

付 属 資 料

1 .協議議事録(M / M)

2 .フェーズ 協力要請に係る資料

3 .プロジェクト広報資料

(JICA フィリピン事務所作成 JICA Newsletter 2000 Second Edition)

1. 協議議事録 (M / M)

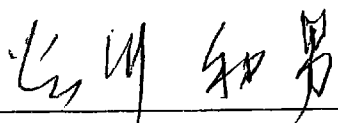
MINUTES OF MEETING
BETWEEN JAPANESE MANAGEMENT CONSULTATION TEAM AND
AUTHORITIES CONCERNED OF THE GOVERNMENT OF
THE REPUBLIC OF THE PHILIPPINES
ON THE JAPANESE TECHNICAL COOPERATION FOR THE CAPACITY
BUILDING PROJECT FOR ENVIRONMENTAL MANAGEMENT IN MINING

The Japanese Management Consultation Team (hereinafter referred to as "the Team ") organized by Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Mr. Kazuo Tanigawa, Special Technical Advisor, JICA, visited the Republic of the Philippines from February 12 to 23, 2001, for the purpose of reviewing the activities of the Capacity Building Project for Environmental Management in Mining (hereinafter referred to as "the Project").

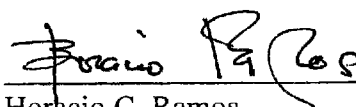
During its stay in the Republic of the Philippines, the Team exchanged views and had a series of discussions on the Project with the authorities concerned of the Government of the Republic of the Philippines (hereinafter referred to as "the Philippines side") over the matters for the successful implementation of the Project.

As a result of the discussions, both sides mutually agreed upon the matters referred to in the documents attached hereto.

Metro Manila, February 21, 2001



Kazuo Tanigawa
Leader
Management Consultation Team
Japan International Cooperation Agency
Japan



Horacio C. Ramos
Director
Mines and Geosciences Bureau
Department of Environment
and Natural Resources
Republic of the Philippines

THE ATTACHED DOCUMENT

1. Joint Evaluation for the Project at Mid-term of the cooperation period

The Team and the Philippine side jointly reviewed and evaluated the achievements of the Project according to the Project Cycle Management method. The evaluation result is shown in Appendix 1, which concluded as follows:

The Project proves to be more or less successful since the inputs of both Japanese and Philippine sides were so far made adequately according to the implementation schedule. And for the remaining cooperation period, the technology transfer to C/P through Japanese experts is expected to be attained according to the plan. However, the sustainability of the project is subject to such conditions that the local budgetary and personnel allocations would be made available continuously.

2. Plan for the rest of the cooperation period

2-1 Project Design Matrix

The Team proposed and the Philippine side agreed to modify the contents of the Project Design Matrix (hereinafter referred to as "PDM") as shown in Annex 2 attached to Appendix 1.

2-2 Inputs from the Governments of Japan and the Republic of the Philippines

The Team and the Philippine side confirmed that, in consideration of more efficient implementation of the Project, the input plan for the rest of the cooperation period is as follows:

(1) Dispatch of short-term Japanese Experts (except those already requested)

1) Ground Water Pollution Monitoring

(2) Change of Philippine Technical Consultant

The following personnel was assigned as Philippine Technical Consultant of the Project as of February 20, 2001, in place of Mr. Arcadio I. Casis who left his post last year:

Mr. Juancho Pablo S. Calvez, Division Chief, Metallurgical Technology Division.

2-3 Method of Evaluation for the effectiveness of technology transfer

The Team and the Philippine side agreed on the method of evaluation for the effectiveness of technology transfer as attached to Appendix 2. The evaluation will be conducted in parallel with the trainer's training which is scheduled in July/August 2001 and the first quarter of year 2002. The implementation program of the trainer's training is shown in Appendix 3.

3. Attendance at the discussions

The attendance to the discussions is shown in Appendix 4.

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Appendix List

Appendix 1	Mid-term Evaluation Report
Appendix 2	Method of Evaluation for the Effectiveness of Technology Transfer
Appendix 3	Implementation Program for the Trainer's Training
Appendix 4	List of Attendance to the Discussions

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Mid-term Evaluation Report

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**JOINT MID-TERM PROJECT EVALUATION REPORT
ON
THE JAPANESE TECHNICAL COOPERATION
FOR
THE CAPACITY BUILDING PROJECT
FOR ENVIRONMENTAL MANAGEMENT IN MINING
IN THE REPUBLIC OF THE PHILIPPINES**

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
MINES AND GEOSCIENCES BUREAU
THE REPUBLIC OF THE PHILIPPINES

February 21, 2001

MANILA
THE REPUBLIC OF THE PHILIPPINES



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I. INTRODUCTION

1. The Evaluation Team

The Japanese Evaluation Team (hereinafter referred to as "the Japanese Team") organized by Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Mr. Kazuo TANIGAWA, visited the Republic of the Philippines from February 12 to 23, 2001, for the purpose of joint evaluation with the Philippine Evaluation Team (hereinafter referred to as "the Philippine Team") on the achievement of the Capacity Building Project for Environmental Management in Mining (hereinafter referred to as "the Project") on the basis of the Record of Discussions (hereinafter referred to as "R/D") signed on June 4, 1999.

Both teams discussed and studied together the efficiency, effectiveness, impact, relevance and sustainability of the Project in accordance with the JICA Project Cycle Management (hereinafter referred to as "JPCM") method.

Through careful studies and discussions, both sides summarized their findings and observations as described in this Joint Evaluation Report.

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2. Schedule of Joint Evaluation

February 12, 2001	Monday	Arrival of a consultant in Manila Meeting with Japanese experts
February 13, 2001	Tuesday	Interview with Japanese experts
February 14, 2001	Wednesday	Interview with C/P team leaders Laboratory observation
February 15, 2001	Thursday	Arrival of other members of the Japanese Team in Manila Meeting in JICA Philippine office Meeting with Japanese experts
February 16, 2001	Friday	Courtesy call: DENR and MGB Interview with Project Director, Project Manager and Project Coordinator Laboratory observation
February 17, 2001	Saturday	Team meeting
February 18, 2001	Sunday	Team meeting
February 19, 2001	Monday	Discussion on the result of mid-term evaluation with MGB staff Discussion on the plan of activities
February 20, 2001	Tuesday	Hearing on the proposed second stage program from MGB staff Drafting M/M
February 21, 2001	Wednesday	Discussion draft of M/M Conclusion of M/M Reception
February 22, 2001	Thursday	Report to the JICA Philippine office Report to the Embassy of Japan Seminar on Life Cycle Assessment by Dr. Kuriyagawa

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3. Member of the Evaluation Team

3-1. Japanese Team

Mr. Kazuo Tanigawa	Leader Special Technical Advisor, JICA
Mr. Joji Kashifuku	Technical Cooperation Planning Assistant Chief for Policy and Planning, Mine Safety Division, Agency for Nuclear and Industrial Safety, Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry
Dr. Michio Kuriyagawa	Mine Environmental Management Director General, National Institute of Resources and Environment, National Institute of Advanced Industrial Science and Technology, Ministry of Economy, Trade and Industry
Mr. Katsuhiko Asai	Personnel Input Director, General Affairs Department, Japan Mining Engineering Center for International Cooperation
Mr. Toru Yoshida	Project Management Staff, Mining and Industrial Development Cooperation Department, JICA
Mr. Nobuyuki Nakazawa	Consultant Deputy Division Manager, Environmental Division, E&E Solutions Inc.

3-2. Philippine Team

Mr. Horacio C. Ramos	Director, Mines and Geosciences Bureau Project Director
Mr. Edwin G. Domingo	Asst. Director, Mines and Geosciences Bureau Project Manager
Mr. Michael V. Cabalda	Chief, Mining Environment and Safety Division Project Consultant for Environment
Mr. Romeo L. Almeda	Chief, Lands Geology and Survey Division Project Consultant for Geology
Mr. Juancho Pablo Calvez	Chief, Metallurgical Technology Division Project Consultant for Metallurgy
Mr. Geronimo Badulis, Jr.	Supervising Science Research Specialist Project Coordinator
Ms. Juliet M. Miguel	Supervising Science Research Specialist Team Leader, Management Group
Ms. Teresita Balmes	Supervising Science Research Specialist Team Leader, Chemical Analysis Group
Mr. Edmon V. Dino	Senior Science Research Specialist Team Leader, Monitoring Group
Ms. Lilian Rollan	Supervising Science Research Specialist Team Leader, Staff Training Group

II. METHODOLOGY OF EVALUATION

1. Method of Evaluation

The Project evaluation was conducted in accordance with the JICA Project Cycle Management (JPCM) method.

- The Project Design Matrix (PDM) was agreed upon by both sides as a basis of the evaluation.
- Achievement of the Project was studied by collecting data on the Objectively Verifiable Indicators as described in the PDM
- The Project was evaluated on five aspects described below.

2. Aspects of Evaluation

The Project was evaluated on the following five aspects:

- 1) Efficiency : Evaluate how the results stood in relation to the efforts and resources, how economically the resources were converted into outputs, and whether the same results could have been achieved by other better methods.
- 2) Effectiveness : Evaluate the extent to which the purpose has been achieved or not, and whether the Project purpose can be expected to happen on the basis of the outputs of the Project.
- 3) Impact : Foreseeable or unforeseeable, and favorable or adverse effect of the Project upon the target groups and persons possibly affected by the Project.
- 4) Relevance : Evaluate the degree to which the Project can still be justified in relation to the national and regional priority levels given to the theme.
- 5) Sustainability : Evaluate the extent to which the positive effects as a result of the Project will still continue after external assistance has been concluded.

3. Information for Evaluation

Following sources of information were used in this evaluation.

- 1) Documents agreed by both sides prior to and/or in the course of the Project implementation;
 - Record of Discussion (R/D)
 - Minutes of the Discussions (M/D)
 - Tentative Schedule of Implementation (TSI)
 - Detailed Plan of Operations (DPO)
- 2) The Project Design Matrix (Annex-1)
- 3) Record of inputs from both sides and activities of the Project
- 4) Statistics
- 5) Interviews with and questionnaires to counterparts, Japanese experts

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III. PROJECT SUMMARY

1. Background of the Project and Dispatch of Survey Team

The Government of the Republic of the Philippines planned to establish environmental evaluation system, laws and regulations, and related funds as the core of the "Medium-Term Philippine Development Plan" in the National Plan named "Philippines 2000".

However, technologies on the side of the Philippine Government to cope with environmental problems are not sufficient. Especially, enhancement of the capability for environmental assessment, monitoring and technologies of countermeasures for pollution in mining industries has become an urgent issue.

JICA started to realize the Philippines environmental problems in 1998 and made a decision to carry out the technical cooperation under the scheme of "Offer-based Project-type technical cooperation" dispatching project formulation advisers for environmental protection in October 1998 and January 1999.

As a result, JICA offered the Project to the Philippine Government to improve the capability to cope with the environmental problems and formulated the detailed contents of cooperation through discussions with authorities concerned on the Philippine side. In May 1999, JICA dispatched the Japanese Implementation Study Team which signed R/D with MGB to start the above project.

The three-year cooperation program started on July 1, 1999. At the middle point of the project implementation, the evaluation team was dispatched to review the project progress, management system, and technology transfer to the counterpart personnel by means of JPCM method thus making a mid-term evaluation jointly with the authorities concerned on the Philippine side.

Taking into consideration of the achievements to date, future implementation program was discussed.

2. Chronological Review of the Project

A Chronological review of the Project is summarized in Annex-2.

3. The Objective of the Project

The Project purpose is described as:

The staff necessary for mine environmental management in the fields of water and soil pollution caused by mining activities will be fostered at MGB.

4. Tentative Schedule of Implementation

The Tentative Schedule of Implementation (TSI) is attached in Annex-3.

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IV. RESULT OF EVALUATION

1. Summary of JPCM Evaluation Result

The Project has been satisfactorily implemented according to the plan. The Efficiency is not so high at present for want of efficient scheduling scheme for the C/P in lab chemical analysis and the collection of and number of samples by the field monitoring team, and due to the inadequate program on evaluation technology concerning environmental impact assessment reports. The Effectiveness is almost satisfactory because C/P's technologies acquired from the Japanese experts have already reached such level as to be able to start the fundamental trainer's training for other MGB technical staff, and at present, the training materials have gradually been made available. The Impact can be considered high since the target groups/persons have all responded positively. The Relevance is also considered high. The Sustainability is moderate, but can be further improved if the MGB satisfactorily supplies the inputs, including budget and personnel, to sustain the future mine environmental management program.

2. Details

2-1. Efficiency

The Input has been satisfactorily made until now. However, the Efficiency is not so high due to the following:

2-1-1 Inadequate Evaluation Method on C/P's Capability

The experts have been trying several kinds of evaluation. However, the evaluation method on C/P's technical capability has been observed to be inadequate yet. Such inadequate evaluation method on C/P's capability may reduce the efficiency of the Project.

2-1-2 Inefficient Training Program on Lab Chemical Analysis C/P

The on-site monitoring has been implemented once a month since last October. The collected samples are analyzed by the chemical lab C/P. A number of the samples have been supplied from the monitoring group to the chemical lab C/P. As a result, a large part of the time required for training lab C/P is limited, since they are engaged in treating samples for most part of their activities. In the latter half of the Project, soil and stream sediment samples are supposed to be newly added to the water samples. Thus, the time required for training lab C/P would be more and more centered on treating monitoring samples.

2-1-3 Delay of Sample Preparation Room

The Japanese experts have requested the MGB to provide a sample preparation room to be used for multi-purpose, including storage space of monitoring equipment, collected samples, and preparation of sample bottles. Without the preparation room, the activities of the monitoring group have been restricted to some extent. Moreover, the risk of possible equipment loss could increase for the monitoring related equipment since the equipment are separately stored in several places. In this regard, the MGB has committed to complete the room before the end of March 2001.

Regarding chemical analysis equipment supplied by JICA, both Ion Chromatograph and AAS graphite have not been used sufficiently so far. To enhance the efficiency, the training program for C/P in chemical lab should be reviewed considering usage of these equipment.

