III. Procedures of Environmental and Social Considerations

3.1 Review Stage of Proposed Projects (All Schemes)

1. JICA reviews proposed projects submitted to the Ministry of Foreign Affairs (MOFA), by confirming a project and site description, environmental impact assessment process in the recipient governments and other information, and categorizes it through first screening. After that, JICA makes decisions on proposed projects from the viewpoint of environmental and social considerations and makes recommendations to MOFA;
2. JICA discloses information of Category A projects, such as a country, an area and project description, for a certain period on its website before making its recommendation to MOFA, and collects external information and opinions to incorporate these in the recommendation;
3. If there is not sufficient information for category classification, JICA makes inquiries to the recipient governments through the Embassies of Japan, JICA overseas offices and other institutions. If information obtained through inquiries is considered insufficient, JICA dispatches teams, etc., to collect information regarding environmental and social aspects through consultations with persons concerned and field visits in recipient countries and other methods. JICA promptly discloses study reports; and
4. Soon after the conclusion of international agreements by MOFA, JICA discloses names, countries, locations, outlines and sectors of projects, and their categorization together with their reasons on its website. For Category A and B projects, JICA discloses recommendations to MOFA on its website.

3.2 Development Study (Master Plan Study)

3.2.1 Preparatory Study Stage

1. JICA conducts preparatory studies for cooperation projects based on the results of the first screening. JICA dispatches a necessary expert(s) for environmental and social considerations to conduct field surveys for Category A and B cooperation projects and also, if necessary, for Category C cooperation projects;
2. JICA examines measures for environmental and social considerations described in the requests and collected at the above-mentioned review stage. In addition, JICA conducts information gathering, field surveys and consultations with the recipient governments. On the basis of collected information and consultations, JICA categorizes projects through a second screening and reviews the categorization when necessary;
3. JICA conducts provisional scoping according to categorization and prepares drafts of the Terms of Reference (TOR) for environmental and social considerations studies. For Category A studies, JICA conducts field surveys, obtains information and opinions from local stakeholders, and incorporates results into drafts of TOR;
4. JICA consults with the recipient governments about environmental and social considerations and concludes mutual undertaking, partnership and coordination; and
5. JICA prepares drafts of the Scope of Work (S/W) after consultation with the recipient governments about the organizational structure of environmental and social considerations. JICA obtains basic agreement from the recipient governments to incorporate results of environmental

and social considerations studies into decision-making process of projects.

3.2.2 Stage of S/W Signature

1. When JICA obtains agreements with the recipient governments, JICA signs S/W that includes draft TOR for projects. If no agreement can be reached, JICA suspends studies without signing S/W. JICA judges projects not to be implemented, then JICA makes recommendations to MOFA to stop cooperations; and
2. JICA discloses promptly S/W and information regarding environmental and social considerations after signing it.

3.2.3 Full-scale Study Stage

1. JICA involves a member(s) for environmental and social considerations in study teams for Category A and B studies;
2. JICA collects relevant information and conducts field surveys covering a wider area than that of the preparatory study stage, holds consultations with the recipient governments, and prepares drafts of scoping;
3. For Category A studies, JICA consults with local stakeholders in collaboration with the recipient governments after disclosure of drafts of scoping, and incorporates results of consultation into TOR. The consultation widely covers the needs of projects and the analysis of alternatives. For Category B studies, JICA consults with local stakeholders in collaboration with the recipient governments after the disclosure of drafts of scoping when necessary;
4. The TOR includes an understanding of needs, the impacts to be assessed, study methods, an analysis of alternatives, a schedule and other matters. JICA endeavors to incorporate the concept of Strategic Environmental Assessment into such studies. JICA then obtains an agreement on the TOR with the recipient governments through consultations;
5. In accordance with the TOR and in collaboration with the recipient governments, JICA conducts IEE-level environmental and social considerations studies, and analyzes alternatives including a "without project" situation. During studies, JICA incorporates its results into related reports prepared in a process accordingly;
6. For Category A studies, when preparing a rough outline of environmental and social considerations, JICA holds a series of stakeholder consultations in collaboration with the recipient governments after information disclosure and incorporates the result of consultation into these studies. For Category B studies, JICA consults with local stakeholders after information disclosure in collaboration with the recipient governments, when necessary;
7. Based on the above-mentioned procedure, JICA prepares drafts of the final reports incorporating results of environmental and social considerations studies, and explains them to the recipient governments to obtain their comments. For Category A studies, JICA discloses the drafts to and consults with local stakeholders in collaboration with the recipient governments, and incorporates the results of that consultation into the final reports. For Category B studies, JICA consults with local stakeholders in collaboration with the recipient governments after disclosure of drafts of the final reports when necessary;
8. JICA prepares final reports incorporating results of study, and submits them to the recipient

governments after confirming that the reports meet the requirements of the guidelines; and
9. JICA discloses final reports promptly after their completion, on its website and at the JICA library and a relevant overseas office.

3.3 Development Study (Feasibility Study)

3.3.1 Preparatory Study Stage

1. JICA conducts preparatory studies based on the results of the first screening. JICA dispatches a expert(s) for environmental and social considerations to conduct field surveys for Category A and B studies and, if necessary, for Category C studies as well;
2. JICA examines measures for environmental and social considerations described in requests and collected at the review stage, and collects related information, conducts field surveys and consults with recipient governments. On the basis of collected information and consultations with the recipient governments, JICA categorizes projects through a secondary screening, and reviews categorization when necessary;
3. JICA conducts provisional scoping according to categorization, and prepares drafts of the TOR for environmental and social considerations studies based on the results of the scoping. For Category A studies, JICA conducts field surveys, obtains information and opinions from local stakeholders, and incorporates the results into drafts of the TOR;
4. JICA consults with the recipient governments on environmental and social considerations and concludes mutual undertaking, partnership, and coordination; and
5. JICA prepares a draft of the S/W based on consultation with the recipient governments about drafts of the TOR and the organizational structure of environmental and social considerations. JICA obtains a basic agreement from the recipient governments to incorporate results of environmental and social considerations studies into the decision-making process of project planning.

3.3.2 Stage of S/W Signature

1. JICA signs the S/W including the drafts of the TOR when agreements with the recipient governments are reached on the scope and implementing structure of the studies. If no agreement can be reached, JICA suspends studies without signing the S/W. When JICA decides that the studies are not to be implemented, it makes recommendations to MOFA to stop studies; and
2. JICA discloses promptly the S/W and the information regarding environmental and social considerations after signing S/W.

3.3.3 Full-scale Study Stage

3.3.3.1 Category A Study

1. JICA involves a member(s) for environmental and social considerations in study teams;
2. JICA collects relevant information, conducts field surveys in a wider area than that of preparatory studies, holds consultations with the recipient governments and prepares drafts of scoping;
3. After disclosing the drafts of scoping, JICA consults with local stakeholders in collaboration with the recipient governments and incorporates results of consultation into the TOR of environmental and social considerations studies. The consultations widely cover needs of projects and analysis of

alternatives;

4. The TOR includes understanding of development needs, impacts to be assessed, study methods, analysis of alternatives, a schedule, etc. JICA obtains an agreement on TOR with the recipient governments through consultations;
5. In line with TOR and in collaboration with the recipient governments, JICA conducts EIA-level environmental and social considerations studies including a monitoring plan, an institutional arrangement, and mitigation measures to avoid, minimize or compensate for adverse impacts. JICA analyzes alternatives including a "without project" situation. JICA incorporates the results of studies into relevant reports prepared accordingly;
6. When considering the rough outline of environment and social considerations, JICA consults with local stakeholders, after information disclosure, and incorporates results into the studies;
7. JICA prepares draft final reports, incorporating the results of environmental and social considerations studies, and explains them to the recipient governments to obtain comments. After disclosure of a draft of the final reports, JICA consults with local stakeholders in collaboration with the recipient governments and incorporates results of consultation into the final reports;
8. JICA prepares final reports and submits them to the recipient governments after confirming that they meet the requirements of the guidelines; and
9. JICA discloses final reports promptly after their completion, on its website and at the JICA library and a concerned overseas office.

3.3.3.2 Category B Study

1. JICA involves a member(s) for environmental and social considerations in study teams;
2. JICA collects relevant information and conducts field surveys in a wider area than that of preparatory studies, conducts scoping together with the recipient governments, and prepares TOR of environmental and social considerations studies;
3. The TOR includes understanding of development needs, impacts to be assessed, study methods, analysis of alternatives and a schedule, etc.;
4. In accordance with the TOR, JICA conducts IEE-level environmental and social considerations studies in which are analyzed alternatives including a "without project" situation. The results are incorporated into various reports prepared in study process, accordingly;
5. JICA reviews screening based on the results of IEE-level studies. For studies newly categorized into Category A, JICA takes procedures as noted in those of the feasibility study of Category A, mentioned in 3.3.3.1. For studies again classified into Category B, the results of environmental and social considerations studies are incorporated into drafts of the final reports. For studies newly categorized into Category C, the process of environmental and social considerations is finished;
6. JICA prepares drafts of the final reports, into which are incorporated the results of environmental and social considerations studies, and explains them to the recipient governments to obtain comments. The comments are incorporated into final reports;
7. JICA prepares final reports, and submits them to the recipient governments after confirming that they meet the requirements of the guidelines;
8. JICA holds consultations with local stakeholders after information disclosure, in collaboration with the recipient governments, if necessary; and

9. JICA discloses final reports promptly after their completion, on its website and at the JICA library and a concerned overseas office.

3.4 Detailed Design (D/D) Study

3.4.1 Coordinated D/D Study with JBIC

For coordinated detailed design studies with JBIC, JICA considers proposed studies that JBIC concludes are adequate for yen loan projects according to JBIC guidelines. Basically, JICA conducts detailed design studies in the engineering field.

3.4.1.1 Preparatory Study Stage

1. For Category A and B studies, JICA obtains from JBIC documents regarding environmental and social considerations, and examines the results of JBIC's judgment; and
2. JICA confirms mitigation measures including compensation in cases where impacts cannot be avoided or minimized, monitoring, and the requirements to meet environmental and social considerations for yen loan projects such as a concrete schedule, personnel and organization, budget, etc. When JICA's assessment differs from the review by JBIC, JICA conveys its own relevant information to JBIC and requires JBIC to undertake adequate measures. And JICA discloses the information after making inquiries to the recipient governments and related organizations.

3.4.1.2 Stage of the S/W Signature

When JICA agrees with the recipient governments on the S/W including a draft of TOR, JICA signs it. If no agreement is reached, JICA suspends studies without signing the S/W.

3.4.1.3 Full-Scale Study Stage

1. For Categories A and B studies, JICA includes a member(s) for environmental and social considerations on study teams;
2. When JICA's assessment differs from the review by JBIC, JICA conveys its own relevant information to JBIC, and requires JBIC to undertake adequate measures. JICA discloses the information after making inquiries to the recipient governments and related organizations;
3. When significant impacts become clear and JICA judges it difficult to address them, JICA makes recommendations to MOFA to stop the studies. JICA discloses recommendations after making inquiries to the recipient governments and related organizations; and
4. After making the inquiries to the recipient governments and related organizations, JICA discloses its final reports promptly after their completion on its website and at the JICA library and a concerned overseas office.

