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IMPLEMENTATION COMPLETION REPORT
(CPL-37160 SCL-3716A SCPD-3716S TF-28693)

ON AN

IBRD LOAN

IN THE AMOUNT OF US$225 MILLION

AND A

GEF GRANT

IN THE AMOUNT OF SDR7.3 MILLION

TO THE

PEOPLE'S REPUBLIC OF CHINA

FOR

THE SICHUAN GAS DEVELOPMENT AND CONSERVATION PROJECT

December 22, 2003

Energy and Mining Sector Unit
Infrastructure Department
East Asia and Pacific Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective as of June 30, 2003)

Currency Unit	=	RMB (Yuan)
RMB1.00	=	US$ 0.12
US$ 1.00	=	RMB8.26

FISCAL YEAR

January 1 December 31

ABBREVIATIONS AND ACRONYMS

CNOOC	-	China National Offshore Oil Company
CNPC	-	China National Petroleum Company
ERR	-	Economic Rate of Return
FIRR	-	Financial Internal Rate of Return
GTMD	-	Gas Transmission and Management Department
IESM	-	Institute of Economic Systems and Management
km	-	Kilometer
MEIAO	-	Mechanical and Electrical Import and Export Administration Office
MOF	-	Ministry of Finance
PCL	-	PetroChina Ltd.
PCL Southwest	-	PetroChina Southwest Oil & Gas Fields Company
PPIAF	-	Public-Private Infrastructure Advisory Facility
SAIETMEP	-	State Administration for Import and Export Trade of Mechanical and Electrical Products
SCORES	-	State Council for Restructuring Economic System
SINOPEC	-	China National Petrochemical Company
SPA	-	Sichuan Petroleum Administration
WTO	-	World Trade Organization

Vice President:	Jemal-ud-din Kassum
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CHINA
SICHUAN GAS DEVELOPMENT AND CONSERVATION PROJECT

CONTENTS

Project ID: P003609	*Project Name:* SICHUAN GAS DEV & CONSERVATION
Global Supplemental ID: P003404 *(Partially Blended)*	*Supp. Name:* SICHUAN GAS DEV. CON
Team Leader: Noureddine Berrah	*TL Unit:* EASEG
ICR Type: Core ICR	*Report Date: December 22, 2003*

1. Project Data

Name: SICHUAN GAS DEV & CONSERVATION
L/C/TF Number: CPL-37160; SCL-3716A; SCPD-3716S
Country/Department: CHINA
Region: East Asia and Pacific Region

Sector/subsector: Oil and gas (100%)
Theme: Pollution management and environmental health (P); Climate change (P); Other financial and private sector development (P); Regulation and competition policy (P)

KEY DATES		*Original*	*Revised/Actual*
PCD:	03/31/1991	*Effective:* 12/14/1994	12/14/1994
Appraisal:	05/30/1993	*MTR:* 11/16/1998	11/16/1998
Approval:	03/17/1994	*Closing:* 06/30/2001	06/30/2003

Supplemental Name: SICHUAN GAS DEV. CON
L/C/TF Number: TF-28693

Sector/subsector: Oil and gas (95%); Central government administration (5%)
Theme: Environmental policies and institutions (P); Pollution management and environmental health (P)

KEY DATES		*Original*	*Revised/Actual*
GEF Council:		*Effective:* 09/16/1994	09/16/1994
Appraisal:	05/30/1993	*MTR:* 11/16/1998	11/16/1998
Approval:	03/17/1994	*Closing:* 06/30/2001	06/30/2003

Borrower/Implementing Agency: PRC/China National Petroleum Company; Sichuan Petroleum Administration; PetroChina Ltd.
Other Partners:

STAFF	Current	At Appraisal
Vice President:	Jemal-ud-din Kassum	Gautam Kaji
Country Director:	Yukon Huang	Shahid Javed Burki
Sector Manager:	Junhui Wu	Richard S. Newfarmer
Team Leader at ICR:	Noureddine Berrah	Selina Wai Sheung Shum
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2. Principal Performance Ratings

(HS=Highly Satisfactory, S=Satisfactory, U=Unsatisfactory, HL=Highly Likely, L=Likely, UN=Unlikely, HUN=Highly Unlikely, HU=Highly Unsatisfactory, H=High, SU=Substantial, M=Modest, N=Negligible)

	Rating	*Rating (Supplemental GEF)*
Outcome:	S	S

Sustainability:	HL	HL
Institutional Development Impact:	SU	SU
Bank Performance:	S	S
Borrower Performance:	S	S

	QAG (if available)	ICR
Quality at Entry:		S
Project at Risk at Any Time:	Yes	

The supervision missions of March 1998 and November 1998 found implementation performance unsatisfactory due to delay in the implementation of downstream activities. The project was, therefore, considered at risk in 1998. Thereafter, the implementation has been rated as satisfactory.

3. Assessment of Development Objective and Design, and of Quality at Entry

3.1 Original Objective:

Project Development Objectives

(a) Support the restructuring of the Borrower's upstream oil and gas sector;
(b) promote the development and conservation of gas resources in an economic, efficient and environmentally sound manner; and
(c) strengthen the institutional capabilities of China National Petroleum Company (CNPC) and Sichuan Petroleum Administration (SPA).

The formulation of project objectives was farsighted and appropriate. The project objectives were formulated at a time when China was still a net exporter of oil and the growth in domestic demand of oil and gas was outpacing the domestic production. (The net oil export had decreased from 25 million tons in 1987 to about 9 million tons in 1992.) Most of the major oil and gas producing fields were considered mature and many of these fields were experiencing production decline. Very large and sustained effort to increase exploration and development was essential to increase gas production. Critical constraints in the various aspects of technology, management and financing needed to be overcome. The sector organization was characterized by the dominance of government control and highly centralized planning.

Since the 1960s, Sichuan Province had been a significant gas producing area but its gas production, then representing 42% of the national production, was declining. SPA, a subsidiary of CNPC, was by far the largest gas producer in Sichuan accounting for 98% of gas production in the province.

With about 10% of the country's population and a per capita income of only 50% of the national average, Sichuan was one of the poorest provinces in China. While the economic growth in Sichuan was averaging around 10%, the growth of energy supply had not kept pace with the demand. As a result of severe gas shortages, industrial production was curtailed and industries were switching over from gas to coal. The share of natural gas in the commercial energy consumption had decreased from 19% in 1979 to 11% in 1990 while the share of coal increased from 68% to 74%. Rise in coal

consumption was exacerbating the already serious environmental impacts linked with its use.

Global Development Objectives. *To assist the Recipient in its efforts to reduce methane emissions, enhance the operational efficiency and safety of gas transmission and distribution in Sichuan, and to strengthen the institutional capabilities of the operating agency.*

Almost all exploration, production, transmission and large scale distribution of natural gas in Sichuan Province was managed by SPA. Its gas transmission and distribution system, consisting of a grid of about 3,000 km of high-pressure pipelines was mostly 20 years old and was prone to breakdowns, accidents and gas leakages. Environmentally, the natural gas (predominantly methane) is a potent greenhouse gas. A pre-investment study of the system estimated that in 1992 around 20,000 tons of methane were released from the system into the atmosphere mostly through fugitive emissions. The same study concluded that a) the integrity of the system was uncertain and safety of the operating personnel and general public was at risk; b) internal corrosion in the pipelines, due to release of sour gas, was the most serious problem; c) in emergency situations the system controls would not have responded efficiently; d) the responsibility of system operation was divided between five gas producing regions and there was a lack of accountability at senior management level; and e) staff expertise required upgrading.

The GEF grant was provided to support the system rehabilitation and to help reduce methane emissions as well as large-scale escape of gas due to breakdown and malfunctioning of the system.

3.2 Revised Objective:

No revision of the objectives was required as there was a clear perception of likely sector development at the time of project preparation.

3.3 Original Components:

The project consisted of the following components:

a. Oil and Gas Sector Restructuring. Initiation of the first phase of the oil and gas restructuring program through, inter alia, commercialization and corporatization of CNPC and SPA, introduction of a commercial accounting system, and implementation of productivity enhancement and related human resources development programs.

b. Gas Fields Development and Rehabilitation. Involving *i*) development of proven gas reserves in about fourteen selected gas fields in East Sichuan through drilling of about 100 infill development wells, acquisition of about 8,800 line-kilometers seismic survey and interpretation, construction of surface facilities consisting of gas gathering systems, gas dehydration and formation water treatment units; *ii*) rehabilitation of old gas wells, about 90 in East Sichuan and 100 in Central Sichuan, through work-over, reservoir stimulation and well re-completion; and *iii)* provision of state-of-the-art technology, equipment and materials for geophysical surveys, gas well drilling and completion, and production and environmental management.

c. Expansion of Gas Transmission and Distribution. Involving construction of desulfurization plants and installation of: *i*) about 18-20 inch diameter x 35 kilometers long loop line from Fuying to Naxi; *ii*) about 18 inch diameter x 16 kilometer long loop line from Wubaiti to Jiangzhi; *iii*) about 18 inch diameter x 71 kilometers long loop line from Wolonghe to Daosuiqiao; *iv*) about 18-22 inch diameter x 124 kilometers long pipeline from Jiangzhi to Wolonghe; and *v*) about 10 inch

diameter x 40 kilometer long pipeline from Fengjiawan to Wanxian, along with the related corrosion control, measurement and gas control facilities.

d. Gas Transmission and Distribution System Rehabilitation. Including: rehabilitation and upgrading of pipelines, measurement, corrosion control, corrosion inhibition, telecommunication, gas control, gas quality monitoring and emergency response facilities of the entire gas transmission and distribution system; deterioration monitoring and evaluation of the transmission and distribution system; environmental upgrades to reduce methane emissions through *i*) installation of additional valves at the vent stacks of both the gas gathering and transmission systems, *ii*) installation of chained caps or plugs on open ended pipelines, *iii*) upgrading or replacement of the seals of control valves, *iv*) replacement of high performance compressor seals, *v*) upgrading of the seals of block valves, *vi*) implementation of comprehensive gas leak detection and repair program including repair or replacement of various types of valves, *vii*) plugging of open ended lines, and *viii*) provision of methane emission monitoring equipment; and provision of a supervisory control and data acquisition system (SCADA) for the whole transmission and distribution system.

e. Institutional Building. *i)* Institutional strengthening of SPA through technical assistance and training in modern petroleum technology and management including provision of in-country and overseas training of staff in gas field development, gas transmission and distribution, and financial management, promotion of petroleum development, and tariff setting; and *ii)* provision of national petroleum education including short and medium term overseas training, lecturing by international experts in China, and teaching materials and computer software.