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2-2. Effectiveness

The C/P training as trainers for other MGB technical staff (trainer's training) will be one of the major activities in the latter half of the Project. By now, the C/Ps have almost reached the level to be able to start the fundamental training for other MGB technical staff, and enough training materials have gradually been made available to start the trainer's training. In this context, the Effectiveness evaluated to be almost satisfactory.

2-3. Impact

Based on the interview with C/P, all of the Impacts generated by the Project are positive as follows:

2-3-1 Basic information

The seminars and the symposiums were useful in terms of supplying basic information on mine environment management not only to MGB staff but also to related organizations and private mining companies.

2-3-2 High level environmental monitoring technologies

The C/P's capabilities including on-site monitoring and lab chemical analysis have been largely strengthened by using the latest equipment supplied by JICA, with the instructions from the experts.

2-3-3 Enhancement of MGB's reliability in mine environment management.

The Project was reported on five newspapers in July 2000. The contents of these articles were carried out in such manner to impress the public of the MGB's efforts to strengthen mine environmental management, with the support and cooperation from JICA.

2-4. Relevance

Since the incident of Marcopper Mine in 1996, the government and the public have been so sensitive to mine pollution. The mine pollution incidents continue to the present. The pollution control of mines and mills is a matter of great concern nowadays in the country. Therefore, the Relevance is evaluated to be still high.

2-5. Sustainability

The technical level in MGB, including its Regional Offices, is expected to be strengthened after the completion of the Project, if the inputs, including budget and personnel, to sustain the future mine environmental management program are satisfactorily supplied by MGB. The Sustainability is considered moderate, but can be further improved if the MGB satisfactorily supplies the inputs, including budget and personnel to sustain the future mine environmental management program complemented with the full operationalization and utilization of the Contingent Liability and Rehabilitation Fund (CLRF) from the private mining companies.

V. CONCLUSION

As a result of the mid-term evaluation, the Project proves to be more or less successful since the inputs of both Japanese and Philippine sides were so far made adequately according to

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the implementation schedule. As for the remaining cooperation period, the technology transfer to C/P through Japanese experts is expected to be attained according to the plan. However, the sustainability of the project is subject to such conditions that the local budgetary and personnel allocations would be made available continuously.

VI. RECOMMENDATION

In order to complete the Project successfully, the followings are recommended:

1. To make up an adequate evaluation method on C/P's capability.
2. The monitoring data should be compiled and analyzed at the site and/or lecture room in each monitoring survey as soon as possible using adequate basic methods including horizontal distribution, relationship between flow volume and concentrations of substances, and correlation analysis among parameters. The above data analysis could enhance C/P's interests.
3. To review chemical analysis lab management system referring to ISO 14000 series. Especially, isolation of hazardous reagents should be conducted. Also, the Project should pay attention to treatment of the lab wastes.
4. To reduce C/P's work volume of monitoring sample treatment and to spare more time to study new technology
5. To make up a concrete training program on environmental impact assessment evaluation technology
6. To include the training program on groundwater pollution.

VII. LESSONS LEARNED

As offer-based project, the preparation period was short compared with other JICA projects. This quick start was adequate to meet the urgent demand of the Philippine side to manage the mine pollution.

The short preparation period of the project is very useful in initiating cooperation with the countries with urgent problems. However, even in offer-based project, there is a need to have enough number of meetings to deepen mutual understandings by both sides and to examine a project plan carefully with enough time.

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VIII. Achievement of the Plan

Project Summary	Verifiable Indicators	Achievement up to the Mid-term Evaluation	Reference
<p>[Overall Goal of the Project] The capacity of MGB in mine environmental management in the fields of water and soil pollution caused by mining activities will be enhanced.</p>	<p>1. The enough number of the technical staff who completed the staff training programs on the mine environmental management of MGB are allocated at the MGB central and major regional offices.</p> <p>2. MGB plans the mine environmental management program in the fields of water and soil pollution for major mines.</p> <p>3. The number of the reports on the water and soil pollution caused by mines and mills decreases.</p>		
<p>[Purpose of the Project] The staff necessary for mine environmental management in the fields of water and soil pollution caused by mining activities will be fostered at MGB.</p>	<p>1. The C/P's technical expertise level of mine environmental management in the fields of water and soil pollution is enhanced to the level that C/P can train other MGB technical staff by themselves by 2002.</p> <p>2. MGB plans the long and mid-term training program on mine environmental management in the fields of water and soil pollution by 2002.</p>	<p>1. The Project at present has been satisfactorily implemented according to the plan. The C/P's technological levels have been increasing and reached the level that the fundamental trainer's training activities can start at anytime now.</p> <p>2. The trainer's training program is now established. Related training materials have almost been made available at present.</p>	
<p>[Outputs of the Project] 0. The management system of the Project will be established.</p>	<p>0-1. MGB personnel are allocated according to the plan.</p> <p>0-2. Local budget from MGB is supplied according to the plan.</p>	<p>0-1 Personnel allocations from both sides, Japan and the Philippines, have been satisfactorily implemented according to the plan.</p> <p>0-2-1 The budget has been planned in adequate timing and well managed.</p> <p>0-2-2 The facilities required by</p>	<p>Annex-5 Annex-9 Annex-10</p> <p>Annex-8 Annex-12</p>

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Project Summary	Verifiable Indicators	Achievement up to the Mid-term Evaluation	Reference
<p>1. The operation and maintenance management of the machinery and equipment used for chemical analysis, measurements and experiments will be undertaken by the technical staff of MGB.</p>	<p>1-1. C/P acquire enough skills in operation and maintenance management for the machinery and equipment used for chemical analysis, on-site measurements, and experiments by 2002.</p> <p>1-2. Documents required for operation and maintenance management for the machinery and equipment are completed by 2002.</p>	<p>the project to MGB has been supplied according to the plan. However, requested preparation of the sample preparation room to be supplied by MGB has been delayed.</p> <p>0-2-3 Periodical meetings with the Philippine side have been satisfactorily implemented according to the plan.</p> <p>0-2-4 The Plan of operation has been prepared in adequate timing and revised in accordance with the proceedings of the Project.</p> <p>1-1-1 The machinery and equipment have been supplied according to the plan.</p> <p>1-1-2 The C/P training for operation of machinery and equipment has been satisfactorily implemented according to the plan. However, the followings are insufficient:</p> <p>[Lab]</p> <ul style="list-style-type: none"> - Hazardous substances are not separated and not stored in a strongbox. - Wastes except chloroform generated from lab activities are not well managed. <p>[Monitoring]</p> <ul style="list-style-type: none"> - Equipment storage and management system (e.g. ISO 14000) is insufficient. <p>1-2 Operation manuals have been prepared for each equipment. However, equipment management system has not been well planned and developed.</p>	<p>Annex-7</p> <p>Annex-13</p>

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Project Summary	Verifiable Indicators	Achievement up to the Mid-term Evaluation	Reference
<p>3. The MGB's functions of evaluation for the environmental management technologies in the fields of water and soil pollution will be strengthened.</p>		<p>satisfactory. As the C/P of lab used to engage in chemical analysis before the start of the Project, their basic technology had already reached a relatively high level. At present their capabilities on chemical analysis have reached a level to be able to start the fundamental trainer's training program to other MGB staff.</p> <p>The two equipment, AAS Graphite and Ion Chromatograph, supplied by JICA, are planned to be used in the latter half of the Project, however, they have not been used sufficiently at present.</p>	
	<p>2-1-5 Analysis and evaluation technology on monitoring data</p>	<p>2-1-5 Lectures and practices on analysis and evaluation of monitoring data will be implemented after getting chemical analysis data from lab.</p>	
	<p>2-2. Training materials required for the C/P's skill acquisition of the above technology fields are prepared by 2002.</p>	<p>2-2 Some manuals and the training materials have gradually made available in all of the technology fields. The rests will be prepared in the latter half of the Project according to the plan.</p>	<p>Annex-14</p>
	<p>3-1. The C/P's technical expertise levels in the evaluation for the environmental management technology are enhanced to the level that C/P can train other MGB technical staff by themselves by 2002.</p> <p>3-2. Training materials required for C/P's skill</p>	<p>3-1 Lectures and practices on environmental management technologies have been satisfactorily implemented according to the plan. Attendance rate on lecture is satisfactory.</p> <p>According to the interviews with the Japanese experts and C/P, the C/P's technical capabilities have been strengthened and have reached the level to be able to start the fundamental trainer's training program to other MGB technical staff.</p> <p>3-2 Based on the lecture text, the related materials have been</p>	<p>Annex-13</p> <p>Annex-13</p>

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Project Summary	Verifiable Indicators	Achievement up to the Mid-term Evaluation	Reference
<p>4. The MGB's functions of evaluation on the environmental impact assessment reports for mining projects will be strengthened.</p>	<p>acquisition of the evaluation on the environmental management technology are prepared by 2002.</p> <p>4-1. The C/P's technical expertise level in the evaluation on the environmental impact assessment reports are enhanced by 2002.</p> <p>4-2. Training materials required for C/P's skill acquisition of the evaluation on the environmental impact assessment reports in the fields of water and soil pollution are prepared by 2002.</p>	<p>prepared according to the plan. The rests will be prepared according to the plan.</p> <p>4-1 The short-term expert will prepare the training program for C/P and other MGB staff according to the plan in the latter half of this project. However, the detailed program has not been made clear.</p> <p>4-2 The short-term expert will prepare the related materials. However, the details of these documents have not been made clear.</p>	
<p>5. The MGB's functions of staff training in the fields of mine environmental management will be strengthened.</p>	<p>5-1. The C/P's staff training capabilities as trainer for other MGB technical staff in the fields of water and soil pollution are enhanced to the level that the C/P can foster other MGB technical staff by themselves by 2002.</p> <p>5-2. MGB plans the long and mid-term staff training program by 2002.</p> <p>5-3. Training materials required for the long and mid-term staff training program by MGB are prepared by 2002.</p> <p>5-4. The technical staff of MGB acquire the basic information on mine environmental management</p>	<p>5-1 The staff-training program is now preparing the activities according to the plan.</p> <p>5-2 The long and mid-term trainer's training program is now preparing the activities according to the plan.</p> <p>5-3 Some of the training materials have already been prepared and the rests will be prepared according to the plan.</p> <p>5-4 Seminars and symposiums have been held according to the plan. According to the questionnaires to the attendants,</p>	<p>Annex-14</p> <p>Annex-15</p>

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Project Summary	Verifiable Indicators	Achievement up to the Mid-term Evaluation	Reference
	in the fields of water and soil pollution by 2002.	these seminars and symposiums were useful to enhance the capabilities of the MGB personnel.	

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ANNEX 1

Project Design Matrix (PDM_D) (Draft) at Mid-term Evaluation

The Capacity Building Project for Environmental Management in Mining in the Republic of the Philippines
 Authority of Japanese Side: Japan International Cooperation Agency (JICA)
 Target Country: The Republic of the Philippines

Terms of Project: from July 1, 1999 to June 30, 2002
 Counterpart: Mines and Geosciences Bureau (MGB)
 Target Group: Staff of MGB

Project Summary	Verifiable Indicators	Means of Verification	Important Assumptions
<p>[Overall Goal of the Project] The capacity of MGB in mine environmental management in the fields of water and soil pollution caused by mining activities will be enhanced.</p>	<p>1. The enough number of the technical staff who completed the staff training programs on the mine environmental management of MGB, are allocated at the MGB central and major regional offices.</p> <p>2. MGB plans the mine environmental management program in the fields of water and soil pollution for major mines.</p> <p>3. The number of the reports on the water and soil pollution caused by mines and mills decrease.</p>	<p>1. Records on training courses and seminars for mine environmental management of MGB.</p> <p>2-1. Records on planning of the mine environmental management programs of MGB.</p> <p>2-2. Implementation records on administrative guidance in mine environmental management for mines and mills of MGB.</p> <p>2-3. Interview with and questionnaire to the parties concerned.</p> <p>3-1. Records on water & soil pollution monitoring.</p> <p>3-2. Records on implementation of water and soil pollution control conducted by MGB and LGU.</p> <p>3-3. Interview with and questionnaire to the MGB staff and parties concerned.</p>	<p>a. The mine environmental management policy is sustained by the Government & Industry.</p> <p>b. The coordination between MGB & EMB is sustained appropriately.</p> <p>c. The services of the technical staff who completed the staff training programs on the mine environmental management of MGB are continued at MGB.</p>
<p>[Purpose of the Project] The staff necessary for mine environmental management in the fields of water and soil pollution caused by mining activities will be fostered at MGB.</p>	<p>1. The C/P's technical expertise level of mine environmental management in the fields of water and soil pollution is enhanced to the level that the C/P can train other MGB technical staff by themselves by 2002.</p> <p>2. MGB plans the long and mid-term training program on mine environmental management in the fields of water and soil pollution by 2002.</p>	<p>1. C/Ps implement the preliminary trainee's training.</p> <p>2. C/Ps receive the comprehension test from each Japanese expert.</p>	<p>a. The services of the C/P who are trained by the experts are continued at MGB.</p> <p>b. The operational cost and staff for the staff training program are assured appropriately.</p>
<p>[Outputs of the Project] 0. The management system of the Project will be established.</p> <p>1. The operation and maintenance management of the machinery and equipment used for chemical analysis, measurements and experiments will be undertaken by the technical staff of MGB.</p> <p>2. The MGB's functions of mine environmental monitoring in the fields of water and soil pollution will be upgraded and strengthened.</p>	<p>0-1. MGB personnel are allocated according to the plan.</p> <p>0-2. Local budget from MGB is supplied according to the plan.</p> <p>1-1. C/P acquire enough skills in operation and maintenance management for the machinery and equipment used for chemical analysis, onsite measurements, and experiments by 2002.</p> <p>1-2. Documents required for operation and maintenance management for the machinery and equipment are completed by 2002.</p> <p>2-1. The C/P's technical expertise levels in the following fields are enhanced to the level that C/P can train other MGB technical staff by themselves by 2002. <Fields of technologies for training> (1) Basic information required for mine environmental monitoring (2) Water and soil sampling technology (3) On-site measurement technology for water and soil (4) Laboratory chemical analysis technology (5) Analysis and evaluation technology on monitoring data</p>	<p>0-1. Records on personnel of MGB.</p> <p>0-2. Records on budget of MGB.</p> <p>1-1a. Records on monitoring and evaluation.</p> <p>1-1b. Interview, questionnaire to, and test to the C/P.</p> <p>1-2a. Manuals on operation and maintenance of the equipment.</p> <p>1-2b. Records on operation, maintenance and management of the equipment.</p> <p>2-1a. Records on monitoring and evaluation (e.g. records on water and soil sampling practice, onsite measurement, Lab chemical analysis, and analysis and evaluation on monitoring data).</p> <p>2-1b. Interview with, questionnaire to, and test to the C/P.</p>	<p>a. The C/P are arranged appropriately in accordance with the specialty concerning technology transfer.</p> <p>b. The operational costs for the Project are assured appropriately.</p>