3.4.2 D/D Study except Coordinated D/D Study with JBIC

For D/D studies – except coordinated D/D studies – JICA reviews documents mentioned in 3.4.2.1, according to the JBIC guidelines. JICA considers proposed studies to which environmental and social factors are given adequate considerations. Basically, JICA conducts D/D studies in the engineering field.

3.4.2.1 Review Stage of Proposed Study

1. For Category A proposed studies, JICA requests the recipient governments or implementing agencies to submit EIA reports of projects. Appendix 4 shows the items included in the EIA report. A resettlement action plan for involuntary resettlement and a mitigation measures plan of the indigenous people for adverse impacts on them must be attached to the EIA report as the need arises;
2. For Category B proposed studies, JICA requests the recipient governments or implementing agencies to submit the EIA report in cases when an EIA has been implemented. If not available, JICA requests other information and reports regarding environmental and social considerations;
3. For Category A or B proposed studies, as soon as JICA receives the main documents on environmental and social considerations, JICA discloses them after inquiring of the recipient governments or implementing agencies. Documents include the Environmental Impact Statement (EIS), environmental permit certificates issued by the recipient governments, resettlement action plans, mitigation plans for indigenous peoples, and other available documents; and
4. When JICA judges that the proposed studies are not appropriate in accordance with JBIC guidelines, JICA recommends MOFA not to select studies, or to implement environmental and social considerations studies by different schemes such as a development study.

3.4.2.2 Preparatory Study Stage

1. JICA confirms whether the recipient governments ensure appropriate mitigation measures to avoid or minimize environmentally and socially adverse impacts. Such measures include compensation for unavoidable impacts, monitoring, a concrete schedule to prepare institutional arrangements, personnel and implementing organization, and budget. If not ensured, JICA requests the recipient governments to improve these matters. If no improvements are made, JICA recommends MOFA to stop the studies;
2. For Category A and B studies, JICA dispatches an expert(s) for environmental and social considerations, conducts field surveys and obtains information and opinions from local stakeholders;
3. JICA consults with the recipient governments about environmental and social considerations, and concludes a mutual undertaking and a way of partnership and coordination; and
4. JICA prepares a draft of the S/W based on consultation with the recipient governments about a draft of the TOR and implementing frameworks for environmental and social considerations.

3.4.2.3 Stage of the S/W Signature

1. JICA integrates mutual undertaking by the recipient governments and JICA into the S/W to prepare mitigation measures to avoid and minimize negative impacts on the environment and society. Mitigation measures include compensation for unavoidable impacts, monitoring, and institutional arrangements. JICA also integrates measures to cope with new impacts in cases when they are found during study periods;
2. JICA signs the S/W including the draft of the TOR when JICA reaches agreements with the recipient governments. If not agreed, JICA suspends studies without signing the S/W. If JICA

judges that the cooperation should not to be implemented, JICA recommends MOFA to stop it; and

3. JICA discloses promptly the S/W and information regarding environmental and social considerations as soon as JICA signs it after inquiring of the recipient governments or implementing agencies.

3.4.2.4 Full-scale Study Stage

1. Based on agreements in the S/W, JICA provides supports necessary for preparing a monitoring plan, an institutional arrangement, and detailed plans of mitigation measures for avoiding, minimizing, and compensating for environmental and social impacts;
2. When new minor environmental and social impacts become clear during studies, JICA considers appropriate countermeasures through consultations with the recipient governments and local stakeholders;
3. When significant impacts become clear and JICA judges it difficult to address them, JICA recommends MOFA to stop the studies;
4. JICA prepares final reports and submits them to the recipient governments, into which the results of environmental and social considerations studies and other support are incorporated; and
5. JICA discloses final reports promptly after their completion, on its website, and at the JICA library and a concerned overseas office after inquiring of the recipient governments or implementing agencies.

3.5 Preliminary Study of Grant Aid Project

3.5.1 Category A Study

1. Prior to Basic Design (B/D) studies, JICA confirms the state of EIA implementation and its items, and whether the EIA study meets the requirements of the guidelines, by conducting preparatory studies and other means. JICA promptly discloses the results of those studies on its website;
2. JICA conducts B/D studies in cases where EIA is carried out, or development studies are implemented in accordance with the guidelines and environmental and social considerations studies are not required again. The results of EIA, preparatory studies, and other means are incorporated into the contents of B/D studies. JICA discloses B/D study reports promptly after their completion on its website and at the JICA library and a concerned overseas office; and
3. When new environmental and social considerations studies are required again in cases where EIA is not fully implemented, JICA recommends MOFA either to take appropriate measures – such as conducting necessary environmental and social considerations studies using the development study scheme mentioned in 3.3 or other means – or to stop studies.

3.5.2 Category B Study

1. JICA confirms the state of EIA implementation and its items, and whether EIA studies meet the requirements of the guidelines, by conducting preparatory studies and other means. JICA promptly discloses results of studies on its website;
2. JICA conducts B/D studies in cases where EIA is finished, or development studies are implemented in accordance with the guidelines and environmental and social considerations

studies are not required again. The result of EIA and other means are incorporated into the contents of B/D studies. JICA discloses B/D study reports promptly after their completion, on its website and at the JICA library and a concerned overseas office;

3. When new environmental and social considerations studies are required in cases where EIA or other measures are not fully implemented, JICA dispatches a member(s) for environmental and social considerations, and conducts scoping by means of preparatory studies, etc. JICA prepares the TOR of environmental and social considerations studies, including understanding of development needs, impacts to be assessed, study methods, analysis of alternatives including a "without project" situation, a schedule, etc. JICA then discusses the TOR with the recipient governments and obtains consensus;
4. In line with the TOR, JICA conducts IEE-level environmental and social considerations studies. After completion of IEE-level studies, JICA undertakes second screening. For Category A studies newly categorized, JICA conducts environmental and social considerations studies in line with the procedures for a feasibility study of Category A mentioned in 3.3 of the guidelines, or recommends MOFA countermeasures including suspension of studies. For studies that are again categorized as Category B, JICA incorporates results of environmental and social considerations studies into contents of B/D studies, and B/D study reports are disclosed promptly after their completion. For studies newly categorized as Category C, JICA finishes work on environmental and social considerations; and
5. JICA discloses results of studies promptly after their completion, on its website and at the JICA library and a concerned overseas office.

3.6 Technical Cooperation Project

3.6.1 Category A Project

1. JICA conducts preparatory studies and dispatches a member(s) for environmental and social considerations. JICA confirms the state of EIA implementation and its items, and whether EIA meets the requirements of the guidelines as well as whether environmental and social considerations studies are required again. JICA promptly discloses preparatory study reports after their completion on its website and at the JICA library and a concerned overseas office;
2. JICA signs a Record of Discussions (R/D) which prescribes ways of monitoring and mutual undertaking on environmental and social considerations in cases where EIA is finished, or development studies are implemented in accordance with the guidelines and environmental and social considerations studies are not required again. JICA discloses R/D and information on environmental and social considerations promptly on its website and at the JICA library and a concerned overseas office;
3. When new environmental and social considerations studies are required again in cases where EIA is not fully implemented, JICA recommends MOFA to take appropriate measures, such as conducting necessary environmental and social considerations studies using a development study scheme or other means;
4. JICA confirms the results of monitoring implemented by the recipient governments during cooperation periods. JICA carries out monitoring directly when necessary. JICA discloses the results of monitoring promptly after their completion, on its website and at the JICA library and a

concerned overseas office;

5. When any environmental and social impacts are found during cooperation periods, JICA takes necessary measures in cooperation with the recipient governments; and
6. After the completion of cooperation, JICA evaluates both the impacts to the natural environment and society – whether or not they are predicted by EIA or environmental and social considerations studies – and the effects of mitigation measures taken. JICA discloses the results of evaluation promptly after their completion, on its website and at the JICA library and a concerned overseas office.

3.6.2 Category B Project

1. JICA conducts preparatory studies and dispatches a member(s) for environmental and social considerations. JICA confirms the state of EIA implementation and its items, and whether EIA study meets requirements of the guidelines as well as whether environmental and social considerations studies are required again. JICA discloses preparatory study reports promptly after their completion, on its website and at the JICA library and a concerned overseas office;
2. JICA signs a Record of Discussions (R/D) which prescribes ways of monitoring and mutual undertaking on environmental and social considerations in cases where the EIA is finished, or development studies are implemented in accordance with the guidelines, so that environmental and social considerations studies are not required again. JICA integrates the results of the EIA, etc., into project plans and implements cooperation. JICA discloses the R/D and information on environmental and social considerations promptly on its website and at the JICA library and a concerned overseas office;
3. JICA confirms the results of monitoring implemented by the recipient governments during cooperation periods. JICA conducts monitoring directly when necessary. JICA discloses the results of monitoring promptly after their completion, on its website and at the JICA library and a concerned overseas office;
4. When any environmental and social impacts are found during cooperation periods, JICA takes necessary measures in cooperation with the recipient governments;
5. After the completion of technical cooperation projects, JICA evaluates the impacts to the natural environment and society – whether or not they were predicted by environmental and social considerations studies – and the effects of mitigation measures taken. JICA discloses the results of evaluation promptly after their completion, on its website and at the JICA library and a concerned overseas office;
6. When new environmental and social considerations studies are required again in cases where EIA is not fully implemented, JICA prepares a TOR of environmental and social considerations studies including impact items, study methods, analysis of alternatives including a "without project" situation, a schedule, etc., by conducting scoping. JICA then discusses the TOR with the recipient governments and obtains consensus;
7. In line with the TOR, JICA conducts IEE-level environmental and social considerations studies in collaboration with the recipient governments. After the completion of IEE-level studies, JICA undertakes a second screening. For Category A projects newly categorized, JICA recommends MOFA to take adequate measures to conduct environmental and social considerations studies in

line with procedures of a feasibility study or other means, including suspension of projects. For projects newly categorized as Category C, JICA finishes work on environmental and social considerations. JICA discloses the results of studies on its website and at the JICA library and a concerned overseas office; and

8. For projects again categorized as Category B, JICA incorporates the results of the study into the items of the R/D, and JICA signs the R/D which prescribes mutual undertakings on monitoring and environmental and social considerations. JICA discloses the R/D and information on environmental and social considerations promptly, on its website and at the JICA library and a concerned overseas office.

3.6.3 Monitoring

1. JICA examines the results of monitoring about significant environmental and social impacts of technical cooperation projects classified as Category A and B by implementing agencies of the recipient governments to ascertain whether adequate actions are taken. When necessary, JICA conducts monitoring directly after JICA consults with the recipient governments;
2. When third parties, etc., point out in concrete terms that environmental and social considerations are not fully undertaken, JICA conveys such comments to the recipient governments and encourages them to take appropriate actions. JICA confirms that implementing bodies cope with the full considerations of comments, analysis of countermeasures, and integration into work plans by a transparent and accountable process; and
3. When implementing bodies do not have sufficient capacity for monitoring, JICA provides cooperation regarding monitoring by means of human resource development including training in certain skills, etc.