The projected components were directly supportive of the project objectives. The restructuring component, based on an ongoing study, supported the government's intention to carry out a restructuring program outlined in the government's policy letter to the Bank of December 30, 1993. The gas fields development component, based on a reserves assessment study, was to help enhance gas production through the identification and delineation of additional reserves and rehabilitation of existing wells. The gas transmission and distribution expansion and rehabilitation components were formulated to enhance the capacity, safety and efficiency of the gas transportation system and to minimize methane emissions in line with the recommendations of a pre-investment (diagnostic) study of the gas transportation infrastructure. The institutional building component was to strengthen the capabilities of the operating organizations through upgrading the know-how of the staff to promote efficient development of petroleum resource.

3.4 Revised Components:

Project components were not revised.

3.5 Quality at Entry:

The quality at entry is considered satisfactory. Prior to formulation of the project, studies with the help of international consultants were undertaken on restructuring of oil and gas sector, gas reserve assessment, gas transmission and distribution rehabilitation, environmental impact assessment, and gas allocation and pricing. These studies analyzed issues hampering the development of gas resources, and helped in designing the project and implementation strategies that would promote sustainable development. The letter included institutional restructuring and capacity building, alleviation of energy shortages in an environmentally sound manner, enhancement of safety and reduction of methane emissions. Potential risks to the project were flagged and steps were taken to mitigate these risks in the

project design phase and during project implementation. The risks in upstream development, mainly due to complex geology, were to be mitigated by the provision of appropriate modern technology and equipment under the project. In the rehabilitation and upgrading of the gas processing and transportation infrastructure the risks were minimized through the technical collaboration of the implementing agency with an experienced and internationally reputable organization. To ensure financial stability of the investment components, assurances were obtained from the government on the implementation of an action plan for the rationalization of gas pricing and allocation criteria.

The project concept and design were endorsed by peer reviewers and the Bank management. (QAG was not in existence.)

4. Achievement of Objective and Outputs

4.1 Outcome/achievement of objective:

The project's development objectives were **fully achieved and in many cases surpassed**. Overall project outcome is rated as **satisfactory** only because of the delayed completion of the upgrading and rehabilitation of the system.

(a) *Support the restructuring of the Borrower's upstream oil and gas sector*. **Highly satisfactory**. Before restructuring, the China National Petroleum Company (CNPC) was responsible for the development of onshore oil and gas resources and the China National Offshore Oil Company (CNOOC) was responsible for the development of offshore oil and gas resources. CNPC, in addition to being responsible for onshore oil and gas development also exercised some policy and regulation functions. Following a restructuring study carried out under the project in 1994 and other assessment carried out by the Government of China, CNPC and the China National Petrochemical Company (SINOPEC) responsible for oil refining and petrochemical production and marketing of products were restructured into two regional (and afterwards competing) vertically integrated entities responsible for onshore oil and gas development/transportation/marketing and refining/petrochemicals production and products marketing.

Core activities of CNPC were consolidated into PetroChina Ltd (PCL), which was registered in November 1999. Non-core activities remained with CNPC through its existing subsidiaries, organized as service companies. Core activities of SINOPEC were consolidated into China National Petrochemical Company (SINOPEC Ltd) with non-core activities remaining with SINOPEC subsidiaries organized as service companies. CNOOC was also restructured with core activities consolidated into CNOOC Ltd and non-core activities remained with CNOOC subsidiaries organized as service companies.

By early 2000, the government functions were separated from the business operations of the enterprises. During the transition, the China Association for Petroleum and Chemical Industries was given regulatory oversight.

As part of its privatization process, PCL successfully carried out in April 2000 an initial public offering for 10% of its shares in international stock markets (New York and Hong Kong) for a total value of about RMB20 billion (US$2.5 billion). In 2002, PCL reported a revenue of RMB244.4 billion (US$29.4 billion), 1.3% increase over 2001 and a profit of RMB46.9 billion (US$5.7 billion), a 3.2% increase over 2001. SINOPEC, Ltd. and CNOOC, Ltd. were also partially listed in international markets. In 2002, restriction on competition between the three

companies was lifted in preparation of the gradual opening of the oil and gas markets to international oil companies beginning in 2005 (WTO commitments).

(b) *Promote the development and conservation of gas resources in an economic, efficient and environmentally sound manner*. **Satisfactory**. State of the art technology and equipment provided under the project enabled rapid increase in gas production; annual production rose from around 7.0 billion cubic meters in 1994 to around 8.7 billion cubic meters per year by 2002. Modern reservoir management techniques enabled optimal recovery and minimized gas loss. New technologies in geophysical work and reservoir modeling, together with better drilling and well completion techniques enhanced the productivity i.e., enabled PetroChina Southwest Oil and Gas Fields Company (PCL Southwest) to attain its exploration and production goals with fewer wells. With the skills enhanced under the project, PCL Southwest could effectively use 3D seismic, conduct more accurate reservoir studies, and reduce well drilling and completion time.

PCL Southwest's proven reserves of natural gas are now estimated at 682 billion cubic meters. At appraisal in 1994, the reserves were estimated at 415 billion cubic meters. The increase of 267 billion cubic meters is far above the appraisal target of 70 billion cubic meters. The target of 8.0 billion cubic meters for annual gas production was achieved by the year 2000 and current production is around 8.7 billion cubic meters per year. PCL Southwest has the capability to produce around 10 billion cubic meters of natural gas per year.

At project commencement, almost all of the gas entering PCL Southwest's gas transmission and distribution network was non-specification. With the installation of new facilities and upgrading of old facilities, the entry of non-specification gas in the transportation network has been completely eliminated and since November 2001 PCL Southwest has been in compliance with the Chinese safety rules with regards to the quality of pipeline gas.

The scope and methodology of rehabilitation and capacity expansion of the transmission and distribution infrastructure was defined by a diagnostic (pre-investment) study financed under a grant from Global Environmental Facility (GEF). An efficient and cost effective plan emerged from the study, comprising: *i)* rehabilitation involving inspection, monitoring and evaluation of the system, repair and upgrading of facilities, and replacement as required; *ii)* capacity expansion, involving installation of additional gas treatment facilities, pipelines, control stations and compressor stations; *iii)* institution building involving consolidation of all gas transmission and distribution operations into a single organization that will be fully accountable for efficient and safe supply of gas to the consumers; and *iv)* upgrading staff expertise through on-the-job training under technical collaboration with an experienced and internationally prominent operating organization.

Under this plan, upgrading of the system and enhancement of its capacity was achieved by: a) optimal rehabilitation through deterioration monitoring and integrity evaluation, enabling replacement of parts and components rather than outright substitution of whole plants and sections; and b) improvement of control, communication and maintenance capability. This approach maximized technology transfer and skills and minimized the upgrading cost. The plan has been substantially completed (with delay) and the network is now capable of transporting 10 billion cubic meters of gas annually, compared with 6.5 billion cubic meters at project commencement in 1995 and 8 billion cubic meters targeted at appraisal.

Following the project environmental action plan, all drilling formation water, wastewater and work-over fluids, process wastewater, and pipeline fluids are treated before appropriate disposal i.e., by re-injection or discharge, and all mud and debris from drilling are treated before mud re-cycling and burial of debris.

A total of 942 hectares of land were acquired for project implementation, of which 779 hectares were acquired for temporary use and 163 hectares were for permanent use. The affected parties were appropriately consulted and compensated in accordance with the laws of the People's Republic of China and the regulations of Sichuan Province and Chongqing Municipality.

In 2002, PCL Southwest supplied around 8.7 billion cubic meters of natural gas to industrial, commercial and household consumers in Sichuan and the neighboring provinces and thus helped avoid the use of about 6 million tons of coal. In Sichuan's energy consumption, coal now accounts for 50%, hydropower for 35% and natural gas for 15%.

(c) S*trengthen the institutional capabilities of CNPC and SPA.* **Satisfactory**. In CNPC, institutional strengthening was organized through a program of in-country and overseas training involving several hundred professional staff. Following the restructuring of CNPC, PCL incorporated it in a larger ongoing program commensurate with its needs. Since PCL had sufficient resources, the remaining funds allocated for this purpose were cancelled at Borrower's request.

In SPA/PCL Southwest, the capabilities were enhanced through: a) a long-term technical collaboration with SOFREGAZ who deployed a multi-discipline team of experts to provide advice, technical assistance and on-the-job training; b) on-the-job and overseas training with the providers of specialized services; c) consultancy services and studies to review problem areas in gas field development, processing, transportation and marketing: and d) in-country and overseas courses and study tours.

Areas in which expertise have been upgraded include: geophysics, seismic data acquisition, reservoir engineering and management, drilling, well stimulation and recovery techniques, gas purification, transmission and distribution, gas systems planning, instrumentation, telecommunication, SCADA, corrosion control, construction techniques, deterioration monitoring and integrity evaluation, rehabilitation management, environmental protection, management information systems, project planning and management, utility management, financial management, gas marketing, tariffs, and gas utilization.