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Project Summary	Verifiable Indicators	Means of Verification	Important Assumptions
3. The MGB's functions of evaluation for the environmental management technologies in the fields of water and soil pollution will be strengthened.	2-2. Training materials required for the C/Ps will acquisition of the above technology fields are prepared by 2002.	2-2. Training materials.	
	3-1. The C/Ps technical expertise levels in the evaluation for the environmental management technologies are enhanced to the level that C/P can train other MGB technical staff by themselves by 2002.	3-1a. Records on monitoring and evaluation. 3-1b. Interview with, questionnaire to, and test to the C/P.	
4. The MGB's functions of evaluation on the environmental impact assessment reports for mining projects will be strengthened.	3-2. Training materials required for C/Ps will acquisition of the evaluation on the environmental management technology are prepared by 2002.	3-2. Training materials.	
	4-1. The C/Ps technical expertise level in the evaluation on the environmental impact assessment reports are enhanced by 2002.	4-1a. Records on monitoring and evaluation (e.g. records on the training programs prepared by the short-term experts and of C/P's comprehension). 4-1b. Interview, questionnaire survey and test to C/P.	
5. The MGB's functions of staff training in the fields of mine environmental management will be strengthened.	4-2. Training materials required for the C/Ps will acquisition of the evaluation on the environmental impact assessment reports in the fields of water and soil pollution are prepared by 2002.	4-2. Training materials.	
	5-1. The C/Ps staff training capabilities as trainer for other MGB technical staff in the fields of water and soil pollution are enhanced to the level that C/P can foster other MGB technical staff by themselves by 2002.	5-1a. Records on monitoring and evaluation (e.g. records on evaluation of trainers training). 5-1b. Interview with, questionnaire to, and test to the C/P.	
	5-2. MGB plans the long and mid-term staff training program by 2002.	5-2. Records on planning of the long and mid-term staff training program of MGB.	
	5-3. Training materials required for the long and mid-term staff training programs MGB are prepared by 2002.	5-3. Training materials concerned staff training.	
	5-4. The technical staff of MGB acquire the basic information on mine environmental management in the fields of water and soil pollution by 2002.	5-4a. Records on implementation of training courses and seminars and number of participants. 5-4b. Questionnaire to the trainees.	

Note: Shaded parts () suggest that they are changed from PDM₀ and PDM₁.

Project Summary [Activities of the Project]	Input up to the present		Important Assumptions
	Philippine side	Japanese Side	
0-1. Allocate the staff based on the plan. 0-2. Formulate the operational plan. 0-3. Formulate the budgetary plan.	1. Preparation of Building & Facilities ① Renovation of building and facilities ② Installation of the Equipment ③ Office of experts ④ Office of counterparts ⑤ Training rooms	1. Dispatch of the Experts	a. Supports of the MGB's Capacity Building Project for Environmental Management in Mining by the central & local governments the mining industry and other related organizations are sustained. b. The customs clearance of the machinery and equipment provided by the Japanese side are processed smoothly.
1-1. Formulate the preparation plan and implement the procurement and maintenance of machinery, equipment and facilities. 1-2. Implement the installation, and guide in the operation and maintenance of machinery and equipment provided by JICA. 1-3. Prepare the manuals on maintenance of the Equipment.	2. Allocation of Staff ① Project director :1 ② Project manager :1 ③ Technical consultant (Environment) :1 ④ Technical consultant (Geology) :1 ⑤ Technical consultant (Metallurgy) :1 ⑥ Financial advisor :1	1-1. Long-term Experts ① Chief Advisor :1 ② Coordinator :1 ③ Expert in charge of Mine environmental monitoring :1 ④ Expert in charge of Environmental chemical analysis :1 ⑤ Expert in charge of Mine environmental management :1	
2-1. Acquire the technical and administrative outline of mine environmental monitoring fields of water and soil pollution. 2-2. Acquire the techniques and prepare the training materials of water and soil sampling environmental analysis. 2-3. Acquire the technology and prepare the training materials of on-site measurements and analysis for water and soil quality.		1-2. Short-term Experts :4 ① Mr. Yoshiharu Watanabe (Chemical Analysis) ② Mr. Saburo Sato (Technical Development of	

Project Summary	Input up to the present		Important Assumptions
<p>[Activities of the Project]</p> <p>2-4. Acquire the technology and prepare the training materials of laboratory measurements and analysis for water and soil quality.</p> <p>2-5. Acquire the techniques and prepare the training materials on the environmental evaluation of the results of measurement and analysis for water and soil quality.</p> <p>3-1. Acquire the technical information for mine environmental management technologies.</p> <p>3-2. Acquire the techniques of environmental management for mine drainage and dam facilities for mine pollution control, and prepare the training materials.</p> <p>4-1. Acquire the technical information on the process of environmental impact mining projects.</p> <p>4-2. Acquire the technical information on the evaluation of environmental impact assessment for reports for mining projects.</p> <p>5-1. Formulate the training programs.</p> <p>5-2. Prepare the training materials.</p> <p>5-3. Implement the training.</p> <p>5-4. Implement the questionnaire survey to the trainees.</p>	Philippine side	Japanese Side	Precondition
	<p>① Project coordinator :1</p> <p>② Technical c/p :21</p> <p>③ Support staff :9</p> <p>a. Clerical staff</p> <p>b. Administrative staff</p> <p>c. Technical staff</p> <p>3. Procurement of Machinery, Equipment and Materials.</p> <p>4. Expenses of Local Counterpart Budget.</p>	<p>Pollution Control)</p> <p>③ Mr. Soichiro Inoue (Supervision and of Tailing Dams in Mines)</p> <p>④ Ms. Misako Yamada (Abandoned mines pollution control)</p> <p>⑤ Mr. Kazuo Kawakami (Mine Environmental Monitoring)</p> <p>Planned up to March 2001</p> <p>Mr. Hiroshi Sasaki (Suitable technologies on the environment in mining development)</p> <p>Planned to March 2002</p> <ul style="list-style-type: none"> · The latest technologies for mine pollution control · Monitoring method using biological indicator · Evaluation method of environmental impact assessment technology and its report · Evaluation and management of the data of onsite measurement and chemical analysis · Environmental management system · Soil pollution by heavy metals and its monitoring <p>2. C/P Training in Japan.</p> <p>1999 :3</p> <p>2000 :2</p> <p>2001 : Three(3) personnel of C/P (planned)</p> <p>3. Provision of the Machinery & Equipment (the Equipment necessary for technology transfer)</p>	<p>a. The agreement between MGB and EMB concerning the mine environmental management is sustained.</p>

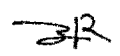
Note: Shaded parts () suggest that they are changed from PDM₀ and PDM₁.

ANNEX 2

Chronological Review of the Project

Year	Month	Items
1998	Nov.	Dispatch of the Project Formulation Advisors.
1999	Feb.	Dispatch of the Project Formulation Advisors.
1999	Jun.	Dispatch of the Japanese Implementation Study Team.
1999	July.	Dispatch of four (4) long-term experts in fields Chief Advisor, Project Coordinator, Environmental Chemical Analysis and Mine Environmental
1999	Aug.	Dispatch of one long-term expert in field Mine Environmental Monitoring.
1999	Sep.	1st Joint Coordinating Committee was held.
1999	Oct.	PCM workshop was held.
1999	Dec.	Dispatch of one (1) short term expert for Chemical Analysis and 1st Mine Environmental Management Seminar was held.
2000	Jan.	1st Monitoring and Evaluation
2000	Feb.	Training of three (3) counterparts in Japan.
2000	Mar.	Dispatch of three (3) short-term experts in fields Mine Environmental Monitoring and Mine Environmental Management and 2nd Mine Environmental Management Seminar was held.
2000	July.	Dispatch of Management and Consultation Team.
2000	July.	Inauguration and Symposium were held.
2000	July.	AAS training of six (6) counterparts and support staff in Singapore.
2000	Sep.	Counterparts Performance of Activities on Technology Transfer was hold.
2000	Sep.	2nd Monitoring and Evaluation.
2000	Sep.	Dispatch of Management and Consultation Team.
2000	Sep.	2nd Joint Coordinating Committee was held.
2000	Sep.	3rd Mine Environmental Management Seminar was held.
2000	Oct.	Technical Exchange Program in Thailand.
2000	Nov.	Training of three (2) counterparts in Japan.
2000	Nov.	XRF training of three (3) counterparts and support staff in Japan.
2001	Jan.	3rd Monitoring and Evaluation.
2001	Jan.	Dispatch of one (1) short-term expert in fields Mercury Environmental Monitoring and 4th Mine Environmental Management Seminar was held.
2001	Feb.	Dispatch of Midterm Evaluation Team.
2001	Feb.	5th Mine Environmental Management Seminar was held.

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M/M for Midterm Evaluation

ANNEX 3
Tentative Schedule of Implementation(TSI)

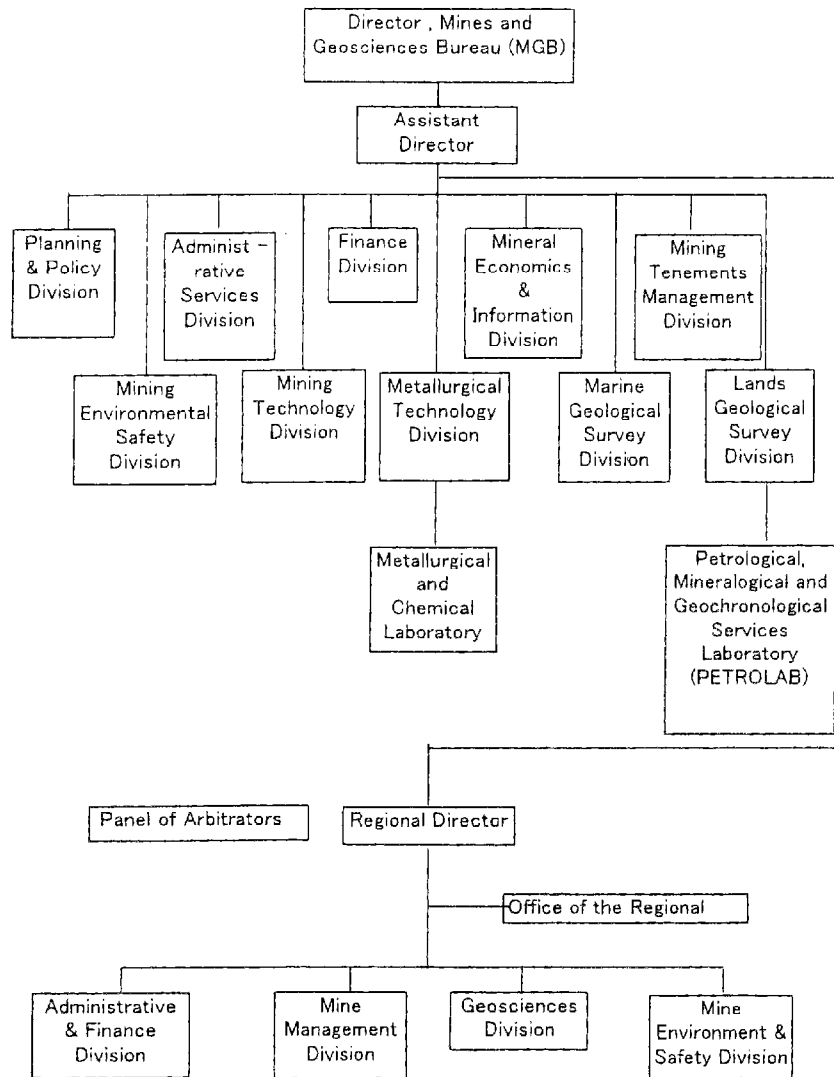
Calendar Year	1998		1999				2000				2001				2002			
Quarter	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
Duration of the Project																		
I. Undertakings of the Japanese Side																		
1.1 Dispatch of Study Teams																		
(1) Project Formulation Advisors for Industrial Pollution Protection																		
(2) Implementation Study Team																		
(3) Management Consultation Team																		
(4) Final evaluation Study Team																		
1.2 Dispatch of Japanese Experts																		
(1) Long-term Experts																		
a. Chief Advisor																		
b. Coordinator																		
c. Expert in Charge of Mine Environmental Monitoring																		
d. Expert in Charge of Environmental Chemical Analysis																		
e. Expert in Charge of Mine Environmental Management																		
(2) Short-term Experts																		
a. Mine Environmental Monitoring																		
b. Chemical Analysis																		
c. Mine Environmental Management																		
d. Environmental Impact Assessment																		
1.3 Acceptance of Counterpart Personnel for Training in Japan																		
1.4 Provision of Machinery and Equipment																		
II Undertakings of the Philippine side																		
2.1 Establishment of the Unit necessary for Management and necessary for Management and Operation of the Project																		
2.2 Preparation of Building and Facilities																		
2.3 Assignment of Counterpart Personnel and Administrative & Supporting Staff																		
2.4 Expense of Operational Costs																		
2.5 Procurement of Machinery, Equipment and Materials																		

[Notes] This schedule is subject to amendment based on the mutual agreement and the framework of the R/D, according to the progress of the Project.

