite Processing
 - Light Carbonate Manufacturing
 - Active Carbon from Coal
 - X-ray analysis
 - One Microscope
 - Fluo Assay
 - Coal Analysis
 - Industrial Minerals
 - Mine Safety
 - Heavy Equipment Operator for Surface Mining
- Administration And Management Manpower Division :**
- Lower Management Course
 - Middle Management Course
 - Top Management Course
 - Training of Trainers (TOT)
 - Management of Training (MOT)
 - Training Officer Course (TOC)
 - Supervisory Training Course
 - Productivity Improvement Course
 - Manpower Planning Course
 - Job Analysis and Evaluation Course
 - Computer Course
 - Library Course
 - General English Course
 - Information Management Course
- Regular Programme Division :**
- Qualification Improvement Programme for Regional Mining Officials in Geology and Mining Level C1
 - Qualification Improvement Programme for Regional Mining Officials in Geology and Mining Level C2
 - Qualification Improvement Programme for Regional Mining Officials in Geology and Mining Level C
 - Qualification Improvement Programme for Regional Mining Officials in Geology and Mining Level W
 - Qualification Improvement Programme for Regional Mining Officials in Geology and Mining Level A1
 - Qualification Improvement Programme for Regional Mining Officials in Geology and Mining Level A
- Education and training at the MDCM covers non-regular training programmes in the fields of geological engineering, mining engineering, and administration and management and regular training programmes.

APPENDIX VIII-VI Course Programmes on Manpower Development for Mines in 1995/6

A. Routine Program	B. Mineral Technology Training Program	C. Infrastructure & Mining Technology Development Program	D. Technology Up-Grading Program	E. Other Programs
1. Geological Drawing Technique 1C(20), 9D	1. Topographic Surveyor for Mines 1C(25), 4M	1. Stock Inventory Booking System 2C(40), 19D	1. Class II blasting Expert 1C(33), 6D	1. Technology on Kartography 1C(20), 20D
2. English Language 4C(31), 20D	2. Regional Mine Control(Geology) & C/C2 Mining 2C(60), 3M	2. Volcano I Observation 1C(20), 3M	2. Environmental & Planning Tech. for Mined-out Areas 1C(24), 18D	2. A Class Financial Officer Training 1C(30), 37D
3. Mine Inspection Planning 1C(20), 6M	3. Regional Geology for Area Development; 1C(20), 19D	3. Regional Mine Inspection Planner 1C(20), 3M	3. PTBA Mine Inspector 1C(30), 7D	3. Purpose of Fill Class III 1C(30), 19D
4. SPAMAM(Middle High School in Administrative Education) Training 1C(30), 4M	4. Industrial Mineral Exploration 1C(20), 19D	4. Conference on Education/Training Demand for Mining General 1C(100), 3D	4. Basic Management of PTBA 2C(61), 30D	4. Technical Guide for Property Administration; 1C(90), 3D
5. Natural Disaster Mitigation. Geology; 1C(20), 19D	5. Data Base C(30), 12D	5. Boring by Fluid 1C(20), 25D	5. Mine Safety 1C(40), 26D	5. Computerization of Mine Topogra- phic Survey; 1C(20), 30D
6. Analysis & Manufacturing of Coal Barquette; 1C(20), 25D	6. Class I Blasting Expert 1C(20), 25D	6. Regional Mine Control(Geology) & C-Class Mining; 1C(29), 3M	6. Fluid Boring Technology 1C(16), 26D	6. Mineral Reserves Evaluation 1C(20), 16D
7. Technical Report Writing Course 1C(30), 10D	7. Mine Production Statistics 1C(30), 12D	7. Mining Industry & Energy Class A 1C(20), 3M	7. Coal Exploration Course 1C(15), 10D	7. Environmental Control Field Train* 1C(20), 30D
8. DPE II Research Technology 1C(20), 35D	8. Well Seismic Survey 1C(20), 11D		8. Evaluation of Class C Mineral 1C(11), 11D	8. Regional Environmental Manage- ment & Mined-out Area Plantation 1C(30), 7D
	9. Remote Sensing Geology 1C(20), 21D		9. Mineral Processing 1C(8), 15D	9. Training of Trainers 1C(25), 13D
	10. Mineral Raw Material Processing 1C(20), 15D		10. Mine Technical Manager	10. Training of Coal Exploration & Mining Development; 1C(30), 14D
	11. Research Technique of Geology & Mining for East Java Area(I) 1C(40), 6D		11. PTBA Middle Class I Management 1C(31), 20D	
	12. Technical Guidance of Financial Management; 1C(200), 5D		12. Course on Economics, Commerce & Project Evaluation for The Min- ing Industry; 1C(13), 5D	
	13. International Conference on Mining & Environment 1C(100), 2D		13. Mine planning 1C(11), 12D	
			14. Class I Blasting Expert 1C(11), 25D	
			15. Mine Topographical Survey 1C(8), 7	