Before project commencement, management of SPA's gas transmission and distribution operations was divided amongst its five gas-producing regions. Following the diagnostic study, the transmission and distribution operations under the management of four gas-producing regions were consolidated into a single organization called the Gas Transmission Management Department (GTMD). The operations in the fifth region (East region), however, remained under regional management, now called the Chongqing Gas Production Division (CGPD). On account of political constraints emanating from the separation of Chongqing municipality from Sichuan Province, merger of these operations into GTMD could not be achieved and the coordination between GTMD and CGPD was provided by PCL Southwest's Director of Planning and Development. This consolidation, though partial, still led to a marked improvement in accountability and operational efficiency as evidenced by the successfully coordinated implementation of deterioration monitoring, integrity evaluation, rehabilitation and capacity expansion programs for upgrading the pipeline network.

Global Development Objective. *Assist the efforts to reduce methane emissions, to enhance the operational efficiency and safety of the gas transmission and distribution in Sichuan, and to strengthen the institutional capabilities of SPA*. **Satisfactory**. As a result of rehabilitation and upgrading works undertaken under the project, entry of non-specification gas into the system has been completely eliminated. Emergency response arrangements have been upgraded. Installation of a supervisory control and data acquisition system (SCADA) is in progress; it was delayed due to SARS and is now due to completed by end December 2003. Fugitive methane emissions from the system have been substantially reduced from an estimated 20,000 tons at appraisal to 390 tons in 1997 and about 50 tons in 2002. Overall, around 170,000 tons of fugitive methane emissions (3.4 million tons carbon dioxide equivalent) have been avoided since the commencement of the project. The Grant funding per ton of carbon dioxide avoided to date amounts to US$2.94.

The Department of Environmental Protection, adequately staffed with competent professionals and headed by a Director, is responsible for planning, implementing and monitoring of measures for environmental protection in gas production, purification and transportation as well as monitoring fugitive methane emissions and planning of remedial measures.

4.2 Outputs by components:

A. *Initiation of the first phase of the oil and gas restructuring program through, inter alia, commercialization and corporatization of CNPC and SPA, introduction of a commercial accounting system, and implementation of productivity enhancement and related human resources development programs.*

In 1994 a restructuring study was conducted under the project. Following this study, restructuring was initiated in two phases.

In 1998, a) two fully integrated onshore oil and gas companies were created, one out of CNPC (the country's largest oil producer- with a capacity of about 2.9 million barrels per day from 20 fields) now called CNPC Group and the other out of SINOPEC, the country's largest oil refiner, with a capacity of about 3.55 million barrels per day from 34 refineries, now called SINOPEC Group, to operate on commercial basis with clear profit targets set by the Government; and b) the China Association of Petroleum and Chemical Industry was given regulatory oversight during the transition period to help separate the sector enterprise functions from Government policy and regulation functions and to promote competition between all companies operating in the sector, in conformity with project's restructuring objectives as stated in the Government's letter to the Bank of December 30, 1993 on oil and gas sector reforms.

In 1999, the Government decided to: (a) spin off the technical services from exploration and production; (b) reorganize CNPC and its subsidiaries on the basis of core competencies; and (c) list the core business companies on the stock markets. The producing fields with associated exploration and development, processing, transmission, distribution and marketing activities were transferred to a newly created national oil company–PetroChina Company Limited (PCL)–which was registered in November 1999 as a limited liability company. Simultaneously, the field technical services were organized as service providers to PCL and other entities in the sector.

SPA's core activities (exploration and production of gas in Sichuan and, transmission and distribution of gas in Sichuan and neighboring provinces) were taken over by PCL in January 2000

and organized as PCL Southwest Oil & Gas Fields Company. The non-core activities remained with SPA, registered as a solely state-owned service company.

Assets to be allocated between SPA/CNPC and PCL have been identified. The Borrower has requested amendments to the Loan and GEF Grant Agreements to reflect the transfer of certain core assets and liabilities of CNPC to Petro China and these are now in the process of being completed.

Commercial accounting has been adopted by PCL Southwest. Its accounting set-up complies with the relevant Chinese financial and accounting regulations. However, for reporting to stock exchanges, further adjustments (such as depreciation) are made to the financial statements prepared on the basis of Chinese accounting regulations to conform to International Accounting Standards and United States Generally Accepted Accounting Principles (US GAAP). Under a Bank funded project, Accounting Reform and Development Project, China Accounting Standards Committee is compiling national accounting standards, of which those applicable to petroleum industry are expected to be finalized by the end of 2003. These standards are being modeled after International Accounting Standards. PetroChina accounts are audited annually by a reputable international auditing company.

Productivity enhancement and related human resource development of the staff in CNPC and SPA was achieved through the skills upgrading programs implemented under the Institutional Building component discussed in subsequent paragraphs.

Progress achieved to-date in restructuring the sector goes well beyond the project stated objectives as indicated in section 4.1 a).

B. *Gas Fields Development and Rehabilitation*

The program of geophysical works, well drilling and rehabilitations and provision of gas gathering and processing facilities envisaged under the project has been completed.

About 12,300 line-kilometers of seismic survey and interpretation have been carried out compared with the project target of 8,800 line-kilometers. A total of 128 infill development wells have been drilled against the original target of 100 wells. Surface facilities installed to support this development include gas gathering systems, gas dehydration and formation water units.

A total of 197 wells have been rehabilitated in East and Central Sichuan through work-over, reservoir stimulation and well re-completion slightly exceeding the original target of 190 wells.

Natural gas reserves in the proven, probable and possible categories are now estimated at 682 billion cubic meters, 176 billion cubic meters and 253 billion cubic meters respectively. At appraisal in 1994, the comparative figures were 415 billion cubic meters, 107 billion cubic meters and 150 billion cubic meters respectively. The increase of 267 billion cubic meters in the category of proven reserves is 3.5 times the appraisal target of 70 billion cubic meters. Gas production, about 8.7 billion cubic meters in 2002, exceeded the appraisal target of 8 billion cubic meters and a production of about 9.0 billion cubic meters is projected for 2003.

The addition to proven reserves, 267 billion cubic meters, includes about 100 billion cubic meters with high sulfur content. With the support of the Corrosion Protection Institute and the Research

Institute of Natural Gas Technology, PCL Southwest is acquiring appropriate technology and equipment to develop these high sulfur gas reserves in a sound environmentally manner.

C. *Expansion of Gas Transmission and Distribution System* &
D. *Gas Transmission and Distribution Rehabilitation.*

These two components are closely interrelated and are therefore being discussed together.

The capacity expansion and rehabilitation of the gas processing and transportation infrastructure was undertaken in accordance with the recommendations of the aforementioned diagnostic study.

At project commencement, in 1995, all of the gas entering the network from East region and about 8.5% of the gas entering the network from other regions was non-specification. By November 2001, with the installation of new facilities and upgrading of old facilities at around 30 different locations, PCL Southwest's total gas purification capability was raised to a total of 7 billion cubic meters per year and, by end 2002, it was further enhanced to 8.2 billion cubic meters per year. Also, as of November 2001, entry of non-specification gas in PCL Southwest's transportation system was eliminated and since then, PCL Southwest has been in compliance with Chinese safety and quality rules of pipeline gas.

PCL Southwest's annual gas production is currently about 8.7 billion cubic meters. Excluding a) the gas consumed internally, b) the gas that does not require purification and c) the gas that is purified by some of the consumers, about 7.5 billion cubic meters requires purification before its sale to the consumers in Sichuan and Chongqing. The total installed purification capacity of PCL Southwest amounts to around 8.2 billion cubic meters per year. While this capacity would meet the current needs, there is little (about 5%) standby capacity and provision for growth. In 2000, SPA conducted a gas market study of Sichuan province and Chongqing municipality with the assistance of SOFREGAZ. The study indicated an annual consumption potential of 10.56 billion cubic meters in the year 2005 and 12.36 billion cubic meters per year in 2010. Thus, given the consumption growth in line with these projections, an additional purification capacity of the order of 2.0-2.5 billion cubic meters per year could be required by 2005. It is planned to meet this additional purification need by a plant with a capacity of about 2.2 billion cubic meters per year to be built at Zhongxian and commissioned by mid 2005. For reasons mentioned in section 5.4, it has not been financed from the Loan.

The implementation of network capacity expansion and rehabilitation was delayed and accordingly in the year 1998 the project implementation was rated as unsatisfactory. These works commenced in earnest from January 1999 following the mid-term review (MTR). The reasons for delays were: a) extended site investigations to evaluate the condition of the various sections of the system, which was a necessary precursor to the repairs that were to be undertaken; and b) delays in the procurement of required goods and services. Of these, procurement delays were the main cause of the late start-up of the major activities of this component.

Rehabilitation involved repair, replacement and relocation of pipelines; construction of loop lines and spurs; upgrading of pressure/ flow regulation and measurement facilities and provision of new facilities; upgrading of corrosion control facilities; strengthening and upgrading of river crossings; and installation of a supervisory control and data acquisition system. Deterioration monitoring and integrity evaluation of pipelines and control stations, undertaken by PCL Southwest with assistance from SOFREGAZ, its international consultant, was an important precursor to rehabilitation and

capacity expansion in Sichuan and China. Its findings determined the type and extent of rehabilitation and expansion works to be undertaken in conformity with Chinese standards. Key steps involved were: evaluation of internal and external corrosion; callipering; risk analysis; and in-line inspection (intelligent pigging) of selected sections. PetroChina Southwest Branch acquired the know-how to carry out deterioration monitoring and integrity evaluation on a continuous basis after the completion of the project.

New carriers with a cumulative length of 338 km were built. Old pipeline sections with a cumulative length of 926 km were repaired and 167 monitoring and control facilities were upgraded. Of the cumulative length of 1026 km of line pipe laid under the project, 338 km were used for new carriers as trunk lines and spurs, and 688 km were used for rehabilitation and strengthening of existing carriers through looping and replacement of selected sections.