M/M for Midterm Evaluation

ANNEX 4-1

Organizational Chart of the Mines and Geosciences Bureau



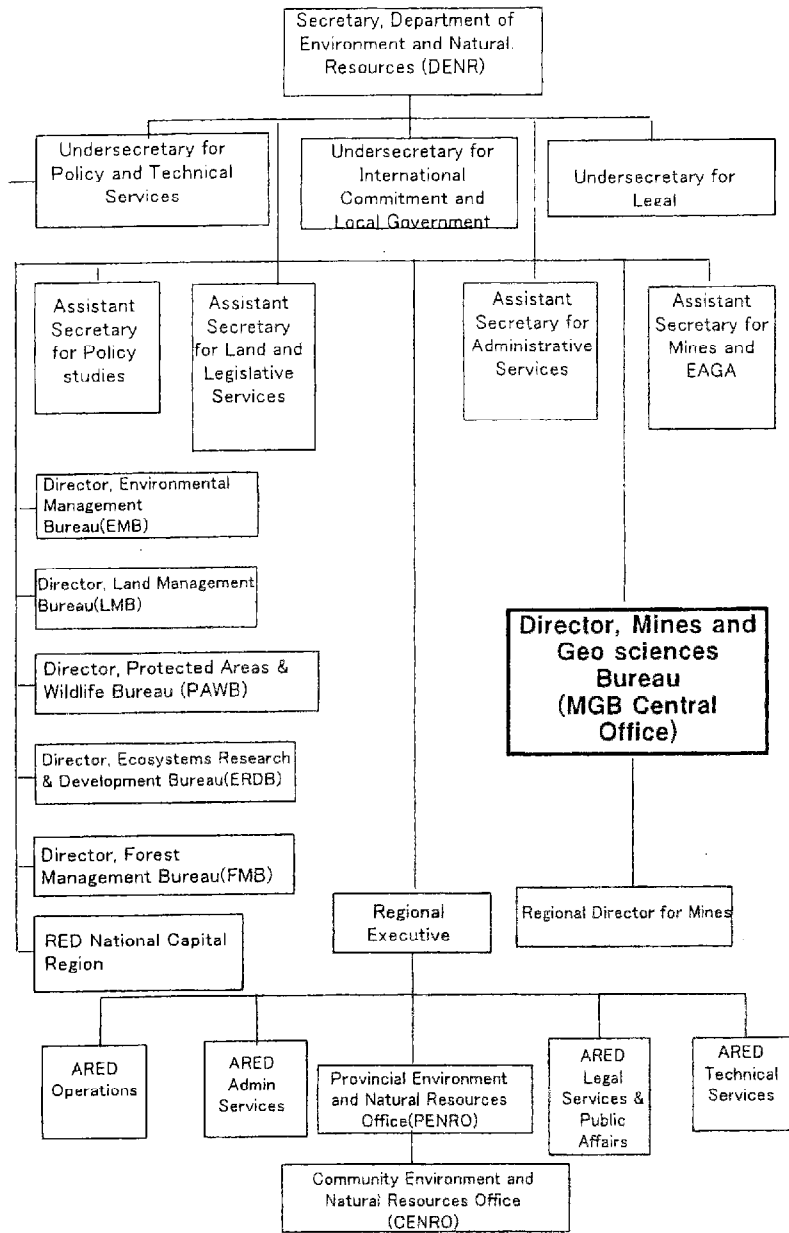
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M/M for Midterm Evaluation

ANNEX 4-2

Organizational Chart of the Department of Environment and Natural Resources



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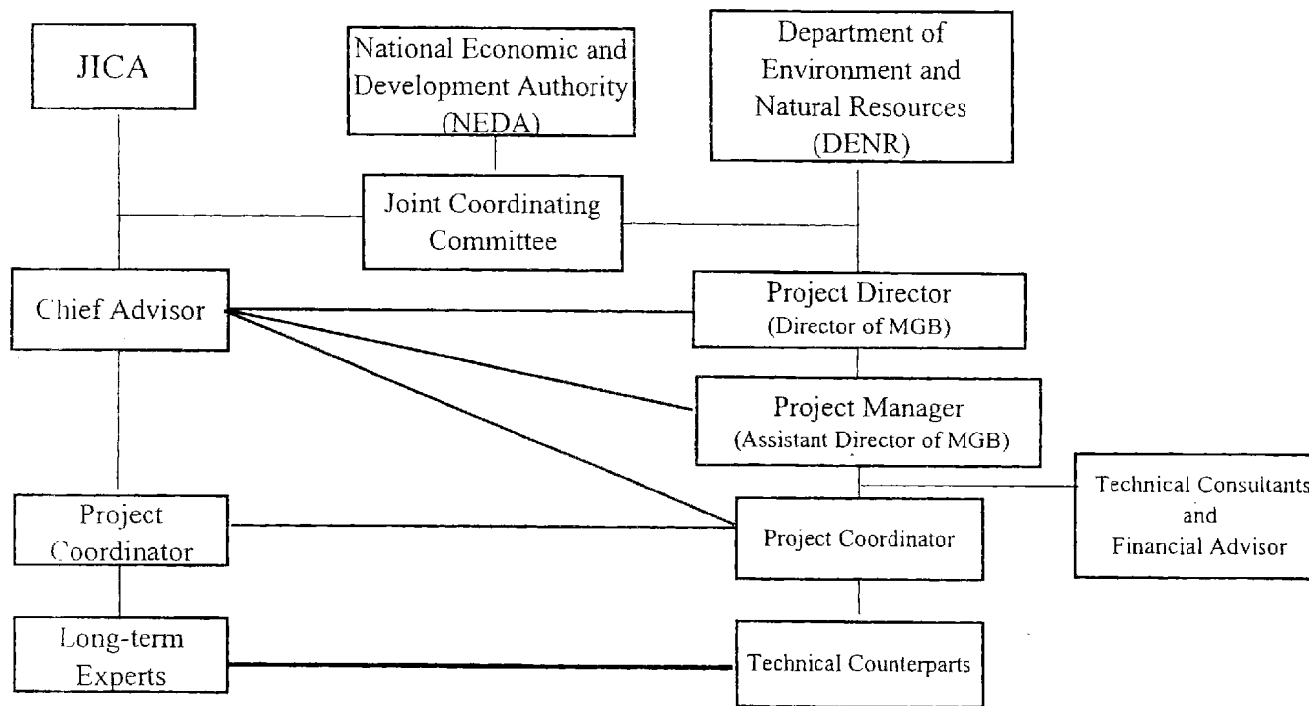
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ANNEX 4-3

Organizational Chart for the Administration of the Project by Both Sides

Japanese Side

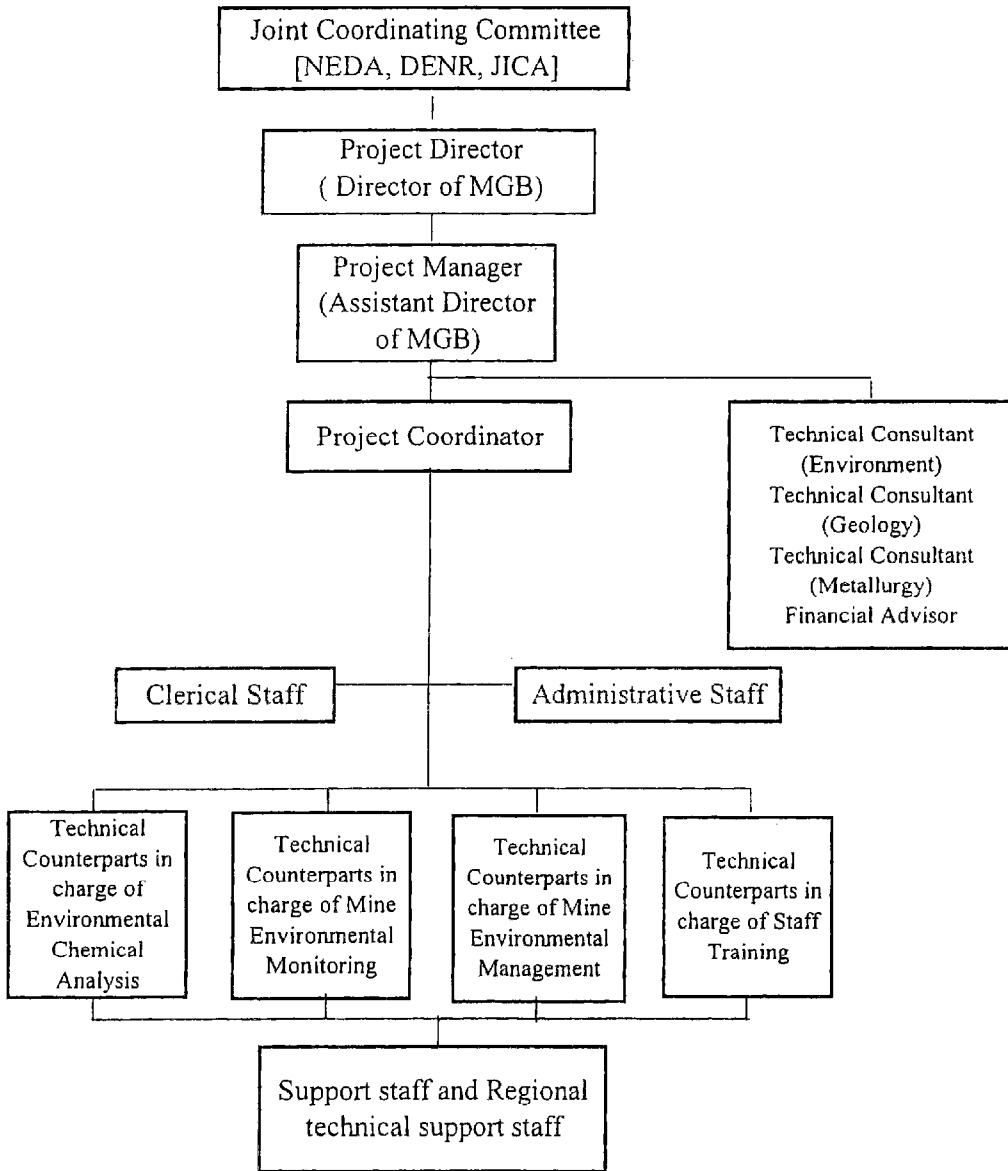
Philippine Side



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ANNEX 4-4

Organizational Chart for the Administration of the Project by the Philippine Side



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M/M for Midterm Evaluation

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ANNEX 5 List of the Dispatched Japanese Experts

July 1, 1999- February 22, 2001

Long Term Experts

1 Dr. Takeshi Usami	Chief advisor	1999/7/1-2001/6/30
2 Mr. Yasuo Kondo	Project Coordinator	1999/7/1-2001/6/30
3 Mr. Yoshikazu Kojima	Mine Environmental Monitoring	1999/8/18-2001/8/17
4 Mr. Takeo Watabe	Environmental Chemical Analysis	1999/7/1-2001/6/30
5 Mr. Atsushi Aoki	Mine Environmental Management	1999/7/1-2001/6/30

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Short Term Experts

1 Mr. Yoshinao Watanabe	Chemical Analysis	1999/11/30-1999/12/4
2 Mr. Saburo Sato	Technical Development of Mine Pollution Control	2000/3/28-2000/4/6
3 Mr. Soichiro Inoue	Supervision and management of tailing dams in mines	2000/3/28-2000/4/6
4 Ms. Misako Yamada	Abandoned mines pollution control	2000/3/28-2000/4/6
5 Me. Kazuo Kawakami	Mercury environmental monitoring	2001/1/8-2001/1/24

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ANNEX 6
Japanese Study Teams Dispatched by JICA

Management Consultation Team July 2 to July 5, 2000)

No.	Mission	Name	Department
1	Leader	Mr. Norinobu Hayashi	Managing Director, Mining and Industrial Development Cooperation Department, JICA
2	Project Management	Mr. Takeharu Nakagawa	Staff, Mining and Industrial Development Cooperation Department, JICA

Management Consultation Team September 25 to September 28, 2000)

No.	Mission	Name	Department
1	Leader	Mr. Masaaki Kato	Director, 2nd. Technical Cooperation Division, Mining and Industrial Development Cooperation Department, JICA
2	Technical Cooperation Planning	Mr. Ryuta Okubo	Geologist, International Cooperation Department, Japan Mining Engineering Center for International Cooperation
3	Mine Environmental Management	Mr. Katsuo Murayama	Senior Advisor, ISO Promotion Center, Japan Quality Assurance

Management Consultation Team (February 12 to February 23, 2001)

No.	Mission	Name	Department
1	Leader	Mr. Kazuo TANIGAWA	Special Technical Advisor, JICA
2	Technical Cooperation Planning	Mr. Joji KASHIFUKU	Assistant Chief for Policy Planning, Mine Safety Division, Agency for Nuclear and Industrial Safety, Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry
3	Mine Environmental Management	Dr. Michio KURIYAGAWA	Director General, National Institute for Resources and Environment, National Institute of Advanced Industrial Science and Technology, Ministry of Economy, Trade and Industry
4	Personnel Input	Mr. Katsuhiro ASAI	Director, General Affairs Department, Japan Mining Engineering Center for International Cooperation
5	Project Management	Mr. Toru YOSHIDA	Staff, 2nd. Technical Cooperation Division, Mining and Industrial Development Cooperation Department, JICA
6	Consultant	Mr. Nobuyuki NAKAZAWA	Deputy Division Manager, Environmental Division I.E & E Solutions Inc.