3.7 Follow-up Activity

1. Financial aid institutions take charge of reviewing the EIA assisted by the development study scheme, and MOFA takes charge of reviewing the grant aid project. However JICA conducts follow-up activities to confirm the integration of the results of environmental and social considerations studies into the EIA prior to the review process;
2. JICA confirms proper integration of the results and recommendations of environmental and social considerations studies into the EIA, a resettlement action plan, and mitigation measures, etc., and discloses the results of confirmation, on its website and at the JICA library and a concerned overseas office; and
3. When third parties, etc., indicate that unexpected environmental and social impacts appear after the completion of cooperation, JICA comes to an understanding of problems by conducting field surveys and making recommendations to relevant organizations, when necessary.

Appendix 1. Requirements of the Recipient Governments

1. Underlying Principles

1. Environmental impact that may be caused by projects must be assessed and examined from the earliest possible planning stage. Alternatives or mitigation measures to avoid or minimize adverse impact must be examined and incorporated into the project plan.
2. Such examinations must include analysis of environmental and social costs and benefits in the most quantitative terms possible as well as qualitative analysis, and they must be conducted in close harmony with economic, financial, institutional, social and technical analysis of projects.
3. The findings of the examination of environmental and social considerations must include alternatives and mitigation measures, and be recorded as separate documents or as a part of other documents. Environmental Impact Assessment (EIA) reports must be produced for projects in which there is a reasonable expectation of a particularly large adverse environmental impact.
4. For projects that have particularly high potential for adverse impact or that are highly contentious, a committee of experts may be formed to seek their opinions, in order to increase accountability.

2. Examination of Measures

1. Multiple alternatives must be examined to avoid or minimize adverse impacts and to choose a better project option in terms of environmental and social considerations. In the examination of measures, priority is to be given to avoidance of environmental impact, and when this is not possible, minimization and reduction of impact must be considered next. Compensation measures must be examined only when impact cannot be avoided by any of the aforementioned measures.
2. Appropriate follow-up plans and systems, such as monitoring plans and environmental management plans, must be prepared; and the costs of implementing such plans and systems, and financial methods to fund such costs, must be determined. Plans for projects with particularly large potential adverse impact must be accompanied by detailed environmental management plans.

3. Scope of Impacts to Be Assessed

1. Impacts to be assessed and examined in terms of environmental and social considerations include impacts on human health and safety as well as the natural environment (including environmental impacts on a trans-boundary or global scale) through air, water, soil, waste, accidents, water usage, ecosystems, and biota. Such impacts also include social considerations as follows: migration of people including involuntary resettlement; local economy such as employment and livelihood; land use and utilization of local resources; social institutions such as social infrastructure and local decision-making institutions; existing social infrastructures and services; vulnerable social groups such as the poor and indigenous peoples; distribution of benefits and losses and equality in the development process; gender; children's rights; cultural heritage; local conflict of interests; and infectious diseases such as HIV/AIDS.
2. In addition to the direct and immediate impacts of projects, derivative, secondary and cumulative impacts are also to be examined and assessed to a reasonable extent. It is also desirable that the possibility that an impact can occur at any time during the duration of a project be continuously

considered throughout the life cycle of the project.

4. Compliance with Laws, Standards and Plans

1. Projects must comply with laws, ordinances and standards relating to environmental and social considerations established by the governments that have jurisdiction over the project site (including both national and local governments). They are also to conform to environmental and social consideration policies and plans of the governments that have jurisdiction over the project site.
2. Projects must, in principle, be undertaken outside protected areas that are specifically designated by laws or ordinances of the governments for conservation of nature or cultural heritage (excluding projects whose primary objectives are to promote protection or restoration of such designated areas). Projects are also not to impose significant adverse impact on designated conservation areas.

5. Social Acceptability

1. Projects must be adequately coordinated so that they are accepted in a manner that is socially appropriate to the country and locality in which they are planned. For projects with a potentially large environmental impact, sufficient consultations with local stakeholders, such as local residents, must be conducted via the disclosure of information from an early stage where alternatives for project plans may be examined. The outcome of such consultations must be incorporated into the contents of project plans.
2. Appropriate consideration must be given to vulnerable social groups, such as women, children, the elderly, the poor, and ethnic minorities, all members of which are susceptible to environmental and social impacts and may have little access to the decision-making processes within society.

6. Involuntary Resettlement

1. Involuntary resettlement and loss of means of livelihood are to be avoided where feasible, exploring all viable alternatives. When, after such examination, it is proved unfeasible, effective measures to minimize impact and to compensate for losses must be agreed upon with the people who will be affected.
2. People to be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported by project proponents, etc., in a timely manner. Project proponents must make efforts to enable people affected by projects to improve their standard of living, income opportunities and production levels, or at least to restore them to pre-project levels. Measures to achieve this may include: providing land and monetary compensation for losses (to cover land and property losses), supporting means for an alternative sustainable livelihood, and providing expenses necessary for relocation and the re-establishment of communities at resettlement sites.
3. Appropriate participation by affected people and their communities must be promoted in the planning, implementation, and monitoring of involuntary resettlement plans and measures against the loss of their means of livelihood.

7. Indigenous Peoples

When projects may have adverse impact on indigenous peoples, all of their rights in relation to land and resources must be respected in accordance with the spirit of relevant international declarations and treaties. Efforts must be made to obtain the consent of indigenous peoples after they have been fully informed.

8. Monitoring

1. It is desirable that, after projects begin, project proponents monitor the following: whether any unforeseeable situations occur and whether the performance and the effectiveness of mitigation measures are consistent with the assessment's prediction. It is also desirable that they then take appropriate measures based on the results of monitoring.
2. In cases where sufficient monitoring is deemed essential for appropriate environmental and social considerations, such as projects for which mitigation measures should be implemented while monitoring their effectiveness, project proponents must ensure that project plans include feasible monitoring plans.
3. It is desirable that project proponents make the results of the monitoring process available to project local stakeholders.
4. When third parties point out, in concrete terms, that environmental and social considerations are not being fully undertaken, it is desirable that forums for discussion and examination of countermeasures are established based on sufficient information disclosure and include the stakeholders participation in relevant projects. It is also desirable that an agreement be reached on procedures to be adopted with a view to resolving problems.

Appendix 2. Illustrative List of Sensitive Sectors, Characteristics, and Areas

The projects that are in sensitive sectors, have sensitive characteristics, and/or are in sensitive areas shown in this illustrative list are ones likely to have significant adverse impact on the environment and society. Each individual project is categorized in accordance with the standards for "Category A" indicated in section 2.1 of the guidelines, entitled "Categorization." Categorization depends on the impact of projects. Consequently, projects likely to have a significant adverse impact on the environment and society are categorized as "Category A" even if they are not included in the sectors, characteristics or areas on this list.

1. Illustrative list of large-scale projects in sensitive sectors are in the following sectors:

(1) Mining development;
(2) Industrial development;
(3) Thermal power (including geothermal power);
(4) Hydropower, dams and reservoirs;
(5) River/erosion control;
(6) Power transmission and distribution lines;
(7) Roads, railways and bridges;
(8) Airports;
(9) Ports and harbors;
(10) Water supply, sewage and wastewater treatment;
(11) Waste management and disposal;
(12) Agriculture involving large-scale land-clearing or irrigation;
(13) Forestry;
(14) Fisheries; and
(15) Tourism.

2. Illustrative list of sensitive characteristics are:

(1) Large-scale involuntary resettlement;
(2) Large-scale groundwater pumping;
(3) Large-scale land reclamation, land development and land-clearing; and
(4) Large-scale logging.

3. Illustrative list of sensitive areas are in the following areas or their vicinity:

(1) National parks, nationally-designated protected areas (coastal areas, wetlands, areas for ethnic minorities or indigenous peoples and cultural heritage, etc., designated by national governments) and areas being considered for natural parks or protected areas; and
(2) Areas the national or local governments believe to require careful considerations.

<Natural Environment>

・Primary forests or natural forests in tropical areas;
・Habitats with important ecological value (coral reefs, mangrove wetlands and tidal flats, etc.);
・Habitats of rare species requiring protection under domestic legislation, international treaties, etc.;

・Areas in danger of large-scale salt accumulation or soil erosion; and
Areas with a remarkable tendency towards desertification.

<Social Environment>

・Areas with unique archeological, historical or cultural value; and

・Areas inhabited by ethnic minorities, indigenous peoples or nomadic peoples with traditional ways of life and other areas with special social value.

Appendix 3. Screening Format

Name of a Proposed Project:
Project Executing Organization
Name, Post, Organization and Contact Point of a Responsible Officer

Name:
Post:
Organization:
Tel:
Fax:
E-Mail:
Date:
Signature:

Check Items

Question 1 Address of a project site:

Question 2 Outline of the project

2-1 Does the project come under following sectors?

□Yes □No

If yes, please mark the corresponding items.

□Mining development
□Industrial development
□Thermal power (including geothermal power)
□Hydropower, dams and reservoirs
□River/erosion control
□Power transmission and distribution lines
□Roads, railways and bridges
□Airports
□Ports and harbors
□Water supply, sewage and waste treatment
□Waste management and disposal
□Agriculture involving large-scale land-clearing or irrigation
□Forestry
□Fishery
□Tourism

2-2 Does the project include any of the following items?

□Yes □No

If yes, please mark following items that the project includes.

□Involuntary resettlement (scale: households persons)
□Groundwater pumping (scale: m3/year)
□Land reclamation, land development and land-clearing (scale: hectors)
□Logging (scale: hectors)

2-3 Description of the Project:
(Scale and/or Basic Information)

2-4 Is the project consistent with the higher program/policy?

□Yes: Please describe the higher program/policy.

(　　)

□No

2-5 Did the proponent consider alternatives before this request?

□Yes: Please describe outline of the alternatives

(　　)

□No

2-6 Did the proponent have meetings with related stakeholders before this request?

□Yes　　□No

If yes, please mark the corresponding stakeholders.

□Administrative body

□Local residents

□NGO

□Others（　　）

Question 3

Is the project a new one or an on-going one? In case of an on-going one, have you received strong complaints, etc., from local residents?

□New □On-going(there are complaints) □On-going (there are no complaints)

□Others [ ]

Question 4 Name(s) of laws or guidelines:

Is Environmental Impact Assessment (EIA) including Initial Environmental Examination (IEE) required for the project according to the laws or guidelines in the host country?

☐Yes ☐No

If yes, please mark corresponding items.

□Required only IEE (□Implemented, □on going, □planning)

□Required both IEE and EIA (□Implemented, □on going, □planning)

□Required only EIA (□Implemented, □on going, □planning)

□Others: [ ]

Question 5

In the case when EIA steps were taken, was the EIA approved by the relevant laws in the host country? If yes, please mark date of approval and the competent authority.

□Approved: without a supplementary condition	□Approved: with a supplementary condition	□Under appraisal

(Date of approval: Competent authority:)

□Not yet started an appraisal process

□Others:( )

Question 6

If the project requires a certificate pertaining to the environment and society other than the EIA, please indicate the title of that certificate.

□Already certified □Required a certificate but not yet done

Title of the certificate :( )

□Not required

□Others [ ]

Question 7

Are any of the following areas located inside or around the project site?