Some works, notably the last phase of intelligent pigging and SCADA installation, have been delayed due to SARS. Upon completion of these works, now scheduled by end of 2003, the network rehabilitation program will have been substantially implemented.

Under certain gas input and off-take assumptions, the network is now capable of transporting 10 billion cubic meters of gas annually, compared with 6.5 billion cubic meters at project commencement in 1995.

E. *Institutional Building*

In CNPC, skills and professional knowledge of 704 professionals were upgraded through studies, courses, seminars, conferences, study visits undertaken abroad and also through similar programs conducted in China with the assistance of 28 foreign specialists.

In SPA/PCL Southwest, the expertise of 1736 staff was enhanced through in-country and overseas courses, on-the-job training, study visits with international gas companies and operating organizations, technical studies, providers of specialized services, and technical collaboration with prominent international organizations. Of the above, 640 staff attended overseas courses covering 338 weeks of coaching.

Technical collaboration of SPA/PCL Southwest with an experienced organization was deemed essential to ensure safe and efficient implementation of the rehabilitation and capacity expansion plan. Under this arrangement, the collaborating organization would provide a broad based package of technical assistance to build SPA/PCL Southwest's management and operating capabilities in parallel with project implementation. Such an arrangement, as opposed to discrete technical assistances packages to deal with different disciplines and hiring consultants to assist in their implementation, was preferable as it would provide a) integration of know-how transfer on site in the course of project implementation, b) keep the work program flexible over time, and c) expose SPA/PCL Southwest to an experienced organization. Such support was provided by SOFREGAZ from 1995 to 2003 under a technical collaboration contract. The TA covered upgrading the skills of PCL Southwest's professional staff in tandem with timely advice in the implementation of the rehabilitation and capacity expansion plan. SOFREGAZ deployed a multi-discipline team of experts to provide advice, technical assistance and on-the-job training. A total of 55 missions to SPA/PCL Southwest were undertaken by SOFREGAZ experts, and a total of 467 engineers and technicians were thus trained. Also, seven overseas training programs were undertaken benefiting 73 professionals and a special training program for high-level managers was conducted.

Additionally, study visits to European gas companies for 34 senior managers (directors, vice president and president) were undertaken.

4.3 Net Present Value/Economic rate of return:

In the ICR, the Economic Rate of Return (ERR) is calculated using: (a) actual gas price from 1995 to 2003, and assuming the same level thereafter; and (b) the actual condensate price from 1995 to 2002 and World Bank's petroleum price projection multiplied by 1.23 as proxies of condensate prices thereafter. (The multiplier is based on the average price difference between petroleum and condensate during 1995 and 2002. Income from condensate sales is very small and has very limited impact on the ERR.) The operating period of the project is 20 years from 1995-2015 as defined in the appraisal report, preceded by capital investments in 1994. The re-estimated economic rate of return (ERR) of the project is 24%, coincidentally equal to the appraisal estimate. If the appraisal assumptions were considered (the economic values of natural gas and condensate were assumed to be the prices of international fuel oil and naphtha, respectively) the re-estimated ERR would be 70%, about three times higher than the appraisal estimated rate of return. (Actual and the Bank's projected oil price were used and naphtha prices were conservatively assumed to be the same as the oil prices.) *Since the benefits to the economy associated with gas efficiency, local and global environmental benefits were not taken into account, the ICR estimate of the ERR is conservative.*

4.4 Financial rate of return:

Financial prospects in terms of profitability, cash flow, and debt service capacity are sound. Financial internal rate of return (FIRR) for the project is estimated at 13% in real terms, which is close to the appraisal estimates of 12%. The main factors which facilitated the satisfactory performance of the project include: (a) gradual gas sales price increases; (b) larger than expected incremental production; and (c) increased investment efficiency by better management of transmission pipelines. Higher capital and operating costs than the appraisal were offset by higher increases in production, sales, and price.

The financial performance of the project implementing agency was monitored by two financial covenants, namely a break-even covenant and a self-financing ratio of more than 50%. However, SPA, the original implementing agency, was restructured in 1999, and its core business was transferred to PCL at a revalued price, while non-core business was organized into a service company. As a result, the project implementation was taken over by PCL. New covenants agreed with PCL would be effective after signing of the amendments to the legal agreement. If the original covenants were applied to PCL, its profitability and liquidity would be sufficient to comply with performance targets after 2001, while it would be short on both covenants for the first two years after its establishment.

PCL is a subsidiary company of the CNPC Group established as a joint stock company with limited liability in November 1999. It completed a global initial public offering of about 10% of its share in April 2000. The company now produces two-thirds of all China's oil and controls 80% of the country's natural gas reserve. In 2002, PCL reported a revenue of RMB244 billion (US$29.4 billion), a 1.3% increase over 2001, a profit of RMB47 billion (US$5.7 billion), a 3.2% increase over 2001, and total assets of RMB483 billion (US$58.4 billion). PCL improved its profitability since its establishment in 1999 and benefited from high oil prices.

4.5 Institutional development impact:

The institutional development impact has been high. The government functions have been separated from the management of enterprises. PCL, SINOPEC Ltd and CNOOC Ltd which have emerged from the restructuring of CNPC, CNOOC and SINOPEC are enterprises operating according to commercial principles and international practice and with clear definition of property rights. They are joint stock companies with foreign share holdings. PCL, SINOPEC Ltd and CNOOC Ltd are also cooperating with international oil companies in exploration for oil and gas in China and overseas and transmission of gas from west to east in China. PCL has entered into 52 contracts with 45 international oil companies for oil and gas exploration and development in China. SPA as a service company is engaged in drilling, logging and geophysical operations in Sichuan, Tarim and Changqin basins in China, and abroad in Thailand, Kazakhistan, Iran, Pakistan, Indonesia, Jordan and Papua New Guinea.

The Association for Petroleum and Chemical Industries has been created to promote competition and to regulate the sector. Preparations are under way for the formulation of a legal and regulatory framework that would help establish more open oil and gas compatible markets as required by market regulators prior to the partial listing of the three companies. (see section 4.6).

PCL Southwest, a department of PCL, is now planning to expand its gas sale in Sichuan and in the neighboring provinces from about 8.5 billion cubic meters per year to around 12 billion cubic meters by the year 2010. It is also cooperating with international oil companies in gas exploration activities in Sichuan and Chongqing.

4.6 Policy Impact

Regulatory Framework

Policy impact has been far reaching. The sector has been restructured. The core business companies have been listed on stock markets and part of their equity in now privately held. Prior to the listing of the new companies, PetroChina and others, regulatory agencies of the selected financial markets requested the gradual development of an adequate and stable regulatory framework. The Chinese government invited the Bank to assist in developing an appropriate framework for the Chinese oil and gas sector. This led to a fruitful cooperation, partially funded by the Public-Private Infrastructure Advisory Facility (PPIAF) between the Bank and the State Council for Reforming the Economic Sector (SCORES) Institute of Economic System Management (IESM) resulting in the preparation of three reports. The first (Modernizing China's Oil and Gas Sector – Structural Reform and Regulation) discussed reform needs in the oil and gas sector as a whole, the second (China: Economic Regulation of Long-Distance Gas Transmission and Urban Distribution) researched economic regulation of long-distance transportation of natural gas and its reticulation in urban areas, and the third report (Preparing the Regulatory Framework for Long-Distance Transmission and Urban Gas Distribution) presented a model legislation designed with appropriate regard both to international best practices and to China's particular circumstances, as a means to bring about modern economic regulation to help achieve the government's policy goals for the sector. Its recommendations have been approved in principle by the State Council and a draft Gas Law is under consideration by the National People's Congress

Gas Pricing. Under the reform action plan agreed at project negotiation, the gas sale price was to be gradually increased to reach netback value level, allowing a reasonable return on investment and encouraging efficient use of gas. During project implementation, the wellhead, purification and transmission prices were gradually increased enabling PCL Southwest's average sale price to increase from RMB389/thousand cubic meters in 1994 to the current level of RMB743.83/ thousand cubic meters (US$1=RMB8.26). It covers the operating cost and has enabled PCL Southwest to achieve a financial rate return of about 13% (compared with 12% covenanted under the Loan). Also, within the existing price structure, some adjustments in the transmission tariff have been made to reflect the distance the gas is transported. However, the prices of competing fuels have still to be rationalized. The price of coal, the main competitor of gas, is about half the price of gas and penetration of gas in domestic energy consumption remains dependent on Government's fuel allocation policy. However, the government is increasingly focusing on taking into account environmental externalities in energy prices through higher sulfur dioxide emissions and incorporation of externalities in the consumer price.

Allocation Policy. Under the same plan the new gas allocations were to be based upon reserve availability and the ranking of economic value of use, taking into account the netback value of gas. Netback would no longer be the basis as the government is moving towards competitive markets. The allocation policy is being phased out slower than expected at appraisal because of its potential impact on state owned enterprises. According to World Trade Organization (WTO) agreements, the Government is committed to open its oil and gas sector by 2005 and completely phase out the allocation policy.

5. Major Factors Affecting Implementation and Outcome

5.1 Factors outside the control of government or implementing agency:

Outbreak of SARS in China in the first half of 2003 significantly affected project implementation Consequently, completion of some of the works has been delayed by as much as six months.

5.2 Factors generally subject to government control:

Restructuring of CNPC and SPA was expeditiously carried out. Creation of PCL, and organization of SPA's core business into PCL Southwest enhanced focus on field operations and management commitment to project implementation, particularly with regards downstream activities i.e., rehabilitation of gas processing and transportation infrastructure.

Rationalization of gas pricing made the project financially viable and encouraged private sector interest in upstream development. However, gas allocation to some large SOEs, especially fertilizer industry, are still mandated by the government to avoid further deterioration of the financial situation of these enterprises and ensuing social problems. These subsidies will be phased out according to WTO commitments.