ANNEX 7

List of Equipment Provided by JICA

Laboratory Equipment

No.	Item	QTY	Abandon	Real Qty	Delivery	Location	Person	Remark (reason of abandonment)
E-01	AAS	3	0	3	2000/3/31	Dry Chem	Chemist	
E-01-1	Pump tube 080	1	0	1				Delivery on March, 2001
E-01-2	Pump tube 130	1	0	1				Delivery on March, 2001
E-01-3	Reaction coil	1	0	1				Delivery on March, 2001
E-01-4	Aspiration tube for NaBH4	3	0	3				Delivery on March, 2001
E-01-5	Aspiration tube for Hcl	3	0	3				Delivery on March, 2001
E-01-6	Oring	2	0	2				Delivery on March, 2001
E-01-7	Fitting	1	0	1				Delivery on March, 2001
E-01-8	Flourinated rubber tube	1	0	1				Delivery on March, 2001
E-01-9	Joint for reagent	3	0	3				Delivery on March, 2001
E-01-10	D2 lamp	2	0	2				Delivery on March, 2001
E-01-11	Hamilton Microliter syringe	3	0	3				Delivery on March, 2001
E-02	AAS Vapore generation	1	0	1	2000/3/31	Dry Chem	Chemist	
E-03	AAS Graphite tube analyzer	1	0	1	2000/3/31	Dry Chem	Chemist	
E-04-A	Hollow Cathode lamp Cu	2	0	2	2000/4/26	Dry Chem	Chemist	
E-04-B	Hollow Cathode lamp Pb	2	0	2	2000/4/26	Dry Chem	Chemist	
E-04-C	Hollow Cathode lamp Cd	2	0	2	2000/4/26	Dry Chem	Chemist	
E-04-D	Hollow Cathode lamp As	2	0	2	2000/4/26	Dry Chem	Chemist	
E-04-E	Hollow Cathode lamp Cr	2	0	2	2000/4/26	Dry Chem	Chemist	
E-04-F	Hollow Cathode lamp Hg	2	0	2	2000/4/26	Dry Chem	Chemist	
F-04-G	Hollow Cathode lamp Zn	2	0	2	2000/4/26	Dry Chem	Chemist	
E-10	XRF	1	0	1	2000/4/18	X-ray room	Chemist	
E-05	Ion selective electrode(SE)meter	3	0	3	2000/3/16	Dry Chem	Chemist	Printer is under service
E-06	Ion selective electrodefor CN	3	0	3	2000/3/16	Dry Chem	Chemist	Under service
E-07	Cynide distillation Apparatus	3	0	3	2000/1/18	Wet chem.	Chemist	
E-08	pH meter	3	0	3	2000/3/23	Wet chem.	Chemist	Under service
E-09	Temperature t:ster	2	0	2	2000/6/6	Wet chem.	Chemist	
E-10	Fumehood	2	0	2	2000/5/3	Wet chem.	Chemist	
E-11	Magnetic stirrer	2	0	2	2000/1/31	Wet chem.	Chemist	
E-12	Hot plate(large)	4	0	4	2000/4/28	Wet chem.	Chemist	
E-13	Compact mill	1	0	1	2000/6/8	Sample	Monitoring	
E-14	Grinding containerTungusten carbide	1	0	1	2000/6/8	Sample	Monitoring	
E-15	Grinding container Alumina	5	0	5	2000/6/8	Sample	Monitoring	
E-16	Set of sieves	4	0	4	2000/6/5	Sample	Chemist	
E-18-A	Analytical balance	2	0	2	2000/2/2	Balance Room	Chemist	
E-18-B	Top loading balance	1	0	1	2000/2/2	Wet chem.	Chemist	
E-19	Refrigerator	1	0	1	2000/5/19	Dry Chem.	Chemist	
E-20	Furnace	2	0	2	2000/4/12	Wet chem.	Chemist	

ANNEX 7

List of Equipment Provided by JICA

E-21	Ion Chromatograph system	1	0	1	2000/3/31	Dry Chem.	Chemist	
E-21-1	Autosampler for Ion chromatograph	1		1				Delivery on March, 2001
E-22	Hexavalent Cr meter	4	0	4	2000/3/2	Dry Chem.	Chemist	
E-23	Turbidity meter	4	0	4	2000/3/31	Wet chem.	Chemist	Under service
E-24	Water distillationsystem	2	0	2	2000/4/12	Wet chem.	Chemist	
E-25	Mercury analyzer	2	0	2	2000/3/31	Wet chem.	Chemist	
E-25-1	Sample boat	200	0	200				Delivery on March, 2001
E-25-2	Catalytical tube	1		1				Delivery on March, 2001
E-25-3	Amalgamator	1		1				Delivery on March, 2001
E-25-4	Silicon Joint of amalgamator	4		4				Delivery on March, 2001
E-25-5	Amalgamator gasket	4		4				Delivery on March, 2001
E-25-6	Stainless steel spoiler	3		3				Delivery on March, 2001
E-25-7	Kanthal coiling of combustion chamber	2		2				Delivery on March, 2001
E-25-8	Kanthal coiling of amalgamator	2		2				Delivery on March, 2001
E-25-9	Stainless steel boat beam	2		2				Delivery on March, 2001
E-25-10	PWB A1-95 board	1		1				Delivery on March, 2001
E-25-11	PWB A2-95 board	1		1				Delivery on March, 2001
E-25-12	Autosampler for Mercury analyzer	1		1				Delivery on March, 2001
E-26	Spectrophotometer UV-VIS	2	0	2	2000/4/11	Wet chem.	Chemist	1 unit is under service
E-27	Platinum crucibles	6	0	6	2000/4/17	Chemical	Chemist	
E-28	Platinum dish	6	0	6	2000/4/17	Chemical	Chemist	
E-29	Hazardous chemical dispenser	4	0	4	2000/6/6	Wet chem.	Chemist	1 unit for Monitoring Group
E-31	Air drying oven	2	0	2	2000/3/23	Wet chem.	Chemist	
E-32	Hot plate(small)	2	0	2	2000/4/12	Wet chem.	Chemist	
E-33	Ultrasonic cleaner	2	0	2	2000/6/19	Wet chem.	Chemist	
E-34	Centrifuge .12 x 15ml	1	0	1	2000/4/25	Wet chem.	Chemist	
E-35	Centrifuge .6 x 50ml	1	0	1	2000/2/18	Dry Chem.	Chemist	
E-36	Shaker for separatoryfunnel	2	0	2	2000/2/12	Dry Chem.	Chemist	
E-36-1	Shaker holder	14	0	14	2000/7/28	Wet Chem	Chemist	
E-37	Mixer for test tube	2	0	2	2000/2/15	Wet hem	Chemist	
E-38	Aspirator pump fisher	2	0	2	2000/3/31	Wet chem.	Chemist	
E-39	Mantle heater for 1000ml flask	4	0	4	2000/2/14	Dry Chem.	Chemist	
E-40	Dispenser 10-100ml	4	0	4	2000/6/5	Wet chem.	Chemist	
E-41	Dispenser 2500ml	4	0	4	2000/6/5	Wet chem.	Chemist	
E-45	Graphite Tube for AAS	100	0	100	2000/4/26	Dry Chem.	Chemist	
E-47	Barnstead Nanopure Infinity Base System	2	0	2	2000/4/13	Wet chem.	Chemist	
E-48	Chart recorder	1	0	1	2000/6/7	Wet chem.	Chemist	
E-48-1	Chart paper	5		5				Delivery on March, 2001
E-48-2	Chart pins	5		5				Delivery on March, 2001
E-49	Positive - Screw driver	1	0	1	2000/9/28	Maintenance	Mainte.	

M

ANNEX 7

List of Equipment Provided by JICA

E-50	Negative - Screw Driver	1	0	1	2000/9/28	Maintenance	Mainte.	
E-51	Open Wrench	1	0	1	2000/9/28	Maintenance	Mainte.	
E-52	Back Wrench	1	0	1	2000/9/28	Maintenance	Mainte.	
E-53	Multi Tester Digital	1	0	1	2000/9/28	Maintenance	Mainte.	
E-54	Clamp Meter Tester	1	0	1	2000/9/28	Maintenance	Mainte.	
E-55	Side Cutter 7"	1	0	1	2000/9/28	Maintenance	Mainte.	
E-56	Long Nose Plier 8"	1	0	1	2000/9/28	Maintenance	Mainte.	
E-57	Plier 8"	1	0	1	2000/9/28	Maintenance	Mainte.	
E-58	Plier 10"	1	0	1	2000/9/28	Maintenance	Mainte.	
E-59	Crimping Tool 9"	1	0	1	2000/9/28	Maintenance	Mainte.	
E-60	Vise Grip 7"	1	0	1	2000/9/28	Maintenance	Mainte.	
E-61	Vise Grip 10"	1	0	1	2000/9/28	Maintenance	Mainte.	
E-62	Wood Cutting Saw 20"	1	0	1	2000/9/28	Maintenance	Mainte.	
E-63	Hammer	1	0	1	2000/9/28	Maintenance	Mainte.	
E-64	Ball Hammer	1	0	1	2000/9/28	Maintenance	Mainte.	
E-65	Aluminum Ladder 10ft	1	0	1	2000/9/28	Maintenance	Mainte.	
E-66	Portable Welding Machine	1	0	1	2000/9/28	Maintenance	Mainte.	
E-67	Hack Saw	1	0	1	2000/9/28	Maintenance	Mainte.	
E-68	Pipe Wrench 10"	1	0	1	2000/9/28	Maintenance	Mainte.	
E-69	Pipe Wrench 14"	1	0	1	2000/9/28	Maintenance	Mainte.	
E-70	Adjustable Wrench 10"	1	0	1	2000/9/28	Maintenance	Mainte.	
E-71	Adjustable Wrench 15"	1	0	1	2000/9/28	Maintenance	Mainte.	
E-72	Wood Chisel	1	0	1	2000/9/28	Maintenance	Mainte.	
E-73	Planner Standard Size Electric	1	0	1	2000/9/28	Maintenance	Mainte.	
E-74	Pipe Threader 1" (Machine)	1	0	1	2000/9/28	Maintenance	Mainte.	
E-75	Taps and Die	1	0	1	2000/9/28	Maintenance	Mainte.	
E-76	Steel tape 5 Meters	1	0	1	2000/9/28	Maintenance	Mainte.	
E-77	Tool Box	1	0	1	2000/9/28	Maintenance	Mainte.	
E-78	Bosch Hammer	1	0	1	2000/9/28	Maintenance	Mainte.	
E-79	Auto voltage regulator	2	0	2	2000/10/18	Wet Chem.	Chemist	
E-80	Cylinder tube with Teflon walve 515-17-83-16	1	0	1	2000/10/19	Wet Chem.	Chemist	
E-81	Cylinder tube with Teflon walve 5002	3	0	3	2000/10/19	Wet Chem.	Chemist	
E-82	Cylinder tube with Teflon walve 5003	3	0	3	2000/10/19	Wet Chem.	Chemist	
E-83	Surge killer	3		3	2001/2/15	Wet chem.	Mainte.	
E-84	Surge killer	3		3	2001/2/15	Dry Chem.	Mainte.	
E-85	Parafilm	2		2				Delivery on March, 2001
E-86	Filter paper No 41	10		10				Delivery on March, 2001

BR

Field Equipment

ANEX 7

List of Equipment Provided by JICA

No.	Item	QTY	Abandon	Real Qty	Delivery	Location	Person	Remark (reason of abandonment)
F-01	Water quality checker	6	0	6	2000/4/10	Monito.	Monitoring	Region III and Car office
F-02	PSF filter holder with receiver	10	0	10	2000/3/10	C/P room	Monitoring	
F-03	Hand operated vacuum pressured pump	10	0	10	2000/3/10	C/P room	Monitoring	
F-04	Spectrophotometer	5	0	5	2000/4/28	Monito.	Monitoring	
F-04-13	Graduated Cylinder 25 ml	3	0	3	2000/8/11	Monito.	Monitoring	
F-04-14	Graduated Cylinder 250 ml	3	0	3	2000/8/11	Monito.	Monitoring	
F-04-17	Flask volumetric 100 ml	3	0	3	2000/8/11	Monito.	Monitoring	
F-04-18	Flask volumetric 200 ml	3	0	3	2000/8/11	Monito.	Monitoring	
F-05-19	Flask volumetric 250 ml	3	0	3	2000/8/11	Monito.	Monitoring	
F-04-20	Bel-art safety bulb	3	0	3	2000/8/11	Monito.	Monitoring	
F-04-21	Pipet serological 5 ml	3	0	3	2000/8/11	Monito.	Monitoring	
F-04-22	Pipet volumetric 1 ml	3	0	3	2000/8/11	Monito.	Monitoring	
F-04-23	Pipette volumetric 2 ml	3	0	3	2000/8/11	Monito.	Monitoring	
F-04-24	Pipette volumetric 3 ml	3	0	3	2000/8/11	Monito.	Monitoring	
F-04-25	Pipette volumetric 4 ml	3	0	3	2000/8/11	Monito.	Monitoring	
F-04-31	Graduated Cylinder, Mixing 50 ml Glass stopper	3	0	3	2000/8/11	Monito.	Monitoring	
F-04-38	Funnel separator 500 ml	3	0	3	2000/8/11	Monito.	Monitoring	
F-05	Stream flow velocity meter	1	0	1	2000/4/12	Monito.	Monitoring	
F-06	Colorimeter	3	0	3	2000/6/16	Monito.	Monitoring	
F-07	Grab sampler	6	0	6	2000/4/17	C/P room	Monitoring	
F-08	Sludge sampler	6	0	6	2000/4/17	Monito.	Monitoring	
F-09	UV lamp	6	0	6	2000/5/23	C/P room	Monitoring	
F-10	Florescent dye tracer	6	0	6	2000/5/23	C/P room	Monitoring	
F-11	Head light system	5	0	5	2000/5/4	C/P room	Monitoring	
F-12	Hand-held global positioning system	4	0	4	2000/1/30	C/P room	Monitoring	
F-14-A	Field vehicle(Patrol)	2	0	2	2000/2/29	MGB	Monitoring	
F-14-B	Van (L-300)	1	0	1	2000/1/27	MGB	Monitoring	
F-15	Multi gas tester	1	0	1	2000/2/29	C/P room	Monitoring	
F-16	Air sampler	1	0	1	2000/4/5	C/P room	Monitoring	
F-17	Video camera	2	0	2	2000/2/8	JICA	Monitoring	
F-18	Radio (VHF)	1	0	1	2000/2/3	C/P room	Monitoring	
F-19	Permeameter	1	0	1	2000/5/12	C/P room	Monitoring	
F-20	Standard penetrometer	1	0	1	2000/4/7	C/P room	Monitoring	
F-21	Piezometer	1	0	1	2000/5/4	C/P room	Monitoring	
F-22	Schmidt hammer	1	0	1	2000/3/27	Monito.	Monitoring	
F-25	Roof Rack	2	0	2	2000/9/4	MGB	Monitoring	
F-32	Step board	2	0	2	2000/9/4	MGB	Monitoring	
F-33	Fog lamp	2	0	2	2000/9/4	MGB	Monitoring	
F34-1	Chrome combe kit	1	0	1	2000/9/4	MGB	Monitoring	