□Yes □No □Not identified

If yes, please mark corresponding items.

- □National park, protected area designated by the government (coast line, wetlands, reserved area for ethnic or indigenous people, cultural heritage), and areas being considered for national parks or protected areas
- □Virgin forests, tropical forests
- □Ecological important habitat areas (coral reef, mangrove wetland, tidal flats)
- □Habitat of valuable species protected by domestic laws or international treaties
- □Likely salts cumulus or soil erosion areas on a massive scale
- □Remarkable desertification trend areas
- □Archaeological, historical or cultural valuable areas
- □Living areas of ethnic, indigenous people or nomads who have a traditional lifestyle or special socially valuable areas

Question 8

Does the project have adverse impacts on the environment and local communities?

☐Yes ☐No ☐Not identified

Reason: [ ]

Question 9

Please mark related environmental and social impacts, and describe their outlines.

☐Air pollution
☐Water pollution
☐Soil pollution
☐Waste
☐Noise and vibration
☐Ground subsidence
☐Offensive odors
☐Geographical features
☐Bottom sediment
☐Biota and ecosystem
☐Water usage
☐Accidents
☐Global warming

☐Involuntary resettlement
☐Local economy such as employment and livelihood etc.
☐Land use and utilization of local resources
☐Social institutions such as social infrastructure and local decision-making institutions
☐Existing social infrastructures and services
☐The poor, indigenous of ethnic people
☐Misdistribution of benefit and damage
☐Local conflict of interests
☐Gender
☐Children's rights
☐Cultural heritage
☐Infectious diseases such as HIV/AIDS etc.
☐Others (　　)

Outline of related impacts:

Question 10

Information disclosure and meetings with stakeholders

10-1 If environmental and social considerations are required, does the proponent agree on information disclosure and meetings with stakeholders in accordance with JICA Guidelines for Environmental and Social Considerations?

☐Yes ☐No

10-2 If no, please describe reasons below.

Appendix 4. Environmental Impact Assessment Report for Category A Project regarding Detailed Design (D/D) Study except for Coordinated D/D Study with JBIC

The scope of EIA and the level of detail should be decided in accordance with the project's likely impacts. The EIA report should include the following items (not necessarily in the order shown).

1. Executive Summary
Discussing concisely the significant findings and recommended actions.

2. Policy, Legal and Administrative Framework
Discussing the policy and the legal and administrative framework within which the EIA report is to be carried out.

3. Project Description
Describing the proposed project and its geographic, ecological, social, and temporal context, including any off-site investments that may be required (e.g., pipelines, access roads, power plants, water supply, housing, and raw material and product storage facilities). Indicates the need for any resettlement or social development plan. Normally includes a map showing the project site and the area affected by the project.

4. Baseline Data
Assessing the dimensions of the study area and describing relevant physical, biological, and socioeconomic conditions, including all changes anticipated before the project commences. Additionally, takes into account current and proposed development activities within the project area but not directly connected to the project. Data should be relevant to decisions about the project site, design, operation and mitigation measures; the section indicates the accuracy, reliability and sources of the data.

5. Environmental Impacts
Predicting and assessing the project's likely positive and negative impacts, in the most quantitative terms possible. Identifies mitigation measures and any negative environmental impacts that cannot be mitigated. Explores opportunities for environmental improvement. Identifies and estimates the extent and quality of available data, essential data gaps, and uncertainties associated with predictions; and specifies topics that do not require further attention.

6. Analysis of Alternatives
Systematically comparing feasible alternatives to the proposed project site, technology, design and operation, including the "without project" situation, in terms of their potential environmental impacts; the feasibility of mitigating these impacts; their capital and recurrent costs; their suitability under local conditions; and their institutional, training and monitoring requirements. For each of the alternatives, the analysis quantifies the environmental impacts to the extent possible, and attaches economic values where feasible. States the basis for selecting the particular project design proposed and justifies recommended emission levels and approaches to pollution prevention and abatement.

7. Environmental Management Plan (EMP)
Describing mitigation measures, monitoring and institutional strengthening to be taken during construction and operation to minimize adverse impacts, offset them, or reduce them to acceptable levels.

8. Consultation

Record of consultation meetings, including consultations for obtaining the informed views of the affected people, local Non-governmental Organizations (NGOs) and competent authorities.

Note: This attachment is based on the World Bank Operational Policy - OP 4.01, Annex B.

Attachment 8.6 Public Organization's View about Impacts on Human Health by EMF and Regulation Levels for EMF

Table 8.A.14 Public Organization's View about Impacts on Human Health by Electric Fields

Name of Public Organization	View
World Health Organization (WHO)	**Environmental Health Criteria 35, 1984** While it would be prudent in the present state of scientific knowledge not to make unqualified statements about the safety of intermittent exposure to electric fields, there strength is below 10 kV/m.
International Commission on Non-Ionizing Radiation Protection (ICNIRP)	**Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300GHz), 1998** The Guidelines show reference exposure levels based on the WHO's Environmental Health Criteria in taking into account safety factors. Reference levels under 50Hz: - below 10kV/m for occupational exposure - below 5kV/m for general public exposure
Ministry of Economy, Trade and Industry, Japan (METI)	**Ministerial Ordinance: Technical Standards on Electric Power Equipment, Article 27, 1965 (revised in 1997)** Electrostatic induction does not directly result in danger and disorder for human beings but the ordinance stipulates allowable intensity limits for electric fields. - Below 3kV/m above 1m from the ground where people are readily located.

Table 8.A.15 Public Organization's View about Impacts on Human Health by Magnetic Fields

Name of Public Organization	View
World Health Organization (WHO)	**Environmental Health Criteria 69, 1987** No harmful biological impact below 50G under 50/60Hz
International Commission on Non-Ionizing Radiation Protection (ICNIRP)	**Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300GHz), 1998** The Guidelines show reference exposure levels based on the WHO's Environmental Health Criteria in taking into account safety factors. Reference levels under 50Hz: - below 5G for occupational exposure - below 1G for general public exposure
The American Physical Society (APS)	**Statement on Power Line Fields and Public Health, 1995** The scientific literature and the reports of reviews by other panels show no consistent, significant link between cancer and power link fields. This literature includes epidemiological studies, research on biological systems, and analysis of theoretical interaction mechanisms. No plausible biophysical mechanisms for the systematic initiation or promotion of cancer by these power line fields have been identified.
The National Academy of Science (NAS)	**Report on Possible Health Effects of Exposure to Residential Electric and Magnetic Fields, 1996** Based on a comprehensive evaluation of published studies relating to the effects of power-frequency electric and magnetic fields on cells, tissues, and organisms (including humans), the conclusion of the committee is that the current body of evidence does not show that exposure to these fields presents a human-health hazard. Specifically, no conclusive and consistent evidence shows that

Name of Public Organization	View
	exposure to residential electric and magnetic fields produces cancer, adverse neurobehavioral effects, or reproductive and developmental effects. **Evaluation Report on Final Report for RAPID Program[70], 1999** The results of the EMF-RAPID program do not support the contention that the use of electricity poses a major unrecognized public-health danger. The committee recommends that no further special research program focused on possible health effects of power-frequency magnetic fields be funded.
National Institute of Environmental Health Sciences (NIEHS)	**Report on Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields, 1999** The scientific evidence suggesting that ELF-EMF exposures pose any health risk is weak. In our opinion, this finding is insufficient to warrant aggressive regulatory concern.
National Radiological Protection Board (NRPB)	**Electromagnetic Fields and the Risk of Cancer, Document of the NRPB, Vol.12, No.1, 2001** Laboratory experiments have provided no good evidence that extremely low frequency electromagnetic fields are capable of producing cancer, and human epidemiological studies suggest that they cause cancer in general.
Ministry of Economy, Trade and Industry, Japan (METI)	**Report on Survey and Study on Electric and Magnetic Fields Effects, Dec. 1993** No evidence has shown that magnetic fields with commercial frequency in the residential environment cause harmful impacts on human health. The intensity of magnetic fields in residential environment is low compared to the views such as WHO's Environmental Health Criteria **Regarding Final Report of RAPID Program, 1999** The report in Dec. 1993 does not need to be revised.
Ministry of Environment, Japan (MOE)	**Study on Health Effects from Electric and Magnetic Fields, March 1995** By collecting and compiling knowledge collected after the Study on Safety of Electric and Magnetic Fields in 1991, the study concluded the following: There have not been any reports that change our knowledge of the biological effects from extremely low frequency electric and magnetic fields as shown in two WHO's reports. The epidemiological study results reported so far are not consistent. Therefore, specific research methodology should be established by solving technical issues in the future.

[70] EMF-RAPID Program: Electric and Magnetic Fields-Research and Public Information Dissemination Program.

Table 8.A.16 Regulation Levels for Electric and Magnetic Fields in the Countries (general public)

		Electric Fields (kV/m)		Maganetic Fields (G) [1G=1,000mG]	
		Level	**Enacted year**	**Level**	**Enacted year**
Countries	Japan	3	1976	None*	
	Germany	5	1997	1	1997
	Italy	5	2001	1	2001
	Australia	5-10	1989	1	1989
	U.K	12 (50Hz)	1993	16 (50Hz)	1993
	France	5	2002	1	2002
	Switzerland	5	2000	1	2000
States in USA	Frorida	2-10	1989	0.15-0.25	1989
	New York	1.6-11.8	1978	0.2	1990
	Oregon	9	1975	None	
	Minesota	8	1976	None	
	New Jersey	3	1981	None	
	Montana	1-7	1984	None	

*: Magnetic field level from electric power equipment is about 0.2G at maximum.

Attachment 8.6 Results of Site Surveys

(1) Singkarak Hydropower Plant
(2) Maninjau Hydropower Plant
(3) Asahan II Hydropower Plant
(4) Asahan III Hydropower Site
(5) Renun Hydropower Plant
(6) Micro Hydropower Plant
(7) Ombilin Thermal Power Plant
(8) Bukit Asam Thermal Power Plant
(9) Tarahan Thermal Power Plant
(10) Belawan Thermal Power Plant
(11) Keramasan Thermal Power Plant
(12) Indralaya Thermal Power Plant
(13) Tarahan Thermal Power Plant
(14) Ulu Belu Geothermal Power Site
(15) Bangko-Lubuk Linggau Transmission Line and Substation

(1) Singkarak Hydropower Plant (PLTA): existing

1. Location	West Sumatra Province
2. Type	Reservoir Type Hydropower (Natural Lake: 1,100km^2)
3. Capacity	175MW (4@43.75MW)
4. Max. Discharge	77m/s^3
5. Gross Head	302.0m
6. Survey Date	June 16, 2004 (PLN Bukittinggi Sector Office) June 17, 2004 (Intake Site)
7. Comments	- The power plant is managed by Bukttinggi Sector Office of PLN - Target operational reservoir water level of Lake Singkarak: Maximum: EL.363.00m in June Minimum: EL.361.50m in November Max.-Min.=1.50m - Emergency reservoir water level of Lake Singkarak: between EL.361.25~360.75m Max.-Emergency water level=1.75~2.25m - Minimum operation reservoir water level: EL.359.5m (3.6m) - Lake Singkarak itself is located in an Ombilin river system which flows into the east ocean of Sumatra, but the power plant diverts the water in the lake to an Anai river system which flows into the west ocean of Sumatra. - The Lake Singkarak watershed is 11,000km^2, while that of the additional river system is 44km^2. - The power plant sufficiently generated electricity in 2003 because it was a rainy year. On the other hand, so far, the water level of the lake has been lower than that of a normal year. Thus, there is only 0.3m out of 1.5m of the operational water level at that time. Those who were in the control room said that a 10 day-operation-water remained. - As for environmental and social consideration at the power plant, they did not keep any proper reports in the office besides RKL and RPL in 1992. The reports did not seem to be effective. - They did not have any environmental or social issues involving the plant. - Community Development (referred to as Com-dep) has been carried out in accordance with the circular note from BUMN (Badan Usaha Milik Negara). (SE-433/MBU/2003) - The contents of Com-dep are as follows: 1) Health and sanitation, education, public service and religion 2) Fishery 3) Human resources development 4) Emergency support - The office is now carrying out the following programs in accordance with Com-dep: 1) Education 2) Public service 3) Religious activities 4) Health 5) Emergency measures - A lot of garbage and food waste such as coconut palms and fruits were floating at the bridge located at the out flow mouth of the Lake Singkarak where a town market existed.