During appraisal it was agreed that all of the gas transmission and distribution operations of SPA, then divided amongst five gas producing regions, would be consolidated into a single organization i.e., a Gas Transmission and Distribution Management Department (GTMD). This was not fully implemented. Due to political reasons arising from the separation of Chongqing Municipality from Sichuan Province, the gas transmission and distribution operations of the fifth gas producing region, the East Gas Region located in Chongqing Municipality area, were not merged into GTMD. Since all the gas fields and consumption centers in Sichuan Province and Chongqing Municipality are served by an integrated

transportation grid, such a split in the management of operations created operational problems requiring frequent coordination from the SPA/PCL Southwest head office.

While the government has been generally supportive of the project, its procedures mandating approval of procurement documents by CNPC and MEIAO (now called SAIETMEP), and for the government's procurement organizations to act as agents to PCL Southwest, impeded expeditious procurement.

5.3 Factors generally subject to implementing agency control:

Although, as mentioned above, the consolidation of gas transmission and distribution operations was only partially carried out, it still improved coordination and procedural consistency in the operation and maintenance of the system and facilitated its rehabilitation due to coordination provided from PCL Southwest's head office.

Capacity expansion and rehabilitation of the network were delayed. The reasons for delays were: a) extended site investigations to evaluate the condition of the various sections of the system, which was a necessary precursor to the repairs and upgrading that were to be undertaken; and b) delays in the procurement of required goods and services. Of these, procurement delays were the main cause, as the site investigations were held up due to non-availability of equipment and services. However, the investigations were of high quality and clearly identified the nature and extent of required rehabilitation.

Prior to sector restructuring, SPA was hamstrung due to cumbersome procedures and insufficient authority. It still managed to achieve good progress in upstream development as it was fully familiar with the involved activities. However, in areas where it had no prior experience such as deterioration monitoring and integrity evaluation of downstream infrastructure, it could not effectively support expeditious implementation due to aforementioned constraints. Following the structural reform, the situation improved and PCL Southwest was able to speed up the pace of procurement processing.

Upgrading of gas processing and transportation infrastructure was extended by about two years due to reasons mentioned above. This delayed project completion and necessitated the first and only extension of closing date by two years.

Selection and appointment of SOFREGAZ, as technical collaborator, provided valuable on-site advice in the planning and implementation of rehabilitation and capacity expansion of gas processing and transportation infrastructure and thus enabled successful completion of these project components.

5.4 Costs and financing:

The total project cost is estimated at US$902.83 million compared with US$877.80 million estimated at appraisal. The aforementioned appraisal cost includes physical and price contingencies as estimated during appraisal but does not include interest during construction.

From the loan amount of US$255 million, about US$37.69 was cancelled upon Borrower's request as PCL, the implementing agency, had sufficient resources to complete the project (due to increase equity funds after listing of PCL) and about US$8.42 million was undisbursed. Of the GEF grant of US$10 million equivalent, about US$0.14 was undisbursed.

The overall project cost is estimated to increase by about 3% from the appraisal in US Dollar term, with overruns of the local costs by about 36% and under-runs of the foreign costs by about 42%. The major factors for local cost overruns are: (a) an increase in gas fields development costs, which accounts for about 70% of the project costs, due to more proven gas reserves than expected at appraisal; and (b) more adoption of locally supplied goods than planned. The lower than expected inflation and the higher than expected exchange rates almost offset each other's effect in US dollar term. The major factors for foreign cost under-runs are: (a) a reduction of imported goods because of the shift to the local goods; and (b) lower than expected inflation. In RMB terms, the costs were lower by about 30%, since price contingency allowances of costs in local currency estimates at appraisal were higher than the actual. (Local inflation during the project implementation period was estimated at about 8% per year on average at appraisal compared to the actual rate of about 2% on average per year.)

Gas Fields Development. The actual cost for this component is US$619.40 million compared with US$498.78 million estimated at appraisal; an increase of about 24%. The local cost is 63% higher while the foreign cost is 32% less than the appraisal estimate. The increase in overall cost is on account of an increase of 28% and 4% respectively in the number of wells drilled and rehabilitated and acquisition of 40% more seismic data and interpretation, resulting in addition of 3.5 times more reserves than expected at appraisal (267 versus 70 billion cubic meters). The under-run in foreign cost is due to lower cost of imported goods and services compared with the cost anticipated at appraisal and also due to increased use of locally produced goods.

Dehydration and Desulfurization. The actual cost is around half of the appraisal estimate. This is due to a) successful rehabilitation and upgrading of existing centralized facilities which in turn minimized the installation of new facilities and b) since following the aforementioned cancellation of funds a new purification plant, to be installed at Zhongxian, was not be financed from the loan.

Field Stimulation /Rehabilitation. The actual cost is about half of what was anticipated as the condition of wells was found to be much better than stipulated at appraisal.

Gas Transmission Expansion. The actual total cost is about 13% less than the appraisal estimated while foreign component is about 20% of the appraisal estimate as mostly locally produced materials were used.

Gas Transmission Rehabilitation. The actual total cost is about 20% higher than appraisal estimate due to increased rehabilitation work following the site investigations. The foreign component is around 40% of the estimate at appraisal due to maximization of local materials and services.

Gas Transmission Environmental Upgrade. The actual total cost and its foreign component are about 35% and 42% lower than the appraisal estimates due to greater use of locally produced materials and also because some of the equipment such as SCADA have been accounted for in the Gas Transmission Rehabilitation component.

Technical Assistance and Training. This is underutilized by about 15% due to aforementioned cancellation of funds from the loan.

6. Sustainability

6.1 Rationale for sustainability rating:

The project sustainability is rated as **highly likely**. PCL is well established. It has performed well and continues to generate investor interest. Its cooperation with international oil companies is expanding. The government is committed to establishing a modern regulatory framework that would promote efficient development of oil and gas resources. Preparations for its implementation are well advanced (see para 4.6). SPA, apart from operating as a service company in two prominent basins in China, has been successful in securing business opportunities in a number of countries in South East Asia, Central Asia and the Middle East. The process of restructuring initiated under the project is clearly irreversible.

Main contributing factors for the future performance and highly likely sustainability of the project outcome are China's commitment to increase natural gas share in primary energy consumption through development and better use of its domestic resources and gas imports. Natural gas market and prices have steadily increased and prices will be gradually be determined by market forces as China's imports increase and the sector further opens to competition. PCL Southwest projects a steady gas sales increase along with an expansion of transmission network to other provinces from 2004. Several provinces are putting restrictions on coal use to promote gas penetration. Principles for regulated transmission prices have been adopted by the National Development and Reform Commission based on a study carried out by PetroChina with Bank assistance.

PCL Southwest has successfully implemented the project; all project targets have been achieved or exceeded. With gas price rationalization achieved under the project and increased penetration of gas (especially for power generation) due to environmental concerns, its business is expanding on a financially sound basis. With abundant gas reserves, a transportation system to match its substantially enhanced production capability and a large market in Sichuan and neighboring provinces, it can rapidly expand its gas sales; it is preparing to increase the sales by 50% over the next seven years. Studies have indicated a large potential for gas utilization in Sichuan and neighboring provinces. Its recoverable gas reserve of about 687 billion cubic meters can support annual sales of 12 billion cubic meters for 50 years. With the institutional strengthening received under the project, its organization has become robust and mature. It has the potential to become an important profit center for PCL.

6.2 Transition arrangement to regular operations:

This will not be required, as PCL Southwest upon taking over SPA's operations acquired an established organization with a long experience in gas development, processing, transportation and marketing. Under the project, its skills have been enhanced, operations have been modernized and infrastructure has been upgraded.

7. Bank and Borrower Performance

Bank

7.1 Lending:

It is rated as **satisfactory**. Bank raised awareness of international experience in restructuring, regulation and promotion of competition in the petroleum sector; flagged the need to acquire modern technology and know-how for efficient development of petroleum resource; and assisted in the diagnosis of the causes of transportation system deterioration and in the formulation of strategy for its rehabilitation. Energy resources in Sichuan, ramifications of coal-based energy generation, institutions

in the energy sector, and government policies were reviewed to identify issues in sector development. Various policy and pre-investment studies were conducted with the help of international consultants to determine the scope of the project. To fund these studies, assistance was solicited and obtained from the international community, which included Technical Cooperation Credit II (US$1.9 million), Japanese Grant Facility (US$1.2 million), United Nations Development Program (US$0.25 million) and Pre-investment Facility of the Global Environmental Facility (US$1.4 million).

7.2 Supervision:

It is rated as **satisfactory**. The Bank closely monitored the implementation and assisted the implementing agencies in evaluations and in devising corrective measures. (Project supervision assessed once by QAG and rated 1). Good working relations were maintained between the Bank, the implementing agencies and consultants. Implementation reporting was systematic and adequately detailed. The aide memoires provided a good account of project implementation, flagged problem areas and remedial measures, conducted an MTR at a critical phase of project implementation to address issues hampering progress in 1998 and facilitated progress tracking. Useful guidance and recommendations were provided on restructuring, institutional strengthening and technical issues. Given cogent reasons, the Bank was flexible in extending the loan closing date.

Bank promptly responded when the government requested assistance to further the reforms beyond the objectives initially sought by the project. Through PPIAF supported studies and workshops, the Bank increased awareness and consensus for establishing an adequate legal and regulatory framework that would promote efficient development. (see section 4.6)

7.3 Overall Bank performance:

Overall, Bank performance is rated as **satisfactory**.

Borrower

7.4 Preparation:

Borrower preparation was **satisfactory**. The Borrower and its implementing agencies, CNPC/SPA, cooperated in the conduct of reviews, studies and workshops for project preparation. Relevant data on gas resource, costs, human resource and capabilities of operating organizations was provided. Interest and participation in discussions and workshops displayed strong ownership of the project.