ANNEX 7

List of Equipment Provided by JICA

F-34	Power winch	1	0	1	2000/9/4	MGB	Monitoring
F-35	Long distance radio for base	1	0	1	2000/8/28	JICA	Monitoring
F-36	Long distance radio for mobile	1	0	1	2000/8/28	Red patrol	Monitoring
F-36	Aerial photo miller	1	0	1	2000/4/7	C/P room	Monitoring
F-37	Compass	2	0	2	2000/4/7	Monito.	Monitoring
F-38	Hand auger	1	0	1	2000/4/7	Monito.	Monitoring
F-39	Pocket compass	1	0	1	2000/7/4	Monito.	Monitoring
F-39	Wide mouth sample bottle 1000 ml	10	0	10	2000/8/15	Monito.	Monitoring
F-25	pH test strip range 0-14	29	0	29	2000/8/15	Monito.	Monitoring
F-32	Narrow mouth bottle 60ml	200	0	200	2000/8/18	Monito. C/P	Monitoring
F-33	Narrow mouth bottle 125ml	200	0	200	2000/8/18	Monito. C/P	Monitoring
F-34	Narrow mouth bottle 250ml	200	0	200	2000/8/18	Monito. C/P	Monitoring
F-35	Narrow mouth bottle 500ml	200	0	200	2000/8/18	Monito. C/P	Monitoring
F-39	Wide mouth bottle 1000ml	100	0	100			Monitoring
F-40	LDPE Wash bottle 250ml	36	0	36	2001/1/22	C/P room	Monitoring
F-41	LDPE Wash bottle 500ml	36	0	36	2001/1/22	C/P room	Monitoring
F-42	Slope calculation software	1	0	1	2001/2/19	JICA	Manage.
F-J-1	Mercury analyzer PM-2	1	0	1	2000/6/24	Monito.	Monitoring
F-J-2	Mercury analyzer EPM-1	2	0	2	2000/6/24	Monito.	Monitoring
F-J-3	Packtest. Cu	3500	0	3500	2000/7/4	Monito.	Monitoring
F-J-4	Packtest. Cr	3500	0	3500	2000/7/4	Monito.	Monitoring
F-J-5	Packtest. CN	3500	0	3500	2000/7/4	Monito.	Monitoring
F-J-6	Packtest. As	3500	0	3500	2000/7/4	Monito.	Monitoring
F-J-7	Packtest. Fe	3500	0	3500	2000/7/4	Monito.	Monitoring
F-J-8	Packtest. Zn	3500	0	3500	2000/7/4	Monito.	Monitoring
F-J-9	Tripod for pocket compass	1	0	1	2000/7/4	Monito.	Monitoring
F-J-10	Measure, stainless 50m	1	0	1	2000/7/4	Monito.	Monitoring
F-J-11	Measure, tape 50m	1	0	1	2000/7/4	Monito.	Monitoring
F-J-12	C/lino compass	1	0	1	2000/7/4	Monito.	Monitoring
F-J-13	Water quality checker	1	0	1	2000/7/4	Monito.	Monitoring
F-J-14	Soil pH meter	1	0	1	2000/7/4	Monito.	Monitoring
F-J-15	Altimeter	1	0	1	2000/7/4	Monito.	Monitoring
F-J-16	Packtest. Wak-pH	3500	0	3500	2000/7/4	Monito.	Monitoring
F-J-17	Packtest. BCG	3500	0	3500	2000/7/4	Monito.	Monitoring
F-J-18	Packtest. TBI.	3500	0	3500	2000/7/4	Monito.	Monitoring
F-J-19	Packtest. Fe 2	3500	0	3500	2000/7/4	Monito.	Monitoring
F-J-20	Sample bag 15*30cm	1000	0	1000	2000/7/4	Monito.	Monitoring
F-J-21	Sample bag 20*40cm	500	0	500	2000/7/4	Monito.	Monitoring
F-J-22	Sample bag 30*45cm	500	0	500	2000/7/4	Monito.	Monitoring
F-J-23	Sample bag 10*20cm	1000	0	1000	2000/7/4	Monito.	Monitoring

ANNEX 7

List of Equipment Provided by JICA

F-J-24	pH meter	2	0	2	1999/8/20	Manage.	Manage.	Advanced equipment
F-J-25	Tin (II) Chloride Dihydrate (100g)	1	0	1	2001/1/11	Monito.	Monitoring	Advanced equipment (Short-term expert)
F-J-26	Consumable applats for Mercury analyzer PM-2	1	0	1	2001/1/11	Monito.	Monitoring	Advanced equipment (Short-term expert)
F-J-27	Sludge sampler Egg man	1	0	1	2001/1/11	Monito.	Monitoring	Advanced equipment (Short-term expert)
F-J-28	Water color meter	1	0	1	2001/1/11	Monito.	Monitoring	Advanced equipment (Short-term expert)

Office Equipment

No.	Item	QTY	Abandon.	Real. Qty	Delivery	Location	Person	Remark (reason of abandonment)
G-01	Disktop computer	6	0	6	2000/2/23	C/P JICA	Staff	
G-02	Laptop computer	3	0	3	2000/2/23	JICA	PCJ	
G-03	Color printer	2	0	2	2000/2/23	C/P	Staff	
G-04	Laser printer	2	0	2	2000/2/23	JICA	PCJ	
G-05	Scanner	2	0	2	2000/2/23	C/P	PCJ	
G-07	Copy machine	1	0	1	2000/1/14	JICA	PCJ	
G-09	Multimedia projector	1	0	1	2000/1/20	JICA	PCJ	
G-10	Direct Projector	1	0	1	2000/1/20	JICA	PCJ	
G-13	Locker	14	0	14	2000/4/11	JICA	PCJ	
G-14	Locker	7	0	7	2000/4/17	C/P	PCJ	
G-15	Locker	7	0	7	2000/4/17	C/P	PCJ	
G-16	Airconditioner	3	0	3	2000/3/15	C/P / Lab	Mainte	
G-17	Printer kit for Able 3221	1	0	1	2000/8/17	JICA	PCJ	
G-19-1	D-link 16 port hub 10 base T	2	0	2	2000/8/17	JICA	PCJ	
G-19-2	Category 5 pair twist cable	1	0	1	2000/8/17	JICA	PCJ	
G-19-3	Net work installation	1	0	1	2000/8/17	JICA	PCJ	
G-20	D-link 10 base T LAN card	5	0	5	2000/8/17	JICA	PCJ	
G-21	Flash pass for digital camera	2	0	2	2000/8/11	JICA	PCJ	
G-23	Norton anti virus 2000	5	0	5	2000/8/30	JICA	PCJ	
G-24	Paper cutter	2	0	2	2000/8/11	JICA	PCJ	
G-25	Book binding machine	2	0	2	2000/8/11	JICA	PCJ	
G-26	HP CDR. 9100i	1	0	1	2000/8/26	C/P	Staff	
G-27	VCR	1	0	1	2000/8/3	JICA	PCJ	
G-28	Windows 2000	5	0	5	2000/8/26	JICA	PCJ	
G-29	MS office 2000	5	0	5	2000/8/26	JICA	PCJ	
G-30	Sliding glass door cabinet	2	0	2	2000/12/5	JICA	PCJ	
G-31	Double door cabinet	2	0	2	2000/12/5	JICA	PCJ	
G-32	UPS	6						
G-J-01	Laptop computer	5	0	5	1999/8/20	JICA	PCJ	Advance equipment
G-J-02	Digital camera	2	0	2	1999/8/20	JICA	PCJ	Advance equipment
G-J-03	Camera (EOS Kiss II)	1	0	1	1999/8/20	Monito.	Monito.	Advance equipment
G-J-04	Camera lens 20-80mm	1	0	1	1999/8/20	Monito.	Monito.	Advance equipment

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ANNEX 7

List of Equipment Provided by JICA

G-J-05	Compact camera	1	0	1	1999/8/20	Monito.	Monito.	Advance equipment
G-J-06	PCMCIA LAN card	5	0	5	1999/8/20	JICA	PCJ	Advance equipment
G-J-07	Helmet	5	0	5	1999/8/20	JICA	PCJ	Advance equipment
G-J-08	Mask	5	0	5	1999/8/20	JICA	PCJ	Advance equipment
G-J-09	Transformer in 110-240V	5	0	5	1999/8/20	JICA	PCJ	Advance equipment
G-J-10	IO data Hub	1	0	1	1999/8/20	JICA	PCJ	Advance equipment
G-J-11	Printer Epson FM-770	1	1	0	1999/8/20	JICA	PCJ	Power supply was broken
G-J-12	Scanner FB620	1	1	0	1999/8/20	JICA	PCJ	Power supply was broken
G-J-13	Digital camera C-2000zoom	1	0	1	1999/8/20	JICA	PCJ	Advance equipment
G-J-14	Soft ware Logovistax	1	0	1	1999/8/20	JICA	PCJ	Advance equipment
G-J-15	Soft ware Assess97 Japanese	1	0	1	1999/8/20	JICA	PCJ	Advance equipment
G-J-16	Soft ware Power point 97 Japanese	1	0	1	1999/8/20	JICA	PCJ	Advance equipment
G-J-17	Soft ware Ichitaro Japanese	1	0	1	1999/8/20	JICA	PCJ	Advance equipment
G-J-18	Soft ware Windows 98 Japanese	1	0	1	2000/11/10	JICA	PCJ	Advance equipment

Note:

Location

Wet chem.: Wet chemical laboratory

Dry chem.: Dry chemical laboratory

Sample: Sample preparation room

Monit.: Mine Environmental Monitoring expert's room

Monit. C/P: Mine Environmental Monitoring C/P's room

Manage.: Mine Environmental Management expert's room

Chemist.: Environmental Chemical Analysis Expert's room

C/P: Counterpart's room

JICA: JICA room's

C/P Lab: Counterpart's room and Laboratory

Person in charge management the equipment

Chemist.: Chemical analysis C/Ps

Mainte.: Supporting staff (Maintenance)

Monito.: Mine environmental monitoring expert

Monitoring: Mine environmental Monitoring C/Ps

Staff: Staff training C/Ps

Manage.: Mine environmental management C/Ps

PCJ: Project coordinator Japan side

MR

ANNEX 8

Local Expenses Provided by JICA

Philippine Peso

Item	1999	2000	2001*
Honoraria	16,800.00	0.00	0.00
Equipment	107,500.00	146,000.00	107,172.00
Supplies	19,800.00	180,000.00	178,071.00
Transportation	22,500.00	30,000.00	29,679.00
Traveling	162,110.00	397,488.00	321,600.00
Communication	45,000.00	60,000.00	59,357.00
Printing	200,000.00	200,000.00	206,101.00
Rents	374,800.00	100,000.00	158,286.00
Employment	64,000.00	108,000.00	106,843.00
Meeting	45,000.00	180,000.00	123,661.00
Miscellaneous	42,000.00	46,000.00	61,001.00
Technical exchange	0.00	409,860.09	595,239.00
Geo technical bring	0.00	947,100.00	0.00
Training for middle class engineers	0.00	0.00	1,370,473.00
Total	1,099,510.00	813,488.00	3,317,483.00

Note: Budget duration is Japanese calendar.

* Proposed Budget.

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M/M Midterm Evaluation

ANNEX 9

Plan and Actual Allocation of Philippine Counterpart Personnel and Staff

Staff Allocation	Number of Counterparts	Number of Support Staff
Project Director	1	-
Project Manager	1	-
Technical Consultants and Financial Advisor	4	-
Project Coordinator	1	-
Counterpart in charge of Mine Environmental Monitoring	5	0
Counterpart in charge of Environmental Chemical Analysis	7	2
Counterpart in charge of Mine Environmental Management	5	0
Counterpart in charge of Staff Training	4	0
Other Support Staff	0	7

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M/M for Midterm Evaluation

ANNEX 10

List of Philippine Counterparts Personnel

Functional Category	Assigned Personnel
[Administrative Counterparts] 1. Project Director 2. Project Manager 3. Project Coordinator 4. Technical Consultant (Environment) 5. Technical Consultant (Geology) 6. Technical Consultant (Metallurgy) 7. Financial Advisor	Horacio C. Ramos, Director, MGB Edwin G. Domingo, Assistant Director, MGB Geronimo C. Badulis, Jr., Supervising Science Research Specialist Mining Environment and Safety Division Michael V. Cabalda, Division Chief, Mining Environment and Safety Division Romeo L. Almeda, Division Chief Lands Geological Division Juancho Pablo S. Calvez, Division Chief, Metallurgical Technology Division Roland A. de Jesus, Division Chief, Finance Division
[Technical Counterparts] 1. Counterparts in Charge of Environmental Chemical Analysis 2. Counterparts in Charge of Mine Environmental Monitoring 3. Counterparts in Charge of Mine Environmental Management Technology 4. Counterparts in Charge of Staff Training	1) Teresita Balmes, Supervising Science Research Specialist, PETROLAB 2) Eleanor R. Lobendino, Senior Science Research Specialist, PETROLAB 3) Sylvia Alcantara, Supervising Science Research Specialist, Metallurgical Technology Division 4) Helen Carbonell, Senior Science Research Specialist, MGB- Region Car 5) Joycelyn F. Taal, Senior Science Research Specialist, Metallurgical Technology Division 6) Leticia G. Santos, Senior Science Research Specialist, PETROLAB 7) Leonisa F. Lecitivo, Chemist IV, MGB-Region IV 1) Edmon V. Dino, Senior Science Research Specialist, Mining Environment and Safety Division 2) Virgilio P. Soriano, Engineer III, Metallurgical Technology Division 3) Alvin Fernando, Senior Science Research Specialist, Lands Geological Survey Division 4) Lolit Broces, Senior Science Research Specialist, Lands Geological Survey Division 5) Jamesie Yadao, Engineer III, MGB-Region IV 1) Juliet M. Miguel, Supervising Science Research Specialist, Mining Environment and Safety Division 2) Rey Perucho, Engineer III, Metallurgical Technology Division 3) Cyril Vizcayno, Senior Science Research Specialist, Mining Environment and Safety Division 4) Paulo Noni Tidalgo, Senior Science Research Specialist, Mining Environment and Safety Division 5) Mario W. Alban, Senior Science Research Specialist, MGB- Region IV 1) Lilian Rollan, Supervising Science Research Specialist, PETROLAB 2) Ellen Grace R. Galiste, Engineer IV, Mineral Economics and Information Division 3) Digna Evangelista, Senior Science Research Specialist, PETROLAB 4) Alice Umerez, Human Resources Management Officer III, Administrative Division