	- Although aquatic plants and muddiness were observed along the lake bank, a good natural environment was generally maintained for the lake. The environment of the lake has still been kept in good condition. - The intake of the power plant is located at the opposite riverbank of the Ombilin river, which flows north from the lake. The water level of the lake was low during this period. Although some coconut palms and plastic substances were caught at the intake of the power plant, the situation was tolerable. There was no odor. Many people came to the intake for fishing.
8. Photograph	

Photo 8.1.1 View of the Lake Singkarak

Photo 8.1.2 Immediate downstream of spillway gates at the Lake Singkarak

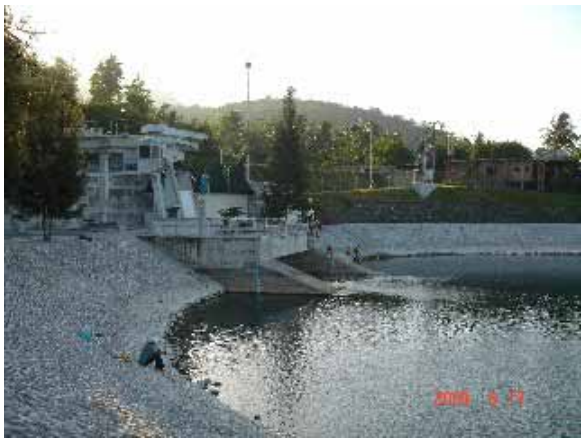

Photo 8.1.3 Intake of Singkarak HP/S

Photo 8.1.4 Front of the intake of Singkarak HP/S

(2) Maninjau Hydropower Plant (PLTA): existing

1. Location	West Sumatra Province
2. Type	Hydropower, Reservoir Type (Natural Lake)
3. Capacity	68MW (4@17MW)
4. Max. Discharge	$36m/s^3$
5. Effective Head	235m
6. Survey Date	June 16, 2004 The PLN Bukittinggi Sector Office was also visited and interviewed on the same day.
7. Comments	- The power plant is managed by Bukttinggi Sector Office of PLN - Normal operational reservoir water level of Lake Maninjau: Maximum: EL.464.00m in May Minimum: EL.463.00m in November Max.-Min.=1.00m - Emergency reservoir water level of Lake Maninjau: between EL.463.00~462.50m Max.-Emergency water level=0.00~0.50m - Before starting operation of the power plant, a few inhabitants lived around the intake and outlet sites. After starting operation, many people migrated to around this area. Besides native inhabitants engaging in agriculture from the past, migrants who run restaurants for tourists of the lake and fish farming have increased at some lake banks and downstream of the outlet of the power plant. Fish farming traders downstream of the outlet consist of about 250 people. Five thousand people live around the lake. - It has been said that NGOs were assisting with the cleaning of collected garbage around the intake. Water quality in the lake seemed to be better than that around the intakes of usual dams because the water did not seem to be deteriorated and the waste did not seem to be serious. Although some coconut shells and plastic bottles can be seen, aquatic plans such as water hyacinth did not thickly cover the lake and the lake did not seemed to be eutrophicated. - On the other hand, fish-farming ponds have increased sharply around the outlet of the power plant and along the lake bank. The farming ponds were 70 units in 1992, 2080 units in 1997 and 3608 units in 2002. Therefore, downstream contamination by the farming ponds is likely to occur in the future. - The power plant office is in trouble regarding claims raised by NGOs and the fish farming traders that of the fluctuating water flow by operation of the power plant causes impacts on the environment. . - It seems that regional environmental management measures are necessary, such as countermeasures against impacts on river water quality because of the increase in fish farming traders who use the water discharged from the outlet, and preservation of forests and the lake bank environment; the outer rim of the crater, and protection of lake water contamination. It is difficult to identify just how much the power plant can be blamed for the above-mentioned transitions. The power plant is supposed to indirectly cause increased migration among fish farming traders and increase people's access to the outer rim of the crater such as the lake bank and the lake water source. Future plans will need to consider regional environmental management regarding regional changes after project implementation caused by the indirect impacts of the project. - Community Development (referred to as Com-dep) has been carried out in accordance with the circular note from BUMN (Badan Usaha Milik Negara). (SE-433/MBU/2003)

	- The contents of Com-dep are as follows: 1) Health and sanitation, education, public service and religion 2) Fishery 3) Human resources development 4) Emergency support - The office is now carrying out the following programs in accordance with Com-dep: 1) Education 2) Public service 3) Religious activities 4) Health 5) Emergency measures.
8. Photograph	

Photo 8.2.1 Spillway and its gates at the Lake Maninjau

Photo 8.2.2 View of the Lake Maninjau

Photo 8.2.3 Intake of Maninjau HP/S

Photo 8.2.4 Immediate front of intake of Maninjau HP/S (No floating garbage)

Photo 8.2.5 Floating garbage in the stream into the Lake Maninjau

Photo 8.2.6 Stream into the Lake Maninjau

Photo 8.2.7 Immediate downstream of the outlet of Maninjau HP/S (Fish farming)

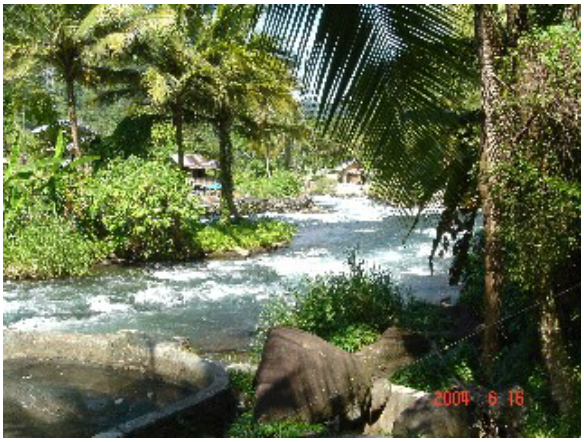

Photo 8.2.8 Fish farming at downstream of the outlet of Maninjau HP/S

Photo 8.2.9 Inside of the powerhouse of Maninjau

(3) Asahan II Hydropower Plant (PLTA): existing

1. Location	North Sumatra Province
2. Type	Hydropower, Reservoir Type
3. Capacity	Siguragura HP/S: 286MW (4@71.5MW) Tangga HP/S: 317 MW (4@79.2MW)
4. Max. Discharge	Siguragura HP/S:150.5m/s^3 Tangga HP/S: 161.1m/s^3
5. Gross Head	Siguragura P/S:230.0m (Rated head: 218m) Tangga P/S: 237.4m (Rated head: 226.8m)
6. Survey Date	June 11, 2004
7. Comments	- It took around 3 hours from Medan to Parapat at the Lake Toba bank, and around 2.5 hours from Parapat to Asahan sites. - Mr.Edward Paradede, an engineer of PT.INALUM (state own aluminum refinery company), accompanied the study team all the way to the Asahan II and Aahan III sites from the Asahan II power plant. - Asahan II was developed by PT.INALUM in 1976- 1982. The objective of the power plant is to supply electricity to PT.INALUM's aluminum refinery. - The power plant has 2 reservoirs involving the resettlement of inhabitants. About 150 resettled families agreed to a monetary compensation. - During the operation period of the refinery in a daytime, the refinery imports electricity from the PLN system. On the other hand, during nighttime residential load peak, PT.INALUM exports electricity to the PLN system. - There are a total of about 170 workers at the power plant including about 80 office workers and local employees. In addition, the power plant provides local people with jobs such as road maintenance works and drainage pipe cleaning work.
8. Photograph	See the following page.

Photo 8.3.1 View of Tangga arch dam

Photo 8.3.2 View of Tangga reservoir

Photo 8.3.3 Confluence of Asahan river (left) and the immediate downstream of outlet of Tangga HP/S (right)

Photo 8.3.4 Outlet of Tangga HP/S

Photo 8.3.5 Downstream of the outlet of Tangga

Photo 8.3.6 View of Lake Toba

(4) Asahan III Hydropower Site (PLTA): planning stage

1. Location	North Sumatra Province
2. Type	Hydropower, Run-of-river type
3. Capacity	151MW (2@75.5MW)
4. Max. Discharge	$100m/s^3$
5. Gross Head	192.9m (Net head: 177.8m)
6. Survey Date	June 11, 2004 June 7, 2004 (PLN Pikitring, North Sumatra and Aceh, Office was visited and interviewed)
7. Comments	- It took around 3 hours from Medan to Parapat at the Lake Toba bank, and around 2.5 hours from Parapat to the Asahan sites. - Mr.Edward Paradede, an engineer of PT.INALUM (state own aluminum refinery company), accompanied the study team all the way to the Asahan II and Aahan III sites from the Asahan II power plant. **(Asahan III site)** - The Asahan III project was originally planned as a reservoir type hydropower plant with a 183m-height-dam in 1980s. But the project has not been realized mainly because of the needed resettlement of around 110 families. At present, the project plan has been revised and proposed as a run-of-river type hydropower plant. The new plan may not cause large-scale resettlement but about 10 families will still need to be resettled just a few tens of meters away. Therefore, in terms of the resettlement issue, the new plan considerably reduced the negative impact. - About 100 families have been living around a bridge downstream of a planned new intake site before Asahan II project implementation. Inhabitants are engaged in agriculture and small businesses. They say that people do not suffer from such large impacts that would cause them to have negative impressions about the power generation business. On the contrary, people even have positive impressions about the project because it is expected to generate employment opportunities such as equipment installation works and road construction works. Inhabitants were very friendly toward the study team. - According to Mr.Edward, the original Asahan III project was planned as a dam reservoir type hydropower with a 183m high dam, but the project has not materialized because the project plan would cause resettlement of around 100 inhabitants. At present, the project has been modified into a run-of-river type hydropower project, The new plan does not cause serious resettlement with only 10 families along the intake canal being forced to move a few tens of meters away. The new plan greatly mitigates resettlement impacts. - The inhabitants know about the Asahan III project, but they have not been informed yet that the project has been modified from a dam reservoir type plan with much resettlement to a new run-of-river type plan. - They said that the inhabitants were living there with the intention of finally resettling there in the future. However, it seemed that they have remained calm about living there. - At present, during the dry season the water level downstream of the planned intake site was 2 to 3m lower than that during rainy season. Water flow was around $130m^3/s$. - Around 300 families are living 15 to 20 km downstream of the river. - River fishes called "Ikan Badak", which are a food sources for the inhabitants, are living in the river. - Impacts on the environment such as ecosystem and river maintenance