7.5 Government implementation performance:

It is rated as **satisfactory**. After the completion of the restructuring study in 1994, around four years were taken to consider the various options. However, once the decision in the matter was taken, the reform was expeditiously carried out and went far beyond the "initiation of the first phase" as expected under the project. Of the five objectives set under the government's policy letter of December 30, 1993, three objectives have been achieved or surpassed. These are: separating the governmental function from the management of enterprises; phasing-in the corporatization and restructuring of oil and gas fields; and expanding international cooperation for the on-shore oil and gas exploration and development. Significant progress has been achieved in the remaining two objectives namely: setting up the market for oil and gas exploration and development of competition for enterprises; and improving the state's macro-control and regulatory system. In 2002, the government lifted restrictions on competition among the three national companies and committed during WTO negotiations to

gradually open the sector for international oil companies beginning in 2005.

The government has been generally supportive of the investment components of the project. Rationalization of gas pricing, with some delay, made these components, and indeed the implementing agency, financially viable. However, the gas allocation policy is not fully phased out mainly because of reluctance of the Sichuan government and concerns about the social impacts on large SOEs in the province.

Following the restructuring of CNPC and creation of PCL there has been a need to revise the legal documents pertaining to the loan and the grant in order to reflect the reallocated responsibilities of CNPC and PCL. After extensive discussions in the years 2001 and 2002 between PCL and the Bank, amendments to the loan and grant agreements and the loan and grant project agreements were drafted. These drafts were submitted to PCL and concerned government agencies in April 2003 for review and clearance before preparation of the formal documents for signing by the concerned agencies. Clearance has not been provided to-date indicating different opinions and inadequate coordination between the restructured entities.

7.6 Implementing Agency:

The implementation performance in the upstream investment component was **highly satisfactory** from the outset. The implementation of the capacity expansion and rehabilitation components was **unsatisfactory** until the MTR and **satisfactory** afterwards (1999-2003). The reasons for delays were: a) extended site investigations to evaluate the condition of the various sections of the system, which was a necessary precursor to the repairs that were to be undertaken; and b) delays in the procurement of required goods and services. Of these, procurement delays were the main cause of late start-up of the major activities of this component. The technical collaborator, deemed essential for safe and efficient rehabilitation, was appointed about a year after loan signing. The site investigations into the condition of the pipelines were slowed down or could not commence due to non-availability of equipment and services. The Project Management Office did not have adequate staff and authority to expedite procurement processing within the implementing agency and the clearances required of other agencies of the government. If procurement activities were carried out in a timely basis, site investigations could have been completed by end 1996 for rehabilitation to commence in 1997. A delay of about two years is thus attributable to slow procurement processing. After the restructuring of SPA and take over of operations by PCL Southwest in 1999, the pace of decision making by the management and procurement processing within the organization improved appreciably, however, the mandated clearance of documents by PCL Beijing, CNPC and MEIAO remained a significant impediment.

Taking into account the fact that all the targets set under the project were achieved, and in several cases exceeded appraisal expectations, overall performance of the implementing agencies (SPA and subsequently PCL Southwest) is rated as **satisfactory**.

7.7 Overall Borrower performance:

Overall borrower performance is assessed to be satisfactory.

8. Lessons Learned

Opportunities to promote and further the reform agenda should be followed upon quickly if they arise

during project implementation. The dual track approach followed during project implementation, intensive policy dialog at the national level and implementation strategies designed at the project level, facilitated and furthered achievement of the objectives of the project. The comprehensive studies carried out under the project allowed the Bank's timely response to government queries about policies and actions that would deepen and further the reforms. Government ownership of and commitment to the reform process are more important to the success of reforms than unrealistic and dictated covenants. In this project, cooperation with SCORES and provision of timely expert advice and international best experience, developed consensus amongst the various stakeholders in sector development and generally facilitated the reform process.

Appropriate technology transfer can significantly step-up sector performance and availability of resources. Under the project, it led to a 267 billion cubic meter increase in the proven reserves of gas compared with 70 billion cubic meters estimated at appraisal, a production capability of 10 billion cubic meters per year versus the appraisal target of 8 billion cubic meters and a transportation capability of 10 billion cubic meters per year as against 8 billion projected at appraisal.

The long-term technical collaboration with an experienced organization in the rehabilitation and capacity expansion of gas processing and transportation infrastructure was highly successful as it provided on-site managerial and technical expertise, advice and training to SPA/PCL Southwest staff and simultaneously facilitated decision making and state of the art knowledge transfer.

Procurement processing could be streamlined in China to avoid delays in project implementation. A delay of about 2 years was encountered on this account in the implementation of this project. The main constraints to efficient procurement processing were the system of multi-layered approvals and processing through intermediaries i.e., government approved agents.

9. Partner Comments

(a) Borrower/implementing agency:

The project started in 1995 when the gas production of the Sichuan Province was declining (from 6.5 billion cubic meters per year in 1979 to 5.2 billion cubic meters per year in 1990) due to aging of several fields and too difficult operating conditions, coupled with outmoded technology and equipment. At the same time, most of the transmission system was 12 - 20 years old, and was operated under precarious conditions, prone to breakdowns, accidents and leakages.

The objectives of the project were then defined after a thorough diagnostic study (1994) which enabled to identify actions to be taken. Their implementation comprised three main components i) a restructuring component, ii) an investment component (Gas field development and rehabilitation, Gas transmission development and rehabilitation), iii) an institution building component (essentially training of personnel).

At the end of the project all the objectives have been achieved, and even exceeded. The restructuring of the gas and petroleum sector, then the reorganization of CNPC and of subsidiaries on the basis of core competencies were accomplished in 1999 and were beneficial to the project. Moreover, the sustainability of the project was critically dependent on rationalization of pricing policy and allocation criteria which reforms have been undertaken and will contribute, along with improvements in operational efficiency, to ensure that the revenues of the overall operations of the system can yield a profit.

The development of new gas fields has reversed the natural decline of the production which could again increase steadily by around 4% a year in average since 2000, exceeding the apprised target of 8 billion cubic meters per year (8.3 billion cubic meters in 2001, 8.8 in 2002, and 9 expected in 2003). In parallel the proven reserves have been increased by 267 billion cubic meters, far above the appraisal (70 billion cubic meters). In the same time, the gas transportation network was upgraded and developed. Weak parts have been rehabilitated or looped with new lines, whereas pipelines in densely areas have been relocated. The totality of the gas entering the network is now processed to comply with transmission specifications and corrosion of pipe (internal or external) is not anymore a threat. The present transmission capacity of the whole system is above 10 billion cubic meters per year.

A total of 1736 persons have been trained, all categories merged (Managers, Engineers, Technicians), either in China through courses, seminar and on the job training, or abroad in overseas companies or institutes.

However, due to adversely conditions (unusual time to procure key equipment at the beginning of the project, technical failures of investigation equipment, SARS in 2003) some actions have been delayed and are still under implementation. They essentially concern the completion of a SCADA system covering the entire network (commissioning planned in September / October 2003), the achievement of the internal inspection on a few lines still under rehabilitation (planned in September 2003). The construction of a purification plant in ZhongXian (completion expected in July 2005), to be locally financed in totality, is essentially needed to provide a spare capacity to the present purification system, and to follow the increase of the production in the coming years.

A specific effort was also sustained in any technical activities to reduce gas releases to the atmosphere and to improve the protection of the environment. Today, drilling operation is totally respectful of the environment (recycling of mud, separation of debris) and 100% of waste waters produced in operation are treated to meet the standards for re-injection or for disposal. On the network more than 1640 valves and around 270 regulators or safety valves have been replaced to avoid fugitive emission of methane. This effort will be pursued in the coming years toward the gas quality (Improvement of the filtration) to limit possible internal damages of the equipment and subsequent release of gas.

The essential lesson learnt from the project relates to the management of this kind of vast plan which covers technical, financial and economical fields, as well as institutional development. To manage such a project, it is essential i) to prepare a stable project Team which will follow up the totality of the project components from the beginning to the end, ii) to rely upon a technical collaboration with an experienced Company of the domain.

As a conclusion the achievements have enabled the improvement of the global system from gas production to gas deliveries, and the conditions for a sustainable development and for a reliable safe operation in the respect of the environment are now gathered.

(b) Cofinanciers:

(c) Other partners (NGOs/private sector):

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10. Additional Information

Annex 1. Key Performance Indicators/Log Frame Matrix

Outcome / Impact Indicators:

Indicator/Matrix	Projected in last PSR[1]	Actual/Latest Estimate
Restructuring of the Borrower's upstream oil and gas sector	Initiate the first phase i.e. commercialization and corporatization of CNPC and SPA	Core operations of CNPC and SPA restructured in 1999 and consolidated into PetroChina Ltd. (PCL). In April, 2000 PCL successfully carried out an IPO of 10% of its shares in international stock markets for total value of RMB 2 billion (US$2.5 billion). In the wake of this reform SINOPEC and CNOOC were also restructured.
SPA's gas resource development	· Gas reserves to increase by 70 billion cubic meters	· Reserves increased by 267 billion cubic meters.
	· Production declined to be reversed	· Production decline reversed from –10% to +6% over the project period
	· Production of 8.0 billion cubic meters per year to be achieved by year 2000 and to be maintained at this level for 6-7 year.	· Production of 8 billion cubic meters/year achieved by the year 2000. Current capability is 10 billion cubic meters/year. Production of 9 billion cubic meters/year is projected for the year 2003.
Expansion and rehabilitation of gas processing transport infrastructure	For safe and efficient transport of 8 billion cubic meters/year	Achieved. Capable of transporting 10 billion cubic meters/year. It is in full compliance with Chinese standards as regards safe and efficient operations.
Gas Tariff	Rationalize to achieve at least 12% FIRR	Average price gradually increased from RMB389/thousand cubic meters in 1994 to RMB743.83/thousand cubic meters in 2003. According to the latest estimate FIRR is 13%
Minimize fugitive methane emission incidence		Declined from 3.7% in 1997 to 0.43% in 2003
Pollution abatement		With economic growth averaging 10%, the share of natural gas and coal in Sichuan's commercial consumption respectively changed from 11% and 74% in 1990 to 15% and 50% in 2002. In 2002, natural gas substituted about 5 million tons of coal in Sichuan

