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IMPLEMENTATION COMPLETION REPORT

INDIA

**NTPC POWER GENERATION PROJECT
(LOAN 3632-IN)**

June 14, 2000

**Energy Sector Unit
South Asia Region**

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CURRENCY EQUIVALENTS

Currency Unit	=	Indian Rupee (Rs)
US\$1.00	=	Rs 30.2 at appraisal (June 4, 1993)
US\$1.00	=	Rs 42.50 at closure (March 31, 1999)
Rs 1.00	=	Paise 100

MEASURES AND EQUIVALENTS

1 Kilovolt (kV)	=	1,000 volts (V)
1 Megawatt (MW)	=	1,000 kilowatts (kW)
1 Kilowatt-hour (kWh)	=	1,000 watt-hours
1 Megawatt-hour (MWh)	=	1,000 kilowatt-hours
1 Gigawatt-hour (GWh)	=	1,000,000 kilowatt-hours

ABBREVIATIONS AND ACRONYMS

BEI	=	British Electricity International, Ltd.
BPCL	=	Bharat Petroleum Corporation, Ltd.
BSES	=	Bombay Suburban Electricity Supply, Ltd.
CAS	=	Country Assistance Strategy
CCPP	=	Combined Cycle Power Plant
CEA	=	Central Electricity Authority
CIEIMS	=	Computer Integrated Environmental Information Monitoring System
EAP	=	Environmental Action Plan
ESP	=	Electro Static Precipitator
GOI	=	Government of India
HVDC	=	High Voltage Direct Current
IBRD	=	International Bank for Reconstruction and Development
ICB	=	International Competitive Bidding
ICR	=	Implementation Completion Report
IMP	=	Independent Monitoring Panel
IPP	=	Independent Power Producer
LCB	=	Local Competitive Bidding
LICB	=	Limited International Competitive Bidding
MOEF	=	Ministry of Environment and Forests
MOP	=	Ministry of Power
NGO	=	Non-Governmental Organization
NTPC	=	National Thermal Power Corporation
PAPs	=	Project Affected Persons
PCB(s)	=	Pollution Control Boards
PFC	=	Power Finance Corporation, Ltd.
POWERGRID	=	Power Grid Corporation of India, Ltd.
R&R	=	Resettlement and Rehabilitation
RAP(s)	=	Resettlement Action Plans
ReAP(s)	=	Remedial Action Plans
SAR	=	Staff Appraisal Report
SEB	=	State Electricity Board

FISCAL YEAR

April 1 - March 31

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NTPC POWER GENERATION PROJECT (LOAN 3632-IN)

IMPLEMENTATION COMPLETION REPORT

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INDIA

NTPC POWER GENERATION PROJECT (LOAN 3632-IN)

IMPLEMENTATION COMPLETION REPORT

PREFACE

This is the Implementation Completion Report (ICR) for the NTPC Power Generation Project, for which Loan 3632-IN in the amount of US\$400 million equivalent was approved on June 29, 1993 and made effective on June 6, 1994. The Borrower was the National Thermal Power Corporation (NTPC), guaranteed by the Government of India. The project comprised generation capacity additions in the form of a five-year time-slice of NTPC's least cost investment program for new thermal power stations. Other components comprised support for NTPC to improve commercial discipline in the power system, undertake joint venture operations, upgrade environmental performance to make its power stations environmentally more sustainable and strengthen its environmental, resettlement and rehabilitation management capability. The remaining funding for the project was provided from NTPC's own resources.

The Loan was originally scheduled to close on September 30, 1997. The Loan closed on March 31, 1999 after two extensions of six months each and further extensions of one and five months respectively. The loan amount was fully disbursed before the final closing date and no part of the loan was cancelled. Since the project was thought to have considerable learning potential from a Bank wide perspective, the ICR has been prepared in a more extensive format in order to better appreciate the lessons learned. Thus, the content goes beyond that required of a standard ICR.

Judith Plummer, Senior Financial Analyst, Energy Sector Unit; Bekir Onursal, Senior Environmental Specialist, Environment Unit; and Reidar Kvam, Senior Anthropologist, Social Development Unit prepared the ICR. Kari Nyman, Team Leader, Energy Sector Unit, and Ellen Schaengold, Principal Sociologist, all from the South Asia Region, reviewed it. The Borrower provided comments that are included as appendices to the ICR.

Preparation of this ICR began during the Bank's ICR mission in April 1999. It is based on material in the project file and site specific information collected during the ICR and other missions. Mihir Mitra and Richard Berney (Consultants), reviewed the technical and environmental aspects of the project, respectively. The borrower contributed to the preparation of the ICR by providing views reflected in the mission's aide-memoire, the statistical data for the tables, their own evaluation of the project's preparation and execution, and comments on the draft ICR.

INDIA

NTPC POWER GENERATION PROJECT (LOAN 3632-IN)

IMPLEMENTATION COMPLETION REPORT

Evaluation Summary

Introduction

1. The National Thermal Power Corporation is one of the largest beneficiaries of the World Bank Group. The NTPC Power Generation Project, Loan 3632-IN, approved by the Bank's Board of Directors on June 29, 1993 for an amount of US\$400 million, was the sixteenth Bank operation with NTPC.
2. The design of the NTPC Power Generation Project took into account the lessons learned from the Project Completion Reports for the first nine NTPC operations¹ and the Performance Audit Report² for the first seven Bank and IDA operations. Prior to this loan, the Bank had already provided US\$3 billion in operations with NTPC. This new project was part of the Bank's overall Country Assistance Strategy (CAS) to support the Government of India (GOI) reforms to address fundamental operational, financial and institutional issues in the power sector in India, which in 1993 had just begun. Bank lending in the power sector was, at that time, focused on: (i) promoting domestic and foreign private investments; (ii) supporting GOI's agents of reform, the Power Finance Corporation (PFC), National Thermal Power Corporation (NTPC), and Power Grid Corporation of India, Ltd.(POWERGRID); and (iii) assisting State Electricity Boards (SEBs) and State Governments, which have started implementing credible plans for restructuring their power sectors.

Project Objectives

3. The objectives of the NTPC Power Generation Project were: (i) to help improve commercial discipline in the power system through the implementation of new commercial and investment policies; (ii) to help NTPC meet its targets for capacity additions through increased mobilization of funds from internal resources, domestic and foreign capital markets, as well as from the private sector through joint venture operations; (iii) to upgrade environmental performance of NTPC power stations and make its new power stations environmentally more sustainable; and (iv) to strengthen NTPC's environmental management and resettlement and rehabilitation management capability. The project comprised: (i) a five-year time-slice of NTPC's least cost investment program of new coal and gas based power stations for which full funding had not yet been arranged; (ii) support NTPC to undertake several joint venture operations; and (iii) the implementation of an Environmental Action Plan (EAP), which included environmental upgrading of projects, training and technical assistance for the strengthening of NTPC's environmental and R&R management capability.

^{1/} Singrauli (Credit 685-IN); Korba (Credit 793-IN); Ramagundam (Credit 84-IN and Loan 1648-IN); Singrauli II (Credit 1027-IN); Farakka (Credit 1053-IN and Loan 1887-IN); Korba II (Credit 1172-IN); Ramagundam II (Loan 2076-IN).

^{2/} OED Performance Audit Report No. 10854: Korba Thermal Power Project, Ramagundam Thermal Power Project, Second Singrauli Thermal Power Project and Farakka Thermal Power Project, February 3, 1993.

4. NTPC had requested that the first two generation projects to be considered should be the Vindhyachal II and Rihand II thermal power stations, but under the time-slice approach, NTPC had the flexibility to use the proceeds of the Bank loan for other power projects as well, provided that the specified eligibility criteria were met. During implementation, Rihand II had to be dropped from the list since the State of Uttar Pradesh was not in compliance with the provisions of its Bulk Power Purchase Agreement with NTPC. After some discussion, the naphtha/gas powered combined cycle power plant at Kayamkulam was selected as a replacement. Thus, the two generation projects, finally included under the time-slice loan, were Vindhyachal II in the Singrauli area of Madhya Pradesh and Kayamkulam in Kerala. Physical implementation of the generation aspects of the loan has proceeded ahead of time (according to the revised schedule) and within the budget. The time-slice approach and the implementation of a comprehensive Environmental Action Plan (EAP) were unique features of the project. Difficulties have been encountered with the implementation of both the environmental and social aspects of the project.

5. Loan 3632-IN for US\$400 million equivalent, was approved on June 29, 1993, signed on December 9, 1993, and became effective on June 6, 1994. Additional financing was provided from NTPC's own resources.

Implementation Experience and Results

6. *Developmental outcome*

(a) *Commercial Discipline.* The objective of instituting commercial discipline into the power sector has been difficult to achieve, but substantial improvements have been made. At appraisal, the financial health of NTPC was threatened by the accumulation of receivables from the State Electricity Boards (SEBs). This was sought to be mitigated by bulk power purchase agreements between NTPC and its customer states. These agreements provided NTPC with, amongst other recourses; the ability to shut off power or restrict supply to states not in compliance with agreed terms of payment. In the event that this was not feasible, NTPC was allowed to charge the defaulting states penal rates for withdrawals exceeding the coverage provided by the respective letters of credit. Implementation of these corrective steps served to improve the financial situation of NTPC significantly and collection efficiency has increased from 75 percent in 1990/91 to 82 percent in 1998/9, while power sales have increased more than five-fold (see appendix E). Continuing political necessity prevents NTPC from regulating supply to or penalizing defaulting customers more extensively. As a result, NTPC's accounts receivable had increased to 3.7 months equivalent as of the loan closing date of March 31, 1999, which is out of compliance with the covenanted level of two months.

(b) *Capacity Additions.* In Vindhyachal, the first 500 MW unit (unit 7) was commissioned and synchronized in March 1999 (five months ahead of schedule). The second unit (unit 8) was synchronized in February 2000 (three months ahead of schedule). In Kayamkulam, construction of the 350 MW naphtha powered combined cycle power plant is complete, again, ahead of schedule.

(c) *Joint Venture operations.* The project envisaged support to NTPC to enter into joint venture operations for generating stations. In the event this has not been the case as NTPC has been able to raise sufficient finance for its own expansion plans. However, NTPC has entered into joint ventures for other concerns such as the development of gas supply infrastructure. During the course of the project NTPC has begun to raise its own capital on both the domestic and international and not rely on development institutions for its funding. It has been successful in mobilising significant resources, such that financing is no longer a constraint to development. In

some regard, the difficulties of this project, which put future Bank funding for NTPC in doubt, have obliged NTPC to take bold steps to obtain alternative sources of finance. This has proved successful to such an extent that the absence of the second time-slice investment loan is now not a constraint to NTPC's investment plans.

(d) *Resettlement and Rehabilitation Performance.* The implementation of resettlement programs was assessed to be deficient in the Singrauli area, at times during the course of the project. However, subsequent effort on all sides and the intervention of the Independent Monitoring Panel (IMP) have meant that now, in April 2000, the implementation of the resettlement action plans (RAPs) is progressing well in the Singrauli area and at Kayamkulam. The RAP and ReAP (remedial action plan) issues will continue to be monitored by the Bank beyond the closure of the loan, until the Bank is confident that adequate mechanisms are in place to ensure the resettlement and rehabilitation of the PAPs.

(e) *Strengthening of NTPC's Environmental Management Capability.* NTPC's capacity in this area has been improved significantly. Although progress in implementation in many areas had initially been slow because of the innovative nature of the projects. The main outstanding issues from the actions agreed with the Bank are now the completion of the ash pond effluent recirculation systems (put on hold due to delays in clearance of the ash-dykes and also procurement issues, which is now ongoing) and further action following from the reports on mercury contamination and ecological impact studies, such as training on environmental medicine. In addition, as a good practice, NTPC agreed with the Bank that a computerized environment information and monitoring system should be implemented (though not covered in the original EAP). This is ongoing under a system referred to as Paryavaran Monitoring System (PMS). NTPC is also seeking ISO 14001 certification for its environmental management.

7. *Implementation*

(a) NTPC is a mature utility and has demonstrated that it can achieve technical performance parameters comparable with those achieved elsewhere in the world. It has developed a corporate culture based on professional pride of doing things well through a highly motivated staff. The major challenges for the project were: (i) whether NTPC would be able to raise the required resources through internal cash generation and from the capital markets, for which much depended on NTPC's ability to recover charges from its clients, the SEBs; (ii) implementation by NTPC of the EAPs; and (iii) remaining in compliance with the loan covenants.

Energy

(b) NTPC's financial management has improved substantially over the course of the project. It is now able to finance future projects from 30 percent internal cash generation and 70 percent domestic and international borrowings; with negligible support from Government. Some of this improved financial situation is due to the tariff structure rather than NTPC's own financial management. Delays in the approval of tariff revisions, which are then applied with retroactive effect, have made NTPC's bill collection even more challenging. NTPC has made considerable efforts to comply with the accounts receivable covenant, (which was designed to help improve its financial health). Most of NTPC's customers are now in compliance, but in the case of a few states, it has been unable to bring the level of outstanding bills down to the covenanted level of two months.

(c) NTPC is now constructive in its support for power sector reform in India. This is, in part, because power sector reform is supported by NTPC's shareholders, the Central Government, but also because NTPC recognizes that reform is in NTPC's own commercial interests since only through reform will its clients, the State electricity utilities become commercially viable. Thus NTPC has started to align its investment and support to those States that are committed to reform and hence likely to become creditworthy. This has been demonstrated in several of NTPC's recent investment and operational decisions; for example, (i) the early change in the investments supported by this project from Rihand, which would serve the poor-performing northern states, to Kayamkulam, which would serve the better payers in the south^{3/}; (ii) the negotiation of take over of power stations to help SEBs settle their dues; and (iii) the recent support to Uttar Pradesh while SEB power workers were on strike. However, NTPC still remains unable effectively to curtail power supplies to its defaulting customers.

(d) Physical implementation of the project components, as with previous projects, proceeded slowly in the beginning. However, after the major contracts were let, the pace of construction picked up significantly and, with good project management, both components noted progress ahead of schedule.

Environment

(e) Implementation of EAPs by NTPC has improved over the years and the project closed with a few incomplete EAP actions. The environmental management structure of NTPC was fragmented, questioning the adequacy of organizational management, including effectiveness of the interface between the various departments. NTPC recognized that environmental management formed an integral part of modern utility business and is pursuing further improvements in the existing environmental management organizational structure. Improvements in environmental management were noted with the introduction of a fully-fledged department at the corporate level and separate environmental management divisions in all power stations, mirroring the same corporate set up. Training with British Electricity International, Ltd. (BEI) and the E-7 countries improved the environmental management system and practices in NTPC.

Resettlement and Rehabilitation

(f) NTPC's recognition and acceptance of the importance of resettlement and rehabilitation (R&R) has improved over the life of the project, but implementation efforts have lagged behind and the results have often been less than satisfactory. The effectiveness of the implementation efforts was considerably better in Kayamkulam than in Vindhyachal, but when the project closed, the R&R actions were not adequate, some eleven years after the land in the Singrauli area was acquired. As addressed in depth in Appendix D, "Resettlement and Rehabilitation (R&R)", the relationship between NTPC and some of the people affected by the project in the Singrauli area deteriorated due to disagreements over the compensation provided and access to land and employment in the Singrauli region. Previous adverse resettlement operations in the area complicated the situation. Many people refused to move, and others were demanding additional compensation or assistance. By 1996, open conflict, blockages and mutual accusations of violence were becoming frequent and NTPC appeared unable to make much progress. However, the

^{3/} Rihand II has now be reinstated into NTPC's future investment plans following Uttar Pradesh's commitment to reform.

affected people have now moved from the ash dyke and, in April 2000, a Bank mission assessed the progress as satisfactory.

The difficulties of addressing resettlement in such a project context have been made worse by a lack of institutional capacity, at the outset, both on the side of the World Bank and NTPC. From the Bank's side, more attention to implementation risks should have been paid at the time the loans were approved. The World Bank was too optimistic in its original assessment of the situation, and did not have a clear strategy for how to respond to supervision reports showing that implementation was unsatisfactory. From NTPC's side, there was an initial lack of capacity and willingness to address social impacts as integral parts of project planning and implementation. The capacity has improved over time and more awareness and understanding has been built up.

8. *Project costs and disbursement.* The entire amount of the loan was disbursed. The time-slice nature of the loan allowed the proceeds to be applied against the cost of particular qualifying generating stations, which were not otherwise fully funded and thus any cost savings were used to fund other parts of the same stations.

9. *Rate of Return.* At appraisal, the rate of return of the project was estimated at 14.7 percent. This was assuming that the stations financed were Vindhyachal II and Rihand II. At NTPC's present tariffs, the EIRR of the project is calculated to be 17 percent (Table 9), based on the construction of Vindhyachal II and Kayamkulam.

10. *Sustainability.* The impacts of the project are likely to be sustainable. Successful commissioning, adequacy of fuel procurement, availability of the required infrastructure to evacuate power and the deployment of a trained and motivated staff, combined with generally satisfactory implementation of environmental action plans, provide assurance of sustainable development. NTPC's improved capacity combined with the high profile scrutiny from environmental and social NGOs is likely to imply that no new investments will be undertaken without addressing associated environmental and socio-economic issues in a fully satisfactory manner. Institutionally, NTPC has grown to be financially stronger, more mature and increasingly an independent organization. One of the challenges for NTPC is to improve its collection efficiency. This will continue to be a challenge until the State utilities become creditworthy through power sector reforms.

Summary of Findings, Future Operations, and Key Lessons Learned

11. *Bank Performance.* The Bank has contributed to NTPC becoming a financially strong and technically efficient operation for other utilities in the Indian power sector to emulate. The relationship between NTPC and the Bank was severely strained over the R&R and environmental issues of this project described above. The difficulties were in part caused by inadequate capacity on the Bank's side during the earlier days of the project to provide guidance to NTPC on the best ways of addressing the social and environmental impacts. Subsequently, a complaint was made to the Bank's Inspection Panel, which agreed that some of the Bank's operational directives, with regard to environment, resettlement and project supervision had not been fully complied with by the Bank's management and task team. As a result, the Bank's management developed an action plan for the continued monitoring of the project as described in detail in paragraph 64 and Appendix D.

12. *Borrower Performance.* NTPC's performance on the technical aspects of the project is regarded as highly satisfactory and it has developed into a significant agent for reform of the State Power sectors. However, the cumbersome approval procedures of GOI and delays in granting the required clearances to proceed with the implementation of the project have caused unnecessary slippage of schedule during the

early part of project implementation. Although NTPC's environmental capacity has improved considerably, particularly in its compliance with statutory requirements, is still slow to act compared with the high efficiency of its operational departments. As discussed in Appendix D, NTPC was not fully committed to undertaking the necessary actions required under the Resettlement Policy from the start of the project. The provisions were agreed to as part of the loan conditionalities, but the agency did not, initially, allocate sufficient resources or develop the institutional capacity to address these issues in an integral manner. As a result, there have been severe conflicts with representatives of local communities, made more difficult by a very complex situation on the ground in the Singrauli area and performance on the resettlement components of the loan had generally been less than satisfactory, until recent improvements were made.

13. *Assessment of Outcome and Future Operations.* The project outcome will be positive. Power availability in India will be improved from the physical construction of two power plants. The knowledge of managing the environmental and social aspects of large projects in India has been enhanced by the technological improvements, policy developments and lessons learned from this project. The project ratings (given in Table 1), reflect the dichotomy of achievement, which is a feature of this project. The project is very likely to be sustainable and to achieve its objectives.

14. *Key Lessons Learned.* Major findings of the project implementation experience and important lessons for future operations are summarized below:

Energy

- (a) In order to maintain its financial health, NTPC must be willing to pursue a disciplined policy on collections of debts even more positively to contain its accounts receivable. Simultaneously, political considerations must, as far as possible, be eliminated from NTPC's efforts at bill collection so that power supplies are directed to creditworthy customers.
- (b) This project shows the risks of the "time-slice" approach to investment. NTPC continued to spend on the assumption that the second time-slice loan would be made available long after it was clear that their inability to comply with covenants would place this funding in jeopardy.

Environment and social aspects

- (c) It is difficult for the Bank to try to secure compliance with its policies that require higher standards than those which are provided under state or national regulations. Bank standards are seen by the implementing agency as creating precedents for future projects, which may not be funded by the Bank, as well as future financial liabilities. This should be recognized by all parties and agreement reached on the appropriate action in the earliest stages of the project. Projects with complex R&R and environmental issues should not be undertaken in a social setting as complex as India without the full commitment of all concerned.

Environment

- (d) On the environment side the key lesson is that, in the long run, responsibility for regional environmental sustainability resides with the state and central regulatory authorities that oversee compliance with environmental standards with the support of civil society. The Bank should work with local regulatory authorities to help them upgrade their capabilities to monitor power project emissions and to encourage them to bring their monitoring requirements (and where practicable,

their environmental performance requirements) closer in line with Bank's environmental guidelines.

Resettlement and Rehabilitation

(e) The lessons are explained in detail in para 74 and summarized below:

- Although the R&R policy approved by NTPC was considered advance in 1993, it did not evolve in light of changing circumstances in India and experience of implementation of this and other projects. The policy should be flexible enough to incorporate the lessons learned as implementation continues and should concentrate on the requirements of new projects rather than looking back.
- The experience of this project also implies that "retrofitting" of rehabilitation without a proper social assessment is fraught with difficulty and in a country with a social structure as complex as India's should, as far as possible, be avoided. This experience only reemphasizes the necessity to get the R&R issues right as the project proceeds. Similarly, delayed displacement (allowing PAPs to stay on land previously acquired), should also be avoided.
- Management commitment is required if social and environmental aspects are to be integrated into the corporation's culture. It is important that the areas of responsibility of all concerned are agreed from the start and activities are implemented on time.
- The experience of this project shows that establishing an IMP has had a positive effect. It is recommended that a neutral agency be appointed to help with monitoring in all suitable projects, to help the client and the Bank assess project performance and likely outcomes. The use of such panels should be tailored to the particular circumstances on the ground.
- There is a need to not only explain the content of the safeguard policies in terms of mandatory principles and procedures, but to provide ongoing guidance and advice to borrowers on how best to achieve the required outcomes. Much emphasis must be put on how a message is transmitted, as well its content.

INDIA

NTPC POWER GENERATION PROJECT (LOAN 3632-IN)

IMPLEMENTATION COMPLETION REPORT

PART I. PROJECT IMPLEMENTATION ASSESSMENT

A. PROJECT OBJECTIVES

1. **Sector Context.** The National Thermal Power Corporation (NTPC) was conceived by GOI in 1975, out of a need to promote least cost regional power development. Previously, in the 1950s and 1960s, the responsibility for power development in India was entrusted almost entirely to the States. This led to less than optimal development planning as each State pursued its own interest, and also to inadequate investments in generation, transmission and distribution facilities as the States had insufficient investment funds. As a result, there were acute shortages of power in most parts of India. This situation resulted in GOI, in the 1970s, changing its policy to focus on least-cost regional development, emphasizing construction of central power stations close to indigenous fuel resources. In 1975, GOI established NTPC, making it responsible for the design, construction and operation of large thermal power stations and high voltage transmission lines, and for the sale of bulk power to the State Electricity Boards. The Bank Group has supported NTPC through 6 IDA and 10 IBRD operations to finance 14 NTPC power plants, and two transmission projects (Part II, Table 2). NTPC's responsibilities for transmission were transferred to POWERGRID⁴ in early 1993, with retroactive effect from April 1, 1992.
2. The project was designed to help fill the growing power supply deficit while encouraging NTPC to adopt alternative funding arrangements and to improve its environment and resettlement and rehabilitation (R&R) capacity. With a per capita consumption of only about 270 kWh per annum, electricity use in India is among the lowest in the world. At the time of preparation of the project in 1992, as now, power shortages were endemic and represented some 9 percent total energy and 18 percent of peak capacity requirements. Demand was growing at 8 percent per annum, even though it was accepted that emphasis must be placed on efficiency improvement and reduction of losses, it was clear that new generation would also be required if supply was to keep pace with demand.
3. **Project Objectives.** The objectives of the NTPC Power Generation Project were to:
 - a) help improve commercial discipline in the power system through the implementation of new commercial and investment policies;
 - b) help NTPC meet its targets for capacity additions through increased mobilization of funds from internal resources, domestic and foreign capital markets as well as from the private sector through joint venture operations;

^{4/} POWERGRID was incorporated on October 23, 1989 as the National Power Transmission Corporation. It changed its name to POWERGRID on October 23, 1992. POWERGRID assumed the management of the transmission assets and projects of NTPC under a contract signed between the two corporations on August 16, 1991. An ordinance to transfer the assets retroactively, from April 1, 1992, was promulgated by the President on January 8, 1993.

- c) upgrade environmental performance of NTPC power stations and make its new power stations environmentally more sustainable; and
- d) strengthen environmental management and resettlement and rehabilitation management capability.

4. The project comprised:

- a) A five-year time-slice of NTPC's least cost investment program of new coal and gas based power stations for which full funding had not yet been arranged;
- b) Support to NTPC to undertake several joint venture operations; and
- c) The implementation of an Environmental Action Plan (EAP) which included environmental upgrading of projects, as well as training and technical assistance for strengthening NTPC's environmental and R&R management capability.

5. NTPC had requested that the first two generation projects to be considered would be the Vindhyachal II and Rihand II thermal power stations, but under the time-slice approach, NTPC had the flexibility to use the proceeds of the Bank loan for other power projects as well, provided that the specified eligibility criteria were met. During implementation, Rihand II had to be dropped from the list since the State of Uttar Pradesh was not in compliance with the provisions of its Bulk Power Purchase Agreement with NTPC. After some discussion, the naphtha/gas powered combined cycle power plant at Kayamkulam was selected as a replacement, since the southern region showed considerably better payment performance than the northern and eastern regions. Thus, the two generation projects finally included under the time-slice loan were Vindhyachal II in Madhya Pradesh and Kayamkulam in Kerala. This underlined NTPC's move to align its investments to those States who complied with their PPAs and reformists. Physical implementation of the generation aspects of the loan has proceeded to cost estimate and ahead of time (according to the revised schedule agreed with the Bank).

6. When this project was presented for approval, this time-slice loan was intended to be the first in a series of three operations to support NTPC's investment program which, would be presented for consideration of the Board, at intervals of 18 to 24 months, for a total amount of US\$1.2 billion, provided that NTPC remained in compliance with the loan covenants. The time-slice approach was a unique feature of this project. In the event, the subsequent timeslice loans were not processed, as NTPC was not in compliance with its covenants.

7. The second objective of helping NTPC meet its targets for capacity additions through increased mobilization of funds from internal resources, domestic and foreign capital markets, as well as from the private sector through joint venture operations, has substantially been achieved. NTPC is now accessing both domestic and foreign markets to raise capital on its own behalf. The prospects for independent power producers (IPPs) changed in India during the course of the project and few reached financial closure due to the lack of creditworthiness of the State Electricity Boards, who would be the power purchasers. Thus, investor interest in IPPs declined and it was not an attractive prospect for NTPC to enter into significant joint ventures in this area. However, NTPC has entered into joint ventures to carry out other services, such as the erection and rehabilitation of power plants, both in India and abroad.

8. The implementation of a comprehensive EAP was another unique feature of the project. The objectives of the EAP were: (i) to rationalize and improve NTPC's organizational structure for environmental management at the corporate and plant levels; (ii) to improve environmental monitoring

and the preparation of environmental impact assessments; (iii) to execute a specific program of remedial environmental measures for NTPC's existing power stations to ensure compliance with Indian environmental standards; (iv) to address outstanding R&R issues (within the context of a new corporate R&R policy); and (v) to upgrade NTPC's capability to prepare and execute R&R programs. The EAP covered six operating NTPC power stations.

9. *Re-evaluation of the project objectives.* The project's objectives were supportive of the Government's energy policy, its vision for the industry structure and its use of central sector agencies as agents of reform. The objectives of the project are in line with the Policy Paper "*The World Bank's Role in the Electric Power Sector*", published by the Bank in 1993. Its findings were that the Bank had contributed to the rapid expansion of the power sector in many developing countries, that access to service had increased, and that power sectors generally perform better than most other sectors. However, the Paper concluded, overall power sector performance had deteriorated since the 1970s, brought about by high oil prices, overwhelming interest rates and inflation; declining access to foreign loans and utterly insufficient sources of capital investment; inappropriate policies on pricing, as well as inadequate encouragement of demand-side management. The paper drew attention to a scant regard for environmental protection, with utilities operated through weak or non-existent financial practices because of government interference, mainly resulting from costly and inefficient, politically motivated attempts to solve social inequities. Thus the Bank's power sector borrowers had made little or no progress in achieving autonomy or financial and technical viability, which would have enabled them to attract the much needed investment capital from overseas and domestic commercial and private sources with the support of sovereign guarantees. To India, all of these concerns were relevant to a great degree.

10. The changes foreseen in NTPC's operations under the project objectives, in terms of encouraging alternative financing mechanisms and transparency in its operations, were clearly in line with the Bank's policy. The Paper affirmed that Bank lending for electric power would in the future focus on countries with clear commitments to improving sector performance, and that the requirement for power lending will be an explicit country movement towards the establishment of a legal framework and regulatory processes satisfactory to the Bank. To this end, in conjunction with other economy-wide initiatives, the Bank will require countries to set up transparent regulatory processes that are clearly independent of power suppliers and that avoid government interference in day-to-day power company operations, regardless of whether the company is publicly or privately owned. The Policy Paper also recognized that because of the capital intensity of the power sector, an adequate private supply response would take time to materialize, and power deficiencies would worsen. Therefore, some transitional investment by the Bank would be needed, but that this must be linked to progress in power sector reform. The linkage of this project to power sector reform has been underlined by NTPC's recent moves to align itself to assist the reforming states that are working to reestablish their creditworthiness (see Appendix E).

B. ACHIEVEMENT OF OBJECTIVES

11. **Overall Results.** The objectives of the project are in the process of being achieved, despite rather variable implementation performance: (a) the physical investments in the two power plants have been completed ahead of schedule; (b) commercial discipline has been significantly improved and this improvement has enabled NTPC to continue to grow while reducing its reliance on government funds from 44 percent to only 2 percent of its investment needs; (c) acceptance of the importance of environmental issues has improved, although implementation is still slow; (d) handling of R&R issues is still not well addressed by NTPC, and not integrated into the projects, particularly at older sites like those in the Singrauli area, (although it has improved at green-field sites such as Kayamkulam).

12. Assessment of Individual Areas

(a) Help improve commercial discipline in the power system through the implementation of new commercial and investment policies. Significant progress has been achieved in meeting the objective of instituting more commercial discipline into the power sector. Even at the time of appraisal, the most significant financial risk foreseen within the project was the ability of NTPC to recover its charges from its clients. Efforts were made to mitigate this risk prior to the project's commencement by the arrangement of Bulk Power Supply Agreements. Under these Agreements, the commercial principles included: (a) permitting NTPC to shut off power or restrict supply to states in case of non-compliance with agreed terms of payment; (b) if physically or technically not feasible, charging defaulting states penal rates for drawing power in excess of the coverage provided by the respective letters of credit; (c) diverting power to other states in case of non-compliance by any state; (d) delaying new investments in states not in compliance; (e) undertaking projects in one region with substantial output allocated to other regions; (f) participating in joint ventures with foreign and local private partners; (g) introduction of two-part tariff for coal-fired power stations; and (h) transparent relationship with all customers. The bottom line was supplying power to only those customers who would pay. Significant improvements have been made in this area, but ultimately NTPC is reluctant to pursue debts aggressively in some specific areas, since it lacks political support for the required measures.

In addition, from a country-wide perspective, this improvement in commercial discipline will only be truly valuable when it extends to the State utilities as well as the other central utilities. One impact of the pressure exerted by NTPC to be paid for past dues was the institution of a scheme for payment of energy dues directly from the central plan assistance allocated to the States. While convenient for NTPC and the other central utilities, this scheme reduces the State's funds available for social sector spending such as health and education.

NTPC is actively working with state utilities that are committed to reform, to ensure that future investment and operational decisions are biased towards creditworthy states.

(b) Help NTPC meet its targets for capacity additions through increased mobilization of funds from internal resources, domestic and foreign capital markets as well as from the private sector through joint venture operations. This objective has been achieved. NTPC is now accessing both domestic and foreign markets to raise capital on its own behalf and is financing plans to finance its future investments through 30 percent internal cash generation and 70 percent domestic and foreign debt. It is apparent that the presence of the World Bank as a lender to NTPC, and the improved financial discipline associated with this project has assisted NTPC in accessing the local and international capital markets, such that the current financing plan for NTPC envisages Government funding for power generation projects reduced from some 44 percent⁵ to some 2 percent only. The prospects for independent power producers changed in India during the course of the project, due to problems of guaranteeing payments for power generated when the state utilities are not creditworthy; such that it was not an attractive prospect for NTPC to enter into significant joint

^{5/} See Appendix E:- For existing capacity funding was through internal cash generation 20 percent; Government equity including Bank loans passed on as equity 30 percent; Government loans including Bank loans on-lent 14 percent; domestic bonds 13 percent; domestic debt 2 percent and commercial borrowings 21 percent. The Current financing plan for future generation projects is based on internal cash generation (net of 30 percent dividends to Government) of 30 percent; marginal Government equity (ongoing OECF assistance for Faridabad is passed on as equity) 2 percent; no Government loans; multilateral loans 23 percent; domestic bonds 10 percent; external bonds 19 percent and external commercial borrowing 16 percent.

ventures in this area. However, NTPC has entered into joint ventures to carry out other services, both in India and abroad, such as the erection and rehabilitation of power plants (see Appendix E). The difficulties of implementation and covenant compliance of this project, which brought into doubt the release of a second time-slice loan to NTPC from the Bank, contributed to the pressure for NTPC to raise funds on the open market. This has now been achieved to such an extent that the absence of the second time-slice loan is not a major constraint for infrastructure investment.