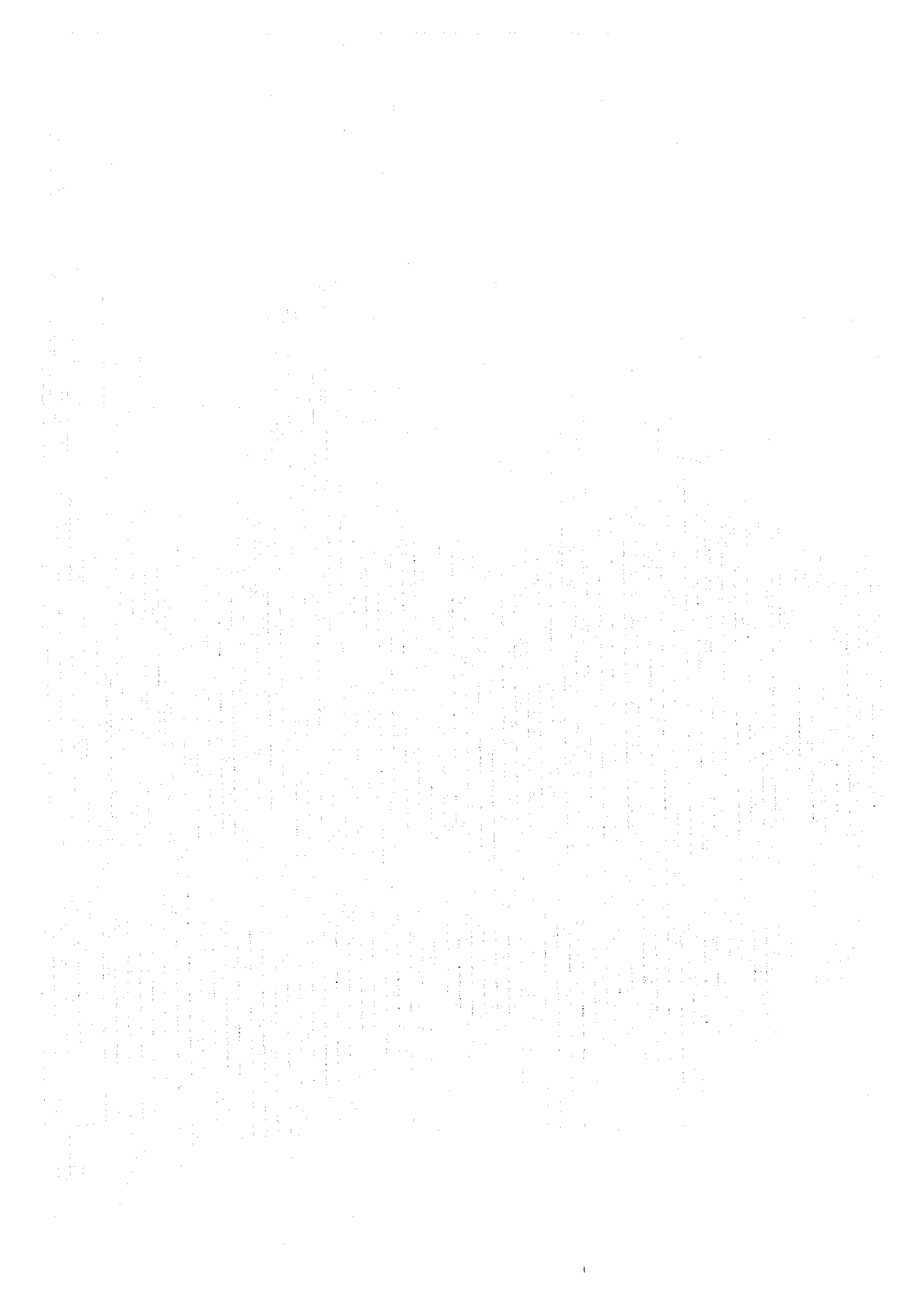
Remarks: C - Class; D - Day; M - Month; Numbers in parenthesis show those of attendants in each class.