- Note:**
1. Project Director, Project Manager and Project coordinator manage the implementation of the Project.
 2. Technical Consultant for Environment gives advise in the field of mine environment for more effective implementation of the Project.
 3. Technical Consultant for Geology gives advise in the field of geology for more effective implementation of the Project.
 4. Technical Consultant for Metallurgy gives advise in the field of chemical analysis techniques and other for more effective implementation of the Project
 5. Financial Advisor plans and manages the budget for the implementation of the Project

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M/M for Midterm Evaluation

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ANNEX 11

List of the Philippine Counterpart Personnel and Trained in Japan

Fields	C/P's name	Allocation												Training in Japan		Remarks				
		1999				2000				2001				2002				Year	Visit	
		I	II	III	VI	I	II	III	VI	I	II	III	VI	I	II		III	VI		
Management	HORACIO C. RAMOS EDWIN G. DOMINGO GERONIMO C. BADULIS, JR.																			Shimadzu XRF
Technical consultants	ROMEO L. ALMEDA MICHAEL V. CABALDA ARCADIO I. CASIS ROLAND E. DE JESUS JUANCHO PABLO S. CALVEZ																			Technical Newly assigned
Mine environmental monitoring	EDMON V. DINO LOLIT BROCES VIRGILIO P. SORIANO ALVIN LUCIO FERNANDO PERCIVAL E. LADUB JAMESIE YADAO																	1999	MITI/MMAJ	Technical
Environmental chemical analysis	TERESITA P. BALMES SYLVIA S. ALCANTARA HELEN CARBONELL JOYCELYN F. TAAL ELEANOR R. LOBENDIO LEONISA F. LECITIVO LETICIA G. SANTOS																			Technical Technical Shimadzu AAS Shimadzu AAS Shimadzu AAS Shimadzu XRF
Mine environmental management	JULIET M. MIGUEL PAULO NONI T. TIDALGO CYRIL R. VIZCAYNO REY V. PERUCHO MARIO W. ALBAN																	2000 1999	METI/MMAJ MITI/MMAJ	
Staff training	LILIAN A. ROLLAN ELLENGRACE R. GALISTE DIGNA G. EVANGELISTA ALICE S. UMEREZ																	1999	MITI/MMAJ	

— is allocating
= training in Japan

Note:
 Technical is Technical Exchange Program
 Shimadzu AAS is Shimadzu Atomic Absorption Spectrophotometer training in Singapore
 Shimadzu XRF is Shimadzu X-ray Fluorescence Spectrometer training in Japan

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ANNEX 12

Local Expenses Provided by Philippine Side

Philippines Peso

Expenses	1999	2000	2001	2002*
C/P's Wages	5673,255	7,254,896	7,254,896	7,254,896
Traveling Expenses	100,000	275,000	268,000	268,000
Communication Services	-	115,000	115,000	115,000
Supplies and Materials	530,000	762,000	492,000	492,000
Water and Power Services	-	441,000	441,000	441,000
Gasoline, oil and lubricants	-	70,000	180,000	180,000
Insurance Premiums	-	127,000	127,000	127,000
Other Services	370,000	793,000	2,624,000	2,624,000
Total	6,673,255	9,837,896	11,501,896	11,501,896

Note: * Proposed Budget

M/M for Midterm Evaluation

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ANNEX 13 List of Technology Transfer Subjects

NO.	Fields	Lecture	Contents of Lecture	Practice	Contents of Practice
1	Mine Environmental Monitoring				
	1999/8/18-1999/12/31	25	Monitoring plan, Sampling method of mining waste water and stream segment	3	Select model sites and others
	2000/1/1-2000/6/30	28	General Environmental Issues, Sampling method of mining waste water and stream segment	6	Select model sites, learn operation the Equipment and others
	2000/7/1-2000/12/31	9	Sampling method for water, Water quality standard, The hydrologic cycle	4	Water sampling, learn operation the Equipment
2	Environmental Chemical Analysis				
	1999/8/18-1999/12/31	15	Introduction of analysis methods, Fundamental chemical knowledge, The theory of solvent extraction	5	Solvent extraction and others
	2000/1/1-2000/6/30	13	Determination of Cr, As, CN in waste water and others	0	
	2000/7/1-2000/12/31	5	Dissolution techniques, Knowledge concerning AAS	60*	Analysis monitoring samples
3	Mine Environmental Management				
	1999/8/18-1999/12/31	7	Out-line mine pollution and others	2	Select model sites
	2000/1/1-2000/6/30	11	System of laws and regulation concerning with mining and others	3	Select model sites, manage tailing dam
	2000/7/1-2000/12/31	3	The suitable technologies for management and maintenance of dam facilities for mine pollution	3	Geo technical drilling

Notice:

The Number of Practice of Mine Environmental Monitoring and Mine Environmental Management were number of field survey

The number of Practice of Environmental Chemical Analysis duration 2000/7/1-2000/12/31 is analyzed monitoring samples

SP

ANNEX 14

List of Training Materials (Draft) for C/Ps

No.	Name	Content	Field
1	The Earth	The History of Earth, etc.	Monitoring
2	Global Environmental Issues	Global Warming, Abnormal Weather, etc.	Monitoring
3	Water	Water Quality and Environmental Monitoring	Monitoring
4	Chemical Basic Principles	PH, Acid and Base, Buffer, Precipitation, Complex, etc.	Chemical Analysis
5	Analytical Data Book	Pretreatment of samples, Quatitative Analysis, Separation, etc.	Chemical Analysis
6	Pretreatment Techniques	Evaporation, Solvent Extraction, Coprecipitation, etc.	Chemical Analysis
7	Waste Water Treatment for Harmful Substances	Criteria for Harmful Substances, Cd Waste Water Treatment, etc.	Chemical Analysis
8	Mining Laws and Philippines and Japan	Applicable Minerals, Mining Rights, Mining Area, etc.	Environmental Management
9	Heavy Metal Pollution Cases in Japan and Philippines	Trasformation and Accumulation of Metals in Body, Polllution Cases in Japan, etc.	Environmental Management

ANNEX 15
Record of the Seminar/Presentation

No.	Date	Seminar and Work shop	Lecturer	Attendance	Major attendance	Place
1	October 23-24, 1999	PCM work shop	Ms. Suki and Ms. Jacky	37	C/Ps, DENR, NEDA, MGB Central office staff	Lecture hall, MGB
2	December 2, 1999	1st Mine Environmental Management Seminar	Mr. Watanabe(Short Term) and Mr. Yamada(JICA EMB)	51	C/Ps, DENR, MGB Central and Regional office staff	Lecture hall, MGB
3	March 30-31, 2000	2nd Mine Environmental Management Seminar	Mr. Sato(Short Term), Mr. Inoue(Short Term) and Ms. Yamada(Short Term)	68	C/Ps, DENR, MGB Central and Regional office staff	Lecture hall, MGB
4	July 3-4, 2000	Mine Environmental Management Symposium	Mr. Caleon(A/S DENR), Mr. Moriya(MMAJ), Mr. Kuwagaki(Short Term), Dr. Usami(Chief Advisor), Dr. Beinhoff(UNIDO), Mr. O'Reilly(UNIDO), Mr. Nakamura(Private), Mr. Martin(MGB Regional), Mr. Diomampo(MGB Regional), Mr. Gacad(MGB Regional) and Mr. Ramos(Director)	123	C/Ps, DENR, NEDA, MGB Central office staff and Mining engineers	Bureau of Soil, DOA
5	September 27, 2000	3rd Mine Environmental Management Seminar	Mr. Murayama (JICA Management and Consultation Team member)	77	C/Ps, MGB Central, Regional office staff and Mining engineers	Lecture hall, MGB
6	January 10, 2001	4th Mine Environmental Management Seminar	Mr. Kawakami (Short Term)	54	C/Ps, MGB Central, Regional office staff and Mining engineers	Lecture hall, MGB

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ANNEX 16 Detailed Plan of Operations

Year	1999		2000				2001				2002	
	III	IV	I	II	III	IV	I	II	III	IV	I	II
Technical Cooperation Term												
0	The management system of the Project will be established.											
0-1.	Allocate the staff based on the plan.											
0-1-1.	Review of staff allocation plan.											
0-1-2.	Assignment of staff											
0-2.	Formulate the operational plan.											
0-2-1.	Review of PDM, TSI, PO, APO, etc											
0-2-2.	Formulation of APO-2001											
0-2-3.	Implementation of Project monitoring and evaluation											
0-2-4.	Formulation of APO-2002											
0-3.	Formulate the budgetary plan.											
0-3-1.	Disbursement of budget 1999.											
0-3-2.	Planning of budget 2000.											
0-3-3.	Disbursement of budget 2000.											
0-3-4.	Planning of budget 2001.											
0-3-5.	Disbursement of budget 2001.											
0-3-6.	Planning of budget 2002.											
0-3-7.	Disbursement of budget 2002.											
1	The operation and maintenance management of the machinery and equipment used for chemical analysis, measurements and experiments will be undertaken by the technical staff of MGB.											
1-1.	Formulate the preparation plan and implement the procurement and maintenance of machinery, equipment and facilities.											
1-1-1.	Planning of building and facilities renovation.											
1-1-2.	Implementation of renovation works.											

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ANNEX 16 Detailed Plan of Operations

Year	1999				2000				2001				2002	
	III	IV	I	II	III	IV	I	II	III	IV	I	II		
1-1-3.	Planning of procurement and maintenance of the Equipment.													
1-1-4.	Implementation of procurement and maintenance of the Equipment.													
1-2.	Implement the installation, and guide in the operation and maintenance of machinery and equipment provided by JICA.													
1-2-1.	Installation and adjustment of the Equipment													
1-2-2.	Learning of the operation the Equipment													
1-2-3.	Learning of the maintenance of the Equipment													
1-3.	Prepare the manuals on maintenance of the Equipment.													
1-3-1.	Preparation of manuals on maintenance of the Equipment													
2	The MGB's functions of mine environmental monitoring in the fields of water and soil pollution will be upgraded and strengthened.													
2-1.	Acquire the technical and administrative outline of mine environmental monitoring in the fields of water and soil pollution.													
2-1-1	General environmental issue													
(1)	Earth-1													
a.	Element, Atmosphere, Water and Life													
(2)	Earth-2													
a.	Ozone Layer and Fleon. Acid rain, Global warming, Abnormal weather and International Environmental laws													
2-1-2	Mine environmental monitoring													
(1)	Monitoring plan													
a.	Selection of model sites													
b.	Review the type of ore deposits and it's operation													

ANNEX 16
Detailed Plan of Operations

Year	1999		2000				2001				2002	
Quarter	III	IV	I	II	III	IV	I	II	III	IV	I	II
c. Review the monitoring method				—	—							
(2) Effluent and environmental standard of heavy metals				—	—							
(3) Biotope and biological indication							—	—				
(4) Geochemistry of stream water, stream sediment and soil						—	—					
2-2 Acquire the techniques and prepare the training materials of water and soil sampling for environmental analysis.	—	—	—	—	—	—	—	—	—	—	—	—
2-2-1 Acquisition of sampling methods	—	—	—	—	—	—	—	—	—	—	—	—
(1) Sampling method of mining waste water and stream water	—	—	—	—	—	—	—	—	—	—	—	—
(2) Sampling method of mining waste and stream sediment	—	—	—	—	—	—	—	—	—	—	—	—
(3) Soil sampling method							—	—	—	—	—	—
2-2-2 Prepare the training materials	—	—	—	—	—	—	—	—	—	—	—	—
(1) Mining waste water and stream water sampling manual	—	—	—	—	—	—	—	—	—	—	—	—
(2) Mining waste and stream sediment sampling manual				—	—	—	—	—	—	—	—	—
(3) Soil sampling manual							—	—	—	—	—	—
2-3. Acquire the technology and prepare the training materials of on-site measurements and analysis for water and soil quality.	—	—	—	—	—	—	—	—	—	—	—	—
2-3-1 On-site measurement and chemical analysis technology	—	—	—	—	—	—	—	—	—	—	—	—
(1) On-site analysis of heavy metals in stream water	—	—	—	—	—	—	—	—	—	—	—	—
(2) On-site measurement of mercury in stream water				—	—	—	—	—	—	—	—	—
(3) On-site measurement of cyanide in stream water				—	—	—	—	—	—	—	—	—
2-3-2 On-site measurement training materials	—	—	—	—	—	—	—	—	—	—	—	—

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ANNEX 16 Detailed Plan of Operations

Year		1999		2000				2001				2002	
Quarter		III	IV	I	II	III	IV	I	II	III	IV	I	II
2-4	Acquire the technology and prepare the training materials of laboratory measurements and analysis for water and soil quality.												
2-4-1.	Acquisition of measurement and analytical technique within chemical laboratory												
(1)	Knowledge concerning determination of Cu, Pb, Cd, As, Hg, CN in waste water and soil samples												
a.	Chemical basic principle												
b.	Measurement technique												
c.	Waste water treatment technique												
d.	Dissolution technique												
(2)	Knowledge concerning AAS												
(3)	Knowledge concerning XRF												
(4)	Knowledge concerning trace analysis												
(5)	Practical coaching for monitoring samples												
a.	AAS,colorimetry												
a-1.	Simultaneous determination of Cu,Pb,Cd by solvent extraction												
a-2.	Simultaneous determination of Cu,Pb,Cd,Cr by La coppt												
a-3.	Colorimetry of Cr												
a-4.	Colorimetry of As												
a-5.	As using hydrogen generation AAS												
a-6.	CN by distillation separation												
a-7.	Dissolution of solid samples												
a-8.	Dissolution of plants and biological samples												
b.	XRF												
b-1.	Quality and quantity analysis of solid samples												
b-2.	Application of solution samples												
(6)	Coaching and supervision of monitoring sample analysis												
a.	AAS,colorimetry												

ANNEX 16
Detailed Plan of Operations

Year Quarter	1999		2000				2001				2002	
	III	IV	I	II	III	IV	I	II	III	IV	I	II
b. XRF												
(7) Statistical treatment of analytical data using computer												
(8) Coaching of trace analysis												
2-4-2. Prepare the training materials												
(1) Preparation of data book												
a. Apparatus, reagents												
b. Pretreatment of samples												
c. Separation												
d. Chemical reaction and basic value												
e. Electrolysis												
f. XRF												
g. Statistical treatment of analytical data												
h. Safety supervision of chemical laboratories												
(2) Preparation of question and answer texts												
a. Question and answer text for determination of Cu, Pb, Cd, Cr, As, Hg, CN												
b. Question and answer text for XRF												
(3) Preparation of practical coaching textbook												
a. AAS, colorimetry												
b. XRF												
c. Trace analysis												
2-5. Acquire the techniques and prepare the training materials on the environmental evaluation of the results of measurement and analysis for water and soil quality.												
2-5-1 Evaluation and assessment of analysis results.												
(1) Mapping technique												
(2) Statistical methods for analysis data sets of environmental monitoring												

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ANNEX 16 Detailed Plan of Operations

Year	1999		2000				2001				2002	
Quarter	III	IV	I	II	III	IV	I	II	III	IV	I	II
(3) Evaluation methods for monitoring data sets of Cu, Pb, Cd, Cr, As diffusion												
(4) Evaluation methods for data sets of Hg diffusion												
(5) Evaluation methods for data sets of CN diffusion												
2-5-2 Prepare the training materials												
(1) Analysis and evaluation monitoring data manual												

Handwritten marks: 'm' and 'te'.