The physical objectives of the project comprising the construction of the second phase of Vindhyachal Thermal Power Station in Madhya Pradesh and the Kayamkulam Combined Cycle Power Station in Kerala has been achieved.

(c) Upgrade environmental performance of NTPC power stations and make its new power stations environmentally more sustainable. There has been significant improvement in the environmental sustainability of NTPC's operations. NTPC has introduced improvements in its system for reducing particulate emissions from some plants from its stacks (upgrades of the ESP system). Stack emissions are still occasionally above the GOI regulatory level of 150ug/Nm³, particularly at Farakka, due to the old design of the Electro Static Precipitator (ESP). However, ambient air quality is in the acceptable range for industrial areas (although it is above the acceptable level for residential areas in the colonies for plant employees, which are located close to the plant, despite the tall stacks). The concentration of total suspended particles (TSP) in effluent from the ash disposal system is often higher than GOI standards dictate. The water temperature differential for cooling water, while it meets the recently established national standard of no more than 10° C across the condenser is substantially higher than the GOI standard of no more than 5° C between the intake and discharge point. This was in effect when the project was appraised, and the Bank guidelines of 3° C between inlet and outlet mixing zone. The main outstanding issues from the actions agreed with the Bank are now the completion of the ash pond effluent recirculation systems (put on hold due to the delays in clearance of the ash-dykes, which is now ongoing) and further action following from the reports on mercury contamination and ecological impact studies. The Bank and NTPC continue to disagree as to how extensively the mercury contamination report should be disseminated (see Appendix C). In addition, as a good practice, NTPC agreed with the Bank that a computerized environment information and monitoring system should be implemented and this is ongoing under a system referred to as Paryavaran Monitoring System (PMS).

(d) Strengthen environmental management and resettlement and rehabilitation management capability. NTPC has established a position of Executive Director (ED) for Environment and R&R, (reporting to the Director (Operations) for environmental management and audit, and to the Director (Personnel) for R&R and safety), consolidated all related activities except preparation of Environmental Impact Assessments (EIA) under this ED, and has filled all 65 positions in the expanded (from 28) directorate. NTPC has availed itself of training provided by BEI (UK), and limited technical assistance from the E-7 network of national power companies. Guidelines have been developed for NTPC's environmental management, established Standard Operating Procedures for control of air and water control for all its plants. Monitoring of effluent parameters are carried out by methodologies specified by the relevant State Pollution Control Board. NTPC's expertise has enhanced in the areas of pollution and waste reduction, effluent treatment and emission control systems. However, strengthening of capacity to analyze environmental monitoring data for remedial measures through trend analysis still needs improvement. The results on the social side, in particular related to resettlement impacts, have been less successful. It seems clear that there was, initially, a lack of commitment and understanding to addressing the issues of displacement in a manner coordinated with other project components. NTPC has gradually

improved its in-house capacity and capability to address these concerns, but the social impacts and opportunities appear to continue to receive inadequate attention (see Appendix D).

13. Achievements of Output

A. A five-year time-slice of NTPC's least cost investment program of new coal and gas based power stations for which full funding had not yet been arranged. The project supported part of the cost of the construction of two power stations, namely Vindhyachal II and Kayamkulam. The remainder of the finance for these stations was drawn from NTPC's own internal resources. During this time NTPC also implemented other projects as detailed in appendix E. NTPC's total investment in generation and related projects for the financial years FY94 to 99, has been some Rs 120 billion (US\$2.9 billion). Thus, this project has constituted 14 percent of NTPC's investment time-slice for the period.

VINDHYACHAL II

14. The first 500 MW unit (Unit 7) of the Vindhyachal II plant, in Madhya Pradesh, was commissioned and synchronized on 3 March 1999, ahead of the revised schedule as approved by the Bank, by almost 5 months and on schedule based on the original estimates made in the Staff Appraisal Report (SAR). The second 500 MW unit (Unit 8) was commissioned in February 2000, three months ahead of the revised schedule.

15. The required infrastructure to support the operation of the additional 1,000 MW under the project is well in place. The coal handling, ash handling, cooling towers, cooling water system and other plant have all been commissioned. There is adequate stock of coal and the coal supply arrangements (4.8 MT/year for Vindhyachal II, in addition to 5.2 MT/year for Vindhyachal I) are complete. The merry-go-round railway system linked with the Nigahi coal mines is in satisfactory operation and undergoing further enhancement. Existing 400 kV and 132 kV transmission lines, in addition to HVDC transmission, are capable of evacuating the full complement of power from the plant. Additionally, two more 400 kV lines to Jabalpur and two lines to Satna-Bina have been constructed and charged by Powergrid Corporation as a part of Vindhyachal Stage II development.

KAYAMKULAM

16. Construction of the 350 MW (two 115 MW gas turbine and one 120 MW steam turbine) naphtha-fired combined cycle power plant (CCPP) in Kerala has been completed; and all the turbines have already been commissioned. This is an innovative plant for NTPC for a variety of reasons including that it is NTPC's first coastal plant and first naphtha-fired station. The land was below sea level and required filling and compacting before the plant could be constructed. The land was filled by dredging the Kayal River.

17. Gas turbine no. 1 was started up and synchronized in December 1998, compared to the original schedule of February 1999. Gas turbine no. 2 was started up and synchronized to the grid in March 1999 where the original schedule called for synchronization in April 1999. The Steam turbine was commissioned on 30th October 1999, against a schedule of February 2000.

18. The supporting infrastructure is already in place, including a double circuit 220 kV transmission line to Edaman. These lines, with future upgrade capability to 400 kV, would be adequate for evacuating the full complement of power from the Kayamkulam plant. An additional set of double circuit, 220 kV transmission lines to Pallom, with future conversion to 400 kV, is complete. The State of Kerala is to be

the sole beneficiary of this power plant. NTPC is planning to build a second phase of this plant and will, when the gas terminal at Cochin is in operation, convert the entire plant to LNG.

B. Support to NTPC to undertake several joint venture operations

19. The possibility of joint venture finance has also proved less important than was previously envisaged since NTPC's financial situation has improved sufficiently for it to be able to raise finance more easily from the domestic and international markets. NTPC's principal venture into this area has ended in litigation as the joint venture partners are alleged to have failed to comply with the promoter's agreement. This experience has not encouraged NTPC to enter into further joint venture agreements for the construction of power stations.

20. In the meantime, NTPC has started to enter into joint ventures for other purposes in which the partner has some competitive advantage to offer NTPC. For example: (a) a joint venture company (called Utility Powertech, Ltd. [UPL]) has been formed between NTPC and BSES (Bombay Suburban Electricity Supply) for construction, erection and project management work in the power sector and other sectors; UPL has carried out several jobs including the erection and modernization of a 50MW station in Bangladesh; (b) through an open selection process, NTPC selected ABB Kraftwerke AG, Germany, as the partner to form a joint venture for carrying out renovation and modernization of power plants in India and abroad; (c) after terminals are constructed by Petronet and Gujarat Pipavav LNG Ltd., NTPC is planning to move to natural gas for some of its plants and has consequently taken an equity stake of 10 percent in Petronet and plans a 26 percent stake in Gujarat Pipavav LNG Limited; (d) Power Trading Corporation has been formed to assist the IPPs in the setting up of mega power projects in the power sector. PTC will have 30 percent equity contribution from Powergrid, 15 percent from NTPC and 15 percent from the Power Finance Corporation. The balance of 40 percent equity is being offered to State Governments, SEBs, other financial institutions and the public at large; and (e) NTPC has obtained GOI's permission to set up hydropower projects. It is exploring the option of implementing green-field hydro projects/taking over incomplete/running plant(s) from SEB, in view of their outstanding dues. Further, the Ministry of Power (MOP) has conveyed its no objection to NTPC taking up the execution of Kol Dam Hydro Electric Project (4x210 MW). An agreement has been signed with the Government of Himachal Pradesh, in which the project is progressing.

C. The implementation of an Environmental Action Plan (EAP), which included environmental upgrading of projects, training and technical assistance for strengthening of NTPC's environmental and R&R management capability

21. The EAP agreed at appraisal was an ambitious agenda. Many of the activities agreed under the EAP have been greatly delayed and some have been dropped. In part, this was due to the innovative nature of some of the studies and projects concerned; but in some cases, this was due to inertia on all sides. Of the major investment programs, only the ESP modernization program, which in addition to reducing stack emissions, also reduced the energy consumption of the ESPs by over 60 percent and reduced suspended particulate matter by up to 22 percent, has been fully implemented, although with substantial delays. Hazardous material storage and handling has been upgraded and sanitary wastewater facilities are now in operations. A detailed overview of the status of the program is provided in Appendix C.

22. NTPC's implementation of the EAP has resulted in a stronger environmental organization. However, there appears to be less than ideal flow of information among the various units, with minimum level of authority given to and initiative taken by environmental personnel at power plants. In addition, the environmental responsibilities of the Environmental Executive Director and General Managers need

to be more clearly defined. NTPC's action towards obtaining ISO14001 is to be commended. Implementation will, however, require a greater dedication, pro-activeness, openness and transparency at both the corporate center and each power plant, and most importantly, the development of a monitorable plan of action for continued improvement in environmental performance, above and beyond the requirements specified through the Government's environmental standards.

23. Initial steps have been taken to bring greater awareness of environmental concerns to operating management and staff at all levels. NTPC have increased the staff coverage of these programs to ensure that the environmental message gets effectively disseminated to all NTPC employees. The Bank is assured, by NTPC, that all employees and executives will have received training by the end of 2001.

24. The Electrostatic Precipitator (ESP) Upgrade Program was the largest environmental investment for NTPC. It has been completed at all plants. The program has been highly successful as can be seen by the reductions in power consumption and PM emissions. These have met expectations on energy savings and have improved ash collection from exhaust gases.

25. The Closed Cycle Cooling Systems retrofits for existing plants, which were needed to meet Indian standards for temperature rise in effect when the project was approved, were not retrofitted to existing plants. NTPC delayed implementation of this project component because (i) the environment regulations were under review; (ii) it was unable to find sufficient space for efficiently locating the needed cooling towers; and (iii) it was concerned that the cost of the towers would not be included in the tariff rate base. NTPC believed that, given India's extreme power shortages, it could not shut down its plants for the time required to install and connect the new systems without major political repercussions. The relevant environmental regulations, which NTPC had expected to be modified in 1993, were eventually modified by the Ministry of Environment and Forests (MOEF) in late 1998, when the maximum permissible temperature rise was raised from 5°C to 10°C. However, to avoid this problem in the future, MOEF now requires all new thermal power plants using fresh water, to include closed cycle cooling systems.

26. Re-circulation of ash slurry, which was advocated as part of the MOEF intention to move towards "zero discharge" environmental standards, is planned for all plants. Some of the recirculation systems have been redesigned and re-tendered. In the mean time, existing facilities have been rapidly filling. In some cases, NTPC believes that investing in re-circulation equipment for their remaining life would not be economic. Re-circulation systems will only be installed for new ash ponds. Thus, ash slurry recirculation plants for Farakka and Singrauli plants were dropped from the EAP in consultation with the Bank. In some cases installation of re-circulation systems has been delayed by the difficulties associated with the project affected families living in the ash dyke areas. Although ash utilization has been deleted from the EAP, ash management programs designed to find productive ways to utilize ash are gaining strength, particularly for use in cement products and for road materials and landfill. Productivity and heavy metal uptake studies are being carried out on ash use for soil conditioning for food and fodder crops. Preliminary indications suggest that heavy metal intake is low for the crops tested.

27. Environmental monitoring has been expanded. Disaster management plans have been established for all the hazardous waste facilities. Ecological impact studies are being implemented. Staff health surveys have been initiated, with special emphasis on jobs in hazardous areas. However, methodologies for all these studies need to be improved. The first ash pond leachate analysis and groundwater contamination and ecological monitoring impact study has been completed and the second is ongoing. A mercury contamination study for plants and humans was implemented, but has been made publicly available only in the local public information centers. The Bank has encouraged NTPC to disseminate this study more widely, but NTPC feels that it should not have been asked to do this study alone, since the problem is a regional one, with NTPC being only one of the several operations in the region which

emit Mercury. It fears that it will be singled out for blame if it distributes the study under its own name. The Bank agreed to delete from the EAP the more relevant Mercury Fate and Transport Study, which was to study what happened to mercury in the coal used by NTPC's power plant, because NTPC data showed that the mercury level in Singrauli coal was significantly lower than that in Europe and the US. Subsequently, better-designed, analytical studies that were requested by the Bank have demonstrated that mercury levels are high enough to warrant implementation of this study. However NTPC does not have any plans to reinstate the study, since such studies have not been carried out in other countries and it, therefore, lacks a frame of comparison for the results.

28. Monitoring and reporting has also been limited by NTPC's view that its only legal responsibility is to implement the Indian statutory monitoring requirements of the Central and State Pollution Control Boards (PCBs). NTPC has implemented environmental data gathering and reviewed activities that go beyond the mandate of the PCBs, particularly in respect of dry ash extraction, liquid waste treatment, better ESP designs and consideration of super-critical technology. It has not however, gone so far as to implement all the standards recommended by the Bank. NTPC feels that, on environmental matters, it is accountable to national entities, not to international entities such as the Bank. The fact that the Bank failed to include, in the project's loan and project agreement legal documents, the specific environmental standards that it expected NTPC to meet, also added ambiguity to NTPC's interpretation of its obligations in this matter. Under such circumstances, it is not surprising that the Bank found it difficult to supervise and enforce its environmental standards, unless the PCBs had established similar standards.

29. The ESP retrofit at Vindhyachal has been completed and is operating satisfactorily. The ash water slurry re-circulation system for the existing phase I plant was delayed and has now been incorporated in a redesigned system covering both the existing and the new plant. This system has been re-tendered and will be awarded by May 2000. In the interim, Vindhyachal has been having a difficult time meeting the Effluent TSS standard. Unresolved R&R problems with PAPs located on the edge of the Phase I ash pond area have greatly limited their ability to increase the height of the ash-dykes (to allow more particulate settling time). Owing to the R&R problems in the ash-dyke area, at the end of 1998 NTPC allowed ash to flow into the reservoir for about three months. This discharge has now been stopped, but NTPC was unable to remove this ash, reportedly due to opposition of nearby PAPs. However, the R&R problems now having been largely resolved, NTPC reports that the ash is expected to be lifted from the lake by June 2000.

30. The Kayamkulam plant was not in full operation before the ICR mission and therefore, no evaluation of its actual environmental performance could be made. NTPC has a program for monitoring ambient air quality and aquatic ecology, particularly surrounding the cooling water discharge channel once the plant starts operating. A contract for monitoring the aquatic ecology of the Kayal River was awarded in December 1999. A tree-planting program is under implementation.

31. NTPC, as a technical agency with a mandate to provide energy, is expected to address social issues. This requires a fundamentally different mindset from technical approach; the company's staff has been trained and oriented. NTPC's R&R management capacity has improved over the life of the project. However, although an organizational structure along with an Executive Director, Environment and R&R, has been created to address resettlement issues, its integration with the overall organizational structure remains poor. Besides, there is no incentive structure within the company to reward good work on socio-economic development including R&R, which is still considered by some as a stumbling block or potential hindrance in the project execution. Some NTPC officials appear to regard the entitlement framework in the corporate R&R policy as overly generous and others seem to regard spending staff time and money on social issues as a low priority.

Compliance with Loan Covenants

32. NTPC has generally been in compliance, but has not fully complied with two critical covenants agreed under Ln. 3632-IN; in the areas of "accounts receivable" and "environment and resettlement achievement", as follows:

Accounts Receivable

33. While most financial covenants have been consistently achieved in a highly satisfactory manner, bill collection remains a severe challenge. Bank assistance to NTPC was under informal suspension on this account in 1994. The Bank was again on the brink of remedial action under this loan in 1996, as receivables once again exceeded the covenanted level by a significant margin and the agreed commercial and investment policies were not effectively and consistently applied. NTPC's accounts receivable at about 3.7 months as of March 31, 1999; again exceed the agreed maximum of 2 months by a wide margin. Payment of current dues is 94.8 percent in 1998/9 as compared with 92.7 percent in 1997/8. It is the previous outstanding dues that NTPC has struggled to collect; these amounts are exacerbated by two major issues that have increased the amount of accounts receivable. Firstly, income tax is now charged on NTPC earnings and passed through to the customers; and secondly, the final price for power from power stations is determined late, necessitating an adjustment to prior billing. However, even if these unpaid amounts were adjusted from the total outstanding then the account receivables would be some 2.8 months as at 31 March 1999 (and still in violation of the covenant). In terms of payments by individual states, all Western region states and most Northern and Southern region states are currently performing in terms of payments to NTPC. Thus, NTPC's critical client states are now Delhi and Uttar Pradesh in the northern region, and the whole of the eastern region. (See chart in Appendix E)

Environment and Resettlement

34. Environmental and social aspects, at investment project and corporate levels, in the past have not been addressed in a manner satisfactory to the Bank. Progress has been made in environmental compliance, but at times during the project NTPC was not in compliance with the Bank's Operational Directive 4.30 on Involuntary Resettlement. However, recently, NTPC, the IMP and the Bank have worked closely to try to improve the situation and the implementation of the RAP is now proceeding satisfactorily.

C. MAJOR FACTORS AFFECTING THE PROJECT

35. In addition to the covenant compliance issues noted previously, the major factors affecting the project were: (a) clearance and contract delays; (b) environmental issues; and (c) resettlement and rehabilitation issues, as follows:

Clearance and contract delays

36. *Project Delays.* Initially, project implementation was slow. Project effectiveness was delayed because of a recurrence of bill collection problems. This remained an area requiring constant and considerable attention from NTPC management. Owing to the poor financial situation of the SEBs, NTPC is, even now, not fully in compliance with the two months accounts receivable covenant. The bill collection problems have, however, not affected NTPC's capability to provide their contribution to the project cost and NTPC's overall financial position remains strong.

37. The tender documents for the main plant packages for Vindhyachal II were issued before Board presentation in June 1993, but the contracts could only be awarded in early 1995, because of delays in obtaining the final GOI clearance. As a result, the project implementation schedule had to be revised. There was also an inexplicable delay by CEA in providing the techno-economic clearance for Vindhyachal II Project. Despite these delays, the construction was completed ahead of the revised schedule agreed with the Bank.

38. *Outstanding Contracts.* The delay in processing further Bank financing to NTPC is causing contractual and timing problems. Vindhyachal II and Kayamkulam power stations were both approved for Bank financing under this loan and after the exhaustion of funds under Ln. 3632-IN. Balance payments amounting to about US\$200 million would, in principle, have been eligible for Bank financing under a proposed NPTC II (the second time-slice loan). However, this second time-slice loan has been significantly delayed, principally, by the issues of covenant non-compliance, noted above, and is no longer part of the Bank's proposed lending program. In practice, NTPC has sufficient fund raising capacity to complete these projects from its own resources. However, the contracts were let on the assumption that they would be Bank financed and consequently contractors would be eligible for "deemed export benefit". The contractors quoted for the contracts assuming that they would receive this benefit. In the absence of Bank funds to complete these contracts, there will be contract management difficulties, which will not only delay the project, but will also raise the project cost.

39. For the environment component under this loan, NTPC has already awarded contracts amounting to some US\$64 million, out of which only about US\$17 million has already been disbursed under the loan. Due to the full disbursement of the first loan and non-availability of the second loan, at this time, packages totaling US\$12 million are now being re-tendered under domestic funding. The rest of the equipment was to be purchased with funds from the anticipated second "investment time-slice" loan. NTPC will have to find the funds for the remaining US\$59 million and will have to pay the increased cost associated with the materials losing the status of "deemed exports". Besides increasing the cost of these project components; implementation, which has been very slow, will be further delayed by these funding issues. However, it should be noted that, since this is a time-slice loan, more of the proceeds of this first time-slice could have been used for these environment contracts if the implementation had not been delayed at such a late stage in the project period, or if less funds had been allocated by NTPC to the construction activities.

Environmental

40. *Wetland at Kayamkulam.* According to the EIA, a substantial portion of the Kayamkulam plant site was 1.5 meters below mean high tide, and had to be raised with 1.5 million cubic meters filled dredged from the Kayal. Yet the Bank accepted the EIA description of this land as "wasteland", rather than its appropriate classification as wetland. In the original EIA, this land was properly classified as a wetland. However, NTPC staff reported that the Bank's environmental staff advised NTPC that it could avoid the use of the term if it could substantiate its claim that the land had been reclaimed in the 1950s. The EIA provides no such claim, which is not surprising since substantial landfill was needed to bring it to above sea level. The Guidelines of OPN 11.02 require that conversion of a significant portion of natural habitats (including wetlands), unless a comprehensive analysis demonstrates that overall benefits from the project substantially outweigh the environmental costs and there is no feasible alternative. No such analysis can be found in the EIA approved by the Bank. On the substantive issue of whether the conversion of this wetland was justified, must rest primarily on the issue of whether land represented a significant portion of the habitat. While the ICR mission was unable to obtain any quantitative evidence about the area, it learned that a substantial portion of the coastline of the state of Kerala is similarly situated. This information suggests that if the EIA had approached the issue in a straightforward,

transparent manner, its analysis would most likely have provided adequate justification for the conversion of the land. Consequently, while the environmental outcome may be satisfactory, the process followed may have been inadequate.

41. Lack of experience in environmental management and environmental design were major causes of implementation delay for some of the EAP components, including the ash pond leachate study, cooling water re-circulation system, and the Mercury Fate and Transport study. The Bank failed to provide sufficient up-front information to implement these components. According to NTPC, the Bank waited to make their views known until designs and procurement packages were completed. While the Bank does not have the resources to provide direct technical assistance in component design, it should be more attuned to the borrower's needs for information on international practices and relevant consultancy groups.

42. *Ash disposal problems* were viewed in the project design stage in the narrow context of power plant practices, rather than in the broader context of the coal cycle. As a result, alternative technologies that might minimize ash-related problems were not considered and evaluated. In particular, there was no evaluation of establishing coal preparation facilities, including coal washing (beneficiation), which could improve boiler availability, reduce boiler maintenance, and ash handling and disposal requirements as well as environmental discharges for particulates and heavy metals.

43. *Bank supervision of environmental matters* by the original environmental team was weak. It accepted Indian National standards as adequate guidelines for NTPC's environmental performance. They did not emphasize the importance of meeting Bank's environmental guidelines, and accepted NTPC decision to limit availability of Bank guidelines to its corporate offices without comment. They also failed to follow-up on all aspects of the EAP, and agreed to drop the Mercury Fate and Transport study from the EAP without adequately examining the empirical basis for the decision. Furthermore, no official Bank follow-up was provided to support the recommendations of environmental supervision field visits, beyond distribution of mission aide-memoires. When the new environmental team was established at the Bank's New Delhi office, and started to supervise the EAP more closely, they were perceived by NTPC as having "moved the environmental goal posts." DEA strongly supported NTPC's position.

44. *The ash water re-circulation concept* still has many unresolved environmental problems, and may not have been thoroughly evaluated. Although the Executive Summary of the EIA for the Vindhychal Stage II raises several unresolved environmental issues, it was approved by the Bank and distributed to the Bank's Executive Directors. Most significant is the statement that the periodic discharges of water with high concentrations of dissolved solids and heavy metals "would not be environmentally sound". It also states that the rich concentration of such salts in the ash will make future ash pond reclamation through vegetation impossible. It is highly questionable whether the Bank should have accepted the re-circulation approach to ash disposal if the problems created are as serious as presented by NTPC. Delay in moving the PAPs from the ash dyke areas has also delayed the EAP actions, particularly the installation of ash pond water recirculation systems.

Resettlement and Rehabilitation (R&R)

45. There are two components to R&R under the project: (i) resettlement and rehabilitation of persons displaced by the construction of new power stations, and (ii) remedial exercises which mitigate the effects of deficiencies in resettlement and rehabilitation from earlier NTPC projects. The Resettlement and Rehabilitation Action Plans (RAPs) for Vindhyachal II, Rihand II and Kayamkulam are being implemented in accordance with the May 1993 R&R policy of NTPC. The Remedial Action Plans (ReAPs) for Singrauli, Vindhyachal I and Rihand I are being implemented in accordance with the provisions of Chapter 5 of that policy⁶. The current status of implementation of RAPs and ReAPs in the Singrauli area and at Kayamkulam is given in the table below⁷.

Table 1: Status of Resettlement and Rehabilitation as of March 2000

STATUS OF R&R	Singrauli	Vindhyachal	Vindhyachal	Rihand	Rihand	Kayam-
		I	II	I	II	kulam
Total land acquired (acres)	4,753	3,663	1,687	2,488*	720	1,167
Government	2,440	307	251	508	11	902
Private	2,313	3,072	888	889	158	265
Forest	0	0	0	660	223	0
Other (Submergence land)	0	284	548	431	328	0
Year of acquisition	1976-82	1985-86	1985-88	1982-85	1986-89	1989-97
Villages affected	27	14	6	6	2	6
Total PAP	=1,755	2,304	1028	1,131	182	2,244
Resettled by March 2000 ^{##}	721	1,300	341	737	113	^{^^} 62
Untraceable/migrated	[#] 482	1,004	3	321	48	00
Rehabilitated by March 2000	1,273	1,266	999	809	143	2040
To be rehabilitated	0	23	29	2	39	204
Resisting relocation	0	0	0	0	0	0

Balance to be resettled nil except at Kayamkulam where balance is 2.

[^] Of this, 1186 acres were transferred to NLC, PWD, and Railways Dept.

= This includes 98 Railway PAPs also.

* According to the R&R office records in Rihand, land acquired was 3202.

Of this 50 deceased

^{^^} PAF self-resettled out of 64 PAFs.

^{##} Homesteads only

46. By January 2000, all the PAPs in the Vindhyachal II and Rihand II projects, who had been refusing to relocate, had moved out of the ash-dyke area.

47. *Land acquisition* was initiated and completed prior to the negotiation of the current loan and involuntary displacement occurred only on land that was immediately required. Displacement was deferred on that land, which remained to be possessed for the ash ponds, and villagers were allowed to continue cultivation. This became an issue when PAPs were subsequently reluctant to move. Another major challenge is to ensure that the income generation schemes are sustainable and are able to restore livelihoods.

48. The number of PAPs /project affected families rehabilitated in Singrauli, Rihand I and Vindhyachal I is based on the findings of the retrofit socio-economic surveys carried out under the projects. As baseline data were incomplete, it could not be ascertained that the livelihood of the PAPs

^{6/} NTPC made a distinction between Stages I and II, under advice from the Bank. Stage I is that period prior to the acceptance of the new policy, and Stage II is that period after. This somewhat artificial distinction has not proved beneficial to the successful implementation of the resettlement.

^{7/} For details of the context of resettlement and rehabilitation in the Singrauli area see Appendix D.

has been improved, but in the vast majority of cases the PAPs are in receipt of compensation for lands and property acquired. Re-establishing lost income and the security that the land provided has proven more difficult, and there are still unresolved issues, as mentioned above. Several community development programs are being implemented by NTPC. A comparative analysis of the standard of living in unaffected villages in the area with the standard of living in the resettlement colonies shows that the living standard in the resettlement colonies is currently higher.

49. NTPC suffers from the problems of “company towns”, where they completely dominate the local economy and have far greater resources than the local Government authorities. As a result, Government and other stakeholders expect NTPC to carry the main burden of local area development. With limited resources and capacity available for local Government, the district authorities have chosen to direct their attention and resources to other areas and populations, which they feel are more in need. NTPC feels this is unjust. They argue, and there is some evidence to support this, that their long term and extensive involvement in providing compensation and services to the affected population has led to a “victim mentality” among the PAPs, and to an unhealthy dependence on NTPC to provide services for which the community or local government ought to take responsibility.

50. It does seem clear that some PAPs have been holding out for more support and benefits than what is reasonable. However, the problem also highlights one of the deficiencies in the approach followed by NTPC and many other agencies dealing with development: Resettlement and other development activities have often been regarded as charitable efforts to provide help to the poor and displaced, but not as comprehensive development effort to be developed in consultation with primary beneficiaries and other stakeholders including local government.

51. Moreover, by not involving the PAPs in a genuinely participatory process about needs, constraints and opportunities, but treating them more as welfare recipients, NTPC has fostered the “victim mentality” among the PAPs. Since they have had little or no say in developing a resettlement and rehabilitation program, PAPs have naturally come to expect decisions taken on their behalf, and assistance to be given with little contribution or participation from their own side. With improved consultation and availability of options, there is a greater sense of ownership of the process among the PAPs, and more likelihood of them taking greater responsibility for their own future.

52. The more complex the situation is on the ground, the more important it becomes to engage local populations in participatory planning and implementation; to consult with them; and to be transparent and fair in implementing the development program. In some cases, the problems have been exacerbated by a sense among the PAPs that NTPC was not consulting properly with them; that there was a lack of transparency in decisions about support mechanisms and services; and that some individuals and groups were given preferential treatment.

53. The situation on the ground has proven to be extremely complex, particularly in Singrauli. It has been characterized by a number of problems not foreseen either by the Bank or by NTPC. Addressing such issues satisfactorily implies a number of steps and inputs, none of which are part of what an agency such as NTPC sees as its core business agenda. This illustrates a key dilemma common to many projects involving displacement of local populations. While such displacement is normally caused by large government agencies utilizing the State’s power to expropriate land under existing Land Acquisition laws, these agencies have limited experience in addressing non-technical components of their projects such as impacts on the environment or on the local population. This has been the case with NTPC. It is important to understand this point, since many of the difficulties encountered during project implementation can be ascribed to the lack of institutional capacity and commitment to the resettlement program. There are understandable reasons for this. NTPC, as a technical agency with a mandate to

provide energy, has effectively been asked to develop expertise as a social development agency. This requires a fundamentally different mindset from the technical approach that the company's staff has been trained in. There is no incentive structure within the company to reward good socio-economic development. Taking the time and spending the money to do this has generally been regarded as something that delays and increases the cost of NTPC's core business.

54. The assessment during the project was that the implementation of the resettlement component was deficient, at times, particularly in the Singrauli area. A major contributing factor to the adverse assessment was the complexity of the situation on the ground, which had posed difficult dilemmas for NTPC and the Bank. This has been the case particularly in the Singrauli region, where displacement of people started as early as 1960, long before a comprehensive framework was developed to address social impacts. In this area, the relationship between NTPC and some of the PAPs has been characterized by mutual distrust and even violent encounters on occasion. In 1997, the conflict escalated, culminating in a formal complaint filed with the World Bank's independent Inspection Panel.

55. The Bank responded by developing an action program with intensified support to the resettlement program. Based on this action program, the Bank's management agreed to extend the project period for a period of six months beyond the original closing date, until March 31, 1999. At the time of closing, there were still unresolved issues and incomplete provision of support to many project affected people. Some of the project affected persons in the Singrauli region still refused to move, and others had not yet been adequately rehabilitated. However, one year after project closing, after much effort on behalf of NTPC, IMP and the Bank, the project affected families have now all moved from the ash dyke areas and the implementation of the RAPs is now proceeding satisfactorily. There are still some pending issues, but the Bank mission of April 2000, was of the view that these are likely to be resolved in the near future. The Bank and NTPC have also agreed to continue their dialogue and hold further discussions on how best to capture lessons learned, and make the necessary changes to corporate resettlement policy.

56. The situation is significantly better in the Kayamkulam area. The site does not suffer from the historical difficulties evident in Singrauli. Also, as this is a more recent project, NTPC has addressed these issues more vigorously and has been able to avoid some of the mistakes of the past.

57. *Disbursements.* The loan was fully disbursed. No cancellation of funds was carried out. NTPC now has long experience of Bank operations and is well able to comply with all the procurement procedures.

58. *Rate of Return.* At appraisal, the rate of return of the project was estimated at 14.7 percent. This was assuming that the stations financed were Vindhyachal II and Rihand II. Based on NTPC's present tariffs, and the revised investment in Vindhyachal II and Kayamkulam, the EIRR of the project is calculated to be 17 percent (Table 9), which is higher than the appraisal estimate.

D. PROJECT SUSTAINABILITY

59. The achievements of the project are likely to be sustainable. The power stations have been commissioned and the advances made in environment and R&R are irreversible. NTPC now receives such high profile scrutiny from environmental and social NGOs that it is unlikely to be able to do any further investment without adequately addressing the environmental and social issues of its projects. In recent interactions with the Bank (March 2000), NTPC management has reaffirmed its commitment to achieving this challenge. In the long run, NTPC's own financial sustainability will be improved by the progress of some of its largest clients to reform their State power sectors and restore their creditworthiness.