ANNEX I Correlation between the Base Case Manpower and A Tentative Projection for Government's New Coal Production Projection Presented to the World Energy Conference Held in October, 1996

(Million Tons)

Coal Producers & Cases		1996/7			1998/9			2003/4			2004/5			2008/9		
		Prod'tion/Manpower/Prod' ty(W-D)			Prod'tion/Manpower/Prod' ty(W-D)			Production/Manpower/Prod' ty(W-D)			Production/Manpower/Prod' ty(W-D)			Production/Manpower/Prod' ty(W-D)		
PIRA	Base Case: Ombilin	0.95	1,700	1.86(300)	0.65	1,600	1.35(300)				0.56	1,400	1.33(300)	1.30	1,400	3.60(300)
	Tanjung Enim	7.90	7,200	3.28(335)	12.00	10,300	3.48(335)				15.40	12,500	3.63(335)	14.60	11,940	3.65(335)
	Sub-total	8.85	8,900	3.00(331)	12.65	11,900	3.19(333)				15.96	13,900	3.44(334)	15.90	13,340	3.59(332)
Revised 1: U/G	O/P	0.95	1,700	1.86(300)	0.95	1,700	1.86(300)	0.95	1,700	1.86(300)				1.30	1,400	3.10(300)
	Sub-total	9.65	8,782	3.28(335)	10.65	9,135	3.48(335)	13.05	10,586	3.63(335)				14.70	12,022	3.65(335)
		10.60	10,482	3.04(332)	11.60	10,835	3.22(332)	14.00	12,286	3.42(333)				16.00	13,422	3.59(332)
Revised 2: U/G	O/P	0.95	1,700	1.86(300)	0.95	1,700	1.86(300)	0.95	1,700	1.86(300)				1.30	1,400	3.10(300)
	Sub-total	11.93	10,857	3.28(335)	20.05	17,198	3.48(335)	24.05	19,508	3.68(335)				24.70	20,200	3.65(335)
		12.88	12,557	3.09(332)	21.00	18,898	3.34(333)	25.00	21,208	3.53(334)				26.00	21,600	3.61(333)
CCOW	1st Gen. : U/G	0.00	-	- (-)	0.30	300	3.33(300)				0.50	830	2.77(300)	0.50	830	2.77(300)
	Base Case O/P	35.76	14,166	7.11(355)	54.80	16,112	9.58(355)				85.70	20,538	11.75(355)	87.30	20,723	11.87(355)
	Sub-total	35.76	14,166	7.11(355)	55.10	16,412	9.46(355)				86.20	21,368	11.36(355)	87.80	21,553	11.48(355)
2nd Gen. : U/G	Base Case O/P										1.50	3,623	1.44(288)	2.50	6,039	1.44(288)
	Sub-total										3.50	1,590	7.08(311)	8.00	3,635	7.08(311)
											5.00	5,213	3.16(304)	10.50	9,674	3.55(306)
3rd Gen. : U/G	Base Case O/P										0.50	1,208	1.44(288)	4.00	9,662	1.44(288)
	Sub-total										10.00	4,543	7.08(311)	30.00	13,630	7.08(311)
											10.50	5,751	5.89(310)	34.00	23,292	4.74(308)
Total : U/G	Base Case O/P	0.00	-	- (-)	0.3	300	3.33(300)				2.50	5,661	1.52(290)	7.00	16,531	1.47(289)
	Sub-total	35.76	14,166	7.11(355)	54.8	16,112	9.58(355)				99.20	26,671	10.66(349)	125.30	37,988	9.64(342)
		35.76	14,166	7.11(355)	55.1	16,412	9.46(355)				101.70	32,332	9.04(348)	132.30	54,519	7.16(339)