	discharge should be studied and assessed in EIA procedures because the water flow of the Asahan main river between the intake and outlet of the power plant will decrease when the water is taken for power generation by run-of-river type hydropower. However, the new plan fundamentally mitigates impacts on environment to a greater extent than the old plan. **(Pikitring Office)** - The original plan was made in 1987 and a new plan was made in 2003 by reviewing the old plan. - In accordance with Indonesian environmental law, AMDAL of the original plan is not effective because 5 years has already passed without implementation of the project while the AMDAL was carried out in 1995. - The original plan was for a dam reservoir type hydropower project with a maximum capacity of 400MW. The reservoir extends 3km upstream of dam site and causes submergence of more than 100 families. The modified plan is a run-of-river type hydropower plant with 151MW (2@75.5MW) and without submergence. It will cause resettlement of less than 10 families along the headrace canal. The original plan required a new 245km transmission line (275kV, 2 circuits) while the new one requires only a 29km transmission line with 150kV, 2 circuits to the existing Asahan substation because the maximum capacity was decreased in the new plan. - Detailed design on the modified plan has not yet been completed, but the basic design has been completed. - EIA shall be assessed by the project site Kapupaten (prefecture) according to a new law enacted this year, while a province shall assess EIA in the past. PLN will confirm whether EIA of the project should be assessed by the province because this project spreads over 2 provinces. The period for EIA procedures is around 8 months, while that of the EIA review of the plan with small changes is around 4 months. The reviewed plan will also take a total of 8 months for EIA procedures including 2 to 3 months for investigations such as a review of the EIA report and minimal site reconnaissance, and 5 to 6 months for evaluation. - The EIA study of the new plan will be carried out as soon as there is approval from the PLN head office. Permissions of the relevant Kapupatens are required when site reconnaissance starts to be carried out. PLN regards the public announcement from PLN as the application to the local government. PLN understands that a local government should disclose information to the public.
8. Photograph	

Photo 8.4.1 Intake site of the new Asahan III HP/S project (left bank), immediate downstream of Tangga HP/S outlet

Photo 8.4.2 River flow at the village downstream of Tangga HP/S outlet

Photo 8.4.3 View of the village downstream of Tangga HP/S, where the village will be submerged if the old Asahan III project is developed.

Photo 8.4.4 Backside view of the same village as the preceding Photo 8.4.3, and existing transmission lines which will be submerged if the old Asahan III is developed

Photo 8.4.5 Dam site of the old Asahan III Project

Photo 8.4.6 Powerhouse and penstock sites of the new Asahan III project (Left bank)

(5) Renun Hydropower Plant (PLTA): under construction

1. Location	North Sumatra Province
2. Type	Hydropower, Reservoir type (regulating pond)
3. Capacity	82MW (2@41MW)
4. Max. Discharge	22.1m^3/s
5. Effective Head	434.6m
6. Survey Date	June 9, 2004
7. Comments	**(Renun Hydropower Plant Construction Office)** - The project has: PLN workers: 26, Local employees: 60, Construction workers: 1,000 at peak, Supervising consultants: 8 - The construction works will be completed at the end of 2005. **(Site Reconnaissance accompanied by the Project Manager, Mr.Amrih Dumadi)** - Weirs and intakes in tributaries: Weirs were so small, less than several meters in height, that considerable environmental changes can not be identified. Management of garbage produced by construction workers should be considered at some construction sites. - Reservoir: Reservoir area: 100,000m^2, Capacity of reservoir water: 500,000m^3, equivalent capacity to 5 hour-operation of the power plant. The reservoir is not located on a river but a small mountain stream. The fill dam is made of materials with waste gravels produced by a tunnel excavation project. - Waterway: Water is collected from the Renun main river and its 12 tributaries. 22.1m^3/s of water is diverted to Lake Toba through tunnels with a total length of about 23km, consisting of about 9km upstream, about 11km downstream and about 3km in the tributaries. There are environmental concerns about Lake Toba and its river system. Penstock is located underground and is about 900m long. - Powerhouse: The water from the weirs is discharged to Lake Toba through the outlet. The maximum amount of water diverted from the Renun river system to Lake Toba would be: 22.1m^3/s x 5hours = about 400,000m^3 A few aquatic plants appear in the lake water near the bank. - Base camp for construction workers Local labors: about 700, foreign workers: around 30 (Koreans, British, others) **(Environmental and Social Consideration Issues)** - At the beginning of project implementation, about 2,700 families with about 9,000 people opposed the project because they were concerned that irrigation water downstream would be lost because of water taken for power generation. The inhabitants requested intervention from an NGO. The NGO had negotiated with PLN for 2 years. Finally, PLN promised that PLN would put the first priority on securing irrigation water to inhabitants and then take surplus water for power generation. Now the dispute is settled. **(At Pikitring Office)** - In the beginning stage of the project, inhabitants downstream of the tributaries distrusted PLN because they had the misunderstanding that the power plant would take all of the irrigation water. Inhabitants downstream

	of the river consist of around 2,700 families and around 9,000 people. - Seven NGO people were invited 3 years ago to mediate between PLN and the inhabitants as a third party. - A relationship of mutual trust between PLN and the inhabitants was improved by mediation by the NGO (LSPL-IEMS). PLN promised that priority of water utilization would be put on paddy field irrigation and power generation would use only surplus water. Finally, negotiations between PLN and the inhabitants were settled. - The inhabitants negotiated with PLN by formulating KORTAEKU, which stands for coordinator for irrigation water for 6 villages. It consisted of 34 representatives from 6 villages. Twelve traditional managers of irrigation water called Rajaboonda from every comity joined the KORTAEKU. - German and Japanese NGOs provided funds to them. The name of the project is "3 years project for conflict resolution". This started after the inhabitants requested mediation from Renun NGO. Although PLN does not cover any funds to "water supply for community project", which is one of community development support projects (Com. dep), PLN provided funds for water supply and training on water management. The project supplies around 60 families each of 4 communities with water. - A relationship of mutual trust between PLN and the habitants is good. JBIC directly interviewed the inhabitants in the SAPI study for 3 months. - Other issues: Indirect impacts occurred such as growing vegetables and rice by cultivating protected forests and illegal logging in the forests due to migration from the other areas along access roads. The local government held a meeting on the issue on July 10. The Forest Department is responsible for management of the forests, but the budget is limited. 7,000ha of natural forest have been lost over the past 10 years. The relevant law is Reg. No.82, regulations on land use. - Under these circumstances, the following 3 committees were established regarding the Renun hydropower plant: 1) Water Use Commission 2) Forestry Commission 3) Community Development Commission. Participation by inhabitants, prefecture governments (Bappeda, Dinas PE responsible of environment), NGO and PLN. Stakeholder meetings have been held 3 times. - It is anticipated that the construction period will be completed in December 2005.
8. Photograph	

Photo 8.5.1 Immediate upstream of one of intake weirs (small dams) at a tributary of the Renun river

Photo 8.5.2 Immediate downstream of one of intake weirs at a tributary of the Renun river

Photo 8.5.3 Intake tower and the reservoir of Renun HP/S

Photo 8.5.4 Reservoir of Renun HP/S

Photo 8.5.5 Immediate downstream of the reservoir of Renun HP/S

Photo 8.5.6 Lodging houses for the construction workers in the base camp of Renun HP/S

Photo 8.5.7 Lodging houses for the construction workers in the base camp of Renun HP/S

Photo 8.5.8 Inside of the powerhouse of Renun HP/S

Photo 8.5.9 The Lake Toba viewed from outlet site of Renun HP/S

Photo 8.5.10 Outlet of Renun HP/S

Photo 8.5.11 View of the Lake Toba

Photo 8.5.12 Construction office building of Renun HP/S

Photo 8.5.13 Irrigation water canal for paddy fields rehabilitated by Renun HP/S project

Photo 8.5.14 NGO's office[71]

[71] The NGO has intermediated between inhabitants and Renun HP/S project.

Photo 8.5.15 Nameplate on the NGO office

(6) Micro Hydropower Plant (PLTMA): existing

1. Location	Lampung Province, near Ulu Belu geothermal site
2. Type	Micro Hydropower
3. Capacity	about 300W
4. Max. Discharge	several ten litters per second
5. Effective Head	a few meters
6. Survey Date	August 10, 2004
7. Comments	- This micro hydropower plant was subsidized by the government and built by local villagers. It has been generating electricity and supplying it to around 30 adjacent private houses. - This power plant is very small and taking river water does not cause any negative impacts. Therefore, environmental impacts are not anticipated. - Large flooding may break a water wheel, generator or powerhouse. - Proper maintenance is necessary.
8. Photograph	See the following page.

Photo 8.6.1 Road and bridge at micro HP/S

Photo 8.6.1 Road and bridge at micro HP/S

Photo 8.6.3 Water wheel of micro HP/S

Photo 8.6.4 Generator in the powerhouse of the micro HP/S

Photo 8.6.5 Distribution line of the micro HP/S

(7) Ombilin Thermal Power Plant (PLTU): existing

1. Location	West Sumatra Province
2. Type	Steam Turbine Thermal Power
3. Capacity	200MW (2@100MW)
4. Fuel	Coal
5. Survey Date	June 17, 2004
6. Comments	- This power plant was commenced in 1996. In the beginning good quality coal (6,200kcal/kg) was supplied from a neighboring open cut coal mine owned by a state own company. But the coal quality decreased to the state of coal containing impurities since 2000 (5,600kcal/kg, containing much sand, gravel and clay, resulting in increasing ash while sulfur is below 1%). The capacity factor of the power plant was around 70% during the commencement year. However, it decreased to around 40% in just 2 to 3 years after the commencement. At present, the power plant is regarded as a peak supplier. - Residual ash content has increased to 20% to 22% of coal weight. The ash has covered the bottom of boilers. The ash has caused damage to equipment and has made maintenance difficult. As a result of this, the capacity factor of the power plant decreased to around 40% because of the decreasing capacity of the power plant, increased maintenance period and shortage of coal supply. One power plant stopped its operations because of a cooling water pipe explosion the day before the study team visited. They said that it took 2 weeks to restore the power plant. Electricity shortages occurred every day in Padang of West Sumatra due to the accidents. - The power plant consumes 500 tons of coal fuel a day per 2 units at a capacity factor of 70% to 80%. 480 thousand tons of residual coal ash are produced a year. This is equal to 1,300 tons a day. It is disposed of to an ash disposal area a 20-minute drive away. Afterward, coal ash was actually disposed of in a pond and its surroundings seemed to be a site of open cut coal mining by large trucks. The disposed coal ash might fly to surrounding areas when strong winds blow because watering and other such steps are not taken. - Low quality coal has caused negative impacts on power facilities and surrounding environments. In the beginning, the power plant was planned to have a 25 year lifespan. But the construction of the power plant was delayed and the coal started being supplied to a cement company. Therefore, the coal deposit has decreased. The open cut mining has been completed and underground tunnel mining has started. As a result, the coal mine cannot supply enough coal fuel to the power plant. The coal mine is expected to be closed earlier than initially planned because of this coal mine shortage. The decrease in coal quality has affected equipment because the design conditions for the power plant fuel called for high quality coal with 5,800 to 6,200kcal/kg. (On the other hand, fuel design conditions for Bukit Asam was 5,000 to 5,400kcal/kg) - Besides 500t of coal is supplied everyday from coal mining companies (PT.BL and IC), the power plant uses the spot market so much that around 1,000 local people mine coal and supply it to coal mine companies. The Sawarund coal mime and a coal mine in Jambi province will start supplying coal fuel from 2005. However, this coal fuel may also be insufficient. - Coal supply result in 2002 was 200 thousand tons by PT.BL and 300 thousand tons by IC. - The coal mine company also supplies cement companies with coal. The companies can be supplied with coal imported from other areas if the coal mine finishes coal supply, because these companies are located near the seashore. Meanwhile, the lifetime of the power plant is the same as the coal mine's because the power plant is far from the seashore.