E. BANK PERFORMANCE

60. *Identification and Appraisal.* In preparing this project, the Bank endeavoured to introduce innovative components such as the time-slice approach and the environmental action plan with retrospective elements. The EAP (including R&R), was considered at the time to be an ambitious agenda. It took a long time for the Bank and NTPC to reach agreement on the components of this plan, and it is possible that insufficient planning was put in place to ensure that these ambitious targets were achievable. The management response, subsequent to the inspection panel (see below), accepted that the ODs on environmental assessment and involuntary resettlement had not been fully complied with during the preparation of the project.

61. *Supervision.* The Bank has contributed to NTPC becoming a financially strong and technically efficient, for other utilities in the Indian power sector to emulate. The Bank supervision team has worked closely with NTPC on their financing, development, investment plans, expansion plans and options for the future.

62. The relationship between NTPC and the Bank was severely strained over the R&R and environment issues of this project, where performance was weak and NTPC was often reluctant to take the necessary measures to rectify the situation.

63. The Bank has developed its capacity to deal with complex environmental and resettlement issues as the project has gone along. The Bank's capacity in these areas was not as strong in 1993 as it is now. In retrospect, if approved now, the project would probably follow a very different course. Some of the Bank's advice to NTPC was focused on a relatively mechanical application of global policy rather than giving practical advice and guidance on how to address the problems.

64. In March 1997, the project was referred to the Bank's inspection panel, the request for inspection alleged that the Bank was out of compliance with five Operational Policies (OPs) and Operational Directives (ODs)⁸. Management, in its response, stated that OP10.04 on Economic Evaluation and OD 4.2 on Indigenous peoples had been complied; OD4.30 on Involuntary resettlement and OD 13.05 on Project Supervision had been substantially complied with; and OD 4.01 on Environmental Assessment had been partially complied with. Among other things, the inspection panel criticized the Bank for inadequate supervision of the Project. On balance, however, the deficiency was less with the amount and quality of supervision than with actions taken to address the observations and problems highlighted through the Bank's supervision. Management accepted the importance of continuing a broad dialogue with NTPC and recommended an action plan for the continued monitoring of the project. The main features of the action plan were⁹:

- an independent social impact assessment of the projects in the Singrauli region;
- appointment of an independent monitoring panel to assess grievances and provide advice to NTPC and the World Bank; and

^{8/} Namely OP 10.04 on Economic Evaluation, OD 4.0.1 on Environmental Assessment, OD 4.20 on Indigenous peoples, OD 4.3 on Involuntary Resettlement, and OD 13.05 on Project Supervision

^{9/} The complaint to the inspection panel and the Bank management's response are dealt with in more detail in appendix D.

- a time-bound action program, which included development of a more comprehensive development program in the Singrauli region.

65. As a result, the supervision of the project was split between two task managers/leaders, one for the energy aspects of the project and one for the environmental and social aspects of the project. At the same time, the supervision of the environmental and social aspects of the project was taken on by staff from the Bank's New Delhi office, who had regular interaction with NTPC staff, such that supervision was, at times, almost continuous. The project received significantly higher than average supervision budgets in order to intensify the supervision efforts. The introduction of an Independent Monitoring Panel (see Appendix D) was innovative and produced some results, but despite both the efforts of this Panel and the intensified Bank supervision, progress continued to be slow. The Singrauli Area Development project proposed at the time to address some of the wider environmental and social issues of the Singrauli area, (but not relying on NTPC) has also taken some time to gain government support and to get started. Despite extensive discussion of the issues, it has become difficult to identify what else the Bank could have done at this late stage in the project to achieve a better outcome on the environmental and social aspects of the project more quickly.

F. BORROWER PERFORMANCE

66. NTPC has grown and developed over the course of this investment into a power producer of international repute and a potential force for change in India. NTPC's performance on the technical aspects of the project is regarded as highly satisfactory. However, its achievements in the environmental and social aspects of this project have yet to achieve the same standard of excellence.

67. It appears that resettlement (and to some extent also environment), has continued to be regarded as marginal to NTPC's senior management. While there has been improved understanding over time, and sincere efforts by many individuals with the organization, it is likely that many officials within NTPC still regard the broader entitlement framework in the NTPC resettlement policy as overly generous and unnecessary. As discussed in Appendix D, NTPC was not fully committed to undertaking the necessary actions required under the Resettlement Policy from the start of the project. The provisions were agreed to as part of the loan conditionalities, but the agency did not, initially, allocate sufficient resources or develop the institutional capacity to address these issues in an integral manner. As a result, there have been severe conflicts with representatives of local communities, made more difficult by a very complex situation on the ground in the Singrauli area. While NTPC has gradually created an organizational structure more suitable to address resettlement impacts, the units created to deal with these issues have remained poorly integrated into the overall organizational structure with no adequate incentive structure to reward performance. As a result, the results on the ground have been disappointing.

G. ASSESSMENT OF PROJECT OUTCOME

68. Overall, the project outcome will be positive. Power availability in India will be improved from the physical construction of two power plants. The knowledge of managing the environmental and social aspects of large projects in India will be improved by the technological improvements; policy developments and lessons learned from this project.

69. The project is very likely to be sustainable and to achieve its objectives. The project ratings (given in Table 1), reflect the dichotomy of achievement, which is a feature of this project. The construction, operation and power sector development aspects of the project are highly satisfactory, whereas the

environmental effort is adequate, but slow, and the resettlement and rehabilitation was, at times, deficient.

H. FUTURE OPERATIONS

70. The physical results, and proposed future operations, of the project are satisfactory. The physical components of the project are installed and being commissioned. The commissioning experience of Vindhyachal II and Kayamkulam has been entirely satisfactory. Sustainable benefits from this project will require the future operations of the respective power plants at rated output and design efficiency, coupled with increasingly improved standards of power system management. To this end, once the plant is operational, NTPC will sign agreements with the respective power plant management to meet the targets necessary for sustained and beneficial operations. It is to be expected that, once in operation, the power plants will be as efficiently run as NTPC's existing plants.

71. NTPC will also need to continue to follow its current policy of aligning itself with reforming States and developing into a significant force for reform in the power sector in India. NTPC's institutional development is likely to include consideration of further joint ventures, expansion and possible divestiture.

72. The revised resettlement action plans, formulated by NTPC with inputs from the IMP, are being implemented and will continue to be monitored by the Bank, through progress reports and visits¹⁰. In the mean time, NTPC needs to revise its resettlement policy and reconsider its implementation arrangements in the light of lessons learnt from this and other operations over the past few years.

73. While NTPC has made considerable progress in enhancing its environmental performance, there are several areas when further progress will be needed to ensure that it will continue to maintain a forward looking, aggressive approach to the continual process of environmental improvement. The fact that NTPC has decided, as a corporate strategy, to work towards obtaining the international ISO 14001 standard for excellence in environmental management and performance is a welcome sign of high level commitment to the area. In line with these efforts to improve its performance, NTPC has decided to: (i) improve on its data gathering for the study on the impact of leaching of heavy metals from ash ponds on groundwater quality by establishing ground water monitoring wells downstream from existing ash ponds; (ii) provide plant environmental staff with information about Bank environmental guidelines for air and water quality; (iii) continue the environmental training program for its staff; (iv) continue to provide the Bank with quarterly progress reports on its environmental programs; and (v) implement the outstanding portions of the EAP. The Bank intends to continue monitoring NTPC's EAP, although at a much reduced intensity, within the context of its country dialogue on both environment and energy.

^{10/} The Bank will continue to supervise the R&R aspects of the project until it is confident that adequate mechanisms are in place to ensure the resettlement and rehabilitation of the PAPs.

I. KEY LESSONS LEARNED

74. Major findings of the project implementation experience and important lessons for future operations are listed below.

Energy (See Appendix E)

(a) Sector issues: NTPC is an increasingly efficient utility, but it cannot be isolated from the overall problems in the power sector. The majority of NTPC's power is sold to SEBs, who has had a notoriously poor payment record. The determined application of more commercial discipline has led to a situation where NTPC, today, is financially strong and able to attract investors for its development programs on its own. NTPC must be willing to pursue this policy even more positively to reduce its account receivable to less than two months of billing in order to maintain its financial health. This will require a further alignment of NTPC's investment and support to the reforming States who are endeavouring to re-establish themselves as creditworthy utilities.

(b) Clearance delays: Cumbersome clearance procedures of GOI and delays in bid evaluation have caused unnecessary delays, which NTPC cannot afford. Alternative clearance mechanisms should be explored.

(c) Training: Emphasis on staff training has played an important role in the transformation of NTPC into a well-managed utility. The accomplishment in 1998 of a Plant Load Factor in excess of 90 percent in Vindhyachal I, with the lowest plant heat rate and a forced outage rate of 2.7 percent only, bears testimony to the high level of staff training and management potential. These figures are well above the international standards for coal-fired power stations. NTPC needs to continue and enhance its training programme to support the growth of the organisation. This should also include being prepared to take, and learn from, consultancy advice where necessary.

(d) Time-slice risks: The project shows the inherent risks in the "time-slice" approach to investment. NTPC continued to rely on the assumption that the second time slice loan would be available, long after it was clear that their inability to comply with covenants would place this funding in jeopardy. The time-slice is a useful instrument and allows considerable flexibility in the project, but the client's expectations with respect to future funding, needs to be clear at all times.

Environment and social

(e) Early planning and flexibility: Sustainable development requires that environmental and socio-economic issues be addressed satisfactorily at the project preparation stage. Management commitment and capacity, thoroughness in planning, transparency in action plans and open public consultations are all essential ingredients to the success of a sustainable environmental action plan. This has been a very important lesson of the NTPC Power Generation Project. Project implementation became easier, and public relations more amiable, as affected communities and NGOs were invited to get involved in the planning of remedial action plans. In this context, the experience in the implementation of the Kayamkulam combined cycle power plant is noteworthy. Improved involvement of the PAPs throughout the rehabilitation process and greater flexibility allowed by NTPC to finalizing individual resettlement options have played a dominant role in the R&R plan for this component of the project to be implemented better than in the Singrauli area.

(f) Follow-up on issues: Despite a historically good relationship with the Bank, NTPC have a tendency not to act on, or respond to, the Bank's advice promptly. Various problems associated with this project could have been averted if NTPC had taken action earlier, as advised. NTPC was particularly reluctant to engage consultancy assistance. The Bank needs to consider whether there are alternative ways of getting its message across. Consideration should be given to how the Bank can communicate key issues and give practical guidance and advice more effectively, and how Bank staff can work with clients to develop solutions jointly through participatory processes rather than being perceived as imposing unreasonable demands. NTPC's lack of understanding and commitment to the Bank's requirements and environment and social good practice standards was a key reason for the difficulties encountered in this project.

(g) Precedents: It is difficult for the Bank to try to secure compliance with its policies that require higher standards than those which are provided under state or national regulations. Bank standards are seen by the implementing agency as creating precedents for future projects, which may not be funded by the Bank, as well as future financial liabilities. This should be recognised by all parties and agreement reached on the appropriate action in the earliest stages of the project. Projects with complex R&R and environment issues should not be undertaken in a social setting as complex as India without the full commitment of all concerned.

Environment (See also Appendix C)

(h) Technical support and realism: On the environment side, the appraisal and supervision process needs to make more efforts to identify project components that are new for the implementing agency and where assistance from the Bank on internationally available information and resources could greatly speed component design and implementation. At appraisal, it was apparent that the EMP was an ambitious scheme, thus both parties should have devoted more effort to ensuring that all the necessary resources were available for its achievement or alternatively have agreed to a less ambitious plan. It is important that both the Bank and the borrower agree to what is realistically achievable in the environmental action plans during the project period.

(i) National Standards: In the long run, responsibility for regional environmental sustainability resides with the state and central regulatory authorities that oversee compliance with environmental standards. NTPC management is committed only to meeting the standards set by these agencies. The Bank should work with local regulatory authorities to help them upgrade their capabilities to monitor power project emissions and to encourage them to bring their monitoring requirements (and where practicable, their environmental performance requirements) closer in line with Bank's environmental guidelines.

(j) Environmental communications: The principle of openness and transparency is an important element in improving the performance of the Bank and its borrowers. Bank's environmental guidelines should be an explicit, integral part of loan documentation and should be widely disseminated to plant operating management and staff. The Bank should establish the principle that environmental studies that are included in projects financed by the Bank, are to be made readily available to concerned individuals and NGOs. Environmental performance indicators should also be widely publicized, preferably through the State Pollution Control Board, which is in a position to verify their accuracy.

Resettlement and Rehabilitation (See also Appendix D)

(k) Need for new policy: Although the 1993 R&R policy approved by NTPC was considered a significant achievement, it did not evolve in light of changing circumstances in India and experience of implementation of this and other projects. The policy should be reviewed regularly and flexible enough to incorporate the lessons learned as implementation continues.

(l) Focus resettlement policy on new project sites: In a policy revision, the focus should be on how to address new project situations rather than trying to repair damage done in older settings. Mixing the retrofit actions in the ReAPs with the RAPs was a mistake. Broader development plans for an area should be undertaken based on a systematic social assessment, but such plans should not be confused with resettlement action plans for a new area to be developed.

(m) Land, employment, and livelihood restoration: Any future policy frameworks should clearly state that while the agency will attempt to provide land-for-land and long term employment wherever possible, other support mechanisms will also be explored, and be considered acceptable as long as they provide a strong likelihood of helping PAPs restore lost livelihoods. Wherever possible, long-term approaches, such as training of younger people for skilled or semi-skilled jobs should be explored to avoid generating a second generation of landless, unskilled wage laborers. In terms of restoring lost livelihoods, the policy should target support to poor and vulnerable groups, assess risks and opportunities, and provide targeted support aimed at minimizing risks and providing sustainable livelihoods.

(n) Establish clear areas of responsibility: The responsibility of the agency acquiring land should be clearly spelled out in a resettlement policy. This should not only cover what support mechanisms and entitlements will be provided to the affected population, but also make clear the limits of responsibility in terms of time and efforts, and how partnerships and shared responsibilities will be established with other key stakeholders such as local government, the local communities, and other agencies active in the area.

(o) Delayed displacement should be avoided: Allowing PAPs to stay on and cultivate or occupy land once land acquisition has taken place, while well intentioned, has led to renewed demands and claims for additional support once displacement takes place, and to a host of problems involving second-generation affected people. It is recommended that this not be done in future projects unless a clear and transparent consultative process establishes agreement between the responsible agency and the PAPs, that no further support beyond the original package agreed upon can be expected once they have to vacate the land.

(p) Resettlement sites and self-relocation: The best results in terms of homestead sites have come about where people have been encouraged to self-relocate with adequate support in advance. PAPs should be given the choice before displacement takes place between moving to a resettlement site, or self-relocating.

(q) Integrated planning from the outset: Potential social and environmental impacts need to be assessed systematically before any decision is made to invest in major infrastructure, rather than treated as problems to be solved after the fact. OD 4.30 states that suitable design alternatives are to be explored; this was not done systematically in the case in Singrauli or Kayamkulam. As obvious as it may seem, one of the lessons of this project may be that it is rarely a good idea to add further resettlement to an area with existing significant/unresolved resettlement issues.

(r) Stakeholder analysis and consultations: A participatory process involving affected people must be undertaken to assess impacts and reach agreement on support mechanisms. This should

be based on a stakeholder analysis assessing vulnerability and risk, and including attention to issues such as different impacts on men and women. This is one of the most important lessons learned, both for NTPC and for the World Bank. The project is unlikely to be socially or institutionally sustainable without involving stakeholders in a manner that creates understanding and ownership of the development process.

(s) The need for organizational capacity: Far greater attention needs to be paid to the organizational and institutional dimensions surrounding resettlement and other social impacts. In common with many other organizations of its type, NTPC's attempts at building up in-house capacity to address these concerns have often fallen short of meeting the requirements. Other, more flexible solutions, such as developing partnerships with other agencies including NGOs, ought to be explored more systematically in future projects.

(t) Independent Monitoring Panel: The experience shows that establishing an Independent Monitoring Panel has had a positive effect. It is recommended that a neutral agency be appointed to help with monitoring in any suitable project, to help the client and the Bank assess project performance and likely outcomes. The use of such panels should be tailored to the particular circumstances on the ground.

(u) The need for better and clearer communications: There is a need to not only explain the content of the safeguard policies in terms of mandatory principles and procedures, but to provide ongoing guidance and advice to borrowers on how best to achieve the required outcomes. Much emphasis must be put on how a message is transmitted, as well its content. In a situation where the issues are new and unfamiliar and there is often a lack of understanding or commitment to the approach suggested, new and innovative means of communicating and developing the solutions in partnership with the client should receive high priority in the Bank's work.

PART II: STATISTICAL TABLES

Table 1: Summary of Assessments

A. Achievement of Objectives	Substantial	Partial	Negligible	Not applicable
Macroeconomic policies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Sector policies	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Financial objectives	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Institutional development	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Physical objectives	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Poverty reduction	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gender issues	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other social objectives	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Environmental objectives	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Public sector management	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Private sector development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. Project Sustainability	Likely	Unlikely	Uncertain	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
C. Bank performance	Highly Satisfactory	Satisfactory	Marginally Satisfactory	Deficient
Identification	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Preparation assistance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Appraisal	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Supervision	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. Borrower performance				
Preparation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Implementation	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Covenant compliance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Operation (if applicable)				
E. Assessment of outcome		Highly satisfactory	Satisfactory	Deficient
		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Table 2: Related Bank Loans/Credits

Loan/Credit Title	Purpose	Year of Approval	Status
IBRD Loans			
<i>Preceding Operations</i>			
Ramagundam Thermal	3x200 MW	January 1979	Complete
Farakka Thermal	3x200 MW	June 1980	Complete
Second Ramagundam Thermal	3x500 MW	December 1981	Complete
Central Power Transmission	400kV+220kV transmission	May 1983	Complete
Second Farakka Thermal	2x500 MW	June 1984	Complete
Rihand Power Transmission	500kV HVDC+400kV AC tr.	May 1985	Complete
Combined Cycle Power	413 MW (Anta)	April 1986	Complete
	652 MW (Auraiya)		
	652 MW (Auraiya)		
Capital Power Supply	4x210 MW (Dadri)	June 1987	Complete
Talcher Thermal	2x500 MW	June 1987	Complete
<i>Following Operations</i>			
Total IBRD Loans: 9			
IDA Credits			
<i>Preceding Operations</i>			
Singrauli Thermal	3x200 MW	April 1977	Complete
Ramagundam Thermal	3x200 MW	January 1979	Complete
Korba Thermal	3x200 MW	April 1970	Complete
Second Singrauli Thermal	2x500 MW	May 1980	Complete
Farakka Thermal	3x200 MW	June 1980	Complete
Second Korba Thermal	3x200 MW	July 1981	Complete
Total IDA Credits: 6			

Table 3: Project Timetable

Steps in Project Cycle	Date Planned	Date Actual
Executive Project Summary		May 27, 1992
Appraisal	June/July 1992	April 9, 1993
Negotiations	November 1992	May 14, 1993
Board Date	December 1992	June 29, 1993
Signing		December 9, 1993
Effective Date		June 6, 1994
Project Completion	March 31, 1997	September 30, 1999
Loan Closing	September 30, 1997	March 31, 1999

Table 4: Loan Disbursements: Cumulative Estimated and Actual

Bank fiscal years	1994	1995	1996	1997	1998	1999
Appraisal estimate (US\$ million)	80.00	240.00	360.00	400.00		
Actual (US\$ million)	0.0	31.63	51.68	91.67	296.72	403.63
Actual as % of Estimate (%)	0	13	14	23		
Date of Final Disbursement	February 1, 1999					

Table 5: Key Indicators for Project Implementation

Vindhyachal Super Thermal Power Project Stage II (2X500 MW)

A. Procurement

<i>Package</i>		<i>Bid Issue</i>	<i>Evaluation Sent to Bank</i>	<i>World Bank Approval</i>	<i>Contract Award</i>
Steam Generator	Planned				
	Actual	06/25/93	10/05/94	11/03/94	03/02/95
Steam Turbine Generation	Planned				03/24/95
	Actual	06/25/93	12/17/95	03/16/95	03/24/95
ESP	Planned	05/10/95			01/26/96
	Actual	02/25/05	11/28/95	12/21/95	01/17/96
Heaters	Planned	09/19/95			05/24/96
	Actual	08/14/95	06/19/96	07/18/96	07/22/96
Deaerators	Planned	09/19/95		NR	05/24/96
	Actual	08/14/95	02/20/96	NR	05/10/96
C & I	Planned	06/23/95			03/01/96
	Actual	08/23/95	11/14/96	12/12/96	01/03/97
Ash Handling Plant	Planned	08/25/95			03/01/96
	Actual	10/10/95	11/28/96	12/09/96	01/03/97
Boiler Feed Pumps	Planned	06/23/95			03/01/96
	Actual	08/09/95	01/25/96	02/14/96	03/26/96
Power Cycle Piping	Planned	06/23/95			03/01/96
	Actual	08/17/95	01/16/96	02/15/96	02/26/96
Coal Handling Plant (B)	Planned			NR	
	Actual	02/28/94		NR	06/30/95
Generator Transformer	Planned	09/01/95		NR	05/10/96
	Actual	07/31/95		NR	02/06/96

B1. Construction and Commissioning

Vindhyachal II

<i>Key Milestones</i>	<i>SAR</i>		<i>As per GOI Schedule agreed with Bank</i>		<i>Actual/Anticipated</i>	
	<i>1st Unit</i>	<i>2nd Unit</i>	<i>1st Unit</i>	<i>2nd Unit</i>	<i>1st Unit</i>	<i>2nd Unit</i>
Main plant award	Mar-94	Mar-94	Jan-95 (SG) Mar-95 (TG)	Jan-95 (SG) Mar-95 (TG)	Jan-95 (SG) Mar-95 (TG)	Jan-95 (SG) Mar-95 (TG)
Piling work start	Jan-95	Oct-95	Apr 95	Jan-96	Apr-95	Jul-95
Boiler erection start	Oct-95	Jul-96	May-96	Feb-97	Feb-96	Dec-96
Boiler drum lifting			Feb-97	Nov-97	Nov-96	Aug-97
Boiler Hydro Test	Nov-97	Aug-98	Jul-98	Apr-99	Dec-97	Jan-99
TG erection start	Jul-97	Apr-98	Jun-97	Mar-98	Jul-97	Jan-98
TG box up			Dec-98	Sep-99	Nov-98	Sep-99
Boiler light up	Jul-98	Apr-99	Feb-99	Nov-99	Nov-98	Nov-99
Steam blowing comp.			Jun-99	Mar-2000	Jan-99	Jan-2000
Unit synchronization	Mar-99	Dec-99	Aug-99	May-2000	Mar-99	Feb-2000
Commercial operation	Sep-99	Jun-2000	Feb-2000	Nov-2000	May-2000	Nov-2000

B2. Construction and Commissioning

Kayamkulam

Key milestones	SAR			Scheduled			Actual		
	Unit I (GT-1)	Unit II (GT-2)	Unit III (ST)	Unit I (GT-1)	Unit II (GT-2)	Unit III (ST)	Unit I (GT-1)	Unit II (GT-2)	Unit III (ST)
Sanction of project by government	N/A	N/A	N/A	N/A	N/A	N/A	09/96	09/96	09/96
Order for main plant turnkey package	N/A	N/A	N/A	10/96	10/96	10/96	09/96	09/96	09/96
Completion of piling in main plant area	N/A	N/A	N/A	08/97	08/97	08/97	08/97	08/97	08/97
Commencement of gas turbine foundation	N/A	N/A	N/A	08/97	10/97	N/A	08/97	09/97	N/A
Commencement of gas turbine erection	N/A	N/A	N/A	07/98	09/98	N/A	04/98	09/98	N/A
Gas turbine synchronization on HSD	N/A	N/A	N/A	02/99	04/99	N/A	11/98	02/99	N/A
Completion of gas turbine trial operation	N/A	N/A	N/A	03/99	05/99	N/A	01/99	04/99	N/A
Waste heat recovery boiler erection commencement	N/A	N/A	N/A	11/98	01/99	N/A	06/98	09/98	N/A
Waste heat recovery boiler hydrotest	N/A	N/A	N/A	05/99	07/99	N/A	03/99	05/99	N/A
Steam turbine erection commencement	N/A	N/A	N/A	N/A	N/A	02/99	N/A	N/A	01/99
Steam turbine box up	N/A	N/A	N/A	N/A	N/A	12/99	N/A	N/A	06/99
Steam turbine rolling and synchronization	N/A	N/A	N/A	N/A	N/A	02/00	N/A	N/A	10/99
Steam turbine trial operation completion	N/A	N/A	N/A	N/A	N/A	03/00	N/A	N/A	02/00

Table 6A: Key Indicators for Project Operations

Vindhyachal State II (2x500 MW)

<i>Years after entering commercial operation</i>	<i>1-2 years</i>	<i>3-10 years</i>	<i>11-20 years</i>	<i>21-25 years</i>
MU/Year	5250	6000	6000	6000
Availability (%)	70	75	75	75
PLF (%)	60	68.5	68.5	68.5

Table 6B: Key Indicators for Project Operations

Kayamkulam 350 MW

<i>Years in Operation</i>	<i>1-2 years</i>	<i>3-10 years</i>	<i>11-15 years</i>
MU/Year	1840	2140	1990
Availability (%)	75	85.0	80.0
PLF (%)	60	70.0	65

Table 7: Studies Included in the Project

<i>No.</i>	<i>Study</i>	<i>Purpose</i>	<i>Status</i>	<i>Impact of Study</i>
1	Ecological Impact Monitoring	In order to evaluate ecological changes during pre-construction and post-construction phases of thermal power plants, ecological impact monitoring was undertaken at Singrauli, Rihand, Vindhyachal, Korba, Farakka and Ramagundam projects. These studies are to be repeated every two years.	The first study has already been completed and the second study is in progress.	The impacts were positive in some cases, which was encouraging. However these impacts cannot be fully attributed to the construction and operation of NTPC stations in the region. The results of the ongoing studies will provide further insights.
2	Mercury fate and transport study	In order to understand fate and transport of mercury released through stacks of NTPC stations in Singrauli area.	The study was awarded to M/s BARC. Subsequently, in view of the low levels of mercury, the issue was reviewed with the Bank and with the concurrence of the Bank, it was decided to discontinue with the study.	Not applicable.
3	Mercury contamination monitoring	To assess the environmental risk to human population due to mercury in Singrauli area.	Completed through M/s Industrial Toxicological Research Center, Lucknow.	Through levels of mercury in some human and environmental samples were found to be higher than recommended levels; specific large scale clinical symptoms attributable to mercury were generally not detected.
4	Ground water contamination prevention, ash ponds	To assess the possibility of ground water contamination due to ash ponds of Singrauli, Rihand, Korba, Farakka and Ramagundam leaching of toxic metals from ash ponds of NTPC stations.	Completed through leading research institutes in India except for Ramagundam, which was completed under Indo-Dutch collaboration by M/s IWACO.	As per the findings of the studies the possibility of contamination of ground water was remote and no immediate specific mitigatory measures like lining were warranted.

No.	Study	Purpose	Status	Impact of Study
5	BEI twinning arrangement	Development of environmental knowledge base to improve environment performance at operating stations.	Completed	Based on experiences of environment appraisals conducted jointly by National Power, UK and NTPC at NTPC's Badarpur and Kahalgaon Projects, NTPC has incorporated necessary changes in appraisal methodology and frequency in NTPC environment appraisal systems for conducting all its future appraisals.
6	E-7 studies	To understand the practices followed in E-7 countries in various area (about 21) such as plant engineering for minimal discharge, standardize effluent disposal and emission control technology, plant energy efficiency, ash utilization and waste reduction and environmental monitoring and data management, organization of environmental laboratory etc., and to develop system based on practices followed in E-7 countries.	Completed	Reports submitted by E-7, were quite informative and gave a global picture of environment management practices being followed worldwide. The recommendations given in E-7 reports have been/are being implemented while developing systems/designs.

Table 8A: Project Costs
Vindhyachal II (2x500 MW)

<i>Project Components</i>	<i>Total Costs</i>			
	<i>Appraisal Estimate</i>		<i>Actual</i>	
	<i>Rs. million</i>	<i>US\$ million</i>	<i>Rs. Million</i>	<i>US\$ millions</i>
Preliminary works	176	5.8	424	11.2
Civil works	3,599	119.3	3,790	100.1
Steam generator with Aux.	8,705	288.6	5,307	140.1
Electrostatic precipitator	678	22.5	581	15.3
Turbine generator with Aux.	3,019	100.1	3,430	90.6
Power cycle equipment & piping	1,674	55.5	2,175	57.4
C&I including DAS	462	15.3	447	11.8
CW pumps & accessories	217	7.2	457	12.1
Water treatment plant	90	3.0	187	4.9
Fire protection system	69	2.3	111	2.9
Other mechanical equipment	1,565	51.9	1,715	45.3
Coal handling plant	141	4.7	942	24.9
Unit & station transformer	103	3.4	75	2.0
LT switchgear	171	5.7	160	4.2
Control & relay panel	12	0.4	Included in C&I	
Generator & tie transformer	194	6.4	146	3.9
Shunt reactor	34	1.1	37	1.0
Other electrical equipment	784	26.0	729	19.3
Subtotal	21,692	719.2	20,711	546.9
Consultancy	217	7.2	1524	46.3
Establishment & others	1,640	54.4		
Interest during construction			2,696	65.7
Working capital margin			576	13.6
Total base cost	23,549	780.8	25,507	672.5
Physical contingencies	1,459	48.4	166	3.8
Price contingencies	13,151	136.4	569	12.8
Total project cost	38,159	965.6	26,242	689.1

1. Price escalation up to March 1999 is based on actuals. For 1999-2000, it is based on a projected rate.
2. Physical contingencies @3% on projected expenditure for 1999-2000 and beyond.
3. Rs.678 million for exchange rate variation on direct loan is not included above.

Table 8A: Project Costs
Kayamkulam CCPP (350 MW)

Project Component	Total Costs			
	Appraisal Estimate*		Actual (latest estimates)	
	Rs. Million	US\$ million	Rs. million	US\$ million
Works cost				
1. Main plant turnkey contract	7,026	190.4	7,931	201.4
2. Preliminary & civil works	716	22.4	1,115	28.3
3. Fuel oil facilities	636	15.9	562	14.3
4. Makeup water system	74	2.1	91	2.3
5. Miscellaneous pump	2	0.0	3	0.1
6. Fire protection system incl. Civil	3	0.1	3	0.1
7. Air conditioning and ventilation	3	0.1	3	0.1
8. Workshop equipment	5	0.1	4	0.1
9. Lab equipment	4	0.1	4	0.1
10. Switchgear	3	0.1	13	0.3
11. Power and control cables	3	0.1	Included in switchgear	
12. Cabling earthing and lighting protection and lighting	2	0.1	Included in switchgear	
13. 11KV system	11	0.3	30	0.8
14. Computer facilities	3	0.1	33	0.8
15. Consultancy	82	2.1	96	2.4
16. Establishment and others	301	8.0	348	8.8
17. IDC + WCM	1,166	29.5	997	24.2
Total base cost	10,039	271.3	11,232	284.1
Physical contingencies	247	6.7	Included above	
Price contingencies	977	25.4	164	3.7
Grant Total (incl. price & physical contingencies)	11,263	303.5	11,397	287.8

1. Price escalation up to March 1999 is based on actuals. For 1999-2000, it is based on a projected rate.

2. The project cost does not include approximately Rs. 310 M of exchange rate variation on direct loan.

* In the SAR, Rihand II was considered, but later Kayamkulam Combined Cycle Project was included – appraisal costs are taken from project budget estimates at that time.