Revised : U/G	1/2 O/P	0.00	-	- (-)	0.30	300	3.33(300)	2.50	5,661	1.52(290)				7.00	16,531	1.47(289)
	Sub-total	39.50	15,649	7.11(355)	55.90	16,437	9.58(355)	69.50	18,912	10.50(350)				93.00	28,208	9.64(342)
		39.50	15,649	7.11(355)	55.20	16,737	9.46(355)	72.00	24,573	8.40(349)				100.00	44,739	6.61(338)
KP	Base Case: U/G	1.05	3,235	1.13(288)	1.05	3,469	1.05(288)				1.30	4,256	1.06(288)	1.30	4,256	1.06(288)
	O/P	2.90	2,593	3.72(300)	2.90	2,364	4.09(300)				3.00	1,917	5.22(300)	3.00	1,917	5.22(300)
	Sub-total	3.95	5,833	2.28(297)	3.95	5,833	2.28(297)				4.30	6,173	2.35(296)	4.30	6,173	2.35(296)
Revised : U/G	1/2 O/P	1.05	3,235	1.13(288)	1.05	3,469	1.05(288)	1.30	4,256	1.06(288)				2.00	6,551	1.06(288)
	Sub-total	1.05	1,155	3.03(300)	1.75	1,925	3.03(300)	4.70	5,170	3.03(300)				9.00	9,901	3.03(300)
		2.10	4,390	1.63(294)	2.80	5,394	1.75(296)	6.00	9,426	2.14(297)				11.00	16,452	2.24(298)
KUD	Base Case: U/G	0.05	85	2.14(275)	0.05	85	2.14(275)				0.05	85	2.14(275)	0.05	85	2.14(275)
	O/P	0.25	715	1.17(300)	0.25	715	1.17(300)				0.25	715	1.17(300)	0.25	715	1.17(300)
	Sub-total	0.30	800	1.27(296)	0.30	800	1.27(296)				0.30	800	1.27(296)	0.30	800	1.27(296)
Revised : U/G	1/2 O/P	0.10	170	2.14(275)	0.10	170	2.14(275)	0.10	170	2.14(275)				0.10	170	2.14(275)
	Sub-total	0.30	855	1.17(300)	0.30	855	1.17(300)	0.30	855	1.17(300)				0.30	855	1.17(300)
		0.40	1,025	1.32(296)	0.40	1,025	1.32(296)	0.40	1,025	1.32(296)				0.40	1,025	1.32(296)
Grand Total	Base Case: U/G	2.05	5,020	1.39(293)	2.05	5,454	1.28(293)				4.41	11,402	1.33(291)	9.65	22,272	1.49(290)
	O/P	46.81	24,679	5.45(348)	69.95	29,491	6.80(349)				117.85	41,803	8.15(346)	143.15	52,560	7.72(353)
	Sub-total	48.86	29,699	4.75(346)	72.00	34,945	5.94(347)				122.26	53,205	6.68(344)	152.80	74,832	5.85(349)
Revised 1: U/G	O/P	2.10	5,105	1.38(299)	2.40	5,639	1.45(294)	4.85	11,787	1.41(291)				10.4	24,652	1.45(290)
	Sub-total	50.50	26,441	5.46(350)	68.60	28,352	6.91(350)	87.55	35,523	7.14(345)				117.00	50,986	6.79(338)
		52.60	31,546	4.79(348)	71.00	33,991	6.00(348)	92.40	47,310	5.69(343)				127.40	75,638	5.04(334)
Revised 2: U/G	O/P	2.10	5,105	1.38(299)	2.40	5,639	1.45(294)	4.85	11,787	1.41(291)				10.40	24,652	1.45(290)
	Sub-total	52.78	28,516	5.30(349)	78.00	36,415	6.16(348)	98.55	44,445	6.45(344)				127.00	59,164	6.35(338)
		54.88	33,621	4.70(347)	80.40	42,054	5.53(346)	103.40	56,232	5.38(342)				137.40	83,816	4.91(334)