	- The power plant has a little less than 160 workers. A condominium is located around 3 km from the power plant. The coal mine has around 1,000 workers. There are 4 villages within a radius of 5 to 7 km. - When the study team visited the power plant, the plant was repaired because of water leakage from a cooling water condenser. Frequent electricity shortages occurred because electricity supply was insufficient in West Sumatra. They said that it would take 2 weeks to repair the power plant. The cooling water system is cooling tower type. **(Environmental and social considerations)** - The power plant provides an environmental-monitoring report to the provincial BAPEDALDA every 3 months. - Complaints from inhabitants included dust due to truck traffic and danger of traffic accidents. - Although the power plant surroundings seemed dusty and environmentally ruined as with a normal mine town, mutual dependence seemed to have developed because local inhabitants worked for mine industry. However, the working environment can not be very good because of the illegal small businesses. - As for Com-dep, the total donation amounts to 240 million Rp. a year (around US$ 3 million) for educational (scholarships for poor pupils in elementary school), religious, public service, sports, social, cultural and art activities. PLN directly gives the donation to schools, teachers, inhabitants and community organizations.
7. Photograph	See the following pages.

Photo 8.7.1 View of Ombilin thermal P/S

Photo 8.7.2 Turbine and generator in the powerhouse

Photo 8.7.3 Condenser water-cooling tower

Photo 8.7.4 Service building of the power plant

Photo 8.7.5 Water treatment equipment

Photo 8.7.6 Coal stockyard

Photo 8.7.7 Downstream of water discharge from Ombilin thermal P/S

Photo 8.7.8 Upstream of water discharge from the power plant

Photo 8.7.9 Family size coalmine near the power plant

Photo 8.7.10 Close view of coal ash disposal field

Photo 8.7.11 Coal ash disposal field

Photo 8.7.12 Coal ash disposal pond

(8) Bukit Asam Thermal Power Plant (PLTU): existing

1. Location	South Sumatra Province
2. Type	Steam Turbine Thermal Power
3. Capacity	260MW (4@65MW)
4. Fuel	Coal
5. Survey Date	June 2, 2004
6. Comments	- Unit 1 and 2 started operations in 1987 while unit 3 and 4 in 1994. - The office also manages diesel power plants with capacity 2@6.3MW outside of the power plant. - This power plant is a mine-mouth power plant near a coalmine. The neighboring coal mine is run by the state own company, PT. Bukit Asam (around 1,000 workers). The coalmine is estimated to have a more than 25 years deposit. - The power plant has around 400 workers consisting of 262 PLN staff and around 140 local employees. - The coal is high quality with 5,200kcal/t, ash content: 4 - 6% and sulfur content: 4.2%. - Coal ash treatment is by an ash modify system. - Electric precipitators are equipped with countermeasures against soot and smoke. The plant is not equipped with either desulfurization equipment or denitration equipment. - They said that the monitoring results for pollutants in the exhaust gas were within standards. The manager said that any impacts from acid rain had not been observed in the surrounding forests. The study team also observed that leaves of trees around the power plant did not seem cloud covered due to acid rain even though it was twilight of the evening. (The PLN Kitlur office raised example issues regarding acid rain and fly ash in Ombilin (West Sumatra) and Bukit Asam.) - The boiler cooling water system is a cooling tower system. Water was taken from the neighboring river (200 to 300 m^3/hour) - Wastewater (50 m3/day) from the power plant is processed and discharged. - In accordance with RPL and RKL established in the AMDAL (EIA) process stage, a "Community Development" program has been implemented. PLN and the power plant staff are aware of the importance of obtaining the understanding of the local people. In cooperation with the coal company, periodic meetings are held with the local government and inhabitants and they meet at schools in order to let people understand the power plant activities. - PLN contracts some maintenance works out to local businesses and employs local people as countermeasures against unemployment. Local people believe in either Islam or Christianity. - Neighboring inhabitants have not raised any environmental and social complaints regarding the power plant. **(Meeting with Mr.H. Kasim S. Depari, a former manager of Ombilin and Bukit Asam power plants)** - He now runs a company supplying power equipment in South Sumatra. - The following treatments have been implemented for the treatment of Bukit Asam coal ash,: 1) Filling up coal mine tunnels 2) Providing road constructions as a cement mixture with sand 3) Using for ceramics and tiles 4) Using as soil improvement mixture for sugar cane fields
7. Photograph	See the following page.

Photo 8.8.1 General view of Bukit Asam thermal P/S

Photo 8.8.2 Turbine and generator building

Photo 8.8.3 Condenser water-cooling tower

Photo 8.8.4 Switchyard

Photo 8.8.5 Water treatment equipment

Photo 8.8.6 Coal stockyard

(9) Tarahan Thermal Power Plant (PLTU): under construction

1. Location	Lampung Province
2. Type	Steam Turbine Thermal Power
3. Capacity	200MW (2@100MW: unit No.3, 4)
4. Fuel	Coal
5. Survey Date	August 11, 2004
6. Comments	- The power plant is located along a main road about 20km southeast from Bandarlampung. - The size of the plant area is 13ha (23ha when including the coal ash disposal area). - The power plant consists of two 100MW coal thermal power plant units. A one hundred MW unit is the largest unit in Sumatra. - The plant is located near a port for shipping to the Suralaya coal thermal power plant, called Tarahan Coal Terminal operated by PT.Bukit Asam. The power plant receives coal fuel from the terminal. - The coal deposit is sufficient and is confirmed as being a more than 40-year deposit. The power plant made a long term contract with PT. Bukit Asam. - The neighboring site of the power plant is for IPP's unit 1 and 2. - Although the construction office has already been built, major construction works have not started yet because the contract for construction works was just completed on July 26, 2004. The contract was the last one out of 7 lots. Preparation construction works completed at the end of 2002 were temporally interrupted. The office for supervising consultants was being built next to the office. The coal thermal power plant boiler uses a fluidized combustion bed first in PLN. - Commissioning has scheduled 32 months for unit 4 (around March, 2007), 38 months for unit 3 (around September, 2007) after the contract day mentioned above. - Seawater is used as cooling water for the condensers (maximum of around $40m^3/s$). The power plant is equipped with intake and outlet facilities. - The power plant is equipped with electric precipitators and desulfurization equipment as environmental countermeasures. The power plant meets environmental standards. Monitoring will be conducted in accordance with RPL. - A 150m high stack will be equipped with environmental countermeasures. - A 150kV transmission line will also be constructed.
7. Photograph	See the following page.

Photo 8.9.1 Tarahan coal thermal P/S site of units No.1 and 2 (IPP side)

Photo 8.9.2 Tarahan coal thermal P/S site of units No.3 and 4 (PLN side): beyond the hedges

Photo 8.9.3 Construction office building and site of Tarahan coal thermal P/S (PLN side)

Photo 8.9.4 Construction office building of Tarahan coal thermal P/S (PLN side)

(10) Belawan Thermal Power Plant (PLTU) existing

1. Location	North Sumatra Province
2. Type	Steam Turbine Thermal Power Combined Cycle Thermal Power
3. Capacity	Steam turbine: 260MW (4@65MW) Combined Cycle: 817.88MW - Gas Turbine: 117.5MW, 128.8MW, 130MW, 130MW - Steam Turbine: 149MW, 162.58MW
4. Fuel	Steam Turbine: Marine Fuel Oil (MFO)/ Natural Gas Combined Cycle: Natural Gas/ High Speed Diesel Oil (HSD)
5. Survey Date	June 10, 2004
6. Comments	**(About Belawan Thermal Power Plant)** - Steam turbine units started operation in 1984 after a 20-year wait. Combined cycle units started operation in middle of 1990s (total 817.88MW with 2 lines, 1 line consisting of 2 gas turbines and 1 steam turbine). - Office of the Belawan power plant is responsible for operation and maintenance of 4 power plants (Belawan, Titi Kuning, Glugur, and Paya Pasir, consisting of small diesel and gas turbine besides Belawan). - Belawan P/S has predominated in terms of capacity in the north system. Capacity factor of the power plant is as high as 83% because no new power plants have been developed recently despite the power demand growth. - Gas supply from PERTAMINA has decreased recently. The power plants are equipped with dual-fuel firing combustors. Steam turbine units can fire both MFO and natural gas while combined cycle units can fire both natural gas and HSD. The gas supply has decreased recently. On the other hand, the amount of MFO and HSD has increased. The power plant has a fuel consumption plan in accordance with instructions from Kitlur. The study team confirmed actual fuel consumption in the operation room of the power plant. The power plant used a half-and-half combination of the fuels. - Maximum capacity for 4 steam turbine units is 65MW each. But these capacities have decreased to unit 1=63MW, unit 2=55ME, unit 3=45MW and unit 4=45MW. This is blamed on the clogging of air filters due to utilization of low quality fuels. - MFO contains 3.5% of sulfur and a high ash content. Five thousand kilo-litters of MFO are transported from near Batam island once every 2 days by a rental boat. The transportation fee is 18 Rp. a litter. - Three-day power shortages occur every 6 months when air filters are cleaned. **(Regarding environmental and social considerations)** - Monitoring results such as exhaust gas, water discharge, surrounding atmosphere, water quality and noise (inside of the plant and its surroundings) were described in Environmental Reports (2001-2004) in accordance with RKL and RPL (environmental management and monitoring plans). Noise immediately near the generators exceeded the standards. But this is different from normal environmental and social impacts because the noise affects the health of the operation staff. They said that other items besides the noise were within the standards. The temperature of thermal effluent is 2ºC higher than that of the water source. - Community Development support program: Construction or donation for churches, mosques, schools, fishermen boats, others **(Environmental and social issues)** - Treatment of coal ash - Concerns about multiple impacts involving pollutants produced from other sources in the surrounding area (factories for glass, foods, plywood, alcohol, palm oil, steel, others)