Table 8B: Project Financing

Funding of Vindhyachal II, Kayamkulam and EAP Packages and Utilization of IBRD Loan

Vindhyachal II				Rs Millions			
<i>Source of Finance</i>	<i>Appraisal Cost</i>	<i>Actual Cost</i>	<i>Expenditure to March 1999</i>	<i>Proposed borrowing for phased expenditure</i>			
				<i>Balance</i>	<i>1999-00</i>	<i>2000-01</i>	<i>2001-beyond</i>
Internal Resources *	5,500	7,870	5,580	2,290	800	520	970
World Bank	13,760	10,050	10,050	-	-	-	-
Domestic/ International Comml. Borrowing	8,270	8,320	1,830	6,490	1,980	1,140	3,370
	27,530	26,240	17,460	8,780	2,780	1,660	4,340

* I.R. was lower, since debt equity ratio of 80:20 was considered at that time.
(Exchange Rate Variation = Rs 680 million)

Kayamkulam				Rs Millions		
<i>Source of Finance</i>	<i>Appraisal Cost</i>	<i>Actual Cost</i>	<i>Expenditure to March 1999</i>	<i>Proposed borrowing for phased expenditure</i>		
				<i>Balance</i>	<i>1999-2000</i>	<i>2000-01 & beyond</i>
I.R.	3,380	3,420	2,970	450	110	340
World Bank	6,750	4,970	4,970	-	-	-
Domestic/ International/ Commercial Borrowing	1,130	3,010	1,110	1,900	770	1,130
	11,260	11,400	9,050	2,350	880	1,470

(Exchange Rate Variation = Rs 310 million)

EAP Packages				Rs Millions		
<i>Source of Finance</i>	<i>Appraisal Cost</i>	<i>Actual Cost</i>	<i>Expenditure to March 1999</i>	<i>Proposed borrowing for phased expenditure</i>		
				<i>Balance</i>	<i>1999-2000</i>	<i>2000-01 & beyond</i>
I.R.	-	-	450	1170	410	760
World Bank	-	-	610	-	-	-
Domestic/ International/ Commercial Borrowing	2,410	2,290	1,120	1,170	410	760

Table 9: Economic Costs and Benefits

**Vindhyachal II and Kayamkulam I
(Rs. Million)**

<i>Financial Year</i>	<i>Capital Expenditure</i>	<i>O&M</i>	<i>Fuel</i>	<i>Total Cost</i>	<i>Incremental Sales</i>	<i>Net Benefits</i>
1995	815	0	0	815	0	-815
1996	1335	0	0	1335	0	-1335
1997	3949	0	0	3949	0	-3949
1998	6813	0	0	6813	0	-6813
1999	9471	0	0	9471	0	-9471
2000	4514	200	3414	8128	6184	-1945
2001	2065	800	7042	9907	14163	4256
2002	2347	800	7913	11060	15189	4129
2003	0	800	8248	9048	15583	6535
2004	0	800	8248	9048	15583	6535
2005	0	800	8248	9048	15583	6535
2006	0	800	8248	9048	15583	6535
2007	0	800	8248	9048	15583	6535
2008	0	800	8248	9048	15583	6535
2009	0	800	8248	9048	15583	6535
2010	0	800	7862	8662	15129	6467
2011	0	800	7862	8662	15129	6467
2012	0	800	7862	8662	15129	6467
2013	0	800	7862	8662	15129	6467
2014	0	800	7862	8662	15129	6467
2015	0	558	2846	3404	6612	3209
2016	0	558	2846	3404	6612	3209
2017	0	558	2846	3404	6612	3209
2018	0	558	2846	3404	6612	3209
2019	0	558	2846	3404	6612	3209
2020	0	558	2846	3404	6612	3209
2021	0	558	2846	3404	6612	3209
2022	0	558	2846	3404	6612	3209
2023	0	558	2846	3404	6612	3209
2024	0	558	2846	3404	6612	3209
2025	0	558	2846	3404	6612	3209

EIRR 17%

Note: For Kayamkulam, price per unit energy sold is Rs.4.28 and assumed gross generation 2200 million unit
For Vindhyachal II, price per unit energy sold is Rs.1.72 and assumed gross generation 3200 million unit

Table 10: Status of Legal Covenants

<i>Loan Agreement</i>	<i>Description of Covenant</i>	<i>Covenant Status</i>
GA 3.01	GOI to enter into an agreement, satisfactory to the Bank, with NTPC for the payment by NTPC of a guarantee fee of 1% per annum on the principal amounts of the Loan withdrawn and outstanding from time to time.	In compliance
GA 3.03	GOI to settle remaining SEB arrears through Central Appropriations in accordance with the schedule agreed with the Bank (FY93/94-Rs.4581.9M, FY94/95-Rs.1998.7M, and FY95/96 Rs.1998.6M).	In compliance
GA 3.04	GOI to take all steps necessary to ensure adequate supply of fuel for the efficient operation of the power plants to be financed under the project by the time the first generating unit for each such plant shall have been commissioned.	In compliance
LA 3.01(b)	NTPC shall undertake only projects with the proceeds of the Loan shall meet the following: (i) technical, economic and financial viability of the plant satisfactory to the Bank, (ii) furnish the Bank with environmental clearances/approval by PIB (iii) State SEB in compliance with BSPA, (iv) furnish the Bank with a satisfactory financing plan, and (v) an R&R plan satisfactory to the Bank.	In compliance
LA 3.03(a)	NTPC to implement the Rehabilitation Action Plan (RAP) in respect of each of the projects to be financed, as agreed with the Bank.	Complied with partially
LA 3.03(b)	NTPC shall (i) carry out socioeconomic survey not later than Dec. 31, 1994 to ascertain the present socioeconomic status of persons affected by the ongoing projects of NTPC, (ii) based upon such surveys, draw up wherever necessary remedial action programs in consultation with the Bank, and (iii) implement such action programs.	(i) and (ii) Complied with (iii) Complied with partially (not yet complete)
LA 3.04	NTPC to implement the Environmental Action Plan dated May 10, 1993, as agreed with the Bank.	Complied with partially

LA 4.04	NTPC to furnish to the Bank not later than Dec. 31, 1993 the scope of the financial management system review satisfactory to the Bank to be undertaken by NTPC: review with the Bank not later than June 30, 1994, the implementation of the recommendations arising from the said review.	In compliance
LA 4.05	NTPC shall not later than Mar. 31, 1994, enter into regional Bulk Power Supply Agreements with all the SEB's with at least two more such agreements to be signed not later than Dec. 31, 1993.	In compliance
LA 5.01(b)(i) and (ii)	NTPC to furnish annually to the Bank within seven months of the FY end its audited financial statements and an audit report of the Special Account.	In compliance
LA 5.01(c)	NTPC to furnish annually within seven months of FY and an SOE audit report.	In compliance
LA 5.02(a)	NTPC shall discuss with the Bank their results of the study on alternative strategies for financing NTPC's long term development, not later than Sep. 30, 1994 and shall thereafter implement the agreed recommendations.	In compliance
LA 5.02(b)	NTPC shall furnish to the Bank for its review, not later than Dec. 31 of each year, starting Dec.31, 1993, its financial projections for the next 10 years, including its investment program and financing plan.	In compliance
LA 5.03	NTPC shall take all steps necessary to maintain its accounts receivable at a level not exceeding an amount equivalent to the proceeds of its sales of power for two preceding months.	Not complied with for all States
LA 5.04	NTPC shall take all such measures as shall be required to produce in the financial year beginning April 1, 1993, funds from internal sources equivalent to not less than 15% of annual capital expenditure and not less than 20% in each financial year thereafter.	In compliance; covenanted levels significantly exceeded.
LA 5.05	NTPC shall create not later than Dec. 31, 1993 an equitable mortgage/charge in favor of the Bank on its unencumbered assets by way of security for its proposed loan.	In compliance

Table 11: Bank Resources: Staff Inputs

Stage of Project Cycle	Planned		Revised		Actual	
	Weeks	US\$	Weeks	US\$	Weeks	US\$000
Pre-appraisal FY92	n/a	n/a	n/a	n/a	88.6	287.6
FY93					66.3	199.9
Appraisal-Board	n/a	n/a	n/a	n/a	34.5	115.7
Supervision	n/a	n/a	n/a	n/a	359.0	1,374.8
Completion	n/a	n/a	n/a	n/a	39.3	149.3
TOTAL					587.7	2,127.3

n/a = not available

Table 12: Bank Resources: Missions

Stage of Project Cycle	Month/Year	No. of Persons	Days in Field	Specialization (see below)		
Through Appraisal	11/91	4	17	FA,E,EC,LE		
	3/92	4	16	FA,E,EC,LE		
	5/92	5	20	FA,E,EC,LE,EN		
Appraisal to Board	04/09/93	3	10	FA,PR,RS		
Board Approval	06/29/93					
Effectiveness	06/06/94					
Stage of Project Cycle	Month/Year	No. of Persons	Days in Field *	Specialization	Performance Rating	
					Implementation	Development
Supervision 1	6/93	1		E		
Supervision 2	8/93	2		RS, NGO	HS	HS
Supervision 3	10/93	7		E,FA,EC,EN, PR, RS, NGO	S	HS
Supervision 4	1-2/94	6		E,FA,EC,EN, RS,	U	HS
Supervision 5	6/94	3		E,EN	S	S
Supervision 6	11/94	1		E		
Supervision 7	5/95	10		ES,FA,EN,E, RS, NGO	S	S
Supervision 8	10/95	8		E,FA,ES,EN, RS,NGO	S	S
Supervision 9	2-3/96	4		FA,EN,RS, NGO	S	S
Supervision 10	10/96	8		E,FA,EN,ES, RS	S	S
Supervision 11	2/97	7		E,FA,ES,EN RS	S	S
Supervision 12	6/97	2		EN		
Supervision 13	10/97	10		E,ES,FA,EN, RS, NGO	S	S
Supervision 14**	3/98	5+2		EN+2 IMP Members		
Supervision 15	5/98	6		E,ES,EN,RS,NGO	S	S
Supervision 16	10/98	2		FA,ES		
Supervision 17	2/99	5		FA, ES, RS, EN	U	U
ICR Mission (18)	5-6/99	5		E,FA,EN,RS	U	U
Supervision 19	12/99	2		ES,FA	U	U

Specialists: E: Engineer; FA: Financial Analyst; EC: Economist; EN: Environmental Specialist
LE: Legal Counsel; RS: Resettlement Specialist; PR: Procurement Specialist
ES: Energy Specialist, NGO: NGO specialist

* Information not available

** In addition to the above, from 1997 onwards the resettlement and rehabilitation and environment aspects of the project were supervised on an more or less continuous basis by staff based in the New Delhi Office. A mission in April 2000 (after the last supervision report) has subsequently ranked the project as proceeding satisfactorily.

AIDE-MEMOIRE OF THE ICR PREPARATION MISSION

INTRODUCTION

1. **The Mission.** An Implementation Completion Report (ICR) is required by the World Bank for each of its lending operations, aimed at improving the quality and effectiveness of Bank loans and reinforcing the borrower's ability to design, implement and operate projects. In this connection, Ms. Judith Plummer, Mr. Sameer Akbar and Mr. Mihir Mitra visited (variously) Kayamkulam, Vindhyachal and Delhi in April/May 1999, to commence preparation of an ICR for the NTPC Power Generation Project ("NTPC I", supported under Ln. 3632-IN) which closed on 31st March 1999. Mdms. Pratima Kochar and Vivi Scott provided support from the New Delhi office and headquarters, respectively. This aide memoire is prepared based on the findings of this mission. For those areas not covered within this mission, the ICR will be prepared using the results of other recent supervision missions, specifically on the social and environmental aspects of the project.
2. The mission is grateful to the management and staff of NTPC and officials of the Ministries of Power (MOP) and Finance (MOF), for the most excellent cooperation, consideration and hospitality extended to its members.
3. The final position of the Bank on the mission's findings will be confirmed by Bank management.
4. The following is the preparation timetable for the ICR. Adequate time has been provided for comments by all parties to be agreed with NTPC and Bank staff.

<i>Action</i>	<i>Completion Date</i>
Completion mission	April/May 1999
NTPC provide statistical data per the formats requested	31st May, 1999
NTPC sends first draft Borrower evaluation to Bank	30 th June, 1999
Bank ICR to NTPC for comment	16 th July, 1999
NTPC sends Final Borrower evaluation to Bank	31 st July, 1999
Comments received from NTPC on Draft ICR	6 th August, 1999
Final Draft ICR	6 th August, 1999
Bank regional clearances	20 th August, 1999
Final ICR	31 st August, 1999

SUMMARY OF PENDING KEY ISSUES

5. This was a "time-slice" loan and, as such, financed a portion of NTPC's investment programme rather than a specific project, as had been the case with previous loans. Thus, in this case the loan closing date is not timed to coincide with the investment project completion dates. Due to a commendable achievement in advancing construction schedules, the two main investments (Vindhyachal II and Kayamkulam), for which parts of the loan were used, will be completed within the year. Thus the ICR

will be able to report on a considerable degree of progress achieved towards the completion of these elements, but will not cover completion leading to commercial operation of the plants (or an operation plan). However, this is not considered a significant issue, as NTPC's record on the operation of its plants is satisfactory.

6. **Social and Environmental Issues.** The mission is pleased to acknowledge that NTPC has initiated the implementation of the revised RAPs and ReAPs in the Singrauli region, following the Independent Monitoring Panel's final report. The processing of the proposed future Bank operations with NTPC is predicated on the assumption that NTPC will continue to implement these RAPs and ReAPs, and will address other pending social and environmental issues in a manner satisfactory to the Bank. To this end, supervision of these issues by the Bank will continue even after closure of the loan.

7. **Compliance with loan covenants.** NTPC has not fully complied with some critical covenants agreed under Ln. 3632-IN; in summary:

- Environmental and social aspects, at investment project and corporate levels, in the past have not been addressed in a manner satisfactory to the Bank. Recently, there has been encouraging progress in the Singrauli area, but these issues have yet to reach a conclusion either in Singrauli and elsewhere. These issues are covered extensively in separate reports and are not elaborated in this aide memoire.
- While most financial covenants have been consistently achieved in a highly satisfactory manner, bill collection remains a chronic challenge. Bank assistance to NTPC was under informal suspension on this account in 1994. The Bank was again on the brink of remedial action under this loan in 1996, inter alia, as receivables once again exceeded the covenanted level by a significant margin and the agreed commercial and investment policies were not effectively and consistently applied. NTPC's accounts receivable at about 3.7 months as of March 31, 1999; again exceed the agreed maximum of 2 months by a wide margin. Payment of current dues is 94.8 percent in 1998/9 as compared with 92.7 percent in 1997/8. It is the previous outstanding dues that NTPC has struggled to collect; these amounts are exacerbated by two major issues that have increased the amount of accounts receivable. Firstly, income tax is now charged on NTPC earnings and passed through to the customers; and secondly, the final price for power from Farakka power station was determined necessitating an adjustment to prior billing. If these unpaid amounts were adjusted from the total outstanding then the accounts receivables would be some 2.8 months. In terms of payments by individual states, all Western region states and most Northern and Southern region states are currently performing in terms of payments to NTPC. NTPC's critical client states are Delhi and Uttar Pradesh in the Northern region, and the whole of the Eastern region. At the beginning of May 1999, NTPC issued notices of regulation of supply to six SEBs. These notices have led to new agreements, which should yield improvements in the arrears situation during the next few months.

8. **Outstanding contracts.** The delay to processing of further Bank financing to NTPC is causing contractual and timing problems. Vindhychal II and Kayamkulam I power stations were both approved for Bank financing under this loan and after the exhaustion of funds under Ln. 3632-IN, balance payments amounting to about US\$200 million would, in principle, be eligible for Bank financing under the proposed NPTC II (the second time-slice). However the issues of covenant non-compliance have significantly delayed this second time-slice loan as noted above. In practice, NTPC has sufficient fund raising capacity to complete these projects from its own resources. However, the contracts were let on the assumption that they would be Bank financed and consequently contractors would be eligible for "deemed export benefit". The contractors quoted for the contracts assuming that they would receive this benefit. In the absence of Bank funds to complete these contracts, there will be contract management difficulties, which will not only delay the project, but will also raise the project cost.

9. For the environment component under this loan, NTPC has already awarded contracts amounting to some US\$70 million, out of which only about US\$17 million has been disbursed under the loan. Due to the full disbursement of the first loan and the non-availability of second loan, at this time, packages totaling US\$12 million are now being re-tendered under domestic funding. This will increase the cost, delay the implementation and consequently jeopardize the environmental improvement programme.

10. These contracts would be eligible for financing under any new operation, but such financing can not start until certain up-front actions, with respect to social, environmental and corporate issues, have been taken and the related milestones have been achieved. (These actions were summarized both in the November 1998 and March 1999 Aide-memoires and will not be re-iterated here).

KAYAMKULAM

11. The 350 MW (2x115 MW gas turbine + 1x120 MW steam turbine) naphtha fired combined cycle power plant (CCPP) in Kerala is still in the construction stage and generation from two gas turbines has started and is linked to the grid. It is expected the plant will be fully operational before the scheduled date of March 2000. This was an innovative plant for NTPC for a variety of reasons, including that it was NTPC's first coastal plant and first Naphtha fired station. The land was below sea level and required filling and compacting before the plant could be constructed. The land was filled by dredging the Kayal River.

Technical issues

12. The implementation of this project is proceeding ahead of schedule by about two months. Gas turbine no. 1 was started up and synchronized in December 1998, compared to the original schedule of February 1999. Gas turbine no.2 was started up and synchronized to the grid in March 1999, where the original schedule called for synchronization in April 1999. Performance guarantee tests have been concluded for gas turbine no. 1, the results of which are now under evaluation by NTPC.

13. Installation of waste heat-recovery boiler no.1 is also proceeding ahead of schedule and it has passed the hydrostatic test satisfactorily. Based on the current pace of progress, the steam turbine plant is expected to be commissioned before the predicted milestone date.

14. The supporting infrastructure is already in place, including a double circuit 220 kV transmission line to Edaman. These lines, with future upgrade capability to 400 kV, would be adequate for evacuating the full complement of power from the Kayamkulam plant. An additional set of double circuit, 220 kV transmission lines to Pallom, with future conversion to 400 kV, is under construction by POWERGRID and expected to be commissioned in July/August 1999. The State of Kerala is to be the sole beneficiary of this power plant.

15. The project management had effectively used an innovative approach to maintain industrial relations throughout the implementation of the project. This included having an Assistant Labor Commissioner posted permanently at the plant site and involving the local labor union representatives in the resolution of day-to-day problems, setting target plans and settling disputes. Completion of the project ahead of schedule bears testimony to the effectiveness of this approach in a state that is famous for its highly educated and sensitive labor force.

16. The ICR mission requested that the following design provisions at the Kayamkulam plant should be reviewed by NTPC in a global context for the purpose of establishing appropriate guidelines and consideration for future plants:

- a. The steam turbine lubricating oil lines are not encased in an outer pipe. Such encasement would reduce the fire risk. The current design exposes the unit to potential fire hazards should an oil leakage develop. Although the canal containing the lubricating lines is protected with HVW spray and associated detection network, encasement of oil lines should also be considered.
 - b. There are four filters on the Naphtha lines that must be dismantled and cleaned manually from time to time. Self-cleaning oil line could obviate the need for having to dismantle them for cleaning. NTPC should explore this possibility to eliminate this potential fire hazard.
 - c. All plant and equipment performance monitoring points should be brought into the data logger so that manual recording of data, except for specific short duration purposes, is eliminated. The mission was informed that all manual recording would be eliminated from the Kayamkulam plant once the steam turbine is commissioned.
17. The introduction of the following safety features were strongly recommended, (NTPC is acting on these issues in Kayamkulam):
- a. NTPC should enforce wearing of protective hard hats and safety shoes by the entire labor force, including the women labor, even though this may be viewed as against the local culture by some. A start has been made, but further effort is required to change the prevailing attitudes.
 - b. NTPC could consider installing a centralized vacuum cleaning system in the plant to facilitate routine cleaning of the equipment, ductwork, cable trays, floors, etc. This may comprise of a header that will run throughout the plant at different levels, with a number of hose connections, spaced appropriately apart, for connecting the cleaning hoses. The dust will flow into a central receptacle that could be emptied from time to time.
 - c. Each fire hydrant may have its own fire hose box right adjacent to it.
 - d. Drip trays should be installed under all pumps, specifically under those pumping oil, to capture any leakage or dripping from glands.
18. NTPC will advise the Bank of its plans for future operation of the Kayamkulam plant as part of the statistical information provided for the ICR.

Environmental issues

19. **Air Quality:** The mission was pleased to learn that NTPC are using special burners with steam/water injection to reduce NOx emissions. However, there is no air pollution monitoring being carried out as yet. The mission was informed that Kerala State Pollution Control Board (KSPCB) had undertaken extensive monitoring before any operation started. It was agreed between NTPC staff on-site and the mission that in order to monitor the impact of plant operation on ambient air quality, NTPC should initiate ambient air quality monitoring at the site as soon as possible. The mission was informed that since the air quality monitoring equipment is expected by June, the monitoring could be initiated by July 1999.
20. The continuous emission monitoring instruments will need to be installed precisely at such locations, as have been indicated by the stack plume dispersion model to be having the maximum ground level concentration of pollutants. Later on, as the plant begins operation at full load, NTPC plans to validate the computer model and, if found necessary, appropriate adjustments to monitoring locations will be made at that time.

21. **Water Quality:** The mission was informed that as of now, the plant is not discharging any waste water, since the steam cycle is not operational. A state-of-the-art demineralization plant and an impressive chemistry lab attached to it have already been set-up. Given the modern equipment that NTPC have installed for analysis of various physico-chemical parameters, they are likely to generate a very rich database of environmental quality parameters. The mission was pleased to hear from staff on-site that they intended to use the database for trend analysis so as continuously monitor plant performance, and also to incorporate some of the environmental quality parameters into an overall plant performance monitoring system. The mission suggested that, once the environmental quality parameters to be included in the performance monitoring system have been decided, the same should be communicated to the Bank.

22. **Aquatic Ecology:** The ecologically fragile backwaters (Kayal) were dredged to create land for the CCPP. However, no effect of the dredging on the water body is apparent. The mission was informed that once the plant is fully operational and starts discharging waste water into the Kayal, NTPC intend to start systematic monitoring of the aquatic ecology of the Kayal. Base line data was collected prior to the construction of the plant against which future operations can be compared.

23. **Disaster Management:** The mission also visited the naphtha unloading area and storage site at the railhead. This area is maintained by the Bharat Petroleum Corporation Limited (BPCL). The mission was pleased to learn that a regular protocol of safety checks and fire drills was being followed. A live drill to test the effectiveness of the Disaster Management Plan (DMP) is to be conducted in June 1999. The idea of a similar DMP drill at the CCPP was also discussed with NTPC staff on-site. The mission was pleased to learn that plans for a live drill involving the plant personnel and the community living nearby were already being discussed with the district administration.

24. **Tree Plantation:** More than 10,000 saplings have already been planted around the site by NTPC, in cooperation with MOEF. The mission noted that the area in the immediate vicinity of the CCPP, particular the area between the Kayal and the plant (which was used as an equipment store until recently), still appears quite barren as the saplings are still small. This area in particular needs vegetation to prevent run off during the monsoon. The mission was pleased to note that NTPC has already taken up the task of tree plantation in collaboration with the forest department, and the activity is being expedited.

VINDHYACHAL

Technical issues

25. The first 500 MW unit (Unit 7) was commissioned and synchronized on 3 March 1999, ahead of the revised schedule as approved by the Bank, by almost 5 months and on schedule based on the original estimates made in the SAR. During the ICR mission, the unit was being prepared for operation with coal firing in the boiler. The unit is expected to commence commercial operation by August 1999, six months ahead of the revised schedule.

26. Based on the current pace of construction, the second 500 MW unit (Unit 8) is expected to be in commercial operation in September 1999. These dates appear to be within reach, even though go-slow tactics by a section of the construction force hold a constant threat to jeopardizing the project plans. The site management is fully aware that special efforts would be required to avert any labor crisis as construction nears its end.

27. The mission was pleased to note the continuing management efforts to curtail the duration of project implementation. As a matter of fact, the slippage of schedule during the early part of project implementation, which prompted a total revision of the milestone dates, was primarily caused by delays

in procurement. Had procurement and clearances been done without loss of time, this project could have been completed even earlier. The SAR milestone dates were revised after receiving the required Government clearances in February 1995, and there have been no further revisions to the milestone dates.

28. The mission noted that the required infrastructure to support the operation of the additional 1,000 MW under the project was in place. There was adequate stock of coal and the coal supply arrangements (4.8 MT/year for Vindhyachal II, in addition to 5.2 MT/year for Vindhyachal I) was complete. The merry-go-round railway system linked with the Nigahi coal mines was in satisfactory operation and undergoing further enhancement. Existing 400 kV and 132 kV transmission lines, in addition to HVDC transmission, were capable of evacuating the full complement of power from the plant. Additionally, two more 400 kV lines to Jabalpur and two lines to Satna-Vina are being constructed by Powergrid Corporation as a part of Vindhyachal Stage II development.

29. Vindhyachal II output is to be shared by the respective states as follows:

Madhya Pradesh	27.3%
Maharashtra	31.9%
Gujarat	23.9%
Goa, Daman, Diu	12.0%
Dadra & Nagar Haveli	0.4%
Daman & Diu	0.3%
Unallocated	15.0%

30. NTPC should take pride in its accomplishment in achieving an annual Plant Load Factor (PLF) in excess of 90 percent for Vindhyachal I. The plant heat rate has also been the lowest achieved so far. The forced outage rate was only 2.7 percent. These compare well above the international standards of performance for coal-fired power stations and bear testimony to the high level of staff training and dedication, including major efforts for planned and predictive maintenance, that NTPC has brought to bear upon the work. NTPC expect to achieve similar performance for Vindhyachal II. NTPC will advise the Bank of its plans for future operation of the Vindhyachal II as part of the statistics provided for the ICR.

31. The Government of India has duly acknowledged the technical success of Vindhyachal. Altogether 20 employees over a period from 1991 to 1998, have won the Prime Minister's special awards (Shram Bhusan and Shram Vir) for distinguished service in the construction of the power plant.

32. In accordance with the North America Reliability Council (NERC) standards for new coal-fired power stations, the plant would be expected to achieve the following performance in its future operations:

Years in Operation	1-2 years		3-10 years	11-20 years	21-25 years
	Planned	Actual	Planned	Planned	Planned
TWh/year	3.86		5.19	4.98	4.38
Plant Availability, %	70		79	79	77
Plant Load Factor, %	63		75	72	65

Usually, NTPC requires performance levels that are more demanding than the NERC standards, as specified through MOUs signed with the respective power plants.

Environmental issues

33. The time-slice loan agreement included several retrofit action plans for NTPC's existing power plants. The mission noted that the Electrostatic Precipitator (ESP) retrofitting action plan had already been completed. With 5 out of 6 units of Vindhychal I in operation at or above full load at the time of the mission's visit, the stacks were clean, with ESP collection efficiency above 99.7 percent and actual emissions well within regulatory limits.

34. The ash water re-circulation system for the existing ash dikes for Vindhychal I and Rihand thermal power stations have been reengineered with a view to integrating the system with Vindhychal II. This is now in the tendering stage. However, with appropriate operating procedures and slight raising of the height of the ash dike, the total suspended solids in the ash dike effluent water has been brought down below regulatory limits. At times during 1998, ash from the NTPC plant was overflowing the ash dyke and flowing into the reservoir. This was due to the lack of agreement with the project affected persons living in the area and will not be fully resolved until an agreement is reached. In the mean time NTPC is planning to raise the height of the bund and has made a divide bund in order to prevent spillage. Ash deposited in the reservoir is being extracted and placed back in the ash area.

35. Three air quality monitoring stations have been set up to correspond to the highest ground level concentration of pollutants indicated by the plume dispersion model. A mobile air quality monitoring van is also being used to spot check air quality at various target locations. Once the plant is operating at full load, NTPC will validate the model. The mission indicated that the Bank would be interested in getting the validation data as a feedback from NTPC.

36. The mission noted that utilization of fly ash from the Vindhychal plant is picking up and demands for more from the nearby cement companies are increasing. The reported utilisation has increased from 2 percent to more than 22 percent (including use by NTPC). A second ash brick manufacturing plant has been set up. An ash block manufacturing plant is to be commissioned in the coming year. The mission encouraged continuing attempts at increasing fly ash utilization for commercial purposes.

PROJECT REVIEW FROM THE BORROWER'S PERSPECTIVE
CONTRIBUTION BY NTPC

Implementation Completion Report (ICR)
IBRD Loan-3632-IN
NTPC Power Generation Project

SUMMARY OF PROJECT REVIEW FROM THE BORROWERS PERSPECTIVE

This is the Summary of Borrower's portion of ICR prepared for IBRD Loan 3632-IN (NTPC Power Generation Project)¹

1.0 INTRODUCTION :

The World Bank has been supporting NTPC investment programmes starting from NTPC's first project at Singrauli in 1976. Since then, the Bank had extended 6 IDA credits and 10 IBRD loans to fund NTPC's 15 generation/transmission projects prior to undertaking processing of IBRD Loan 3632 IN for NTPC Power Generation Project in 1992-1993. All these credits/loans were extended for specific projects. *US\$ 400 million IBRD Loan 3632 IN was a departure from traditional project specific loan in the sense that it was a loan to NTPC under 'time slice' concept and offered flexibility to fund any new project(s) subject to their meeting certain eligibility criteria stipulated in the loan agreement.* With a view to facilitate uninterrupted availability of the World Bank fund to complete the contracts awarded under loan 3632 IN with certain deemed export benefits unique to the procurements under the World Bank funding, it was agreed during negotiations for loan 3632 IN that World Bank will provide a series of loans at regular intervals totaling to about US\$ 1.2 billion. *The IBRD loan 3632-IN closed on March 31, 1999 after it was fully disbursed while the projects funded under it were at the peak of implementation and still needed about US\$ 200 million World Bank fund to complete the Bank funded contracts of these projects.* However, further loan from the Bank could not be obtained so far.

2.0 PROJECT DESCRIPTION

The NTPC Power Generation Project (IBRD loan 3632-IN) comprised the following as defined in the Staff Appraisal Report (SAR):

- a. Generation Capacity additions : Supporting a five year time slice of Borrower's least cost investment Programme of new Power stations.
- b. Private sector Component : Support a programme of the Borrower to undertake joint venture operations with private entrepreneurs.
- c. Environmental strengthening and Resettlement and Rehabilitation : Implementation of an Environmental Action Plan (EAP) including environmental upgrading of Projects, training and technical assistance for strengthening of NTPC's environmental and Rehabilitation and

¹ Note that the full length version of this text is available from the World Bank or NTPC.

Resettlement (R&R) management capabilities and the implementation of the said Action Plan.

3.0 PROJECT OBJECTIVES AS DEFINED IN THE STAFF APPRAISAL REPORT AND ACHIEVEMENT OF OBJECTIVES

- i) help improve commercial discipline in the power system through the implementation of new commercial and investment policies:

With a view to improve the commercial discipline in the power system through loan 3632 IN for NTPC Power Generation Project, the Ministry of Power (MOP), GOI had issued certain directives in October 1992 which included *inter alia* permission to NTPC to shut-off or restrict power supply from its concerned power stations in case of non-compliance with the agreed terms, delay in new investments in a state if that state is not in compliance with the BPSA and permission to NTPC to undertake projects in one region with a substantial part of the output to be allocated to other.

These directives have proved to be a major step towards bringing in better commercial discipline in the Indian power sector. NTPC has been applying these new commercial and investment policies and outcome has been encouraging. However, Indian power sector is plagued with many ills that can not be expected to be fully addressed through NTPC. Various steps have already been initiated to enhance commercial discipline in the power sector in the country. Some of these actions include SEBs' reforms, formation of Central and State Electricity Regulatory Commissions (CERC and SERCs) by the GOI and the State Governments and formation of Power Trading Corporation. Multilateral financial institutions including the World Bank and the Asian Development Bank (ADB) are in various stages of funding power sector reform program in India.

In addition to the application of the commercial and investment policies stated above, NTPC has also initiated several actions with a view to improve commercial discipline in the power sector such as signing of PPAs for new power stations prior to commencement of the project implementation, introduction of Special Incentive Scheme to encourage SEBs to open LCs of amount equivalent to average monthly billing, and direct supply of power to bulk consumers etc.

- ii. help NTPC meet its targets for capacity additions through increased mobilization of funds from internal resources, domestic and foreign capital markets, as well as from the private sector through joint venture operations:

Discussions for the IBRD loan 3632 IN for NTPC Power Generation Project with the Bank commenced in 1991-92 at a time when the country was passing through severe financial crisis which had resulted in slowing down of NTPC capacity addition program. The World Bank loan (IBRD Loan 3632 IN) instilled confidence in other investors including multilateral financial institutions such as the ADB and OECF, commercial banks – both domestic and overseas and the financial institutions. Subsequent to the World Bank extending IBRD loan 3632 IN, NTPC successfully raised money from the overseas banks through syndication in addition to tying up funding from ADB and OECF. In fact, NTPC's long term financing strategy envisages raising financial resources for its investment program from the multilateral funding institutions, through external commercial borrowings - including from the overseas markets and through syndication – and also from the domestic market, banks and financial institutions. NTPC plans to raise financial resources from time to time depending on its requirement and market conditions. Further, the new commercial and investment policies helped NTPC improve its collection performance resulting in improved internal resource generation for investment program. NTPC is fully capable of funding equity requirement for its investment program from the internal resources generated.

Under this loan, two projects namely Vindhychal-II (2X500 MW) and Kayamkulam (350MW) which met eligibility criteria for funding were taken up for implementation. Rihand-II (1000 MW) which was being considered for funding under this loan at the time of loan negotiations was subsequently dropped because State of UP was not in compliance with the provisions of Bulk Power Supply Agreement with NTPC. With the commissioning of both 500 MW units of Vindhychal-II and both Gas Turbines and Steam Turbine of Kayamkulam, total capacity of 1350 MW has been added under this loan.