Output Indicators:

Indicator/Matrix	Projected in last PSR[1]	Actual/Latest Estimate
Gas fields development and rehabilitation	· Acquisition of about 8,800 line kilometers of seismic survey and interpretation · Rehabilitation of 190 wells · Drilling of 100 development wells	· About 12,300 line kilometers of seismic data and interpretation acquired · 197 wells rehabilitated · 128 development wells drilled
Expansion and rehabilitation of gas processing and transport infrastructure		· Purification capacity enhanced from 5 billion cubic meters/year in 1999 to 8 billion cubic meters/year in 2003 · As of November 2001, entry of non-specification gas into the transportation system eliminated · Achieved. New carriers with a cumulative length of 338 kilometers built, old pipeline sections with a cumulative length of 926 kilometers repaired and 167 monitoring and control facilities upgraded. Some rehabilitation works delayed due to SARS and are now scheduled to be completed by end 2003.
Institution building		· Expertise of 704 staff in CNPC and 1736 staff in SPA/PCL Southwest upgraded. · SPA/PCL Southwest's gas transmission and distribution operations, scattered over five gas producing regions, partially consolidated into two departments namely the Gas Transmission and Distribution Department covering Sichuan Province and the Gas Transmission and Distribution Section covering Chongqing Municipality; further consolidation was not possible due to separation of Chongqing Municipality from Sichuan Province.

[1] End of project

Annex 2. Project Costs and Financing

Project Cost Breakdown by Components (US$ million)

COMPONENTS	APPRAISAL			ACTUAL/ESTIMATE		
	Local	Foreign	**Total**	Local	Foreign	Total
Gas Fields Development	296.09	202.69	**498.78**	481.93	137.46	**619.39**
Dehydration/Desulfurization	40.26	23.50	**63.76**	23.95	9.42	**33.37**
Fields Stimulations/Rehabilitation	85.15	29.97	**115.12**	35.18	18.07	**53.25**
Gas Transmission Expansion	43.14	30.96	**74.10**	58.33	6.48	**64.81**
Gas Transmission Rehabilitation	30.51	53.10	**83.61**	79.07	21.82	**100.89**
Gas Transmission Environment Upgrade	4.38	20.02	**24.40**	4.31	11.36	**15.67**
Technical Assistance/Training	0.88	17.16	**18.04**	1.31	14.14	**15.45**
Total Base Costs	500.40	377.40	**877.80**	684.08	218.75	**902.83**

1. Actual includes estimate of remaining disbursements.
2. Price/physical contingencies included in above for ease of comparison.
3. The project was exempt from taxes and duties.
4. Costs do not include interest during construction.
5. Figures rounded to second decimal place.

Project Cost Breakdown by Procurement Arrangements (US$ million)

Expenditure Category	APPRAISAL				ACTUAL/ESTIMATE			
	ICB	**Other**	**NBF**	**Totals**	**ICB**	**Other**	**NBF**	**Totals**
Works			131.9	131.9				
Well access roads/drilling sites and fields surface facilities								144.75
Gas transmission system							63.99	
Gas processing							49.70	
Resettlement							4.10	
							26.96	
Equipment and Materials								
Fields development drilling and rehabilitation	102.1 (102.1)	18.7 (18.7)	145.8	266.6 (120.8)	102.01 (102.01)	21.48 (21.48)	207.77	331.26 (123.49)
Seismic surveys	8.0 (8.0)	5.8 (5.8)	2.0	15.8 (13.8)	20.64 (20.64)	11.46 (11.46)	9.20	41.30 (32.10)
Gas treatment and field surface facilities	19.5 (19.5)		82.0	101.7 (19.5)	32.33 (32.33)		96.09	128.42 (32.33)
Gas transmission and distribution system	76.3 (76.3)		36.0	112.3 (76.3)	16.70 (16.70)		94.96	111.66 (16.70)
Technical Services		7.0 (7.0)	224.2	231.2 (7.0)		0.84 (0.84)	130.05	130.89 (0.84)
Consultancy and Training		4.3	0.3	4.6		4.10	0.24	4.34
Capacity building		(4.3)		(4.3)		(4.10)		(4.10)
Project Implementation Support		0.5 (0.5)	0.2	0.7 (0.5)				0.00
Training		12.8 (12.8)	0.3	13.1 (12.8)		9.19 (9.19)	1.02	10.21 (9.19)
Total	205.9 (205.9)	49.1 (49.1)	622.9	877.9 (255)	171.68 (171.68)	47.07 (47.07)	684.08	902.83 (218.75)

1. "Other" includes limited international bidding, direct purchase, shopping and consultant services (procured in accordance with Bank Guidelines) and training.
2. NBF denotes non-Bank financing.
3. Technical services include directional drilling, electric logging, well connecting, production and stimulation.
4. Figures in parentheses are amounts financed by the Bank.
5. figures rounded to second decimal place.

Project Financing (US$million)

COMPONENTS	APPRAISAL			ACTUAL/ESTIMATE		
	Local	Foreign	**Total**	Local	Foreign	**Total**
GEF		10.0	**10.0**		9.86	**9.86**
SPA/CNPC/PCL	500.4	179.7	**680.2**	717.23		**717.23**
IBRD		255.0	**255.0**		208.89	**208.89**
Total	500.4	444.7	**945.2**	717.23	218.75	**935.98**

Note: Figures include interest during construction

Annex 3. Economic Costs and Benefits

Assumptions for Rate of Return Calculations

Sales: The data for 1995-2002 are actual. After 2003, decreased incremental production is assumed in response to the depletion of wells developed and rehabilitated under the Project. Share of the sales to each customer category remains same as the actual share in 2002. Self-use and transmission losses of the gas are assumed to be 5% after 2003 based on the 2002 actual.

Gas price: The data for 1995-2002 are actual. Price is assumed to be constant in real terms after 2003. City gate prices, including well-head price, processing fee and transportation fees, are used for analyses.

Exchange rate: Exchange rate adopted are RMB8.46/US$ in 1994, 8.32 in 1995, 8.30 in 1996, 8.28 during 1997-1998, 8.27 in 1999, 8.28 during 2000-2002, and 8.27 after 2003.

Operating costs: Operating costs include administration, and maintenance costs. The data for 1995-2002 are actual. It is assumed to be RMB312 per thousand cubic meters of gas produced after 2003 based on the 2002 actual.

Project Economical Analysis

Sichuan Gas Development & Conservation Project

(Loan NO:3716-CHA)

Project Economic Analysis

(in million Yuan)

	unit	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Incremental Production																							
Natural Gas	(bcm)		0.8	1.9	2.9	2.6	3.9	4.8	4.5	4.2	4.1	3.9	3.8	3.7	3.5	3.4	3.2	3.3	3.1	2.8	2.5	2.3	2.2
Condensate	(thousand ton)		1.7	3.9	4.5	5.0	5.5	5.1	4.8	4.3	4.1	3.8	3.7	3.5	3.3	3.2	3.0	2.9	2.8	2.7	2.6	2.6	2.6
Prices																							
Average gas price with VAT	(Yuan/mcm)		587	626	664	674	682	673	679	718	720	720	720	720	720	720	720	720	720	720	720	720	720
Condensate with VAT	(Yuan/ ton)		1,355	1,521	1,665	1,668	1,647	1,657	1,967	1,553	2,228	1,933	1,592	1,412	1,312	1,322	1,331	1,339	1,347	1,337	1,327	1,316	1,306
Benefits																							
Income-gas			429	1,142	1,829	1,659	2,437	3,087	2,886	2,870	2,805	2,668	2,600	2,531	2,394	2,326	2,189	2,258	2,121	1,915	1,710	1,573	1,505
Income-condensate			2	6	7	8	9	8	9	7	9	7	6	5	4	4	4	4	4	4	3	3	3
Total Cash Inflow			432	1,148	1,837	1,667	2,446	3,095	2,896	2,876	2,814	2,675	2,605	2,536	2,399	2,330	2,193	2,261	2,124	1,919	1,714	1,577	1,508
Costs																							
Operating Cost			288	658	988	888	1,337	1,465	1,411	1,310	1,254	1,213	1,182	1,151	1,089	1,057	995	1,026	964	871	778	715	684
Capital Cost		419	849	952	992	989	1,043	1,184	533	702	237												
Total Cash Outflow		419	1,138	1,611	1,981	1,876	2,380	2,649	1,944	2,013	1,492	1,213	1,182	1,151	1,089	1,057	995	1,026	964	871	778	715	684
Net Benefits		-419	-706	-462	-144	-209	66	447	952	864	1,322	1,462	1,424	1,385	1,310	1,273	1,198	1,235	1,160	1,048	936	862	824
																						IRR	**23.8%**
																						NPV	**6,596**

Source: PetroChina Southwest

Note: 1. Commerial Sales of gas is assumed to be 95% of production after 2003.

2. Prices of gas and unit operating costs are held constant in real term after 2003. Prices of condensate are assumed to be 123% of WB's petroleum price projection after 2003.