**ANNEX 16
Detailed Plan of Operations**

Year		1999				2000				2001				2002	
Quarter		III	IV	I	II	III	IV	I	II	III	IV	I	II		
Technical cooperation term															
3	The MGB's functions of evaluation for the environmental management technologies in the fields of water and soil pollution will be strengthened.														
3-1.	Acquire the technical information for mine environmental management technologies	—————													
3-1-1.	Outline of mine pollution	—————													
(1)	Current conditions of mining Industry		—————												
(2)	The cases of (mine) pollution problems		—————												
a.	The history of mine pollution		—												
b.	The cases of (mine) pollution problems by cadmium, arsenic and mercury		—————												
3-1-2.	The system of laws and regulations concerning with (mine) pollution prevention			—————	—————	—————									
(1)	The system of laws and regulations concerning with mining			—————	—————										
a.	The outline of mining law			—————	—————										
b.	The outline of mine safety law			—————	—————										
c.	The outline of the law on special measures for mine damages caused by metal mining industry			—————	—————										
(2)	The system of laws and regulations concerning with water pollution and soil pollution prevention				—————	—————									
a.	The outline of basic environment law				—										
b.	The outline of water pollution prevention law					—————									
c.	The outline of law for prevention of soil contamination for farmland					—————									
d.	The outline of the law for bearing of anti-pollution work expenses by businesses						—————								
e.	The outline of the law on compensation for pollution-caused damages to health						—————								

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**ANNEX 16
Detailed Plan of Operations**

SP

Year	1999		2000				2001				2002	
Quarter	III	IV	I	II	III	IV	I	II	III	IV	I	II
Technical cooperation term												
3-1-3. The system of supervisory administration for mine environmental management			—									
(1) The policy of supervision and guidance for mine environmental management			—									
a. The outline of mine safety and inspection administration in Japan			—									
b. The points of supervision and guidance for mine environmental management by the administration			—									
(2) The approval and examination system for mining facilities of mine pollution control by the administration			—									
a. The approval and examination system for mining facilities of mine pollution control			—									
b. The inspection performance for mining facilities by the administration			—									
(3) The system of mine pollution control for abandoned mines			—									
a. The reserve system for the project of mine pollution control			—									
b. The subsidy system for the project of mine pollution control			—									
c. The fund system for the project of mine pollution control			—									
3-1-4. The latest technologies for environmental management						—	—	—	—	—	—	—
(1) Technical information for environmental management system						—					—	—
a. Current condition of environmental management system (ISO)						—					—	—
b. Technical information for process of environmental management system											—	—
b-1. The definition and establishment of the environmental policy											—	—

ANNEX 16
Detailed Plan of Operations

Year	1999		2000				2001				2002	
Quarter	III	IV	I	II	III	IV	I	II	III	IV	I	II
Technical cooperation term												
b-2. The planning of the environmental management system elements												—
b-3. The implementation and operation of environmental management system												—
b-4. The monitoring and measurement of the environmental performance												—
b-5. The review and improvement of environmental management system												—
(2) Technical information for suitable technologies on the environment in mining development							—	—				
a. Suitable technologies on the environment in mining development							—					
b. The latest technologies for mine pollution control in the world								—				
3-2. Acquire the techniques of environmental management for mine drainage and dam facilities for mine pollution control, and prepare the training materials.		—	—	—	—	—	—	—	—	—	—	—
3-2-1. The technologies for treatment and measures of mine drainage and dam facilities for mine pollution control							—	—	—	—		
(1) The current conditions of mine pollution control technologies								—				
(2) The technologies for treatment and measures of mine drainage for mine pollution control								—	—			
a. The technologies for shut-off of mine drainage								—	—			
b. The technologies for improvement of quality of mine drainage								—	—			
c. The technologies for treatment and measures of sludge concerning with neutralization of mine drainage								—	—			
(3) The technologies for treatment and measures of dam facilities for mine pollution control							—	—		—		

Handwritten mark resembling a stylized 'W' or 'V'.

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ANNEX 16 Detailed Plan of Operations

Year	1999		2000				2001				2002	
Quarter	III	IV	I	II	III	IV	I	II	III	IV	I	II
Technical cooperation term												
a. The technologies for stabilization of dam facilities												
b. The technologies for management of dam facilities												
c. The technologies for treatment and measures of waste stone, tailing and slag												
3-2-2. The suitable technologies for management and maintenance of mine drainage and dam facilities for mine pollution control, and prepare the training materials .												
(1) The suitable technologies for management and maintenance of mine drainage for mine pollution control												
a. The investigation for improvement of quality of mine drainage that causes a harmful influence on the environment												
b. The investigation of apt chemicals to neutralization of mine drainage												
(2) The suitable technologies for management and maintenance of dam facilities for mine pollution control, and preparing the materials.												
a. The check points of the whole design of a tailing dam												
b. The check points of undertaking construction of a tailing dam												
c. The check points of management and maintenance of tailing dam facilities												
d. The stabilization analysis of the embankment at a tailing dam												
d-1. The choice of a tailing dam for a model case												
d-2. On-the-spot tests of geotechnical drilling on the embankment at a tailing dam												
d-3. Indoor tests for samples of geotechnical drilling												

ANNEX 16
Detailed Plan of Operations

Year	1999		2000				2001				2002	
Quarter	III	IV	I	II	III	IV	I	II	III	IV	I	II
Technical cooperation term												
d-4. The piezometer monitoring (seepage water levels) in the embankment at a tailing dam							_____	_____	_____	_____		
d-5. The implementation of stabilization analysis of the embankment at a tailing dam							_____	_____	_____	_____		
d-6. The evaluation of stabilization analysis of the embankment at a tailing dam							_____	_____	_____	_____		
e. Preparing the manuals for the management and maintenance of dam facilities, and process of stabilization analysis of the embankment at tailing dams							_____	_____	_____	_____		
4 The MGB's functions of evaluation on the environmental impact assessment reports for mining projects will be strengthened.												
4-1. Acquire the technical information on the process of environmental impact assessment for mining projects										_____	_____	
4-1-1. The introduction to the environmental impact assessment for mining projects										_____	_____	
4-1-2. Acquire the technical information for aspects of investigation, predictions and evaluation concerning water and soil pollution										_____	_____	
4-2. Acquire the technical information on the evaluation of environmental impact assessment reports for mining projects											_____	_____
4-2-1. The contents of framework of environmental impact assessment reports for mining projects											_____	_____
4-2-2. The methods of evaluation of environmental impact assessment reports for mining projects											_____	_____

Handwritten notes: "M" and "22" with arrows pointing to the table header.

**ANNEX 16
Detailed Plan of Operations**

Year		1999		2000				2001				2002	
Quarter		III	IV	I	II	III	IV	I	II	III	IV	I	II
Technical cooperation term													
5	The MGB's functions of staff training in the fields of mine environmental management will be strengthened.												
5-1.	Formulate the training programs.												
5-2.	Prepare the training materials.												
5-3.	Implement the training.												
5-3-1.	Training on on-site measurements and analysis.												
5-3-2.	Training on measurement and analysis at laboratory.												
5-3-3.	Training on evaluation of the environmental monitoring.												
5-3-4.	Seminar on mine environmental management.												
5-4.	Implement the questionnaire survey to the trainees.												

Method of Evaluation for the Effectiveness of Technology Transfer

Purpose of the Project
 The staff necessary for mine environmental management in the fields of water and soil pollution caused by mining activities will be fostered at MGB

I. C/Ps implement the preliminary trainer's training.

Means of Verification

II. C/Ps receive the comprehension test from each Japanese expert.

50%

50%

- (Evaluation by Trainees)**
- 1) Unable to understand the contents completely. <20%>
 - 2) Unable to understand the contents well. <40%>
 - 3) Able to understand the contents <60%>
 - 4) Able to understand the contents well <80%>
 - 5) Able to understand the contents satisfactorily <90 ~ 100%>

- (Evaluation by Japanese Experts)**
- 1) Unable to train the trainees completely. <20%>
 - 2) Unable to train the trainees well. <40%>
 - 3) Able to train the trainees. <60%>
 - 4) Able to train the trainees well. <80%>
 - 5) Able to train the trainees satisfactorily. <90 ~ 100%>

- 1) Able to understand the outline of the technology to be transferred, or operate the equipment & machinery. <20%>
- 2) Able to prepare reports on the technology to be transferred. <40%>
- 3) Able to prepare training materials & manuals. <60%>
- 4) Able to train MGB staff satisfactorily. <80%>
- 5) Able to give lectures for official symposium, etc. . <90 ~ 100%>

* C/Ps for Mine Environmental Monitoring, Environmental Chemical Analysis and Mine Environmental Management

Implementation Program for Trainer's Training

Courses		*FY	2001 (Months)						2002 (Months)						Remarks
			7	8	9	10	11	12	1	2	3	4	5	6	
Overall Course			↔												<ul style="list-style-type: none"> MGB Central Office 5 days Lecture Attendance : About 50 pax
Individual Course	Environmental Monitoring Course								↔						<ul style="list-style-type: none"> 3 days Lecture [MGB Central Office] 5 days On-Site Training [Model Site] Attendance : About 15 pax <i>{ 1 Representative from each Regional Office }</i>
	Chemical Analysis Course								↔						<ul style="list-style-type: none"> 3 days Lecture [MGB Central Office] 4 days Lab Practice [Petrolab] Attendance : About 20 pax <i>{ 1 Representative from each Regional Office }</i>
	Environmental Management Technology Course								↔						<ul style="list-style-type: none"> 2 days Lecture [MGB Central Office] 4 days On-Site Training [Model Site] Attendance : About 15 pax <i>{ 1 Representative from each Regional Office }</i>

1.) Japanese FY 2.) 3 representatives from Region VII, IX & CAR and 2 representatives from other Regional offices

List of Attendance to the Discussions

The Japanese Side

- 1) Kazuo Tanigawa
(Leader) Special Technical Advisor,
Japan International Cooperation Agency
- 2) Joji Kashifuku
(Technical Cooperation Planning) Assistant Chief for Policy Planning,
Mine Safety Div., Agency for Nuclear and Industrial Safety,
Agency for Natural Resources and Energy, METI
- 3) Michio Kuriyagawa
(Mine Environmental Management) Director General, National Institute for Resources and Environment,
National Institute of Advanced Industrial Science and Technology, METI
- 4) Katsuhiro Asai
(Personnel Input) Director, General Affairs Dept., Japan Mining Engineering Center
for International Cooperation
- 5) Toru Yoshida
(Project Management) Staff, Second Tech. Cooperation Div., Mining and Industrial Development
Dept., JICA
- 6) Nobuyuki Nakazawa
(Analysis/Evaluation) Deputy Division Manager, Environmental Division,
E & E Solutions Inc.
- 7) Motofumi Kohara
Deputy Resident Representative,
JICA Philippine Office
- 8) Susumu Katsumata
Assistant Resident Representative,
JICA Philippine Office
- 9) Takeshi Usami
Chief Advisor,
Capacity Building Project for Environmental Management in Mining
- 10) Yasuo Kondo
Project Coordinator,
Capacity Building Project for Environmental Management in Mining
- 11) Yoshikazu Kojima
Mine Environmental Monitoring Expert,
Capacity Building Project for Environmental Management in Mining
- 12) Takeo Watabe
Environmental Chemical Analysis Expert,
Capacity Building Project for Environmental Management in Mining
- 13) Atsushi Aoki
Mine Environmental Management Expert,
Capacity Building Project for Environmental Management in Mining
- 14) Taizo Yamada
JICA Expert,
Department of Environment and Natural Resources

The Philippine Side

- 1) Pedro C. Caleon
Assistant Secretary for Mines and EAGA Affairs,
Department of Environment and Natural Resources
- 2) Horacio C. Ramos
Director,
Mines and Geosciences Bureau
- 3) Edwin G. Domingo
Assistant Director,
Mines and Geosciences Bureau
- 4) Michael V. Cabalda
Division Chief, Mining Environment and Safety,
Mines and Geosciences Bureau
- 5) Romeo L. Almeda
Division Chief, Lands Geology
Mines and Geosciences Bureau
- 6) Juancho Pablo S. Calvez
Division Chief, Metallurgical Technology
Mines and Geosciences Bureau
- 7) Geronimo C. Badulis Jr.
Supervisor Science Research Specialist,
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