As regards Joint Venture financing, subsequent to the GOI permission to NTPC in 1993 to enter into joint ventures and entrance of private sector developers in power sector leading to signing of MOUs between the SEBs and Independent Power Producers (IPPs), provision was kept in this loan to use part of the proceeds of the loan for financing NTPC's contribution in joint ventures. However, capacity addition through joint ventures with private developers could not materialise as entry of IPPs was limited mainly because of poor financial health of most of the SEBs. It emerged from re-examination of NTPC future business portfolio that capacity addition under joint venture route need not be pursued because power projects implementation and their operation and maintenance are NTPC's core competence. NTPC do not foresee any difficulty in meeting equity fund requirements from internal resources generated for its own capacity addition programme. However, NTPC plans to follow joint venture route in the areas where partners could complement each other such as in the area of plant rehabilitation and LNG etc. NTPC has accordingly entered into several joint ventures including with BSES for Utility Powertech Limited and with ABB-Alstom for plant rehabilitation.

iii. upgrade environmental performance of NTPC power stations and make its new power stations environmentally more sustainable; and

iv. (a) strengthen its environmental management capability.

The environmental issues receive as much attention in NTPC as generation of electricity. NTPC has always been proactive, open and transparent in addressing environmental concerns. It established a full-fledged environment department, comprising multi disciplinary expertise, in 1980 at a time when even Ministry of Environment and Forests (MOEF) of GOI was not existing. Further, despite there being no specific requirement, NTPC started adopting various environmental impact mitigation measures since its first project in 1976 by way of providing tall stacks, high efficiency electrostatic precipitators (ESPs), well designed ash Ponds, dust extraction and suppression systems and green area development. NTPC approach has been to address the environmental concerns covering all the three phases of the power project life cycle namely, pre-construction, construction and operation and maintenance.

NTPC had drawn up, in consultation with the Bank, an environmental action plan (EAP) under loan 3632 IN with its components aimed at further enhancing NTPC's environmental capability in order to be able to successfully face the future challenges of following more and more stringent environmental norms and meeting increasing environmental requirement. The EAP included activities related to institutional strengthening, environment monitoring, scientific studies and environmental projects in addition to the R&R component.

Overall implementation of EAP has been successful and satisfactory except certain initial delays which occurred mainly because some of the environmental studies and projects which were unique in nature were being implemented for the first time in NTPC and in the country also. Technical expertise in-house was limited in some areas and as such deliberations with educational/research institutions were necessary for finalising the specifications. Bank support by

way of providing technical assistance in finalising TORs and technical specifications was also limited.

Major achievements of EAP are as follows:

1. Separate groups for Environment Management, Ash Utilisation and Rehabilitation and Resettlement (R&R) were created. Subsequently, a new post at senior level, namely, Executive Director (Environment & R&R) was created and all these groups were brought under the umbrella of Executive Director (Environment & R&R) for better effectiveness. Number of staff in the Environment Department at Corporate Centre and Power Stations has increased from 28 in 1993 to 66 today.
2. Comprehensive training programme in the environmental area has been developed and its implementation begun. The environmental training programme is now more focussed and structured and receives more emphasis by finding place in the Training Calendar of the Power Management Institute (PMI) which is the prime training institute created by NTPC for imparting training.
3. The electrostatic precipitator (ESP) retrofit programme in a number of NTPC stations has been completed. This has resulted in energy conservation (about 63-70%) and reduction in SPM emissions (about 12-22%).
4. The ash water recycling system at Ramagundam has been completed and is under operation. Implementation of ash water recycling system at Rihand and Korba is proceeding at stations and are expected to be commissioned by May, 2000 and early 2001 respectively. Bids for the ash water recycling system for Vindhyachal, earlier invited based on World Bank funding, have been now re-invited based on funding from internal resources/borrowings because of non-availability of World Bank loan after IBRD Loan 3632 IN closed in March, 1999. This has led to shift in award date of this package which has now been placed on 26 May, 2000. Ash water recycling system packages at Rihand and Vindhyachal were initially delayed because of R&R problems in ash dyke area and at Korba because of delays in obtaining forest clearance. The ash water recycling system greatly helps in water conservation as well as in better ash pond management. In view of these benefits, ash water recycling system is now also being implemented in new power stations of NTPC.
5. Various scientific studies such as "ecological impact monitoring" and "ground water contamination" at different power stations and "mercury contamination" in Singrauli area have been completed. Although these studies were covered under EAP, they were not funded by the World Bank. NTPC funded them from own resources. These studies helped in establishing that NTPC projects are environmentally sound.
6. NTPC is also implementing, with own initiative, "liquid waste treatment plant" and "dry ash extraction system" at various power stations. The "liquid waste treatment plant" is an integrated scheme in which effluent from different locations are collected and treated at a centralised place. Its implementation would result in reducing number of effluents, avoiding multi point monitoring and will lead to water conservation and better compliance of environmental norms set by the statutory agencies. Implementation of "dry ash extraction system" would enhance ash utilisation potential.
7. Technical assistance in various environmental disciplines received from E7 Groups provided global picture of environmental management practices being followed worldwide and interaction was very useful. It was heartening to note that NTPC was not lagging but was at par in many areas.

The EAP originally agreed with the World Bank covered activities in respect of only six power stations of NTPC, namely, Singrauli, Vindhyachal, Rihand, Farakka, Korba and Ramagundam. However, realising significant environmental benefits of these actions, NTPC

extended their implementation at other power stations in line with its proactive approach towards environment. NTPC's sincerity and concern in improving the environment could also be gauged from the fact that several environmental projects not covered in the EAP and such as "dry ash extraction and transportation systems" and "liquid waste treatment plant" etc. have been initiated by NTPC on its own as mentioned above for its ongoing and new projects.

iv (b) Strengthening the Borrower's R&R Management Capability

NTPC is among the first public sector enterprises in the country to formulate a comprehensive Rehabilitation and Resettlement (R&R) policy. NTPC had been following this policy for rehabilitation and resettlement of those affected by its projects. However, in the context of IBRD Loan 3632-IN, this policy was revised in 1993 in consultation with the Bank to make it broadly consistent with the Bank's Operational Directives. It serves as basis and provides broad guidelines for drawing up project specific Rehabilitation Action Plans (RAPs) taking into account local conditions specific to the project.

NTPC has created and fully strengthened R&R groups both at the corporate headquarters and at power stations. As stated earlier, Corporate R&R group has since been brought under Executive Director (Environment and R&R) in order to ensure increased and focussed attention to this important function in the organisation. Further, learning from its experience, NTPC has brought monitoring of implementation of the Rehabilitation Action Plans (RAPs) of its new projects under Corporate Monitoring Group at the time of regular project review team (PRT) meetings every month. The PRT meetings have proved to be an important tool for timely project implementation. It is expected that with the new practice, RAP implementation would also proceed in parallel with the project implementation and completion of both would match properly.

During the course of implementation of the project, NTPC came across a number of complex situations concerning R&R particularly in Singrauli area which arose mainly because of evolving nature of the subject and neither the Bank nor NTPC had any proven prescriptions to address the issues. Complex situation developed in the Singrauli area because of, *inter alia*, artificial discrimination of Stage-I and Stage-II PAFs/PAPs by the Bank and lack of adequate support from the State administration and the Bank. The IMP recommendations which were well beyond the mandated TOR agreed with IMP by the Bank and NTPC further added to the complexities. However, NTPC accepted IMP recommendations with the intention of resolving long pending R&R issues which have now been fully resolved in the Singrauli area. The implementation of R&R programme at Kayamkulam has been proceeding successfully as per schedule. NTPC has established that it has the intention, commitment, capability, strength, sincerity, transparency in approach and concern for the affected people to implement RAPs/ReAPs. Experience gained in the process will be helpful in further strengthening the R&R management capability.

NTPC has initiated action for revising its R&R policy in line with the framework of the draft national policy on R&R and the draft of the revised policy has been provided to the Bank for comments. Bank comments are awaited.

4.0 PROJECTS FUNDED UNDER LOAN 3632-IN

Implementation of the following projects/schemes were taken up under loan 3632 IN:

1. Vindhyachal Super Thermal Power Project (STPP) Stage-II (2x500 MW)
2. 350 MW Kayamkulam Combined Cycle Power Project (CCPP)
3. Environmental Action Plan (EAP)

5.0 VINDHYACHAL SUPER THERMAL POWER PROJECT STAGE II (2X500 MW)

5.1 Project Implementation: The first 500 MW unit of Vindhyachal Stage II Project was synchronised in March, 1999, five months ahead of schedule. Subsequently certain problem was faced in the mills and dampers due to delays in supplies by BHEL. Critical pipings also needed certain rectification. The unit is presently in operation since 1st March, 2000 and is expected to be declared on commercial operation by May/June, 2000 against schedule of February, 2000. The second 500 MW unit has been successfully commissioned in February, 2000, three months ahead of schedule. The unit is now being made ready to run on coal. Trial operation and commercial operation are expected to be achieved ahead of schedule of November, 2000.

6.0 KAYAMKULAM CCPP (350 MW)

6.1 Project Implementation: Kayamkulam Combined Cycle Power Project consists of two Gas Turbines (GTs) of capacity 115 MW each and one Steam Turbine (ST) of capacity 120 MW. The project is the first fully liquid fuel fired combined cycle project of NTPC at coastal location. Both GTs and ST have been commissioned ahead of schedule. GT-1, GT-2 and ST have been declared under commercial operation from 1st January, 1999, 1st May, 1999 and 1st March, 2000 respectively.

7.0 ENVIRONMENT ACTION PLAN (EAP)

The EAP consisted of a total 645 activities (578 relating to Environment and 67 relating to R&R) covering six projects of NTPC, namely, Singrauli, Vindhyachal, Rihand, Korba, Ramagundam and Farakka.

7.1 Environment

7.1.1 Implementation : Major component of environment portion of the EAP included institutional strengthening, environmental management, scientific studies and environmental projects. Out of the total 578 activities of EAP representing environment portion, 95 (16.4%) activities were dropped as agreed with/informed to the Bank. Out of balance 483 activities, 470 (97.3%) have been completed and balance 13 activities (2.7%) are under advanced stage of implementation.

7.2 R&R component of EAP

7.2.1 Implementation : Socio Economic Surveys (SES) have been completed for all projects envisaged under EAP. At Kayamkulam, out of 2244 PAPs, 2110 have been rehabilitated and remaining 134 are scheduled to be rehabilitated by December, 2000 as per approved RAP. All PAPs have been shifted in Rihand and Vindhyachal. At Rihand, out of total target PAPs of 158, agreement with 134 PAPs have been signed and money deposited. Out of balance 24, one has expired (legal heirs not responding for signing the agreement), legal dispute is pending in the court in respect of another and 22 are untraceable (2 – IMP/State Government to verify claims, 20 – failed to submit relevant documents to IMP). In case of Vindhyachal-II, out of total target PAPs of 1028, 998 PAPs have already been rehabilitated. Out of balance 30, 9 are traceable but refusing to sign agreement and IMP to resolve, 18 have expired and IMP to verify legal heirs, 3 are untraceable and IMP/State Government to verify claims.

8.0 OVERALL BORROWER'S PERFORMANCE:

The overall performance of NTPC in implementing the project has been excellent which is evident from the fact that both 500 MW units of Vindhyachal II and both GTs and ST of Kayamkulam have been commissioned ahead of schedule. As compared to its previous best of 57 months for synchronisation of 500 MW unit from the date of award of main plant equipment contract, NTPC could commission first 500 MW unit of Vindhyachal-II in 48 months. This achievement of NTPC in commissioning project before schedule needs to be seen and appreciated in the backdrop of uncertainty regarding availability of World Bank funding due to increasing difficulties experienced by GOI/NTPC in obtaining extension in loan closing date pursuant to institution of Inspection Panel and also due to non-availability of further World Bank funding after loan closed in March, 1999.

As regards implementation of EAP also, overall performance of NTPC has been very good. NTPC has shown sincerity, keenness and has put in best effort in implementing various activities of the EAP. Some of the activities were unique in nature and were undertaken for the first time in NTPC and in the country as well. The areas of activities were diverse needing skills in various environmental disciplines and formulation of TOR itself was a big challenge. It is in this context that some activities got delayed because of finalisation of TORs and technical specifications due to inadequate technical guidance and support from the Bank in this regard. The commitment of NTPC in completing these tasks in spite of these difficulties needs to be recognised.

As already stated, EAP originally agreed with the World Bank covered activities in respect of only six power stations of NTPC, namely, Singrauli, Vindhyachal, Rihand, Farakka, Korba and Ramagundam. However, realising significant environmental benefits of these actions, NTPC extended their implementation at other power stations in line with its proactive approach towards environment. NTPC's sincerity and concern in improving the environment could also be gauged from the fact that several environmental projects not covered in the EAP such as "dry ash extraction and transportation systems" and "liquid waste treatment plant" etc. have been initiated by NTPC on its own.

NTPC's performance in successfully dealing with R&R issues especially in Singrauli area was however restricted due to the following reasons:

- I. Lack of adequate support from any quarter including the State Government/Administration and NGOs led to the borrower (NTPC) dealing with the complex situation almost single handedly.
- II. There is no clarity regarding the boundary between R&R and other social issues. There are many agencies and systems to address social issues such as the State Government, people's representatives, bureaucracy and legal system. However, social issues are invariably clubbed with R&R and NTPC is made answerable for many follies/shortcomings of others e.g. compensation cases, slow settlement of legal disputes etc.
- III. Creation of artificial distinction between affected persons of a project under Stage-I and Stage II like in Vindhyachal by the World Bank.
- IV. Complex R&R situation in Singrauli area which could not be foreseen either by NTPC or the Bank and neither the NTPC nor the Bank had any proven practices to address these issues.
- V. Prior to signing of Loan 3632-IN in the year 1993, NTPC didn't have the R&R policy consistent with Bank's Operational Directives on R&R and it didn't address all R&R issues adequately. Also, the required institutional set up to address such complex social issues was

- not available. With the revision of NTPC's R&R policy in 1993 and institutionalising the R&R set up, it took some time in addressing these issues.
- VI. Interference from local NGOs due to World Bank's over involvement.
 - VII. Changing stand of Independent Monitoring Panel (IMP) even after agreement with the NTPC and World Bank on revised R&R actions for Vindhyachal and Rihand.
 - VIII. Lack of support from the World Bank during initial period i.e., at the time of conducting socio-economic surveys.
 - IX. The World Bank did not share information regarding handling of R&R at other Bank funded projects.

In spite of the above constraints, long pending R&R issues in the Singrauli area have been resolved which could become possible because of NTPC's sincerity and commitment to resolve the problems, its concern for the affected people and transparency in its approach.

9.0 OVERALL BANK PERFORMANCE :

The Bank has played major role in providing funding assistance for capacity addition programme of NTPC. Bank's funding assistance to NTPC under Loan 3632-IN provided in 1993, at a time when the country was passing through severe financial crisis, helped in speeding up NTPC's capacity addition programme which had slowed down then. The project was closely supervised by Bank with adequate number of site visits by Missions. Bank's regular Supervision Missions and expert advice from time to time has enabled NTPC integrate international experience into its Project and Contracts Management thus contributing in commissioning of units ahead of schedule.

NTPC had awarded packages worth about US\$ 600 million with funding from Loan 3632-IN for Vindhyachal-II, Kayamkulam and EAP. However, by March 31, 1999, the closing date of loan, with full utilisation of US\$ 400 million (first tranche) a balance of about US\$ 200 million was still needed to complete the packages awarded under Bank funding. To fund this gap, further loan from the Bank is unlikely despite repeated requests by NTPC. In view of certain deemed export benefits under Bank funding and non-availability of further World Bank loan after loan 3632-IN closed in March, 1999, NTPC not only has to arrange balance funds to complete these contracts already awarded but also has to deal with the contractual complications.

Environmental activities under the EAP was the thrust area of the Loan 3632-IN which included execution of a specific programme of remedial environmental measures for NTPC's existing power stations to make its operations environmentally more sustainable. With this in view, certain environmental projects were included in the EAP. Bank funding to the extent of about US\$ 64 million was required for completing these environmental projects. However, by the loan closing date (March, 1999), only about US\$ 17 million had been disbursed leaving a balance of about US\$ 47 million. In order to derive full benefits from these environmental projects, it was appropriate that the Bank should have continued funding the same either under continuation of Loan 3632-IN or under a special loan.

Owing to discontinuation of Bank funding after loan 3632-IN closed in March,99, several packages such as Ash Water Recycling system and Liquid Waste Treatment Plant for Vindhyachal, Dry ash extraction and transportation system for Rihand for which bids were earlier invited based on World Bank funding and award was yet to be placed had to be re-tendered based on funding from internal resources/borrowings resulting in delays in their award and implementation.

Assistance of the Bank in the implementation of EAP, especially the scientific studies and environmental projects, which were unique in nature, had been limited. During the course of EAP implementation, it was observed that the role of the Bank was mainly confined to monitoring the schedules. NTPC feels that the Bank should have been more proactive by providing necessary technical advice and support based on its rich experience world over and access to huge data base for resolving various environmental issues. Bank's technical help in environment schemes like ash water recycling, liquid waste treatment plant would have not only helped in enriching knowledge but would also have helped in faster implementation of these schemes. Bank's technical advice for considering vermi-composting as Solid waste management as an alternative has been very useful.

Progress of the EAP was regularly reviewed by the Bank Environment Missions which helped in expediting implementation. However, sometimes these reviews were observed to be somewhat subjective. The views, requirement and satisfaction level of the Bank varied with change in the members of Supervision Missions. This resulted in more activities offshooting from original 578 activities representing environment component of EAP. It would have been more appropriate if reviews were more objective and based on set guidelines. Further, since NTPC is the borrower, Bank expects that all actions should be taken by NTPC even if there are other players in the region. It would be in all fairness that Bank takes a pragmatic view and not insist on NTPC alone rectifying all the problems in a particular area. However, overall concern of Bank for environment protection of area and strengthening the environmental capabilities of NTPC to meet environment challenges has been found to be very appreciative and is fully in line with NTPC's approach.

As regards Bank's performance in the area of R&R, though interactions with Bank staff were adequate, support from the Bank during initial period was not adequate. At times, Bank changed their stand frequently on many issues, thereby preventing Borrower to adopt uniform approach. Frequent visits of the Bank Missions to Singrauli area acted as a catalyst in raising the expectations of affected people which further complicated already complex situation. NTPC feels that if the Bank had adequately analysed the long term implications, instead of only responding to pressure from a small section of interest groups, the performance of NTPC on the R&R front would have been much more satisfactory. Bank insisted on several studies in the same area but these studies were not made use of, e.g., even though socio-economic surveys for Singrauli, Rihand and Vindhyaçal were earlier conducted, Bank insisted on study by XIDAS, Jabalpur. Ultimately establishment of IMP was suggested which was also constituted. The Bank also got influenced by local NGOs without distinguishing their approach whether negative or positive. The Bank also kept adding the milestones/targets as a condition for loan closing date extensions.

The World Bank should have paid more attention to the major components of the Action Plan agreed in September, 1997 between the Bank and NTPC subsequent to the preliminary report of the Inspection Panel. These were (i) conducting Social Impact Assessment (SIA) study of NTPC projects in Singrauli Region by XIDAS, Jabalpur and recommendations from them within NTPC's R&R policy for revising RAPs and ReAPs (ii) appointing an IMP to monitor the implementation of such revised plans (iii) institutional strengthening and R&R restructuring (iv) training for R&R executives (v) a comprehensive Singrauli area development programme by Government of U.P. and M.P. to be funded by the World Bank. The Bank rejected recommendations of the SIA study by XIDAS, Jabalpur, a consultant appointed by the Bank. Instead, Bank insisted and prevailed upon NTPC through various meetings and aide-memoires to accept IMP recommendations even though they were

much beyond TOR agreed by the Bank and NTPC. Also, the Bank should have pursued more vigorously and should have ensured significant progress in setting up of Singrauli Area Development Programme which was primarily the responsibility of the Bank, for better resolution of R&R issues.

10.0 OVERALL KEY LESSONS LEARNT

- i. The time slice concept of the World Bank funding does not guarantee availability of further loans to complete contracts awarded under the Bank funding with certain deemed export benefits to the contractors. This leads to lot of uncertainties during the course of project implementation which are very large and complex projects and also leads to contractual complications in the event further loan tranches are not made available. Discontinuation of World Bank funding also leads to delay in award and implementation of packages for which bids have been invited under Bank funding and award is yet to be placed, because of re-invitation of Bids based on own funding. The Bank should therefore either provide full funding for specific project or should devise a suitable mechanism to ensure availability of loan to complete the contracts it funds under the time slice concept.
- ii. Bank should engage, wherever necessary, particularly in the area of power sector, specialists who should not only be concerned about the environment issues but also actually assist the borrowers in providing solutions to the technical issues.
- iii. Special care needs to be taken in drawing up realistic implementation schedules of activities which are to be taken up first time by the borrower in order to avoid problems as has been observed in certain EAP activities.
- iv. While processing the loan proposal, the World Bank starts looking into projects other than those being considered for funding particularly in the context of R&R matters. The loan covenants also cover many other ongoing/completed projects which are either funded by other agencies or the World Bank loans closed long back. Based on our experience with Loan 3632-IN, it has been observed that it invariably leads to complications. It is felt that the Bank, as a policy, should restrict itself to the projects being considered/implemented under the World Bank funding. Under the EAP component of Loan 3632-IN, projects not funded by the World Bank and implemented through other funding agencies/bilateral arrangements (Rihand-I, Vindhya-I) together with the completed projects under World Bank funding were covered.
- v. Bank should not insist on retrofitting of R&R plans in existing projects during execution of expansion plans because this leads to opening of already settled issues in Stage I also.
- vi. Bank should provide adequate exposure to the borrowers regarding handling of R&R issues/programmes at other Bank funded projects.
- vii. During selection of new project site, R&R aspect should be among the prime considerations. NTPC has been following this in identifying project sites. Even MOEF, GOI now scrutinise applications for environmental clearance from R&R angle, fix the areas to accommodate main plant and ash dykes and discourages further acquisition of land.
- viii. Socio-Economic Survey should be conducted at an early stage.
- ix. In view of delays in implementation of RAPs, NTPC has now started monitoring the implementation of RAP of new projects along with project implementation monitoring during monthly Project Review Team (PRT) meetings.
 - x. There should be clear distinction between social issues and R&R issues.
 - xi. State Government cooperation in solving R&R issues should be sought right at the inception of the project.
 - xii. NGO's active cooperation should be sought while distinguishing their approach positive or negative.

- xiii. The varying rate of success of different IGSs/SEs at Kayamkulam has established the fact that individual with own initiative only can be turned into successful entrepreneurs, whatever be the input NTPC makes.

NTPC'S MAJOR COMMENTS ON BANK'S PORTION OF ICR FOR LOAN 3632-IN

These comments are in addition to the summary of the Borrower's Portion of ICR provided by NTPC and annexed in the ICR and both should be read together. The views of the Borrower, i.e., NTPC on achievement of project objectives, Borrower's performance, Bank performance and key lessons learnt have been expressed in detail in the summary of the Borrower's Portion of ICR.

- 1.0 Bank's portion of ICR states that "whereas the environmental effort is adequate but slow...", and "environmental performance has significantly improved although implementation is slow...".

Since formation of NTPC it has taken/has been taking several initiatives in the area of environment such as i) creation of full fledged environment department at a time when even Ministry of Environment & Forests (MOEF) was not existing, ii) spending 8 to 10% of total project cost on environment protection and control measures such as ESP, tall stacks etc., iii) plantation of more than 13 million trees in and around its power plants, iv) implementation of various environmental projects such as liquid waste treatment plants, dry ash extraction systems on its own (not covered in EAP agreed with Bank), v) extending the implementation coverage of EAP activities agreed with Bank from six operating plants to other plants, vi) establishment of Centre for Power Efficiency and Environment Protection (CENPEEP) with USAID support. CENPEEP is actively working to reduce greenhouse gases (CO₂) per unit of electricity generated and has successfully demonstrated and disseminated various technologies/practices at various NTPC and SEB stations, vii) obtaining ISO 14001 certificates for its power plants for Environment Management Systems. Two stations of NTPC, namely, Dadri and Ramagundam and one station being managed by NTPC (Balco) have already been accredited with ISO 14001 certification, viii) adoption of best ash management practices at power plant ash dykes, ix) introducing super critical technology for power generation for the first time in India for its Sipat STPP (3x660 MW), x) provision of high efficiency ESPs designed for SPM emission level of 50 mg/Nm³ for its new thermal power plants, which is same as the Bank's norm; and so on. NTPC's effort in the area of environment has also been recognised by various agencies by way of several awards which has been informed to the Bank from time to time.

It is, thus, clear that NTPC has taken initiatives in the area of environment and has not been slow in its environmental efforts.

- 2.0 **Regarding wet land at Kayamkulam**

In Kerala, the terminology 'wet land' and 'dry land' is used for irrigated and non-irrigated land and is not related to ecological classification of 'wet land'. The land acquired for construction of the project is reclaimed land, as stated in the EIA report of Kayamkulam project prepared by the Indian Institute of Technology, Chennai for Kerala State Electricity Board. Ecologically, the land has not been classified as 'wetland' by Ministry of Environment & Forests, GOI. Thus guidelines of Bank have not been violated.

- 3.0 NTPC does not agree with the statement made in the Bank's ICR that "NTPC's lack of understanding and commitment to the Bank's requirements and environment and social good practice standards was a key reason for the difficulties encountered in this project". In fact,

certain difficulties were encountered in the area of environment and R&R, the reasons for which have been elaborated in the summary of the Borrower's portion of ICR.

- 4.0 Bank's portion of ICR states that "However, NTPC still needs to determine whether, and to what extent ground water resources are being polluted by seepage from the ash pond". It may be noted that all the geohydrological studies got conducted by NTPC under EAP for its various stations have established that there is no contamination of ground water.
- 5.0 As regards cooling tower retrofitting under EAP, NTPC had been examining various alternatives for meeting the GOI norms in close and continuous consultation with the Bank. After doing the pre-feasibility study, NTPC had been sharing with the Bank various difficulties such as engineering and practical constraints, required longer shut down of stations, high cost of implementation. It was also informed to the Bank that the temperature rise norm was under review by MOEF, GOI. Further, the statement that "However, NTPC management cancelled the study before the measurements could be taken" is not correct. The fact is that since it was understood that even after using submerged discharge systems, MOEF, GOI standards on temperature rise norm would not have been achieved, NTPC did not pursue the matter further.

6.0 **Major comments on R&R issues mentioned in Bank's ICR**

a) R&R Policy

Bank's portion of ICR states that "Although the R&R policy approved by NTPC was considered advance in 1993, it did not evolve in light of changing circumstances in India and experience of implementation of this and other projects".

Though the World Bank while approving the loan in 1993 endorsed NTPC's R&R policy as meeting Bank standards (as also mentioned in the draft ICR), it has now been termed as inadequate. As late as in 1997, the World Bank's senior management stated "It considers the NTPC R&R policy of May, 1993 to be consistent with OD 4.30 except with respect to the treatment of indigenous people, particularly in reference to land tenure rights..... The R&R options to restore livelihood which are available to PAPs of NTPC under May, 1993 R&R Policy are also in line with OD 4.30 (Ref. World Bank Inspection Panel Report Annexure 4)". Though no specific changes relating to monetary benefits were made in the policy, per se, but entitlements were enhanced/modified from project to project depending upon the need and requirements which formed part of RAPs for specific projects. Even IMP's monetary package did not violate the core of NTPC's R&R policy. It is, therefore, incorrect to say that NTPC's R&R policy does not allow adequate adjustments for inflation, as quoted at many places in the Draft ICR.

NTPC's R&R policy is only a broad guideline for all its projects spread over the entire length and breadth of the country with diverse conditions. Project specific RAPs based on the broad guidelines of R&R policy are, therefore, prepared taking into account local conditions specific to the project.

NTPC has already initiated action for further revising the R&R policy in line with the draft National Policy on R&R. A draft copy had earlier been provided to the World Bank informally for comments. Further, as advised by the World Bank's recent R&R mission led by Mr. Reidar Kvam, a workshop for revision of existing R&R policy is being organised in later part of this year.

b) Compensation for acquired land (Indian laws/payment of compensation as replacement value vs. market value).

As per the World Bank, Indian practice of providing compensation on market value and 30% solatium to the estimated value under Land Acquisition Act (LA Act) differs from World Bank OD 4.30 requiring compensation amounts to be paid on replacement cost, based on objective assessment of real market values.

The assessment is incorrect. The cost of land in Singrauli Region was around Rs.900 per acre 10-15 years back when acquisition took place for NTPC projects. This was enhanced ten times and compensation was paid on an average of Rs.7000-Rs.10000 per acre, besides 30% solatium and interest as per LA Act. IMP gave recommendations arguing that Rs.70,000 per acre should be fixed as replacement value cost, apart from 15% solatium, development and registration charges. The ground realities are, however, different. The land being purchased today by PAPs after receiving IMP packages (Rs.70,000/- per acre plus solatium etc.) is available roughly at the same rates at which compensation was paid 10-15 years back, thereby implying that NTPC paid much more compensation than the replacement value. This was also brought to the notice of the IMP during finalisation of their recommendations. It is, therefore, incorrect to arrive at the conclusion that PAPs have suffered due to payment of inadequate compensation and that NTPC failed to meet World Bank standards (on replacement value) as stated in Draft ICR.

c) Consultation and Participation

The Bank's view that participation/consultation is lacking in Singrauli Region is incorrect. Though certain inadequacy in this regard existed initially, NTPC regained lost grounds soon after. In fact, various World Bank Missions appreciated this. Further, all suggestions and advice on the issue from the World Bank were adhered to and implemented from time to time. However, our past experience suggest that even in genuine consultative process, vocal, literate and rich come forward and bargain for their interests leaving the poorer and marginalised lot. It is also a fact that the same methodology for active participation and consultation has produced excellent results at Kayamkulam. It, therefore, makes it clear that the reasons for R&R problems in Singrauli Region was other than inadequate consultation/participation as explained in the summary of the Borrower's Portion of the ICR.

d) Success of IMP and its emulation elsewhere

World Bank has concluded in ICR that "establishing an Independent Monitoring Panel has had a positive effect". It has further recommended that "a neutral agency be appointed to help with monitoring in all major projects, to help the client and the Bank assess performance and likely outcomes".

Though setting up of IMP partially helped in resolving R&R issues in Singrauli area, it may not necessarily warrant to be emulated for all major projects without a detailed and careful analysis. It is important to note that IMP's recommendations were well beyond the mandated TOR given to IMP by NTPC and the World Bank and were accepted by NTPC only with the intention of resolving long pending R&R issues which have now been resolved.

e) Lack of Institutional Capacity and Commitment

We don't agree with the statement made in Bank's ICR that "NTPC was not fully committed to undertaking the necessary actions required under the Resettlement Policy from the start of

project”, “in addition to the lack of institutional capacity and commitment, very complex situation on the ground”.

NTPC has always been committed to address R&R issues which is clear from its various actions such as creation of R&R cells at each power station and at Corporate Center, formation of R&R policy, creation of senior position at the level of Executive Director (Environment & R&R), regular review of R&R issues by the senior management and implementation of IMP’s recommendations which were much beyond the TOR agreed by IMP with NTPC and the Bank.

ENVIRONMENTAL IMPACT ISSUES

NTPC POWER GENERATION PROJECT

Environmental Action Plan

1. The Environmental Action Plan (EAP) included a large number of specific measures that NTPC agreed to take to improve its environmental performance as an integral part of the project design. These measures fell into three groups; (i) those focused on institutional strengthening, (ii) those related to environmental management and (iii) those requiring investments. The discussion presented below includes a sample of typical activities for each of these groups. In addition, two environmental activities not included in the EAP, but undertaken by NTPC are also discussed.

INSTITUTIONAL STRENGTHENING

Environmental Organization

2. The present environmental organization at NTPC has been developed during a period of about two decades. The Environmental Engineering Group (EEG) was established at the corporate center in 1980. The growth of environmental concerns throughout the 1980s, led to the establishment of specialized Environment Management groups at the corporate center as well as at each power station in 1991. In the mid 1990s, additional groups, including one responsible for rehabilitation and resettlement issues and another responsible for expanding ash utilization, were also established.

3. The Bank, having expressed its concern about NTPC's environmental management during project appraisal in 1993, reached an agreement with NTPC, during project negotiations, to have a study implemented to review and recommend ways to improve the effectiveness of NTPC's environmental organization. During project implementation, Bank's supervision missions repeatedly expressed their concerns about the fragmented nature of environmental units at NTPC. In particular, Bank's supervision mission in 1997 pointed out the lack of coordination of environmental efforts among NTPC's several environmental groups, which had weakened the company's environmental performance, and the lack of a unified leadership, which had hindered NTPC's efforts to establish long-term policy objectives and to translate these objectives into performance plans and programs. The Bank recommended that NTPC undertake a thorough review of its organizational structure, including improvement in the flow and use of environmental data within its environmental groups, and in the specification of its environmental policy objectives.

4. At that time, the Bank recommended that NTPC: (i) to bring all environmental functions under one integrated group with clearly defined roles and responsibilities for each constituent unit; (ii) to increase the number of environmental staff to at least 66 professional staff; and (iii) to establish a set of measurable long-term objectives and develop plans and programs to meet these objectives. To achieve greater benefits from these measures, the Bank suggested that NTPC hire an outside consultant to lead a detailed study initiative, which would include evaluation of alternatives. The Bank helped NTPC in drafting the terms of reference for this study.