Remarks: a) The table is tentatively made to correlate the manpower forecast of JICA report and that of government's latest one, which is entitled as "Prospect of Coal Supply/Demand For Electric Steam Power Based on Long Term Coal Supply", presented by Dr. Kuntoro Mangkusubroto, Direktur Jenderal Pertambangan Umum, of Direktorat Jenderal Pertambangan Umum Departemen Pertambangan Dan Energi in the World Energy Conference held on October 15 - 17, 1996 in Jakarta; b) Prod-ty - Productivity (t/man · day); c) W-D - Working days per annum; d) Gen. - Generation



ANNEX II Correlation between the Base Case Manpower and A Tentative Projection for Government's New Coal Production
Projection Presented to the World Energy Conference Held in October, 1996 (2010/11 - 2020/21)

Coal Producer & Cases	2010/11			2014/15			2020/21		
	Prod./Manpower/Prod' ty (W-D)			Prod./Manpower/Prod' ty (W-D)			Prod./Manpower/Prod' ty (W-D)		
PTBA:Base Case:Ombilin	1.93	1,850	3.43(300)	2.06	1,850	3.71(300)	1.50	1,400	3.57(300)
T. Enim	13.60	11,130	3.65(335)	10.60	8,670	3.65(335)	10.60	8,350	3.59(335)
Sub-total	15.53	12,980	3.61(331)	12.66	10,520	3.64(331)	12.10	10,250	3.57(331)
Rev. 1 :U/G	1.93	1,850	3.43(300)	2.06	1,850	3.71(300)	1.50	1,400	3.57(300)
O/P	14.07	11,507	3.65(335)	13.94	11,401	3.65(335)	14.50	11,559	3.65(335)
Sub-total	16.00	13,357	3.62(331)	16.00	13,251	3.66(330)	16.00	13,259	3.63(332)
Rev. 2 :U/G	1.93	1,850	3.43(300)	2.06	1,850	3.71(300)	1.50	1,400	3.57(300)
O/P	24.07	19,685	3.65(335)	23.94	19,579	3.65(335)	24.50	20,037	3.65(335)
Sub-total	26.00	21,535	3.61(332)	26.00	21,429	3.65(332)	26.00	21,437	3.64(333)
CCOW:Base Case:U/G	0.50	830	2.77(300)	0.50	830	2.77(300)	0.50	830	2.77(300)
1st Gen. O/P	87.30	20,433	12.04(355)	83.20	19,423	12.07(355)	85.20	19,373	12.03(355)
Sub-total	87.80	21,535	11.63(355)	83.70	20,253	11.64(355)	85.70	20,703	11.66(355)
Base Case:U/G	3.00	7,246	1.44(288)	3.40	8,213	1.44(288)	3.60	8,696	1.44(288)
2nd Gen. O/P	12.00	5,452	7.08(311)	14.00	6,360	7.08(311)	14.40	6,542	7.08(311)
Sub-total	15.00	12,698	3.56(306)	17.40	14,573	3.89(307)	18.00	15,238	3.86(306)
Base Case:U/G	6.00	14,493	1.44(288)	12.00	28,986	1.44(288)	13.65	32,971	1.44(288)
3rd Gen. O/P	40.00	18,173	7.08(311)	50.00	22,716	7.08(311)	54.60	24,806	7.08(311)
Sub-total	46.00	32,666	4.57(308)	62.00	51,702	3.91(307)	68.25	57,777	3.86(306)
Base Case:U/G	9.50	22,569	1.46(288)	15.80	38,029	1.45(288)	17.75	42,497	1.45(288)
Total O/P	139.30	44,058	9.33(339)	147.20	48,499	9.03(336)	154.20	51,221	8.99(335)