7. Photograph	

Photo 8.10.1 General view of Belawan thermal P/S (steam turbine)

Photo 8.10.2 Turbine and generator of Belawan thermal P/S (steam turbine)

Photo 8.10.3 General view of Belawan thermal P/S (combined cycle)

Photo 8.10.4 Gas turbine building and stacks of Belawan thermal P/S (combined cycle)

Photo 8.10.5 Turbine and generator of Belawan thermal P/S (combined cycle)

Photo 8.10.6 Switchyard of Belawan thermal P/S

Photo 8.10.7 Front of outlet of condenser cooling water in Belawan thermal P/S

Photo 8.10.8 Immediate front of outlet of condenser cooling water in the power plant

Photo 8.10.9 Fuel tanker at wharf of the power

Photo 8.10.10 Fuel tanks in the power plant

(11) Keramasan Thermal Power Plant (PLTU): existing

1. Location	South Sumatra Province
2. Type	Steam Turbine Thermal Power Gas Turbine Thermal Power
3. Capacity	Steam Turbine: 25MW (2@12.5MW) Gas Turbine: 44.85MW (2@11.75MW, 21.35MW)
4. Fuel	Steam Turbine: Marine Fuel Oil (MFO) Gas Turbine: Natural Gas
5. Survey Date	June 1, 2004
6. Comments	- Environmental monitoring has been carried out twice a year on exhaust gas and wastewater in cooperation with a university research laboratory. The university owns the monitoring equipment. - Four hundred kilo-litters of oil was spilled into the Musi river and contaminated the river because a transport ship that carried the intermediate oil to the power plant collided with a Chinese rice transport ship in September of last year. - Households about 50m away from the facilities (about 20m away from the site boundary) complained about noise not from the Keramasan Power plant but from a gas turbine power plant called Batang Hari with capacity 2@30MW in Jambi province.
7. Photograph	See the following page.

Photo 8.11.1 Boiler of Keramasan thermal P/S (steam turbine)

Photo 8.11.2 Turbine and generator the power plant (steam turbine)

Photo 8.11.3 Service building of Keramasan thermal P/S and stacks of steam turbine thermal P/S

Photo 8.11.4 Lubricant oil spillage ditch at Keramasan thermal P/S (gas turbine)

Photo 8.11.5 General view of Keramasan thermal P/S (gas turbine)

Photo 8.11.6 Switchyard in Keramasan thermal P/S

(12) Indoralaya Thermal Power Plant (PLTG): existing & under construction

1. Location	South Sumatra Province
2. Type	Gas Turbine Thermal Power
3. Capacity	Existing: 50MW Under construction: 40MW
4. Fuel	Natural Gas
5. Survey Date	June 2, 2004
6. Comments	- PT. Indonesia Power owns the power plant. The gas turbine unit is made by GE and is a type flame 7 with capacity of 45MW (3,600rpm). - The plant was first built in Jakarta in 1976 and moved here in 2001. - The plant is operated at 45MW during peak hours and 20MW during other hours. The power plant can be operated at 48MW within 2 hours. - The plant follows orders from UPB (dispatching center). Both cable and wireless communications are utilized for communicating between UPB and the plant. - Natural gas is supplied through a 5 km branch gas pipeline with pressure of 300psi from a gas pipeline with pressure of 600psi towards Pundopo, Palembang, Keramasan and Pusuri. - A cooling tower system is used for the cooling water equipment. - Electricity is sent through 150kV transmission lines to the Keramasan substation in Palembang (around 30km). - Inhabitants have not complained about the power plant from environmental and social viewpoints. - In terms of environmental impacts, the power plant emits a little SOx and NOx because of the gas fuel used. - The plant has decreased the noise level to below 90dB at the site boundary by adding a silencer as a noise countermeasure. The distance between the power plant and the site boundary (fences) is around 50m. Forests remain in the surrounding area. The distance to the nearest inhabitants is around 300m. The plant itself cannot been seen from private houses. - Leakages of oil and grease that are used in the equipment are collected in concrete pits around the plant, except for leaks penetrating into the site ground. Oil was not detected when monitoring the quality of the underground water. - EIA (AMDAL) with RKL and RPL was conducted in 2001 when the plant was moved from Jakarta. - Monitoring has been conducted in accordance with PKL and RPL. An environmental report is submitted once every 3 months. Water quality and underground water are monitored. Every item has been within the standards. - The plant has 8 operators with 3 shifts (1 group = 2 operators) and 4 maintenance workers. There is a total of 16 staff members including a plant manager and the other administration staff. - Now under construction is a new gas turbine power plant made by GE with a type flame 6 (40MW). Plans are to commence operations of this plant at the same site.
7. Photograph	See the following page.

Photo 8.12.1 General view of Indoralaya thermal P/S (existing gas turbine)

Photo 8.12.2 Close view of the power plant

Photo 8.12.3 General view of construction works of Indoralaya thermal P/S (gas turbine)

Photo 8.12.4 Oil spillage ditch of Indoralaya thermal P/S (existing gas turbine)

Photo 8.12.5 Switchyard of the power plant

Photo 8.12.6 Service building of the power plant

(13) Tarahan Thermal Power Plant (PLTD & PLTG): existing

1. Location	Lampung Province
2. Type	Diesel Thermal Power, Gas Turbine Thermal Power
3. Capacity	Diesel: 54.904MW (7 units) Gas Turbine: 51.35MW (2 units)
4. Fuel	High Speed Diesel Oil (HSD)
5. Survey Date	August 11, 2004
6. Comments	- There are some operational issues due to the old power plants. The power plant suffered from power derating because air filters were clogged up with flying coal particles due to the handling of coal in a neighboring coal stock yard (shipment to Suralaya thermal power plant) when wind blows from the yard. - The power plant supports schools, teachers, mosques and farmers through Community Development activities.
7. Photograph	

Photo 8.13.1 Switchyard of the Tarahan thermal P/S

Photo 8.13.2 General view of powerhouse of Tarahan thermal P/S (diesel)

Photo 8.13.3 Inside of the powerhouse (7 diesel units)

Photo 8.13.4 General view of a gas turbine unit

Photo 8.13.5 Coal handling yard neighbor of the power plant

Photo 8.13.6 Burge mounted gas turbine power plant in preparation for relocation to Palembang

Photo 8.13.7 Fuel oil tanker, its pier and fuel oil storage boat in front of the existing Tarahan thermal P/S

Photo 8.13.8 Marks of oil spillage at seashore near the fuel oil tanker pier

(14) Ulu Belu Geothermal Power Site (PLTP): planning stage

1. Location	Lampung Province
2. Type	Geothermal Power
3. Capacity	110MW (2@55MW)
4. Survey Date	August 11, 2004
5. Comments	- The study team surveyed boring No.3 site (one of 4 boring sites), power plant site and neighboring villages. - The borings were carried out by PERTAMINA. Four boring sites were located within a 1-2 km area around the power plant site. - Depth of No.3 boring was 730m. A pipe for the boring well remained and was surrounded by a fence around 3m in width. The surrounding soil was soft and covered by grass as tall as a man. The flora around the boring seemed not to change specifically. - A small pond exists around 100m from the boring site. They said that the pond was a cold spring. But there were no tourism activities. They said that the spring water contains sulfur. - Rare animals such as monkeys, tigers, elephants, certain eagles and hawks have been observed, but it is expected that impacts on them are negligible. The University of Lampung is now officially studying the impacts. - The power plant site is now a paddy field with 20ha area. The state owns 50% of the site; inhabitants own the remaining 50%. Therefore, land acquisition, paddy field movement and compensation for the inhabitants will be needed in order to build the power plant. - The power plant site is located in a mountainous area around a one-hour car ride from Tarangpadang to the north along a main road. The power plant site is located in 3 villages with a total of around 4,000 families. - The villages have not been electrified yet. They use batteries. Battery charging businesses are being operated. - A micro hydropower plant was subsidized by the government and built by the villagers. It has been generating electricity and supplying it to around 30 adjacent private houses. - Although the villages are not electrified and seem poor, they are actually apparently not too poor because inhabitants can support themselves through agriculture such as coffee and rice. - The villagers are in favor of the project. They want electrification and better infrastructures such as roads through this development. They said that it would take only around 20 minutes to reach Tarangpadang if the road was renovated. - AMDAL is now being prepared and the University of Lampung is carrying out environmental studies. - BAPEDALDA of Lampung province permitted ANDAL, RKL and RPL conducted by PERTAMINA on geothermal development on December 17, 2003 except for the power plant and transmission line. - PLN and PERTAMINA need to follow AMDAL procedures again because the geothermal power plant has capacity over 55MW and transmission lines with 150kV in voltage in accordance with the law.
6. Photograph	See the following page.

Photo 8.14.1 No.3 boring site at Ulubelu geothermal site

Photo 8.14.2 Spring containing sulfur near No.3 boring site

Photo 8.14.3 Road near the No.3 boring site

Photo 8.14.4 Village near Ulubelu geothermal power plant site

Photo 8.14.5 Power plant site of Ulubelu geothermal power plant

Photo 8.14.6 Grain storage house near the power site plant

(15) Banko-Lubuk Linggau Transmission Line and Substation: under construction

1. Location	South Sumatra Province
2. Type	Transmission Line and Substation
3. Capacity	150kV
4. Survey Date	June 3, 2004
5. Comments	- Lahat Substation A landslide recently hit the extended plot of the station site during heavy rains, and a portion of the plot was eaten away in the accident. The landslide occurred one month ago. - Lubuk Linggau Substation Lubuk Linggau Substation is 3 km away from the town area. At night, the area surrounding the station is dangerous since it is infested with criminals, so even the stationed staff do not move around. - From Lubuk Linggau Substation three (3) transmission line systems with 150 kV extend to Lahat Substation (114 km), a substation (68 km) in Bengkulu and the Bangko Substation (195km: designed for 275kV) in West Sumatra. - The transmission line to Bangko Substation (195km) is now under construction, but the work is being delayed because of a disagreement over compensation for the residents (or private croplands) under the transmission line. The issue has lasted since around February 2002, or for about two years. The negotiations over the amount of compensation are still under way with a few families. - The transmission line towers are numbered from T1 to T573 along a 195km section with the average interval being 350 m. - The remaining works for the transmission line are, at present, the segment from T167 to T198 in Section 1, the segment from T225 to T245 in Section 2, and the segment from T245 to T265 in Section 3. A total of bout seventy spans and a length of 24.5 km still remains. - Plans are for operations to start by the end of June. However, the realistic prospects are for operations possibly starting at the end of June in Section 1, but not starting until mid-July for the other sections. (Later we learned that the system operations started and the lines were connected on July 2nd.)
6. Photograph	See the following page.

Photo 8.15.1 Transmission Towers at Lahat substation

Photo 8.15.2 Transformers at Lahat substation

Photo 8.15.3 Marks of landslide at Lahat substation

Photo 8.15.4 Office building of Lubuk Linggau substation

Photo 8.15.5 Switchgears at the substation

Photo 8.15.6 Transmission line to Banko substation

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