Actions Taken

- ◆ NTPC found it difficult to expand its environmental staff during the early years of project implementation. At the time the Inspection Panel began to review the project (in early 1997), fewer

than 30 NTPC's environmental staffing posts had been filled. However, by August 1998, NTPC had increased its environmental staffing to 67, with the two additional staff used to strengthen activities at the corporate center.

- ◆ NTPC was reluctant to hire outside consultants for its environmental organization and management study. In early 1998, it provided the Bank with a proposed reorganization plan without addressing the core coordination and information flow issues. In mid 1998, it suggested that the study was not needed because it had appointed an Executive Director for Environment who would be responsible for environmental matters of NTPC. When the Bank continued to press for a comprehensive study, NTPC established an internal committee to review how its organizational structure could be improved to help implementation of its environmental policy objectives. This committee recommended the following actions, which have been taken or are under implementation:
 - (a) Environment Management, Ash Utilization, Rehabilitation and Resettlement (R&R) and Safety Groups have been brought under the umbrella of the new Executive Director.
 - (b) The Regional Environment Management Groups have been strengthened through the filling of all approved positions.
 - (c) Environmental performance indicators have been codified to ensure uniform and objective assessment of the environmental performance at each power plant.
 - (d) Annual awards for the best environmentally managed power plant have been established.
 - (e) Performance appraisal format for Head of the Power Plant, Head of O&M and Regional Executive Director have been redefined to include criteria for assessing their performance, with respect to environmental management.
 - (f) NTPC management has decided to start working towards obtaining the ISO 14001 certification for its environmental program.

Conclusions and Recommendations

5. NTPC's implementation of the EAP has resulted in a stronger environmental organization. However, there appears to be less than ideal flow of information among the various units, with minimum level of authority given to and initiative taken by environmental personnel at power plants. In addition, environmental responsibilities of the Environmental Executive Director and General Managers need to be more clearly defined.

6. NTPC's action towards obtaining ISO14001 is to be commended. Implementation will, however, require a greater dedication, pro-activeness, openness and transparency at both the corporate center and each power plant, and most importantly, the development of a monitorable plan of action for continued improvement in environmental performance, above and beyond the requirements specified through the Government's environmental standards. For example, NTPC has not yet accepted the responsibility for taking a lead role in addressing the environmental issues of the Singrauli region through inter-agency coordination and dissemination of the findings and recommendations of studies and ambient air quality monitoring data.

Environmental Training

7. The lack of a well-developed environmental training program was noted by several Bank missions during project supervision. Training programs were sporadic and targeted mainly at corporate office personnel, and plant visits revealed a need for training in wastewater treatment, environmental design, and environmental data interpretation. The Bank's September 1997 supervision mission recommended that NTPC expand its environmental training program with a long-term focus. Subsequently, in September 1998, NTPC prepared a comprehensive training program that included details of on-going and future activities. This was revised and submitted to the Bank in December 1998. The focus of this revised program was on creating awareness of the importance of environmental measures for all NTPC employees, as well as providing specific training focusing on the relationship between efficient power generation and environmentally sound plant management, and on specialized areas of concern, including hospital waste management and sewage treatment and disposal.

Actions Taken

- ◆ The Power Management Institute (PMI) has been designated as the central implementation agency for the expanded environmental training program.
- ◆ PMI's training calendar for 1999-2000 has incorporated a significant number of environmental training programs.
- ◆ All power plants have incorporated environmental awareness training programs for management and staff in their training calendars.
- ◆ The first hands-on training courses on hospital waste management and sewage treatment and disposal were delivered in December 1998 and similar courses were organized in January/February 2000.

Conclusions and Recommendations

8. Initial steps have been taken to bring greater awareness of environmental concerns to operating management and staff at all levels. NTPC have increased the staff coverage of these programs to ensure that the environmental message gets effectively disseminated to all NTPC employees. The Bank is assured by NTPC that all employees and executives will receive training by the end of 2001.

9. NTPC still needs to develop a training strategy that identifies specific objectives and focuses on specific target groups who need training to meet these objectives. In addition, it would be useful to request PMI to begin designing expanded follow-up, environmental awareness programs for specific operational areas that have been identified as needing strengthening, which could then be implemented as soon as the initial round of training is completed. Of particular importance would be modules that focus on the relation between the environmental and the production performance of power plants. Other areas where enhanced training would be desirable are, training on environmental aspects of coal handling, ESP control and monitoring, and hospital waste management. NTPC has informed the Bank that this work is ongoing.

ENVIRONMENTAL MANAGEMENT

Environmental Monitoring

10. During project negotiations in May 1993, NTPC agreed to enhance its environmental monitoring, including its data collection and analysis capability. The first supervision mission in October 1993

accepted NTPC's existing monitoring system, but recommended some modifications including additional analysis of mercury content of coal, coal ash, and discharge water. Over the next several years, Bank missions recommended several further improvements in NTPC's procedures and data reporting format, which NTPC implemented. Bank attention to the environmental monitoring program was substantially enhanced with the establishment of an environmental support group at the Bank's New Delhi Office in 1997. The new team made several suggestions for improving environmental management, including analysis of the implications of trends in the environmental data, both within a single plant and between plants.

11. A comprehensive review mission in June-July 1998 suggested that there was considerable room for further improvement in the areas of environmental monitoring, data analysis and reporting, such as analysis of monitoring data with minimum, average, and maximum values reported using a visually more comprehensible graphic format for data reporting, and inclusion of additional data, including heavy metal concentrations in groundwater and ash pond effluent, and ambient water temperatures in the vicinity of cooling water discharge areas. The Bank also requested that more effort be made to undertake trend analysis studies as a tool for problem identification and solution finding. Although NTPC considered this request to be outside of the agreed EAP, it agreed to draft and review with the Bank a design proposal to meet these objectives.

Actions Taken

12. Formats were revised in accordance with Bank suggestions. Average daily values for ambient air quality were calculated and reported, but annual averages were not calculated.

- ◆ Monitoring and reporting of additional environmental parameters on respirable particulate matter (PM-10), groundwater quality, heavy metal concentration in ash pond effluent and plant effluents was started in July 1998.
- ◆ NTPC agreed to improve upon current environmental monitoring program and data management, and to develop a framework for trend analysis. NTPC proposals for the new system were submitted to the Bank in October 1998.
- ◆ Bank recommendations on additional data needs, including additional analyses for heavy metals content in coal, were implemented.

Conclusions and Recommendations

13. NTPC has made considerable progress in its environmental monitoring and reporting program. However, at times it has applied the letter of the agreed program, without much consideration of program's objectives. For instance, it has taken its groundwater contamination measurements from locations that are upstream from the ash ponds, choosing abandoned water well locations primarily because they were convenient. Its data trend analysis has, for the most part, focused on mechanical statistical data analyses, rather than on a systematic evaluation of the causes for the observed trends and the operational lessons that can be learned. More work needs to be done to develop an integrated structure of rationale, methodology and uses for its trend analysis efforts, if it is to use the analysis as a tool for problem identification and solution finding. NTPC advised the Bank that it is implementing this.

14. Monitoring and reporting has also been limited by NTPC's view that its only legal responsibility is to implement the Indian statutory monitoring requirements of the Central and State Pollution Control Boards (PCBs). NTPC has implemented environmental data gathering and review activities that go beyond the mandate of the PCBs, particularly in respect of dry ash extraction, liquid waste treatment, and

better ESP designs. It has not, however, gone as far as to implement all the standards and good practices recommended by the Bank. NTPC's feels that, on environmental matters, it is legally accountable to national entities, not to international entities such as the Bank. The fact that the Bank failed to include, in the project's loan and project agreement legal documents, the specific environmental standards that it expected NTPC to meet, also added ambiguity to NTPC's interpretation of its obligations in this matter. Under such circumstances, it is not surprising that the Bank found it difficult to supervise and enforce its environmental standards, unless the PCBs had established similar standards.

15. In the longer term, the Bank has neither the resources to monitor the environmental performance of a project it finances, nor the leverage to enforce its environmental requirements after project funds have been fully disbursed, since it is unlikely to take the drastic step of recalling the loan. Since PCBs will have the responsibility for long term monitoring and enforcement of environmental standards, the Bank needs to work with these PCBs to get them to enhance their standards to a level that is compatible with the Bank's environmental guidelines.

Mercury Studies

16. The EAP includes two Mercury related studies: A study on Mercury Contamination in the Singrauli Areas and a study on the Fate and Transport of Mercury in Coal used by NTPC Power Stations. The Mercury Contamination indicated sufficiently high mercury concentrations in humans, plants, and animals to cause concern for the Singrauli area. NTPC has not widely disseminated the results of this study, primarily because it is concerned with the likely public reaction, because it believes that its power stations are not a major contributor to the mercury problem in the Singrauli area. According to NTPC, the study has now been made available in the public information centres in the Singrauli area. NTPC was supposed to implement the Mercury Fate and Transport Study in parallel with the Contamination study. The study was supposed to determine how, and in what form, the mercury in the coal is discharged into the environment, where it ultimately precipitates and collects.

17. NTPC has been extremely reluctant to undertake this latter study. After implementation had been delayed for several years, for a variety of reasons, NTPC proposed in late 1996, that the study be dropped from the EAP. The grounds for this were that NTPC's most recent analysis of the Singrauli coal used in its power plants showed that the mercury levels in coal were significantly lower than those in the US, where mercury discharge from power plants had not been considered a significant environmental problem. The Bank accepted NTPC's new figures, and in February 1997, agreed to the elimination of the mercury study from the EAP without any analysis of NTPC's data.

18. The August 1997 Bank mission noted the discrepancy among the reported results for mercury concentrations in NTPC's previous analysis (0.11-0.14 ppm) and Roorkee University analysis (0.8-11.4ppm). The Bank, therefore, requested that NTPC redo the study after consulting with other reputable laboratories and agencies in India to establish a standard test procedure that would be consistent with the coal testing procedures used in the US. NTPC agreed to redo the study in parallel with two independent Indian laboratories. It took a year for NTPC to establish a consistent set of testing procedures, provide the samples, and report on the test results. The results showed mercury concentrations in coal in the range of 0.17-0.32 ppm, significantly higher than those in the US did, and similar to those in typical European coals, where mercury contamination has been of concern.

Actions Taken

- ◆ NTPC continues to maintain the position that since the Mercury Fate and Transport Study was dropped from the EAP, it was not obliged to implement it, and did not intend to do so.

- ◆ NTPC does not want to implement this study, first, because it believed that NGOs would automatically draw the conclusion that it was responsible for all mercury contamination, and second, because NTPC management has been unable to find a reference to a similar study carried out anywhere in the world, and believes that it needs an example to help it design and carry out such a study in a scientifically correct way.

Conclusions and Recommendations

19. The Bank handled this issue poorly. It should have looked more thoroughly at the original "mercury in coal" study before accepting the conclusion that there was not enough to worry about. On the design of the mercury transport study, the Bank needed to take a proactive approach. As a "Knowledge Bank", it should have assisted NTPC by providing examples of similar studies from developed countries. It is difficult to believe that this problem is not being addressed somewhere in the developed countries.

20. If in fact such a study has never been done anywhere in the world, and there is no framework available to establish such a study, then it is highly questionable whether the Bank should request (let alone insist) that a Borrower pioneer in such efforts. The Bank has an obligation to expect Borrowers to conform in Bank projects, to well defined world standards, particularly in the environmental field. It is on much weaker grounds when it tries to impose standards without reference to what is being done in other countries. The Bank should ensure that it is able to provide all necessary support to its clients when they set out to test or use technologies for which the available data and experience, internationally, is limited. If this support is not available from within the Bank then it must be provided from elsewhere or the project component redesigned appropriately.

21. However, the analytical results for mercury concentrations in coal and the ash show clearly that significant quantities of mercury are being emitted to the environment, especially into the air. The issue should not be passed over on the basis of inadequate design strategies for an ideal study. A local NGO has already undertaken some preliminary work on mercury contamination. Even with their limited resources they have been able to demonstrate, through environmental monitoring and laboratory analysis, that the mercury problem in the Singrauli area is significant. NTPC might wish to consider developing a working partnership with this and other NGOs, so as to demonstrate their commitment to doing everything that they can do to maintain the environmental integrity of the areas around their power plants.

Evaluation of Environmental Data

22. Bank supervision mission have made several recommendations on how to improve the quality of the environmental data that NTPC obtains from its monitoring activities, as well as ways that NTPC could use the data in analyzing operational problems and identifying new, improved operating procedures. It has been suggested that one way to enhance the usefulness of the Environmental Statements would be to include a comparison of values for all environmental parameters associated with all NTPC's stations. It has also been suggested that NTPC upgrade its data monitoring and gathering by installing online, continuous monitoring, which could identify when and where environmental problems occurred and correlate these problems with operational procedures.

Actions Taken

- ◆ NTPC's annual Environmental Statements provide a substantial amount of quantitative information on the pollutants being discharged to the atmosphere and water bodies. Comparison of this data among NTPC power plants shows that there is a wide range of variations, due to such factors as different design /operating conditions, and qualities of raw materials.

- ◆ NTPC believes that superficial comparisons of environmental parameters from the Environmental Statements associated with each NTPC power plant would not be a meaningful exercise, particularly since these Statements were not designed for such comparison. NTPC believes that too many of the underlying parameters are different for each power plant. For instance:
 - (a) Consumption of cooling water depends on the type of condenser cooling system employed (once through systems have different water consumption than systems with cooling towers, pond cooling, or hybrid systems). Water consumption also depends on whether the cooling tower uses natural or induced draft, on the design of the boiler and the condenser, and the quantity of makeup water. Consumption of water for ash disposal depends on the design of the ash disposal system (e.g. closed-loop versus once-through ash water design, and the ash:water ratio for the ash slurry), as well as the percentage of ash in the coal.
 - (b) PM concentrations in the flue gas are reported by statutory requirement, using the assumption that the flue gas contains 12 percent CO². However, the important parameter, the mass flow rate of PM depends on other plant design and operating parameters, including flue gas flow rates and excess air used, which affects the actual CO² concentration in the flue gas.
 - (c) Quantitative effluent parameters, such as mass flow rates of TSS, BOD etc, also vary among NTPC power plants, even when their concentration in the effluent may be of the same order of magnitude. The factors that influence these readings include variations in intake water quality, as well as variations in system design related water requirements for boilers, condensers and ash disposal system. In addition, the integration of process effluents and storm water drainage systems makes it impossible to measure the separate effluent quantities from the two sources.

Conclusions and Recommendations

23. While the Bank agrees with NTPC that conclusions drawn from direct comparisons among plants need to take into account variations in underlying technical parameters, it also believes that NTPC could make better use of its existing data if it would standardize the format of the reported data, so that variations among the plants could be identified and analyzed as to the underlying causes of and possible corrective actions for higher pollution levels. Such an analysis may lead to identify areas where greater efforts would be needed to minimize environmental degradation from plant pollutants and, by showing which plants cause the most pollution, could indicate to NTPC management where they might best focus their future environmental investments. In addition, now that each power plant has established its environmental performance baseline, meaningful annual assessments should be made on the improvement of each plant over time. NTPC has reported to the Bank that it is now implementing such a system.

INVESTMENT COMPONENTS

Ash Water Recycling

24. The EAP included ash water recycling project components for Ramagundam, Rihand, Vindhychal and Korba. Singrauli and Farakka Super Thermal Power Plants (STPPs) were dropped from the EAP.

Actions Taken

25. As agreed with the Bank, NTPC performed laboratory tests to measure physical and chemical characteristics of ash slurry. Based on this information NTPC carried out system design engineering for ash water recycling at all plants. The present status of ash water recycling at various NTPC plants is as follows:

- ◆ Rihand STPP: The contract agreement was signed on January 28, 1998, somewhat behind schedule due to R&R problems. Construction work is under progress. The system is expected to become operational by May 2000.
- ◆ Vindhychal STPP: The work, which was delayed due to R&R problems, will no longer be financed by the Bank. A revised proposal for ash water recycling system covering both Stage I and Stage II plants has been re-tendered after GOI's approval of funding of the package that will be procured through Indian competitive bidding. Contract award is expected by May 2000.
- ◆ Korba STPP: The ash water recycling scheme for the existing ash pond was revised. NTPC now plans to use it only for the new ash dyke at Dhanras. A composite package has been planned, which consists of ash slurry disposal system and part of the ash water recycling system for Dhanras. Procurement for this revised scheme was held up by the delays in getting forest clearance. The contract has been awarded and completion is expected by early 2001. Work is in progress at the site.
- ◆ Ramagundam STPP: The ash water recycling system has been operating since January 1996. The system helps greatly in water conservation as well as ash pond effluent quality control.

Conclusions and Recommendations

26. Based on results obtained at the Ramagundam STPP, NTPC has decided to recycle ash water from all its new ash disposal ponds. Recycling is expected to improve ash pond operation at NTPC's power plants as it promotes water conservation and reduces discharge of pollutants to surface waters. However, NTPC still needs to determine whether, and to what extent, groundwater resources are being polluted by seepage from the ashponds. The locations of their existing groundwater monitoring wells are either upstream from the ash ponds, where they can only monitor baseline water quality, or are ineffective because they are too shallow to reach the groundwater table. NTPC should investigate the possibility of monitoring at the embankments of the reservoir.

Closed Cooling Water System Retrofit

27. Historically, NTPC's thermal power plants found it difficult to meet the GOI's environmental standard of a maximum of 5°C differential between the intake and effluent water temperatures. NTPC, therefore, agreed with the Bank to include a project component to bring them into compliance with this GOI standard.

Actions Taken

- ◆ Shortly after the project became effective, NTPC raised objections about the high cost of the investment in cooling towers that were needed to achieve compliance, and about the time that the plants would have to shut down to make the changeovers, during a period of sustained (and increasing) national power shortages.

- ◆ An expert committee was convened by the Central Pollution Control Board to review the standards for cooling water discharge in September 1992, prior to the signing of the loan. NTPC cited engineering and practical constraints and therefore took a slow approach to implementation of the cooling water retrofit investments. Finally, in absence of a clear technical solution, NTPC initiated efforts to convince the GOI to relax the cooling water discharge standard for existing power plants. Thus, they were able to satisfy the loan conditions without rectifying the problem.
- ◆ The Bank and NTPC endeavoured to find a solution to this problem. The Bank arranged for a Japanese grant, which allowed NTPC staff to go to Japan to look at a system involving use of ocean bottom diffusers. The Japanese technicians proposed to adopt the same concept for dispersing cooling water discharges from NTPC's power plants, and designed a study to determine the Reservoir's temperature profile through direct measurements and satellite imagery. However, NTPC management cancelled the study before the measurements could be taken. NTPC feels that even if they had used submerged discharge systems, the MOEF standards would not have been achieved.
- ◆ The Bank continued to press for implementation of this project component, while NTPC, confident that the regulations would be changed, continued to delay implementation.
- ◆ Subsequently, the CPCB-led expert committee concluded that the existing regulations could not be enforced without a high cost retrofitting of already operating power plants, through the construction of cooling towers in conjunction with closed water cooling systems, and that this operation would require significant shut-down period during which time power availability would shrink. It recommended, in 1996, that the maximum allowable water temperature differential be raised for existing plants, from 5°C between the intake and discharge point to 10°C across the condenser.
- ◆ The Government took a long time to decide to accept this recommendation. NTPC, consequently delayed implementation of this project component. The project closing date was extended three times without this component being initiated. The change in the regulations was finally approved fifteen months after the project's original closing date and barely three months before its was finally closed. On January 2, 1999, the Ministry of Environment and Forests (MOEF) of GOI issued a Gazette Notification which stated that: (i) the temperature differential of cooling water at condenser inlet and outlet for existing power plants shall not exceed 10°C; and (ii) new thermal power plants (using fresh water) commissioned after June 1999, shall install cooling towers, irrespective of location and capacity. NTPC are implementing cooling towers at all new plants.

Conclusions and Recommendations:

28. As a result of the new regulation, NTPC no longer needs to retrofit its existing power plants to reduce the temperature of its cooling water effluents, which reach 45°C (113°F) in summer months in the Singrauli area. As this temperature which is more than enough to kill marine fauna within the warmer areas of the mixing zone, an environmental impact study for cooling water discharges from NTPC's existing power stations is warranted.

29. The Bank was outmaneuvered on the issue of cooling water discharge requirement. It accepted a loan agreement that made no reference to the Bank's environmental guidelines and specified only that NTPC was required to meet Indian environmental standards. However, it is considered likely, from the experience with this project, that the application of national standards is an inadequate safeguard to ensure that projects meet the Bank's environmental guidelines. Even if national standards are acceptable to the Bank at the time of appraisal, they are inadequate for assuring compliance with Bank's environmental guidelines as the government can retroactively choose to lower these standards below the Bank's requirements.

30. Rather than refer to either the Bank's guidelines or existing national standards as the appropriate yardstick, the Bank's legal documentation should include a set of absolute quantitative criteria for all of the parameters that it considers important enough to include in its environmental guidelines. These quantitative criteria would, of course, have to be consistent with the Bank's guidelines. The Bank's review of the quality and effectiveness of Environmental Management Plans for India projects, completed in August 1997, made a similar recommendations: that "environmental performance indicators should be included in legal agreements more often and more explicitly."

31. For the Bank to be successful in its endeavor to support environmentally sustainable development in India, it must help the SPCBs to adopt environmental standards that are at least as stringent as the Bank guidelines. To ensure that the environmentally sensitive projects that it finances in India, will remain environmentally sustainable. The Bank may consider making the revision of the relevant Government standards a condition of Board presentation. Such an action would also resolve the problem that the Bank has with borrowers, such as NTPC, who consider the SPCBs to be the highest authority on environmental standards, and focus all their efforts on meeting these SPCB standards.

ESP Retrofit

32. The electrostatic precipitator (ESP) upgrading program was already underway prior to the preparation of the Environmental Action Plan (EAP). The main benefit was expected to be a 60 percent decrease in energy used, and a higher level of ESP performance (greater efficiency and lower PM emissions from stack). ESP performance evaluations had been undertaken and design modification feasibility studies had been made by NTPC. The retrofit program consisted of installing field plates in the dummy fields of the Stage I ESP units of the Singrauli and Ramagundam STPPs, and fitting of new microprocessor controllers in the following STPPs: Singrauli, Vindhyachal, Rihand, Korba, Farakka and Ramagundam. These retrofits were expected to reduce power consumption by at least 60 percent and particulate matter (PM) emissions from the stack by about 20 percent.

Actions Taken

- ◆ The commissioning of ESP retrofit has been completed at all stations.
- ◆ The Bank supervision mission of July 1998 suggested that NTPC evaluate the effectiveness of ESP retrofits by monitoring the difference in performance parameters between the on and off status of the new microprocessor controls.
- ◆ This monitoring methodology has shown that the reduction in PM emissions ranging from 12 to 22 percent, and power consumption savings ranging from 63 to 70 percent.

Conclusions and Recommendations

33. The program has been highly successful, as can be seen by the reductions in power consumption and PM emissions. However, ongoing monitoring is needed to confirm the performance data at all plants. NTPC will need to establish a periodic ESP testing program to maintain optimum performance of ESPs. In addition, optimization studies are recommended to determine the tradeoff between power consumption and particulate collection efficiency at all NTPC power stations.

Ash Utilization

34. The disposal of ash has become a highly contentious issue for all coal-fired power plants in India. The Bank's project with Coal India included studies on the possibility of using ash for backfill at coal-

mines. The use of ash for making lightweight bricks was also included in the EAP, and funding for a commercial plant had been allocated from the Dadri Thermal Power Station loan. The Independent Inspection Panel reviewed a series of complaints that NTPC was relying too heavily on ash dikes to dispose of the ash, and had not made sufficient efforts to explore alternatives, particularly backfill at coal mines. The Bank's response to the Panel was that the backfilling of ash in the existing Singrauli opencaste coal mines was not found feasible by the Northern Coalfields Ltd. (NCL) and that new ash dyke management techniques have been introduced. Based on its initial overview of the documents, the Panel had some doubt that all possible feasible ash disposal technologies had been considered until recently. The panel concluded that a full analysis of alternatives, as required, did not appear to have been carried out, and the issue was not addressed in the SAR.

Action Taken

- ◆ NTPC has initiated discussions with coal mining authorities on utilizing ash as a backfill material at exhausted mines. However, their response has, in general, been somewhat negative. Open pit mines use their mined out areas to accommodate their overburden material from ongoing operations. Space for ash would only be available when the mine is completely exhausted. And since the mines in the Singrauli area are still in their early years of operation and have a further programmed useful life of 15-20 years, the question of how to use the empty spaces is of only academic interest.
- ◆ However, in 1997, CIL was pressed by the Bank to carry out a feasibility study for disposing of ash in mined out area as part of a Bank lending program. NTPC established the dialogue with CIL officials on this subject and provided the terms of reference and other necessary details to assist them with their study. At Ramagundam, NTPC had conducted pilot study in association with the Central Mining Research Institute, Dhanbad, for stowing of underground mines at Singreni Collieries Company Ltd. using ash successfully. In the study, about 80,000 tons of ash has been stowed. Further work is in progress. Subsequently the scope of study was increased to cover all CIL mines in India, and in June 1999 this work was awarded to M/s Consulting Engineering Services. The study is scheduled to be completed by the end of 1999. Evaluation of leaching into groundwater should be an integral part of this study.
- ◆ NTPC is also sponsoring studies to determine whether coal ash can be used for soil enhancement for market crops, without harming the crops through heavy metal contamination. These studies need to be carried out for another two or three years in order to obtain conclusive results. They should include a review of leachate to both surface water and ground water.
- ◆ Coal ash is being used for cement manufacture, and several plants have installed partial dry ash collection systems to facilitate this form of utilization (see below). Attempts to commercialize the ash-based bricks for construction have yet to prove successful. Almost all NTPC plants have pilot scale brick manufacturing units, but none have expanded their activities or attracted large-scale private investors. The primary reason appears to be strong consumer resistance to non-traditional ash bricks. A notification issued by MOEF specifies the minimum use of 25 percent ash in bricks made by manufacturers within a 50km radius of coal fired plants.

Conclusions and Recommendations

35. Before coal ash is used to backfill a specific underground mine, geological and hydrogeological studies need to be undertaken to assure that this disposal method would not lead to groundwater contamination.

36. NTPC assured the Bank that their studies have shown ash bricks to be a reasonable substitutes for clay bricks, although often more expensive than clay due to the cost of transporting the ash. This information has been published by NTPC (e.g. in the "NTPC guide for users of Coal Ash"), but still public concern remains. These studies should be more widely disseminated by NTPC so that questions about the technical substitutability of ash brick for clay bricks can be put to rest. In addition, some studies in other countries (particularly Canada) have shown that ash may contain radioactive materials. NTPC report that they have had tests carried out by the Indian Institute of Physics and have shown that radioactivity of NTPC ash is comparable to that in the USA and below the levels prescribed by the United Nations Scientific Committee of the effects of Atomic Radiation.

NTPC'S ENVIRONMENTAL ACTIVITIES NOT INCLUDED IN THE EAP

Wastewater Treatment

37. Wastewater treatment plants (WTP) are being established at each of the NTPC power plant. They will collect and treat all the industrial effluents, and reuse them where feasible. This scheme is part of NTPC's effort to conserve water by considerably reducing effluents and to ensure compliance with government environmental standards.

Actions Taken

- ◆ The WTP is under operation at the Jhanor Gandhar STPP.
- ◆ Part of the WTP is in operation, and balance work is near completion at the Ramagundam STPP.
- ◆ The WTP is under construction at the Kahalgaon, Farakka, Korba, Singrauli and Rihand STPPs.
- ◆ Retendering of a WTP at the Vindhyachal STPP is in progress.
- ◆ WTPs are to be installed in all future power generation projects.

Results

38. Installation of WTPs is expected to achieve environmental compliance of wastewater discharges for all NTPC's power plants, while substantially reducing the amount of input water needed for the plants and colonies.

Dry Ash Extraction for Industrial Use

39. Dry ash extraction systems (DAES) are being installed to promote industrial ash utilization at selected NTPC power plants. These systems, which suppress fugitive dust around ESPs will provide dry ash for local asbestos and cement industries as well as for brick manufacturing units operated by both in-house and private commercial entities.

Actions Taken

- ◆ DAES is in operation at the Ramagundam STPP.
- ◆ The Dadri STPP was designed for a 100 percent dry ash collection and disposal system from the beginning.

- ◆ DAES is under construction at the Kahalgaon, Farakka, Talcher, Korba, Vindhyachal, Singrauli and Unchahaar STPPs.
- ◆ DAES is also proposed, but not yet designed for the Rihand STPP.

Results

40. Installation of DAES is an essential first step for the more widespread utilization of fly ash in the construction sector.

Land Acquisition, Resettlement and Rehabilitation Issues

INTRODUCTION AND SUMMARY

This report is an annex to the Implementation Completion Report (ICR) for the NTPC Power Generation Project (Loan 3632-IN). It discusses issues related to involuntary resettlement in the six projects in four sites included in the EAP, where the World Bank has variously supported India's National Thermal Power Corporation (NTPC) in its development of power stations and related transmission lines. Three of the project sites are in the Singrauli region, located on the borders of the states of Uttar Pradesh and Madhya Pradesh in Northern India. These are the Singrauli, Vindhyachal and Rihand power projects. There are two phases of each of the Vindhyachal and Rihand projects, totaling five projects in the Singrauli area. The sixth project, the Kayamkulam Combined Cycle Project, is located in Kerala, South India.

These projects have all included land acquisition. Local people have lost agricultural land and other assets, and have been displaced from their homesteads. In all, more than 15,000 acres¹ have been acquired for the projects, affecting around 8,500 individuals. According to the loan agreements between NTPC and the World Bank, such losses were to be compensated, and people were to be assisted in regaining their livelihood.

This report discusses the policies, plans, and implementation mechanisms aimed at compensating for project-induced losses in the NTPC projects supported by the World Bank. It summarizes the key challenges and dilemmas which the Bank and NTPC have faced in addressing the challenges caused by resettlement in these projects². The report does not repeat all the details and facts about the numbers and nature of support services, results of studies undertaken, or statistics about progress over time, since such information is available elsewhere. Instead, the report attempts to summarize the key issues and focus on an analysis of the situation and lessons learned.

In assessing the status of the resettlement program undertaken in Singrauli and Kayamkulam, the report concludes that this component of the NTPC loan had been deficient, at the time of the loan's closing, since, some eleven years after the land was acquired, NTPC was not in compliance with the Bank's Operational Directive 4.30 on Involuntary Resettlement. However, in the year since project closing much progress has been made and the implementation of the resettlement action plans is now proceeding satisfactorily.

A major contributing factor to the difficulty in achieving satisfactory outcomes has been the complexity of the situation on the ground, which has posed difficult dilemmas for NTPC and the Bank. This has been the case particularly in the Singrauli region, where displacement of people started as early as 1960, long before a comprehensive framework was developed to address social impacts. In this area, the relationship between NTPC and some of the project-affected persons (PAPs) has been characterized by mutual distrust

^{1/} See Table 1 for details.

^{2/} These activities are variously referred to as resettlement, resettlement and rehabilitation, or just R&R. In this report, the term resettlement is used, but refers to the full scope of activities around involuntary displacement and the development activities organized to address such displacement. It includes both physical relocation, compensation for losses, and rehabilitation measures to enable people to regain lost incomes.

and even violent encounters on occasion. In 1997, the conflict escalated, culminating in a formal complaint filed with the World Bank's independent Inspection Panel.³

The Bank responded by developing an action program with intensified support to the resettlement program. Based on this action program, the Bank's management agreed to extend the project period for a period of six months beyond the original closing date. Further extensions were granted until March 31st, 1999. At the time of closing, there were still unresolved issues and incomplete provision of support to many project affected people. However, one year later all of the project affected persons in the Singrauli region have moved out of the sash dyke areas and, while there are some outstanding issues, the implementation of the RAPs is continuing.

The situation is significantly better in the Kayamkulam area, in part because this is a more recent project, where NTPC has addressed these issues more vigorously and been able to avoid some of the mistakes of the past.

This report argues that many of the problems might have been avoided or reduced with greater capacity, better up-front planning and earlier commitment of adequate resources. The report concludes that the difficulties of addressing resettlement in such a project context have been made worse by a lack of institutional capacity both on the side of the World Bank and NTPC. From the Bank's side, more attention to implementation risks should have been paid at the time the loans were approved. The World Bank was too optimistic in its original assessment of the situation, and did not have a clear strategy for how to respond to supervision reports showing that implementation was unsatisfactory. The failure to do so was based in part on inadequate attention paid to the signals received, and in part on the Bank's own lack of capacity and knowledge about how to address the difficult problems which became evident during project implementation.

From NTPC's side, there was an initial lack of capacity and willingness to address social impacts as integral parts of project planning and implementation. The capacity has improved over time, and more awareness and understanding has been built up.

CURRENT STATUS

As of August 1999, at the time of the ICR missions, implementation of the resettlement action plans and other development programs, intended to benefit the local population in the project sites, remained incomplete. NTPC was not in compliance with the World Bank's policy on Involuntary Resettlement as summarized in Operational Directive 4.30. Efforts have been made to improve the situation and the land was finally vacated in January 2000, and the rehabilitation of the affected families is now ongoing and proceeding satisfactorily. Table 1 summarizes the current status in the six resettlement projects:

^{3/} The events around the Inspection Panel complaint and the action program, which was developed in response, are discussed further later in this annex.