Sub-total	148.80	66,627	6.65(336)	163.10	86,528	5.69(331)	171.95	93,718	5.56(330)
Rev. 1/2 :U/G	10.00	23,782	1.46(288)	18.00	38,314	1.45(288)	18.00	43,103	1.45(288)
O/P	139.00	43,947	9.33(339)	147.00	48,450	9.03(336)	154.00	51,135	8.99(335)
Sub-total	149.00	67,729	6.55(336)	165.00	86,764	5.63(331)	172.00	94,238	5.53(330)
KP :Base Case:U/G	1.40	4,350	1.12(288)	1.40	4,350	1.12(288)	1.50	4,445	1.17(288)
Mines O/P	3.20	1,917	5.56(300)	3.20	1,917	5.56(300)	3.00	1,492	6.70(300)
Sub-total	4.60	6,267	2.48(296)	4.60	6,267	2.48(296)	4.50	5,937	2.56(296)
Rev. 1/2 :U/G	2.00	6,551	1.06(288)	2.00	6,551	1.06(288)	2.00	6,551	1.06(288)
O/P	9.00	9,901	3.03(300)	9.00	9,901	3.03(300)	9.00	9,901	3.03(300)
Sub-total	11.00	16,452	2.24(293)	11.00	16,452	2.24(293)	11.00	16,452	2.24(293)
KUD :Base Case:U/G	0.05	85	2.14(275)	0.05	85	2.14(275)	0.05	85	2.14(275)
Mines O/P	0.25	715	1.17(300)	0.25	715	1.17(300)	0.25	715	1.17(300)
Sub-total	0.30	800	1.27(296)	0.30	800	1.27(296)	0.30	800	1.27(296)
Rev. 1/2 :U/G	0.10	170	2.14(275)	0.10	170	2.14(275)	0.10	170	2.14(275)
O/P	0.30	855	1.17(300)	0.30	855	1.17(300)	0.30	855	1.17(300)
Sub-total	0.40	1,025	1.27(296)	0.40	1,025	1.27(296)	0.40	1,025	1.27(296)
Grand:Base Case:U/G	12.88	28,854	1.54(290)	19.41	44,314	1.52(289)	20.80	48,427	1.49(289)
Total O/P	154.25	57,820	7.80(342)	161.25	59,831	8.05(335)	168.05	62,278	8.08(334)
Sub-total	167.13	86,674	5.70(333)	180.66	104,145	5.26(330)	188.85	110,705	5.19(323)
Rev. 1 :U/G	14.03	32,353	1.50(290)	20.16	46,885	1.49(289)	21.60	51,224	1.46(289)
O/P	152.37	66,210	7.30(336)	170.24	70,607	7.22(334)	177.80	73,150	7.24(333)
Sub-total	176.40	98,563	5.39(332)	190.40	117,492	4.93(329)	199.40	124,374	4.36(323)
Rev. 2 :U/G	14.03	32,353	1.50(290)	20.16	46,885	1.49(289)	21.60	51,224	1.46(289)
O/P	172.37	74,383	6.90(336)	180.24	78,185	6.85(334)	187.80	81,928	6.83(333)
Sub-total	186.40	106,741	5.24(333)	200.40	125,070	4.85(329)	209.40	133,152	4.79(328)

Remarks: a) The table is tentatively made to correlate the manpower forecast of JICA report and that of government's latest one, which is entitled as "Prospect of Coal Supply/Demand for Electric Steam Power Based on Long Term Coal Supply", presented by Dr. Kuntoro Mangkusubroto, Direktur Jenderal Pertambangan Umum of DGM, in the World Energy Conference on October 15-17, 1996; b) Prod' ty - Productivity; c) W-D - Working Days; d) Gen. - Generation; e) T.Enim - Tanjung Enim; f) Rev. - Revised; g) U/G - Underground; h) O/P - Open Pit

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