Table 1: Status of Resettlement and Rehabilitation as of March 2000

STATUS OF R&R	Singrauli	Vindhyachal	Vindhyachal	Rihand	Rihand	Kayam- kulam
		I	H	I	H	
Total land acquired (acres)	4,753	3,663	1,687	2,488*	720	1,167
Government	2,440	307	251	508	11	902
Private	2,313	3,072	888	889	158	265
Forest	0	0	0	660	223	0
Other (Submergence land)	0	284	548	431	328	0
Year of acquisition	1976-82	1985-86	1985-88	1982-85	1986-89	1989-97
Villages affected	27	14	6	6	2	6
Total PAP	⁼ 1,755	2,304	1028	1,131	182	2,244
Resettled by March 2000 ^{##}	721	1,300	341	737	113	^{^^} 62
Untraceable/migrated	[#] 482	1,004	3	321	48	00
Rehabilitated by March 2000	1,273	1,266	999	809	143	2040
To be rehabilitated	0	23	29	2	39	204
Resisting relocation	0	0	0	0	0	0

Balance to be resettled nil except at Kayamkulam where balance is 2.

[^] Of this, 1186 acres were transferred to NLC, PWD, and Railways Dept.

⁼ This includes 98 Railway PAPs also.

^{*} According to the R&R office records in Rihand, land acquired was 3202.

[#] Of this 50 deceased

^{^^} PAF self-resettled out of 64 PAFs.

^{##} Homesteads only

RESETTLEMENT POLICIES: PRINCIPLES AND DILEMMAS

The Challenge of Resettlement

In supporting NTPC in these projects, the World Bank has incorporated adherence to its safeguard policies⁴ through various means. An Environmental Action Plan has been developed to address environmental impacts and to strengthen NTPC's environmental management capabilities. With the World Bank's assistance, NTPC has also developed a corporate policy related to involuntary resettlement, and developed Resettlement Action Plans (RAPs) for the projects covered under the loan.

Indian law and practice, and World Bank requirements

In India as in most countries, resettlement has generally been seen as a simple case of land acquisition and payment of cash compensation. The revenue department carries out resettlement, which is responsible for records and management of both public and private land. India's current Land Acquisition Act dates back to colonial times (established in 1894). While it has been updated since then, the benefits and entitlements provided for through this law are basically limited to cash compensation for land or other assets. Those entitled to such compensation under law are people who can demonstrate legal title to their property.

^{4/} This report focuses on impacts related to Involuntary Resettlement, covered by The World Bank's Operational Directive 4.30. This Operational Directive is in the process of being converted to a new format, but the basic principles remain unchanged: Involuntary resettlement is to be avoided where possible, and minimized and mitigated where it is unavoidable after suitable design alternatives have been explored. People affected by involuntary resettlement are to be compensated for their losses at full replacement value, and assisted in obtaining housing and regaining their livelihood where loss of assets constitutes a loss or reduction in livelihood.

Experience with development projects throughout the world, including in India, has led the World Bank to develop a broader framework of support. This was adopted in 1990 as Operational Directive 4.30, Involuntary Resettlement⁵. The most important distinction between Indian law and the Bank's OD 4.30 is the provision of support not only related to compensation and relocation assistance, but to also provide rehabilitation support to people suffering a loss or reduction of income and livelihood. Additionally, the Bank's policy establishes that "*the absence of legal title to land by such groups should not be a bar to compensation*" (Paragraph 3). This more inclusive definition of who should be entitled to support is intended to ensure that people do not get displaced from land or access to other productive resources which they may have traditional or usufruct rights to, without assistance.

Indian practice and World Bank requirements also frequently differ on the definition of what constitutes market value for the land and other assets lost. The revenue department generally bases its valuation on existing records and adds another 30 percent known as *solatium* to the estimated value, to compensate for the involuntary nature of the acquisition, and to cover transaction costs. However, since official records are usually under-reported and outdated, the compensation amount offered is frequently far below the actual value of the land being acquired. This is one of the main reasons for complaints, court cases, and lengthy delays in land acquisition in India. The World Bank's OD 4.30 requires compensation amounts to be paid to the full replacement cost, based on an objective assessment of real market values.

It is important to be aware of these differences between the World Bank's policy requirements and Indian law and practice. However, while OD 4.30's requirements are more extensive and cover a wider range of impacts than Indian laws, the enhanced entitlements and support mechanisms are complementary to Indian laws and not contradictory to them⁶. In the case of NTPC and its earlier land acquisition, prior to this project, the company acted in accordance with Indian law, but failed to meet World Bank standards.

NTPC's Resettlement Policy

NTPC adopted its corporate policy on Resettlement and Rehabilitation in 1993. This was based on NTPC's earlier guidelines, approved in 1980, which established the basic principles of how NTPC was to function as a "responsible Corporate Citizen", and to "discharge social responsibility in respect of environmental protection and rehabilitation".

As with the World Bank's Operational Directive, NTPC's policy on resettlement and rehabilitation supplements the land acquisition and development policies of India's central and state governments. The policy states that, "*the R&R Policy will be implemented in close cooperation with the concerned State Authorities*". Compared with the national laws on land acquisition, NTPC's policy framework expands upon the categories of impacts recognized and the corresponding entitlements and support mechanisms given to project affected persons.

^{5/} OD 4.30 is frequently referred to as one of the World Bank's social safeguard policies. The other social safeguard policy covers impacts related to cultural heritage and impacts on indigenous populations.

^{6/} One area, which has been a subject of debate, has been the degree to which illegal squatters and encroachers on public land should be given assistance or compensation if they are displaced by a development project. A standard approach for addressing impacts related to squatters and encroachers has recently been developed, and has been approved by Indian authorities as being in conformity with Indian laws and practice. Speculative encroachments are to be discouraged, while the poor are to be provided support through housing and other mechanisms. This does not include compensation for the value of the land they have been occupying, since the term "compensation" in India refers to the payment made by the State to private individuals when title to property is transferred from the individual to the State.

The World Bank endorsed the 1993 NTPC policy as meeting Bank standards, and regarded the adoption of this policy as a significant achievement for a company as large as NTPC, working on major projects all over India. Establishing this policy framework was an important milestone for NTPC and for resettlement programs in India.

However, experience with implementation has led the Bank and others, including the Independent Monitoring Panel (see separate section later in this report), to call for revisions and improvements to the policy. The current policy focuses overly much on detailed specifications of types and extent of impacts, and relating this to monetary benefits, with specified amounts to be given in different circumstances. This does not allow adequate adjustments for inflation (so NTPC has already had to move outside the policy amounts), nor does it provide sufficient guidance for exploring support mechanisms in a consultative fashion with affected people and other stakeholders.

An important factor contributing to NTPC's adoption of the 1993 policy on resettlement was the fact that NTPC had entered into discussions with the World Bank in 1991 about the proposed NTPC Power Generation Project financing the Vindhyaal II and Rihand projects⁷. Development of a more systematic approach to land acquisition and resettlement in consultation with the World Bank formed part of the project preparations.

While an agreement was reached between NTPC and the World Bank in 1993 about this enhanced framework for support to affected people, it appears that this was not regarded as necessary or important by all representatives of NTPC. It appeared that there was only limited understanding and commitment to this broader approach. In retrospect, it seems likely that the World Bank insistence on adhering to its more stringent guidelines was only reluctantly agreed to as one among several loan conditionalities. The implications of this have most likely contributed to the poor performance of the project in dealing with resettlement impacts. Most importantly, it led NTPC to underestimate the organizational implications of addressing the resettlement issues properly. This is discussed in more detail in the concluding section on organizational and institutional mechanisms.

SOCIAL ISSUES AND IMPACTS

The Singrauli region

While there are a total of five sub-projects in the Singrauli region, the context and issues are similar⁸. Until 1960, Singrauli was an isolated and economically under-developed rural area on the borders of the states of Uttar Pradesh and Madhya Pradesh. The local population, the majority of whom were lower-caste Hindus, were primarily engaged in subsistence agriculture. Communications with larger towns and other parts of India were difficult before roads were built into the area when the whole region was developed. This development started around 1960, and involved construction of the Rihand Reservoir, a large dam that flooded much of the valley. Over time, the area underwent a massive transformation not only because of NTPC's power plants, but also because of extensive coal mining undertaken by Coal India, in part supported by World Bank loans.

^{7/} At a later stage, Rihand was dropped, and Kayamkulam in Kerala was added to the project.

^{8/} The five are Singrauli; Vindhyaal, Phases 1 and 2; and Rihand, Phases 1 and 2. This report treats the projects in the Singrauli region as one cluster, in the same manner as they have been treated as one cluster by other studies done in the past. The situation in Kayamkulam is different, and is discussed separately.

The environmental and social impacts have been severe⁹. In its response to the 1997 Inspection Panel request, the World Bank's management said:

"Today the region suffers from the results of decades of uncoordinated and poorly managed heavy industrial developments, creating serious environmental problems and a large population of displaced people".

In the traditional agricultural society, the local population was stratified based on caste and wealth. With modernization, economic cleavages have intensified. Staff employed by NTPC and Coal India are relatively well off, while more than half the local population in the rural communities live below the poverty line.

The population displaced by the projects is in an intermediate position. The land acquisition and other changes implied dramatic changes in the lives of the local population. Having lost their agricultural land, people became dependent on wage labor. In some sense, this constituted an improvement in many people's lives, since incomes rose, along with the improved services (for example access to health centers and education) brought about in part by urbanization, in part as components of the resettlement assistance given by NTPC. Their incomes are therefore generally higher than the rest of the local population's. However, the change has also meant greater vulnerability for many, since the households no longer have the security of the land, which had provided basic subsistence and income over generations.

Kayamkulam

The site for the Kayamkulam Combined Cycle project is located on the coast of the state of Kerala in South India, about halfway between Cochin and Trivandrum. The situation there is very different from the Singrauli region. While not without challenges, the project has benefited from more fortunate circumstances. The project is located in an area, which is not economically depressed, and where the local population is more educated, mobile and far less vulnerable than the displaced groups in Singrauli. Most of the 2,244 PAPs in the Kayamkulam did not depend on agriculture as their only source of livelihood prior to the land acquisition. The risks of impoverishment or severe negative impacts have, therefore, been considerably less in this project site. Moreover, the project is more recent, and the resettlement program, which was approved in 1996, has taken account of lessons learned elsewhere. NTPC has allocated more resources and attention to issues of participation and choice among support mechanisms. The State of Kerala has also played a stronger and more supportive role than Uttar Pradesh or Madhya Pradesh have in the case of Singrauli.

Through the Kayamkulam project, important principles have been established: loss of access to public water bodies was incorporated as an entitlement impact in the resettlement policy, to be compensated in similar ways as loss of access to public lands; and PAPs have been given preference in plant employment during the project construction phase¹⁰.

Kayamkulam has also had its share of difficulties. Some of the PAPs have complained about lack of adequate compensation and support, and the planned income generating activities have suffered from inadequate market research, lack of training capacity, and poor overall coordination.

^{9/} This report is limited to NTPC and resettlement impacts, and does not address Coal India or environmental impacts or action plans.

^{10/} However, such employment is generally temporary and based on unskilled or semi-skilled labor. PAPs have demanded more secure and permanent employment at the plant, arguing that they agreed to the project in the belief that they would get employment at the plant. This is refuted by NTPC.

The specific nature of the impacts, their corresponding entitlements, and the disagreements over the nature of support provided by NTPC to the affected population are discussed in more detail in the following sections¹¹.

From Policy to Plan to Implementation: Reality on the Ground

Based on its corporate policy framework, NTPC has developed project-specific Resettlement Action Plans. These RAPs contain the project-specific implementation guidelines for the corporate policy framework on resettlement, and address issues such as identification of Project Affected People (PAPs), consultation processes, compensation and other support measures, and monitoring and evaluation mechanisms. These action plans have been reviewed and approved by the World Bank, generally following an extensive discussion and incorporation of suggested revisions and improvements.

Implementation of these plans has, however, run into a series of problems and challenges, largely unforeseen at the time the corporate policy was approved in 1993, which illustrate the complexities and dilemmas of translating broad principles into action on the ground.

- ◆ **RAPS AND REAPS:** The distinction in the policy between those PAPs who are affected before and after the 1993 policy was adopted, has led to considerable controversy. For people displaced after 1993 in the Singrauli, new Resettlement Action Plans (RAPs) have been developed. NTPC has attempted to address older, unresolved issues and claims through retroactive Remedial Action Plans (ReAPs). These provided general support to communities, but did not give additional individual entitlements to PAPs displaced prior to 1993.

These attempts at “retrofitting” the situation by offering additional support to those displaced before a more comprehensive framework was developed were not well thought through. While well intentioned, they failed to assess the situation adequately through a systematic assessment of social analysis and participatory planning. Undertaking such a social assessment ought to be the first and basic requirement before action plans are developed. Those displaced prior to 1993 quickly realized that later generations of PAPs were receiving substantially more assistance. This became a source of dissent among people in the Singrauli region, and has led to claims for retroactive compensation and support among people affected earlier¹².

Mixing retroactive support measures to ameliorate problems caused in the past with a resettlement policy aimed at new land acquisition and projects, has led to confusion. A better solution in the future would be to keep the two strictly apart. Measures should be taken to provide support to communities affected in the past, but this should be undertaken as a comprehensive community development program based on participatory planning, and not mixed with formal entitlements under a new policy. The Bank was over-ambitious in including “retro-fit” rehabilitation in this project.

^{11/} The complaints by PAPs in Kayamkulam may in part be ascribed to the higher levels of literacy and long history of radical politics and union activism in the state; people are more aware of their rights and less inclined to accept what is offered by the Government in compensation for their losses.

^{12/} This problem has been exacerbated by the inclusion of people who had originally been affected by previous land acquisition, but had refused to move from the land they occupied, as PAPs with full entitlements under the new policy framework. This decision aggravated the sense of injustice among those that had accepted their compensation and moved voluntarily. They now feel that they are being penalized for having cooperated with the project.

- ◆ **INTER-GENERATIONAL IMPACTS:** Lack of access to productive employment has caused severe problems among the children (and in some cases grandchildren) of the original project PAPs, leading them to demand the same compensation benefits as those enjoyed by the older generation. NTPC have objected to this, arguing that the company can not be expected to continue to pay compensation several times over for a one-time case of land acquisition.
- ◆ **DELAYED DISPLACEMENT:** In several cases, NTPC has acquired land for which it did not have immediate use. The agency frequently allowed PAPs to remain on the land, after having paid them the compensation money. However, many of the PAPs who have continued to cultivate or live on these lands have been reluctant to vacate the land several years after it was acquired by NTPC. The PAPs argue that the compensation paid years ago was insufficient; that it did not meet real market value even then; and that they are unable to purchase replacement land or finance their relocation several years later, as prices have risen. In most cases, the original compensation amount has been spent long ago. NTPC, on their side, feel aggrieved that the PAPs are unwilling to move since not only has NTPC paid them the legal compensation; NTPC also feels that it has provided an additional benefit to the people by allowing them to stay on the land.
- ◆ **COMPENSATION LEVELS:** A central principle of NTPC's corporate policy as well as the World Bank's OD 4.30 is that land and other assets acquired from people must be compensated at full replacement cost¹³. However, PAPs have complained on numerous occasions that the amounts of money paid by NTPC for land and other assets do not represent the real replacement cost. This is the case both for Singrauli and Kayamkulam. This issue has also been raised and discussed during World Bank supervision missions. While NTPC acknowledges that the standard of living among many PAPs has gone down as a result of project impacts, the agency has not yet followed up with additional support to those who may have been under-compensated¹⁴.
- ◆ **LAND-FOR-LAND:** The World Bank insisted early on that NTPC adopt the principle of land-for-land, i.e. that those losing land, in particular agricultural land, should be given the same amount of replacement land elsewhere¹⁵. In spite of good intentions, it has become apparent that providing good quality replacement land may not always be possible in practice. Acceptable replacement land of equal productive value has proven difficult to find. NTPC has, therefore, decided not to offer replacement land to PAPs as a rule. However, the fact that this was originally promised to the affected people, and NTPC was unable to deliver on this promise, has contributed to bitterness and a sense that the company has reneged on its promises among many of the local people.

^{13/} While the Indian Land Acquisition Act states the same principle, that lost land should be compensated at its "market value", in practice such market value has been defined as the registered value of plots in official land records. These values are normally substantially under-reported, and PAPs are usually compensated at considerably less than replacement cost, even with the customary 30% "solatium" paid in addition to "market value". Although experience in Singrauli, recently, has proved that the PAPs are able to purchase land within the compensation provided.

^{14/} The Bank understood that NTPC had agreed in 1996 to conduct a study of differences between values lost and amounts offered as compensation, but has not yet undertaken such a study.

^{15/} This principle was promoted because of the risks to poor households when cash payment for required land was made. Frequently, vulnerable groups have been unable to reestablish the secure source of livelihood that land represented, and have spent the compensation money on consumption, payment of debt, or investments in enhanced social status through dowry or other traditional expenditures. In recent years, the World Bank and other agencies have recognized that land-for-land may not always be a realistic option. The main principle should be to reduce risk for vulnerable groups, but this may also be done in other ways.

- ◆ **RESETTLEMENT COLONIES AND SELF-RELOCATION:** The standard approach in cases of displacement has been to establish resettlement colonies, with housing and provision of other services such as water and sanitation, electricity, etc. This has also been the case in the NTPC project. While the housing provided is frequently of a higher quality than the homes people have had to vacate, PAP needs and preferences have not always been accommodated. In many cases, the housing was too far from their remaining land or other sources of income. In most of these sites, maintenance of infrastructure has proven to be a problem, since PAPs, NTPC, and local government authorities all expect one of the other groups to take responsibility for upkeep of the facilities. A major flaw with the design was that there was no clear agreement from the beginning about who was to be responsible for the maintenance and operation of facilities.

An alternative solution was established in the case of Kayamkulam, where people were displaced from their homesteads in 1992. NTPC failed to provide alternative housing, and people relocated on their own. Following adoption of the corporate resettlement policy, NTPC started to establish a resettlement colony since they acknowledged that people had a right to housing. However, through consultations with PAPs and the Bank, it was decided that developing a resettlement site belatedly would be of little value once people had relocated. Instead, NTPC provided Rs 150,000 for each household to rebuild or improve their existing homes. This support towards self-relocation has been successful; studies indicate that all 64 households who lost their homestead in Kayamkulam prefer self-relocation to shifting to a resettlement colony.

This example illustrates the need to plan relocation well in advance of displacement; to do it in consultation with the affected population; and to coordinate and sequence different project components so that resettlement does not delay civil works activities.

- ◆ **ACCESS TO EMPLOYMENT:** Given the difficulty of obtaining good quality replacement land, some project affected people were offered and accepted paid employment with NTPC. In the Singrauli region, NTPC has continued to employ around 150 PAPs in different jobs related to plant operation and maintenance. Most of these are employed through labor contractors and labor cooperatives. While no PAPs have full time jobs in Kayamkulam, some of them work for a few weeks every year on a rotational basis.¹⁶

However, the option of paid, secure employment has not been available to all. Once the construction phase was completed, there was less work available for unskilled or semi-skilled laborers, and NTPC has been unable to provide such employment to all those who feel they ought to be entitled to it. This caused resentment among PAPs, since in some cases, NTPC early on promised such employment, then decided they were unable to provide work to all. Since some PAPs have in fact been given

^{16/} In Kayamkulam, the employment of PAPs has in fact been made more difficult because of the strong position of labor unions in Kerala. The unions have insisted that their members should be given preference in access to construction work, and have contested the preferential treatment of the PAPs.

work, others feel there has been preferential or unequal treatment. This has been a major source of discontent¹⁷.

- ◆ **REHABILITATION THROUGH INCOME GENERATING SCHEMES:** As NTPC decided that neither land-for-land nor guaranteed employment to PAPs were viable options for all PAPs, they have settled on income generating schemes of various kinds as the main strategy for rehabilitating displaced people. These schemes have been offered to the PAPs, and have included a wide variety of different activities, training, and access to credit and seed capital. However, the implementation of these schemes has been plagued with difficulties. In most cases, no proper market analysis was undertaken to assess whether a particular activity promoted had the potential to provide sufficient earnings to the participants, nor was a cost-benefit analysis undertaken to determine the sustainability of individual schemes over time. Many PAPs remain unconvinced that these schemes will remain viable and sustainable over time. Many of them have been reluctant to engage in schemes, which would make them self-employed; they have maintained that they wanted good quality replacement land, or secure employment with NTPC. NTPC has also had problems in finding suitable partner agencies with the skills and experience needed to facilitate the income generating schemes. Again, this has proven more difficult in the Singrauli region than in Kayamkulam¹⁸.

In developing these schemes and offering them to the PAPs, NTPC has presented the PAPs with the opportunity to choose among several different options. The PAPs could choose whether they wanted to engage in welding or poultry raising, for example. This is a good principle, but its execution was only partially successful. In part, this was because inadequate analysis was made of the risks and benefits associated with each scheme. The PAPs were asked to make a choice between options that they did not have sufficient information about. Thus, the principle of informed participation was not followed. The income generating schemes would in all likelihood have been more successful if PAPs had been given better guidance to enable them to make informed decisions¹⁹.

NTPC compounded the difficulties caused by inadequate information by allowing too much time to elapse between the time when PAPs were informed about their options, and the time they had to make

^{17/} Given the fact that these power plants are in operation for many years, it could be argued that NTPC should have addressed the employment situation better by providing vocational and technical training so that more PAPs could have developed the skills necessary to hold jobs in plant operations. This might also have provided opportunities for the children of the original displaced population, and could have reduced the discontent and “inter-generational” problems described above. However, promoting enhanced skills among PAPs would clearly not provide employment for all interested PAPs, nor should such employment be presented or regarded as secure employment for life as an entitlement. This could be pursued as one among several options *for longer-term development*.

^{18/} As part of the intensified efforts at supervision and technical assistance following the 1997 Inspection Panel complaint, the World Bank helped NTPC contract a specialist consultant with experience in these types of activities, to guide the work in the Singrauli region. This has improved the success rate of these schemes.

^{19/} It is considered good practice in resettlement projects to present PAPs with options and choices among different entitlement and support mechanisms for each category of impact. This contributes to greater involvement, understanding, and ownership on the part of the affected population. These choices should be developed based on consultations with the local community. A principle, which ought to be followed, is that targeted support should be given to more vulnerable groups, and they should be encouraged to choose the compensation or support mechanisms which carries the least risk. However, in the case of NTPC, no initial attempt was made to distinguish between vulnerable and non-vulnerable groups among the displaced population. More recently, attempts have been made to identify the more vulnerable among the affected population, and to target support mechanisms to benefit these groups and individuals.

a choice. Many months went by before the decisions were finalized, and before the schemes started materializing. In the mean time, PAPs continued to feel that there was a chance of full time employment so long as they did not opt for an income-generating scheme.

- ◆ **GENDER ISSUES:** Men and women have different needs, opportunities and access to employment or markets in the Indian context, and the project has affected men and women's livelihood situation differently. For instance, men and women have different roles in fisheries in the Kayamkulam context, and women's access to earnings may have been limited more than men's through the project activities. In the Singrauli region, the changes had a more lasting effect on the relative roles of men and women. Whereas in the past, women had participated in agricultural production activities, employment in NTPC or through other jobs tended to be dominated by men. Many women were relegated to a domestic sphere, and lost much of their traditional influence and involvement in economic decisions and public life. This is now gradually being addressed through income generating schemes, where the most successful activities have been those targeted at women. The income from schemes, such as poultry rearing and carpet weaving have supplemented household incomes and allowed women to participate more actively in economic activities.

These differential impacts on men and women were not predicted in the early socio-economic surveys undertaken to address land acquisition and resettlement impacts; nor have they been addressed explicitly in resettlement policies or action plans. An important lesson learned is that targeting and inclusion of more vulnerable groups can be improved through systematic gender analysis. Gender analysis should also be undertaken as part of developing a consultation strategy for a resettlement project, to ensure that both men's and women's views and concerns are addressed.

- ◆ **LIMITS OF NTPC's RESPONSIBILITY:** The various demands and complaints from PAPs, especially the "second generation" demands from children of people displaced long before a comprehensive resettlement policy was established, illustrate a dilemma keenly felt by NTPC and many other agencies engaged in resettlement and rehabilitation. While they accept responsibility for redressing negative social and environmental impacts, they argue that there has been a lack of clarity about just how much is required, and for how long they should be expected to provide support and services to local populations.

However, this report argues that while greater clarity has to be developed regarding the limits of an agency's responsibility, the prolonged difficulties in the NTPC case are to a large extent due to the agency's own failures to address the issues satisfactorily.

- ◆ **CREATION OF A DEPENDENCY SYNDROME?** NTPC suffers from the problems of "company towns", where they completely dominate the local economy and have far greater resources than the local Government authorities. As a result, Government and other stakeholders expect NTPC to carry the main burden of local area development. With limited resources and capacity available for local Government, the district authorities have chosen to direct their attention and resources to other areas and populations, which they feel are more in need. NTPC feels this is unjust. They argue (and there is some evidence to support this), that their long term and extensive involvement in providing compensation and services to the affected population has led to a "victim mentality" among the PAPs, and to an unhealthy dependence on NTPC to provide services in which the community or local government ought to take responsibility for.

It does seem clear that some PAPs have been holding out for more support and benefits than what is reasonable. But the problem also highlights one of the deficiencies in the approach followed by NTPC and many other agencies dealing with development. Resettlement and other development activities appear to have been regarded as charitable efforts to provide help to the poor and displaced,

but not as comprehensive development activities to be developed in consultation with primary beneficiaries and other stakeholders including local government.

Moreover, by not involving the PAPs in a genuinely participatory process about needs, constraints and opportunities, but treating them more as welfare recipients, NTPC has fostered the “victim mentality” among the PAPs. Since they have had little or no say in developing a resettlement and rehabilitation program, PAPs have naturally come to expect decisions taken on their behalf and assistance to be given with little contribution or participation from their own side. With improved consultation and availability of options, there could have been a greater sense of ownership of the process among the PAPs, and more likelihood of them taking greater responsibility for their own future²⁰.

PARTICIPATION AND CONSULTATION MECHANISMS

Importance of participation and transparency

A lesson learned through the NTPC project is that the more complex the situation is on the ground, the more important it becomes to engage local populations in participatory planning and implementation; to consult with them at an early stage; and to be transparent and fair in implementing the development program. It appears that communication worked better in Kayamkulam than in Singrauli, possibly reflecting the differences in literacy between the two locations.

The problems described in the previous sections have been exacerbated by a sense among the PAPs that NTPC was not consulting properly with them; that there was a lack of transparency in decisions about support mechanisms and services; and that some individuals and groups were given preferential treatment.

Community outreach and the role of extension workers

In more recent years, NTPC has tried to improve its relations with the local communities and the quality of its resettlement program by hiring people trained in community development to act as liaisons with the local population. In each plant, one man and one woman are now responsible for the company’s consultation process and extension activities. For the most part, these extension workers are dedicated and hard working. In most cases, relations with the community have improved markedly. The company has also established Public Information Centers (PICs), which have allowed greater insights into project activities and individual entitlements among the PAPs. NTPC management now regularly meet with PAPs to discuss grievances, suggestions, and the progress of different activities such as the income generating schemes. Each plant has a manager for resettlement, who supervises the work of the extension workers and are responsible for the overall implementation of the resettlement program. They also meet regularly with PAPs.

In spite of these changes, there is definite scope for improvement of how the community outreach functions. PICs are located inside the company compound in a restricted area. While the PAPs who seek access are welcome to come in, the whole situation may be intimidating. Some of the information is only available in English, which is of little use to the majority of the PAPs in Singrauli. Grievances are heard,

^{20/} A top down, non-participatory approach to development and subsequent lack of ownership or involvement among local populations is the rule rather than the exception in most projects, and is clearly not limited to NTPC or resettlement situations.

but the main orientation of the program is that of a one-way flow of information. While the extension workers have shown sensitivity to the needs of the PAPs, they have no authority within NTPC's corporate structure. They are not members of NTPC's *cadre* of regular staff, and for the most part they are young and relatively inexperienced and so they feel unable to engage NTPC's management in discussions about policy and decision-making.

Village Development Advisory Committees (VDACs)

In response to criticism about inadequate consultations with PAPs, NTPC established Village Advisory Committees in 1995. These were intended to function as problem-solving mechanisms to address issues proactively before they became critical.

Initially, these were largely ineffective or functioned as outlets for NTPC views rather than consultative institutions representing the interests of the PAPs. As part of the intensified action program following the 1997 Inspection Panel complaint, efforts have been made to reconstitute and improve the VDACs in the Singrauli region. An NGO has been consulted in this process, which is aimed at making the VDACs more participatory and transparent. The VDACs are now being reorganized into a two-tier structure, with village level committees as the first level. These are then to elect representatives to a project level VDAC at each plant. But while the formal structure of the VDACs is being improved, the content remains unsatisfactory. The discussions often remain dominated and controlled by NTPC, and many PAPs are getting increasingly frustrated. They argue that NTPC is not serious about participation.

INSPECTION PANEL COMPLAINT AND INTENSIFIED EFFORTS

The problems discussed in the previous sections contributed to a deterioration in the relationship between NTPC and some of the PAPs. In the Singrauli region, many people refused to move, and others were demanding additional compensation or assistance. By 1996, open conflict, blockages and mutual accusations of violence were becoming frequent.

This conflict between NTPC and members of the local communities in the Singrauli region gained the attention of local and international NGOs and activists. In April 1997, representatives of villagers assisted by a local NGO filed a complaint with the World Bank's independent Inspection Panel. In this complaint, they argued that the Bank had failed to comply with its own Operational Directives, and that people living in the area were being harmed as a result of the Bank's omissions and failures in the preparation and implementation of the project.

In its Management Response to this complaint, the Bank accepted that it had not complied fully with its Operational Directives on Involuntary Resettlement (OD 4.30), Bank Supervision (OD 13.05), or Environmental Assessment (OD 4.01). It proposed to undertake an intensified Action Program intended to improve substantially the implementation of the projects, and to bring the Bank into full compliance with its safeguard policies.

In its review of the complaint, the Inspection Panel only partially accepted the Management Response. Arguing that there was evidence of harm to the local population, the Panel recommended a full investigation into the project. Among other things, it criticized the Bank for inadequate supervision of the Project. On balance, however, the deficiency was less with the amount and quality of supervision than with actions taken to address the observations and problems highlighted through the Bank's supervision. The problems raised in the complaint to the Inspection Panel did not come as a surprise to the Bank. The difficulties and inadequacies of the resettlement program had been described in detail by several Bank

supervision missions, and numerous recommendations had been made to NTPC and Bank management about actions that ought to be taken.

In spite of this, little progress was made. NTPC dragged its feet on many issues, and the Bank did not always have adequate resources to support NTPC or impress upon the agency how seriously the Bank regarded the situation. With the Inspection Panel complaint and the threat of a full investigation and possible suspension of the project, both the Bank and NTPC were galvanized into action.

Management Action Plan

The recommendations of the Panel were only partially endorsed by the Bank's Board of Executive Directors²¹. As a compromise instead of a full investigation on the ground by the Inspection Panel, the Bank's Board approved a Management Action Plan, which provided additional resources, intensified supervision efforts, training, and support to a regional development plan in the Singrauli area. This plan contained three components:

- *an independent social impact assessment of the projects in the Singrauli region*
- *appointment of an independent monitoring panel to assess grievances and provide advice to NTPC and the World Bank*
- *a time-bound action program, which included development of a more comprehensive development program in the Singrauli region*

Impact Evaluation

An independent NGO and consultancy firm, the Xavier Institute of Development Action and Studies (XIDAS), was recruited to undertake an assessment of progress and status of the resettlement program in the Singrauli region, and to recommend remedial action to address the problems identified.

The Terms of Reference (TOR) for this study were developed jointly by the World Bank and NTPC, with inputs by XIDAS. The organization was asked to assess current status and progress, and recommend solutions to NTPC and the Bank.

XIDAS submitted their report on May 31st, 1998. Their findings confirmed many of the observations made by different World Bank supervision missions, and highlighted the main problem: PAPs wanted land or secure employment, and NTPC was unable to provide either.

The impact evaluation was only partially successful. While it highlighted many of the difficulties, it failed to provide clear guidance on how to address the problems. It only superficially addressed institutional and organizational constraints. The XIDAS team was also unable to contribute to better dialogue and problem-solving between PAPs and NTPC, and the team's own efforts at organizing consultative workshops in March 1998 about the study findings were a failure.

^{21/} There were strong complaints from the Indian Government against what they saw as an investigation into internal affairs, and they argued that the Inspection Panel's mandate was only to investigate the Bank's own conduct, not the actions of the Indian Government or its agencies. Since the complaint against the Bank was based on the argument that NTPC did not adequately implement the provisions of the project resettlement plans, and that the Bank failed to take adequate action to improve matters, it would be difficult to conduct a full investigation without also pointing out shortcomings of the Borrower.

Nevertheless, the study and the intensified efforts by NTPC and the Bank in addressing the problems led to improvements in several areas. The VDACs are being strengthened; more systematic attention is being paid to the viability of income generating schemes; and NTPC has improved its outreach and consultation with the affected communities. In January 1999, a revised Rehabilitation Action Plan was developed for the Vindhyachal project, with an improved program for addressing the deficiencies identified through the impact evaluation and other studies.

Independent Monitoring Panel

One of the most innovative mechanisms for addressing the problems and contributing to conflict resolution is the establishment of the Independent Monitoring Panel (IMP). This Panel was established in November 1997, and was expected to function for a minimum period of one year. Its mandate has since been extended, and it was still active one year after the project was closed in March 2000.

A three-member Panel was established as an advisory group, which was to systematically review and advise on the implementation of the resettlement program. One member is a senior advocate of the Supreme Court and represents the legal community; one member has a background from NGO activities, and one member is an academic with experience in training programs related to resettlement. A key objective was to select eminent and respected persons who would have the experience and integrity to review the situation, and to provide guidance and advice, which would be acceptable to NTPC and other stakeholders such as the NGO community.

In spite of some disagreements over individual recommendations made by the Panel, NTPC and the Bank agree that the innovative mechanism of such a Panel has contributed to improved relations among the various stakeholders involved, and to better efforts at addressing the project's resettlement challenges.

Regional Development Plan in Singrauli

As part of the action plan, the Bank is working in a project to support a more comprehensive socio-economic development program in the Singrauli region. This work is being carried out in collaboration with local and state Government authorities. It focuses on community development and improved access to services in the area, targeting the poorer groups. This project has suffered from delays.

LESSONS LEARNED: ORGANIZATIONAL AND INSTITUTIONAL MECHANISMS

Institutional capacity within NTPC

The difficulties encountered during the implementation of the NTPC project do not have easy solutions, and there are no standard formulas for dealing with them. In many ways, the physical displacement of people, and providing replacement housing and infrastructure, is the easiest part of resettlement. The real challenge lies with helping poor people to reestablish and improve their livelihood in the cases where they have been displaced by a development project. This has proven far more difficult in the Singrauli setting than in Kayamkulam, and illustrates the risks to local populations when land acquisition is undertaken in a rural setting with predominantly subsistence agriculture where previous resettlement problems exist.

As we have seen, the situation on the ground has proven to be extremely complex, particularly in Singrauli. It has been characterized by a number of problems not foreseen either by the Bank or by

NTPC. Addressing such issues satisfactorily implies a number of steps and inputs, none of which are part of what an agency, such as NTPC, sees as its core business agenda. This illustrates a key dilemma common to many projects involving displacement of local populations. While such displacement is normally caused by large government agencies utilizing the State's power to expropriate land under existing Land Acquisition laws, these agencies have limited experience in addressing non-technical components of their projects such as impacts on the environment or on the local population.

This has been the case with NTPC. It is important to understand this point, since many of the difficulties encountered during project implementation can be ascribed to the lack of institutional capacity and commitment to the resettlement program. There are understandable reasons for this. NTPC, as a technical agency with a mandate to provide energy, has effectively been asked to develop expertise as a social development agency. This requires a fundamentally different mindset from the technical approach that the company's staff has been trained in. There is no incentive structure within the company to reward good socio-economic development. Taking the time and spending the money to do this has sometimes been regarded as something that delays and increases the cost of NTPC's core business.

In spite of an acceptable policy framework, resettlement has therefore continued to be regarded as marginal to NTPC's senior management. While there has been improved understanding over time, and sincere efforts by many individuals with the organization, it is likely that many officials within NTPC still regard the broader entitlement framework in the NTPC resettlement policy as overly generous and unnecessary. In addition, while NTPC has gradually created an organizational structure more suitable to address resettlement impacts, the units created to deal with these issues have remained poorly integrated into the overall organizational structure. As a consequence, the results on the ground have been disappointing.

Institutional capacity in the World Bank

Many of the same arguments about evolving principles, standards and practices discussed above can also be made about the World Bank. While the Bank has longer experience than many of its client agencies in addressing involuntary resettlement, these components have frequently been regarded as marginal to the overall objective of the projects. As with NTPC, the incentive structure for individual task managers in the World Bank has been unclear, involving contradictory messages about the need for speedy loan processing, disbursements and physical progress; while at the same time attention has to be paid to social and environmental concerns which are less concrete, lack international standards, are harder to measure and take time to get right.

The Bank has gradually improved its capacity to address these concerns, and developed greater expertise. It has also become clearer that social and environmental impacts and opportunities are at the core of the Bank's business and not marginal concerns. In the earlier days of the Bank's processing of the NTPC loans, there was only limited expertise and commitment to addressing these concerns on both sides. Thus, the messages given by the Bank to NTPC related to these concerns were more focused on mandating what should or should not be done based on a relatively mechanical application of a global policy, rather than giving practical advice and guidance on how best to address the problems²².

When judging the resettlement implementation in the NTPC project to be unsatisfactory, therefore, the responsibility for this must be shared between NTPC and the World Bank. The complexities outlined in this report were underestimated not only by NTPC, but also by The World Bank. In retrospect, it can be

^{22/} Addressing these issues appropriately requires reform and changes in behavior on the part of the Bank as well as its client agencies. Even today, with a greater body of knowledge about problems, solutions and good practices worldwide, the Bank remains constrained by its limited ability to communicate these messages and to develop a common understanding with its clients through participatory planning.

argued that inadequate guidance has been provided to NTPC from the Bank in predicting and addressing the difficulties of resettlement in such large projects.

SUMMARY OF LESSONS LEARNED

Over the years that the NTPC project has been active, the difficulties in translating the policy into practice on the ground have gradually become apparent. However, deciding on a course of action to remedy the problems has proven more difficult, and implementing recommendations has been hampered by the lack of institutional capacity.

While risks related to resettlement and other social impacts can never be fully eliminated, the experience in this project illustrates that the best way of reducing risks is to have a careful assessment of institutional capacity and commitment before a lending operation is approved. Clear and measurable indicators for developing such capacity should be established, and there should be agreement up front on the consequences of failing to develop such capacity. This is now regarded as good practice in projects involving resettlement or other components with which the implementing agencies are unfamiliar²³.

Recognizing that both the Bank and NTPC had underestimated the challenges involved in addressing the social impacts of the projects, the Bank decided to continue to work with NTPC in spite of dissatisfaction with how social and environmental concerns were being addressed. The Bank's management felt that the best way to improve on the situation on the ground was to continue to be involved.

On balance, it seems that the decision to continue the dialogue rather than withdraw or impose sanctions such as project suspension was a correct one. It is probable that more could have been done at an earlier stage to impress upon NTPC the seriousness of the issues. However, even with hindsight, it is not easy to determine how this could have been done.

For both the Bank and NTPC, the experience with the projects in Singrauli and Kayamkulam has provided valuable institutional learning about how to minimize negative impacts and contribute to improved social development in large energy projects. Since this project was approved, the Bank's policies on resettlement have developed, as has NTPC's ability to deal with the issues (as partially demonstrated by the difference between the resettlement action at the two main plants constructed with funds from this project). Neither the Bank nor NTPC have stood still; both have developed and have already learnt lessons from the experience of this project.

Among the conclusions we can draw from the experience are:

Resettlement policy issues:

- ◆ **Need for new policy:** Although the 1993 R&R policy approved by NTPC was considered a significant achievement, it did not evolve in light of changing circumstances in India and experience of implementation of this and other projects. The policy should be reviewed regularly and be flexible enough to incorporate the lessons learned as implementation continues.
- ◆ **Realism and consistency:** The two most critical issues in the whole process have been access to land and to secure employment. In some places both were promised to PAPs, but both proved difficult to

^{23/} In hindsight, it can be argued that more systematic attention to these dimensions should have been undertaken in the case of NTPC. However, insisting on such analysis was not common practice only a few years ago, when the NTPC loans were approved. Thus, this lesson has already been largely learned and addressed.

provide. This demonstrates the need for realistic support mechanisms, and the importance of providing what has been promised. The apparent failure of NTPC to provide land and employment is a core reason for the distrust and resentment on the part of many PAPs.

- ◆ **Land, employment, and livelihood restoration:** Any future policy frameworks should clearly state that while the agency will attempt to provide land-for-land and long term employment wherever possible, other support mechanisms will also be explored, and be considered acceptable as long as they provide a strong likelihood of helping PAPs restore lost livelihoods. Wherever possible, long term approaches such as training of younger people for skilled or semi-skilled jobs should be explored, to avoid generating a second generation of landless, unskilled wage laborers. In terms of restoring lost livelihoods, the policy should target support to poor and vulnerable groups, assess risks and opportunities, and provide targeted support aimed at minimizing risks and providing sustainable livelihoods.
- ◆ **Focus resettlement policy on new project sites:** In a policy revision, the focus should be on how to address new project situations rather than trying to repair damage done in older settings. Mixing the retrofit actions in the ReAPs with the RAPs was a mistake. Broader development plans for an area should be undertaken based on a systematic social assessment, but such plans should not be confused with resettlement action plans for a new area to be developed.
- ◆ **Establish clear areas of responsibility:** The responsibility of the agency acquiring land should be clearly spelled out in a resettlement policy. This should not only cover what support mechanisms and entitlements will be provided to the affected population, but also make clear the limits of responsibility in terms of time and efforts, and how partnerships and shared responsibilities will be established with other key stakeholders such as local government, the local communities, and other agencies active in the area.
- ◆ **Delayed displacement should be avoided:** Allowing PAPs to stay on and cultivate or occupy land once land acquisition has taken place, while well intentioned, has led to renewed demands and claims for additional support once displacement takes place, and to a host of problems involving second-generation affected people. It is recommended that this not be done in future projects unless a clear and transparent consultative process establishes agreement between the responsible agency and the PAPs that no further support beyond the original package agreed upon can be expected once they have to vacate the land.
- ◆ **Resettlement sites and self-relocation:** The best results in terms of homestead sites have come about where people have been encouraged to self-relocate with adequate support in advance. PAPs should be given the choice before displacement takes place between moving to a resettlement site, or self-relocating.

Planning stage:

- ◆ **Integrated planning from the outset:** Potential social and environmental impacts need to be assessed systematically before any decision is made to invest in major infrastructure, rather than treated as problems to be solved after the fact. OD 4.30 states that suitable design alternatives are to be explored; this was not done systematically in the case in Singrauli or Kayamkulam. As obvious as it may seem, one of the lessons of this project may be that it is rarely a good idea to add further resettlement to an area with existing significant/unresolved resettlement issues.
- ◆ **Stakeholder analysis and consultations:** A participatory process involving affected people must to be undertaken to assess impacts and reach agreement on support mechanisms. This should be based on a stakeholder analysis assessing vulnerability and risk, and including attention to issues such as different impacts on men and women. This is one of the most important lessons learned, both for NTPC and for the World Bank, without involving stakeholders in a manner that creates understanding

and ownership of the development process, the project is unlikely to be socially or institutionally sustainable.

Implementation and organizational issues:

- ◆ **The need for organizational capacity:** Far greater attention needs to be paid to the organizational and institutional dimensions surrounding resettlement and other social impacts. In common with many other organisations of its type, NTPC's attempts at building up in-house capacity to address these concerns have often fallen short of meeting the requirements. Other, more flexible solutions such as developing partnerships with other agencies including NGOs ought to be explored more systematically in future projects.
- ◆ **Independent Monitoring Panel:** The experience shows that establishing an Independent Monitoring Panel has had a positive effect. It is recommended that a neutral agency be appointed to help with monitoring in all suitable projects, to help the client and the Bank assess project performance and likely outcomes. The use of such panels should be tailored to the particular circumstances on the ground.
- ◆ **World Bank responses to delays and non-compliance:** This report argues that the World Bank did not have a clear strategy for how to respond to reports about problems in the field and a situation of non-compliance. Clearer guidelines should be established to provide a more predictable situation in future projects, where the Bank, the Borrower, and the affected communities know what the implications are of unsatisfactory progress or outcomes related to involuntary resettlement. The overall approach should be one of greater flexibility in terms of inputs and activities as long as clear adherence to basic principles is demonstrated.
- ◆ **The need for better and clearer communications:** Amongst the Bank's staff who work on resettlement, there is a growing understanding of the need to not only explain the content of the safeguard policies in terms of mandatory principles and procedures, but to provide ongoing guidance and advice to borrowers on how best to achieve the required outcomes. This now includes examples of good practice from other project situations all over the world. However, it is clear from the NTPC example that, as much emphasis must be put on how a message is transmitted, as well its content. In a situation where the issues are new and unfamiliar and there is often a lack of understanding or commitment to the approach suggested, new and innovative means of communicating and developing the solutions in partnership with the client should receive high priority in the Bank's work.

Resettlement as a development opportunity

From regarding resettlement issues and other social impacts as obstacles to fast and efficient construction of infrastructure, the Bank and its development partners and clients are gradually coming to regard these concerns as development opportunities and ways to alleviate poverty. The challenge is to reach a shared understanding of how to take advantage of these opportunities.

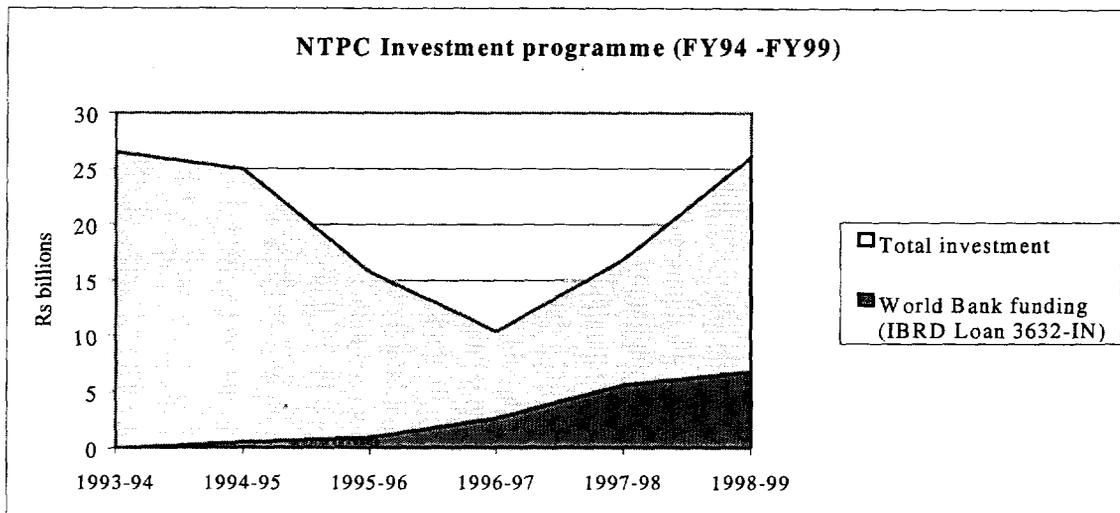
APPENDIX E

Role of NTPC in the Indian Power Sector

This Appendix considers NTPC's growth into the role of a leading player in the power sector. It discusses NTPC's capacity improvements; its Joint Venture initiatives; its support for State power sector reform; its financial management; and the current challenges for the future.

Recent Growth

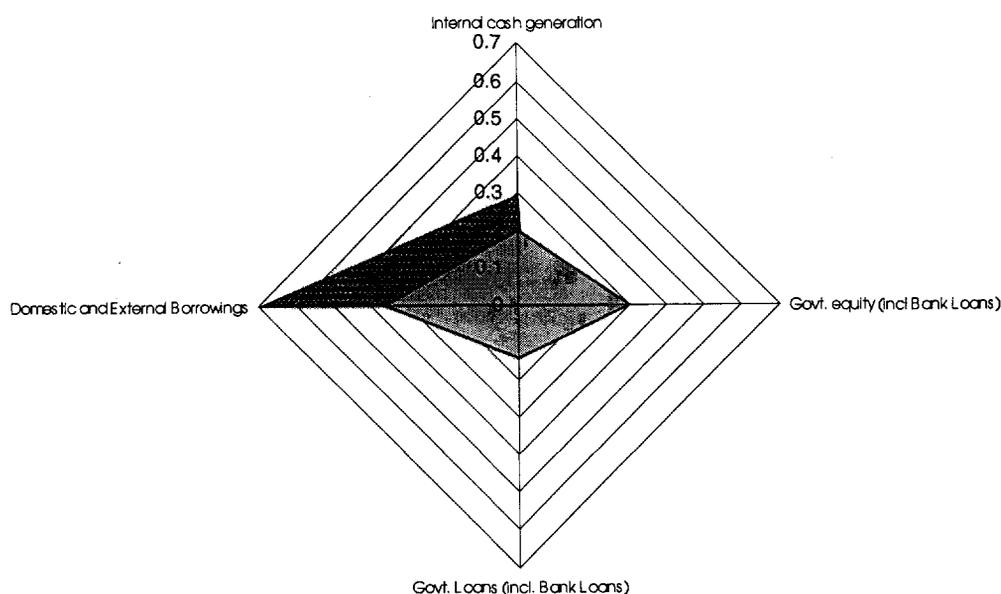
Presently, NTPC has an installed capacity of 19,291 MW including the capacity of Tanda Project taken over from UPSEB. NTPC plans to reach a level of over 30,000 MW by the end of the 10th Plan. Projects of 3,144 MW are under construction, Faridabad (144 MW of the 432 MW), Simhadri (2x500 MW) and Talcher-II (4x500MW). The two 500 MW units of Vindhyachal-II, 2x143 MW gas turbines at Faridabad, Kayamkulam (350MW) and Unchahaar (2x210 MW), have recently been commissioned. Another 8,600 MW is proposed through new coal (6,000 MW) and gas (LNG)/naphtha (2,600 MW) projects. In addition, NTPC is initiating work on the expansion of Kayamkulam to about 2,000 MW, to be fueled by LNG (including the conversion of the ongoing 350 MW project to gas). Given NTPC's established capability in project implementation and the 1998 increase in authorized return on equity, this large program, while ambitious, is in principle feasible and financible, assuming that: (a) LNG import arrangements can be finalized expeditiously; (b) current problems in bill realization are overcome and action is taken to regulate supply where required; (c) the required Government clearances for the proposed projects are provided expeditiously; and (d) NTPC manages the social and environmental dimensions of its projects in a satisfactory manner.



As can be seen from the chart above, NTPC have invested heavily during the period of this loan. NTPC's total investment in generation and related projects for the financial years FY94 to 99 has been some Rs 120 billion (US\$2.9 billion). Thus, this project has constituted 14 percent of NTPC's investment time-slice for the period. NTPC used to rely heavily on Government support (equity and loans) in the financing of its investments. Its existing capacity was funded through internal cash generation (20%), Government equity, including Bank loans passed on as equity (30%), Government loans including Bank loans through the Government (14%); the balance was covered through domestic bonds (13%) and domestic (2%) and external

(21%) commercial borrowings. The financing mix is changing, with NTPC paying significant dividends to the Government, direct borrowings from the Bank starting with NTPC I, increased internal cash generation, and rapid increase in commercial financing. This change from the Government to capital markets is strikingly visible in the current financing plan for the 12,246 MW planned new projects: they are to be funded through internal cash generation (30%, net of quite significant dividends to the Government at 30% of net profit), only marginal Government equity (ongoing OECF assistance for Faridabad is passed on as equity, 2%), no Government loans; the balance (almost 70%), is to be covered through domestic and external bonds and external commercial borrowings, with only marginal role for multilateral financiers including the Bank. NTPC has accessed international capital markets successfully, and is rapidly gaining experience and confidence, and what appear to be reasonable financing terms. NTPC has a BB / +ve credit rating by Standard and Poor's (and AAA rating from Crisil for its domestic bonds).

Comparison of NTPC past and future funding ratios



The above figures do not include capacity contributions or financing requirements of NTPC's joint ventures. In principle, it should not be difficult for NTPC to finance its equity contributions to its own joint ventures, but its equity support to the Power Trading Corporation may prove to be a different case.

Joint ventures

NTPC is making progress in the implementation of its corporate strategy to diversify through joint ventures:

- NTPC has formed an R&M joint venture company with ABB;
- NTPC intends to take over NHPC and continues to look for suitable hydro projects and intends to develop such projects with qualified joint venture partners;
- NTPC is finalizing a shareholders' agreement for an LNG joint venture with British Gas, and NTPC also plans to participate in Petronet, both joint ventures are designed to help NTPC arrange large-scale LNG imports for its power stations, on a competitive and diversified basis.
- NTPC intends to take an equity stake in the power trading corporation. The Government has established a Power Trading Corporation (PTC)²⁴, primarily for the purpose of buying power from mega power projects under long-term PPAs and selling the power to the beneficiary states also under long-term PPAs. POWERGRID is to be the largest single equity investor in PTC at a 30 percent share, along with NTPC and PFC at 15 percent, and the balance from other financial institutions. There is potential merit in NTPC participation in PTC, but only if the Government focus PTC to reforming states and thereby develop it into an agent of power sector reform and fiscal discipline.
- NTPC has obtained GOI permission to set up hydropower projects. It is exploring the option of implementing green-field hydro projects/taking over incomplete/running plant(s) from SEB, in view of their outstanding dues. Further, the Ministry of Power has conveyed its no objection to NTPC taking up the execution of Kol Dam Hydro Electric Project (4x210 MW) after obtaining the approval of the Government of Himachal Pradesh.

Support for State power sector reform

NTPC is aligning its investment program, and operations of existing plants, to directly support state power reforms. Investments have recently been made in Faridabad for Haryana, and Simhadri for Andhra Pradesh. It is also now proposed to resurrect the previous plan to construct Rihand II, now that Uttar Pradesh is committing to reform. In operations, there have been additional sales (e.g. to Andhra Pradesh) and more favorable rescheduling arrangements for reforming states.

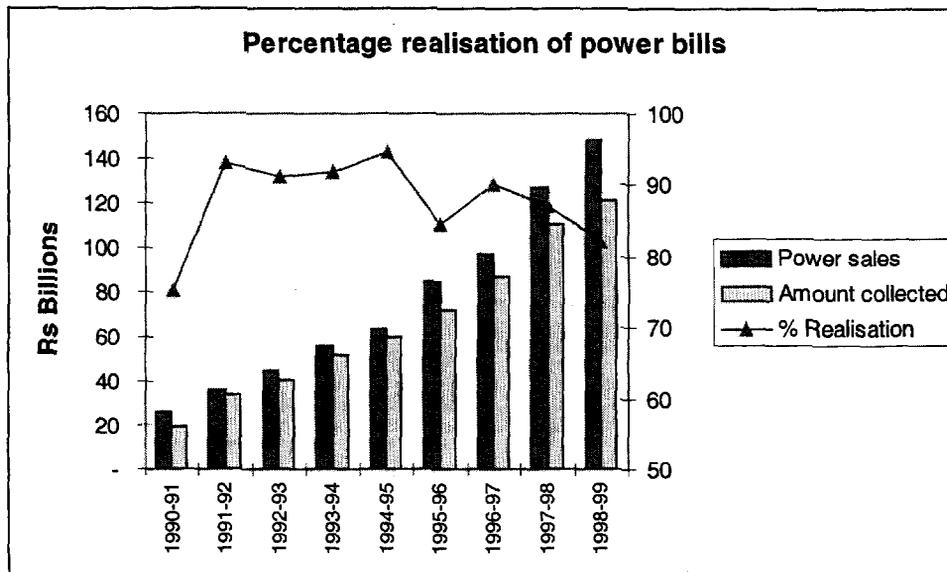
NTPC has in the past taken over two power stations, one in UP and one in Orissa, (and another similar arrangement is being finalized, again in UP), in each case as payment for past unpaid electricity so as to clear their arrears. These takeovers, not only settle the arrears, but also provide for additional power to UP and Orissa through the rehabilitation of what were poorly performing power stations. NTPC's actual accomplishment in Orissa, turning around the old and poorly performing Talcher power station, demonstrates in a concrete fashion how other states could benefit, both in terms of operational performance and additional power supply, and significant environmental improvements. (Results in UP, in terms of operational improvements, were even better, but there the power station was of a much more recent vintage, i.e. the renovation much not as great a challenge as in the case of Talcher in Orissa). More recently, NTPC made a significant contribution to the resolution of a major strike in UP by worker campaigning against reform. NTPC provided staff to run UP power facilities and also additional power from the central generating stations. Within a few days of the strike being called, UP was receiving some power in all areas, largely due to the efforts of NTPC and POWERGRID staff.

^{24/} The word trading in the name of the corporation is a misnomer, PTC is not a typical trader, but a long-term power contracting corporation.

Financial management

NTPC's continues to struggle with the issue of accounts receivable in a highly challenging environment, in a sector facing fundamental managerial, financial and operational issues. Through a variety of measures, including regulation of supply and enforcement of power purchase agreements, NTPC has managed to maintain and improve its collection efficiency over the past ten years, while increasing its billing by more than 500 percent as shown in the chart below.

Bill collection is a chronic issue, which continues to challenge NTPC and require extraordinary amounts of top management attention and effort month after month, year after year. There is no quick solution in sight: even the planned massive securitization of SEB dues to NTPC is only a stop-gap measure. The only sustainable solution, state power sector reform with distribution privatization and independent regulation, is being pursued only by a few states, a few others are seriously reviewing their options but still undecided about the course of action, and the majority of the states are still maintaining the status quo and either by choice or default, continue to rely on the SEBs. Tariff commissions, under the Electricity Regulatory Commission's Act, 1998, should help de-politicize tariff setting and provide some relief at least for some SEBs of the non-reforming states, but distribution privatization is the only effective means to address the fundamental managerial, financial and operational issues in the state power sector. It is to be hoped that tariff commissions will accelerate the introduction of reforms, e.g. through the publication and debate of tariff proposal and SEB performance in their tariff hearing processes. More directly applicable to NTPC, high expectations are also placed on the Central Electricity Regulatory Commission to speed up the extraordinary slow tariff processes of central utilities.



NTPC has taken dramatic action at times to improve the situation. The action, in the latter part of 1998, in the Eastern region, including the closing of the Farakka power station for about three weeks, was a remarkable and successful attempt to improve bill collection, but this needs to be continued. In terms of payments by individual states, all Western region states and most Northern and Southern region states are currently performing in terms of payments to NTPC. NTPC's critical client states are Delhi and Uttar Pradesh in the Northern region, Kerala in the Southern region, Assam in the North-Eastern region, and the whole of the Eastern region. Delhi and UP are also POWERGRID's most critical clients and bill realization from these two

states remains a chronic problem; in part because they have typically managed to avoid the regulation of supply, which NTPC has carried out elsewhere, most recently in the Eastern region. Delhi has paid its current bills in the last several months. The issue is the recovery of past arrears, and dialogue is underway. A comprehensive settlement has been agreed with UP, which if implemented as expected, would not only settle the arrears, but would also provide for additional power to UP through the takeover and rehabilitation of a poorly performing power station.

The situation in the Eastern region is atypical, payment defaults in part reflect the long-standing dispute about grid in-discipline and high frequency. Eastern region SEBs maintain that NTPC is unnecessarily pumping power to the grid in order to increase its revenue at their expense when power is not needed. NTPC maintains that it is following RLDC schedules. The new availability-based tariff system, with the frequency-linked pool rate, should help resolve this major dispute: if NTPC indeed generates over its RLDC schedules, at times when system frequency exceeds 50.5 Hz, such extra power will be free of charge in the new tariff system.

Securitization of SEB dues

The Government approved on November 9, 1999 a proposal to securitize the dues of central utilities and CIL from the SEBs, possibly for an amount as high as Rs 12,000 crore. Of which, NTPC's share is about Rs 6,000 crore (the other major beneficiary being Coal India). A special purpose vehicle (SPV) would issue tax-free bonds, which would be serviced by the Government from Central Plan Assistance to the states – this is another round of central appropriations, with the difference that through securitization, the utilities would get the funds up-front.

Earlier rounds of central appropriations have resulted in 15 percent of annual Central Plan Assistance being diverted for several years into the future (up to 17 years in some cases). The 15 percent ceiling has now been raised to 30 percent, to make the current scheme feasible. If implemented, this additional 15 percent cut in funds available to the states will place tremendous pressure on state finances. This arrangement is likely to have an extremely high social cost. The charge on Central Plan transfers almost invariably results in cuts by the state government in their spending in the social sectors and the hardest hit are services to the poor – the poorest in India who typically do not benefit from power service are involuntarily made to pay for the cost of such service to the wealthiest segment of the society. In the long run, regulation of supply to the level for which the SEB is able to pay would be a better method of financial management than further appropriations from Central Plan Assistance.

Future directions for NTPC

As it enters its silver jubilee year, there are currently three main choices for the path of NTPC's future development, which are not mutually exclusive, but could be combined to develop NTPC into a driving force for India's development. These are (a) agent of reform for state power; (b) disinvestment; and (c) hydropower.

NTPC as an agent for State power sector reform

Taking over assets. NTPC could make a very significant contribution to state power reforms in various states, by agreeing to similar takeovers as payment for future electricity bills. This would “release” cash or more accurately reduce the need for significant amounts of cash – which would have been required to pay NTPC. It appears that this kind of support from NTPC might be required in most, if not all, reforming states: (i) it has already been used in Orissa; (ii) it would be very useful in UP and Andhra Pradesh; (iii) it probably will be required in Haryana if and when the reform implementation resumes; and (iv) while situation in Karnataka and Rajasthan is still being analyzed, they might well benefit from such takeovers as well. In addition to making a great contribution as an agent of power sector reform, from

NTPC's perspective, this approach would be fully justified as long as the states are actually reforming and will become through reforms capable of paying their power bills in the future. (Taking over power stations in non-reforming states would only delay and aggravate the problem when the power bills are to be paid next, after the in-lieu payment period is over.) Moreover, once the reforms are over, NTPC could consider privatizing the stations, at that time, given that the clients would now have become creditworthy, the sales would attract great interest.

Aligning investment to reform

NTPC should continue to align its investment program and operations of existing plants to directly support state power reforms. This would require that the traditional Gadgil allocations be discontinued for NTPC's new power stations. While such a reorientation will not be easy, avoiding it – continuing to supply to non-reformers beyond their capacity to pay and maintaining the exposure to future payment defaults - is likely to result in increasing bill realization problems in the coming years and another slowdown in NTPC's investment program. Initially, this alignment with reforms might most effectively be achieved through; (a) NTPC's participation in the Power Trading Corporation (PTC), assuming PTC is focused on supporting reforming states. (If PTC is not focused on reform, NTPC can be expected to experience even greater difficulties in bill realization, if it does not align its own program and operations to reforming states); and (b) NTPC taking over power stations as payment for past arrears and even future electricity bills (as described above). Proceeds of NTPC plant disinvestment could in part be used to support this process.

Disinvestment

The Government has instructed NTPC to examine options for disinvesting part of the Government's very large investment in NTPC (Rs 8,000 crore in paid-up capital and another Rs 12,000 crore in reserves and surpluses). The disinvestment approach needs to be designed so as to: (a) not undermine the implementation of NTPC's investment program; and (b) not create a massive dominant private power generator. Government disinvesting a small share of its equity in NTPC is not advisable, the experience in the petroleum sector has shown this already, resources raised are not significant and danger of under-valuation is very real. Government disinvesting its equity in NTPC to below 50 percent would yield very significant resources and proper valuation of NTPC. But selling more than 50 percent would obviously lead to NTPC becoming a private company, which at 18,000 MW and growing towards 30,000 MW, would remain in the foreseeable future a dominating force in the sector, and as such, would probably make any future plans to introduce more advanced competitive wholesale power markets very difficult to implement successfully. Plant-by-plant privatization would avoid this potential risk and disadvantage.

With the state power reform process more advanced and spread across India, the Government could create a competitive wholesale power market and at the same time realize, very quickly, extremely high privatization proceeds by selling off NTPC, plant by plant (or by groups of plants), through competitive bidding processes. Given the early and still fragile stage of the state power reform process, a more gradual approach is advisable and probably the only feasible option in the near-to-medium term. Best prospects would appear to be the privatization of a plant or two in the Western and/or Southern regions, where the payment record of the clients is by far the best and most consistent. Privatization of a plant in the Eastern region would also be an excellent proposition, given the current power surplus situation and the very difficult bill collection environment, if the export of the power to the Southern and/or Northern regions can be ensured.

NTPC relationship to NHPC

In November 1999, the Government suggested that it would request NTPC to take over NHPC. This concept has since been dropped, but should possibly be reconsidered. Of course the Government could have considered privatizing NHPC, so selling NHPC to NTPC is not the only option but it is a good option. NTPC and NHPC were established at about the same time. Their development paths have been strikingly different. NTPC has grown fast and become a successful and efficient generation corporation, providing a very significant contribution to India's power generation and thereby to India's economic growth and development. NHPC is nominally a corporation, but effectively remains a government department. It has grown slowly and its contribution to hydro development remains modest. NTPC's financial position is strong and it has the capability to raise resources. NHPC's financial position is weak and it remains dependent on government support. As long as the Government would allow NTPC to take action to bring NHPC into shape, such a takeover would likely be highly successful: NTPC has the managerial talent to initiate the restructuring of NHPC and it has the financial strength, not only to pay the Government, but also to enable NHPC to complete its ongoing projects and launch new projects. NTPC staff should welcome such an arrangement, as it would provide NTPC with a new growth opportunity and a new challenge to its staff.