3. Prices stated at constant price of 2002.

4. NPV is discounted to year 2002.

Project Financial Analysis

Sichuan Gas Development & Conservation Project

(Loan NO:3716-CHA)

Project Financial Analysis (Real Term)

(in million Yuan)

	unit	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Incremental Production																							
Natural Gas	(bcm)		0.8	1.9	2.9	2.6	3.9	4.8	4.5	4.2	4.1	3.9	3.8	3.7	3.5	3.4	3.2	3.3	3.1	2.8	2.5	2.3	2.2
Condensate	(thousand ton)		1.7	3.9	4.5	5.0	5.5	5.1	4.8	4.3	4.1	3.8	3.7	3.5	3.3	3.2	3.0	2.9	2.8	2.7	2.6	2.6	2.6
Prices																							
Gas price without VAT	(Yuan/mcm)		519	554	588	596	603	596	601	636	636	636	636	636	636	636	636	636	636	636	636	636	636
Condensate price without VAT	(Yuan/ ton)		1,199	1,346	1,473	1,476	1,458	1,466	1,741	1,374	1,972	1,711	1,409	1,250	1,161	1,170	1,178	1,185	1,192	1,183	1,174	1,165	1,156
Benefits																							
Income-gas			380	1,011	1,619	1,468	2,155	2,733	2,556	2,543	2,477	2,356	2,296	2,236	2,115	2,054	1,933	1,994	1,873	1,692	1,511	1,390	1,329
Income-condensate			2	5	7	7	8	7	8	6	8	7	5	4	4	4	4	3	3	3	3	3	3
Total Cash Inflow			382	1,016	1,626	1,475	2,163	2,741	2,564	2,549	2,485	2,363	2,301	2,240	2,119	2,058	1,937	1,997	1,876	1,695	1,514	1,393	1,332
Costs																							
Operating Cost			288	658	988	888	1,337	1,465	1,411	1,310	1,254	1,213	1,182	1,151	1,089	1,057	995	1,026	964	871	778	715	684
Capital Cost		419	849	952	992	989	1,043	1,184	533	702	237												
Sales Tax			21	55	87	79	116	148	138	137	134	127	124	121	114	111	104	108	101	91	82	75	72
Custom Duty				9	5	0	18	10	0.4	0.6													
Total Cash Outflow		419	1,158	1,674	2,073	1,955	2,514	2,807	2,083	2,151	1,625	1,340	1,306	1,271	1,203	1,168	1,100	1,134	1,065	962	859	790	756
Net Benefits		-419	-776	-658	-447	-480	-351	-66	481	399	860	1,023	995	968	916	890	837	863	811	733	654	602	576
																						IRR	**12.7%**

Source: PetroChina Southwest

Note: 1. Commerial Sales of gas is assumed to be 95% of production after 2003.

2. Average gas prices do not include VAT.

3. Prices of gas and unit operating costs are held constant in real term after 2003. Prices of condensate are assumed to be 123% of WB's petroleum price projection after 2003.

4. Prices stated at constant price of 2002.

Annex 4. Bank Inputs

(a) Missions:

Stage of Project Cycle	No. of Persons and Specialty (e.g. 2 Economists, 1 FMS, etc.)		Performance Rating	
Month/Year	Count	Specialty	Implementation Progress	Development Objective
Identification/Preparation				
06/04-06/09/1992	*2*	Financial Analysts (2)		
07/12-07/18/1992	*2*	Petroleum Geologist (1) Petroleum Engineer (1)		
02/21-03/07/1993	*11*	Gas Specialist (1) Financial Analysts (4) Energy Economists (3) Lawyer (1) Environmental Specialist (1) Petroleum Engineer (1)		
Appraisal/Negotiation				
06/13-07/01/1993	*9*	Financial Analysts (3) Gas Specialist (1) Energy Economists (2) Petroleum Engineer (1) Geologist (1) Environmental Specialist (1)		
CNPC Restructuring Study Review 08/08/-08/11/1994	*2*	Petroleum Enginer (1) Energy Economist (1)		
Supervision				
12/19-12/23/1994	*2*	Petroleum Engineer (1) Procurement Specialist (1)	S	S
01/22-02/12/1996	*2*	Petroleum Engineer (1) Gas Specialist (1)	S	S
04/02-04/18/1997	*3*	Petroleum Engineer (1) Gas Specialist (1) Energy Specialist (1)	S	S
02/23-03/12/1998	*3*	Petroleum Engineer (1) Gas Specialist (1) Procurement Specialist (1)	U	S
11/16-11/30/98	*5*	Gas Specialist (1) Petroleum Engineer (1) Energy Specialists (2) Financial Analyst (1)	U	S
05/05-05/22/1999	*2*	Gas specialist (1) Petroleum Engineer (1)	S	S
09/12-09/24/1999	*5*	Energy Economists (2) Oil & Gas Specialist (1) Restructuring Specialists (2)	S	S
11/17-12/10/1999	*5*	Energy Specialists (2) Petroleum Engineer (1) Gas specialist (1) Legal Expert (1)	S	S

	04/16-04/29/2000	*4*	Financial Analyst (1) Energy Economist (1) Restr./Reg. Experts (2)	S	S
	05/23-06/14/20000	*2*	Petroleum Engineer (1) Gas specialist (1)	S	S
	11/28-12/19/2000	*5*	Petroleum Engineer (1) Gas specialist (1) Energy Specialists (2) Lawyer (1)	S	S
	05/28-06/19/2001	*2*	Petroleum Engineer (1) Gas specialist (1)	S	S
	11/22-12/17/2001	*5*	Gas specialist (1) Energy Specialist (1) Financial Analyst (1) Petroleum Engineer (1) Procurement Specialist (1)	S	S
	06/03-6/19/2002	*2*	Gas specialist (1) Procurement Specialist (1)	S	S
	11/17-12/04/2002	*2*	Gas specialist (1) Petroleum Engineer (1)	S	S
ICR					
	07/23-08/12/2003	*3*	Gas Specialist (1) Financial Analyst (1) Resettlement Expert (1)	S	S

(b) Staff:

Stage of Project Cycle	Actual/Latest Estimate	
	No. Staff weeks	US$ ('000)
Identification/Preparation Appraisal/Negotiation Supervision ICR Total	(see tables below)	

GEF P003404			
Stage of Project Cycle	Actual/Latest Estimate		
	No. of Staffweeks	US$ ('000)	
		Direct Costs	Full Costs
Prior FYs* (1992-2003)			
Identification/Preparation	13.6	41.7	52.1
Appraisal/Negotiation	7.4	26.5	33.1
Supervision	86.5	229.6	572.7
Total Prior FYs	107.5	297.8	658.0
Current FY (2004)			
ICR	4.7		34.2
Total Current FY	112.2	297.8	692.2

P003609			
Stage of Project Cycle	Actual/Latest Estimate		
	No. of Staffweeks	US$ ('000)	
		Direct Costs	Full Costs
Prior FYs* (1991-2003)			
Identification/Preparation	157.6	475.3	594.1
Appraisal/Negotiation	60.3	194.0	242.5
Supervision	131.3	341.4	781.2
Total Prior FYs	349.2	1,010.7	1,617.9
Current FY (2004)			
ICR	8.2		43.9
Total Current FY	357.4	1,010.7	1,661.8

*Regional direct to full costs mark-up is 25% for prior fiscal years up to 1999.

Annex 5. Ratings for Achievement of Objectives/Outputs of Components

(H=High, SU=Substantial, M=Modest, N=Negligible, NA=Not Applicable)

	Rating	Rating (Supplemental GEF)
☐ *Macro policies*	○ H ○ SU ○ M ○ N ● NA	○ H ○ SU ○ M ○ N ● NA
☐ *Sector Policies*	○ H ● SU ○ M ○ N ○ NA	○ H ○ SU ○ M ○ N ● NA
☐ *Physical*	○ H ● SU ○ M ○ N ○ NA	○ H ● SU ○ M ○ N ○ NA
☐ *Financial*	○ H ● SU ○ M ○ N ○ NA	○ H ○ SU ○ M ○ N ● NA
☐ *Institutional Development*	○ H ● SU ○ M ○ N ○ NA	○ H ● SU ○ M ○ N ○ NA
☐ *Environmental*	○ H ● SU ○ M ○ N ○ NA	○ H ● SU ○ M ○ N ○ NA
Social		
☐ *Poverty Reduction*	○ H ○ SU ○ M ○ N ● NA	○ H ○ SU ○ M ○ N ● NA
☐ *Gender*	○ H ○ SU ○ M ○ N ● NA	○ H ○ SU ○ M ○ N ● NA
☐ *Other (Please specify)*	○ H ○ SU ○ M ○ N ● NA	○ H ○ SU ○ M ○ N ● NA
☐ *Private sector development*	○ H ● SU ○ M ○ N ○ NA	○ H ○ SU ○ M ○ N ● NA
☐ *Public sector management*	○ H ● SU ○ M ○ N ○ NA	○ H ○ SU ○ M ○ N ● NA
☐ *Other (Please specify)*	○ H ● SU ○ M ○ N ○ NA	○ H ● SU ○ M ○ N ○ NA
Global Environment		

Annex 6. Ratings of Bank and Borrower Performance

(HS=Highly Satisfactory, S=Satisfactory, U=Unsatisfactory, HU=Highly Unsatisfactory)

6.1 Bank performance	*Rating*	*Rating (Supplemental GEF)*
☐ *Lending*	○ *HS* ● *S* ○ *U* ○ *HU*	○ *HS* ● *S* ○ *U* ○ *HU*
☐ *Supervision*	○ *HS* ● *S* ○ *U* ○ *HU*	○ *HS* ● *S* ○ *U* ○ *HU*
☐ *Overall*	○ *HS* ● *S* ○ *U* ○ *HU*	○ *HS* ● *S* ○ *U* ○ *HU*

6.2 Borrower performance	*Rating*	*Rating (Supplemental GEF)*
☐ *Preparation*	○ *HS* ● *S* ○ *U* ○ *HU*	○ *HS* ● *S* ○ *U* ○ *HU*
☐ *Government implementation performance*	○ *HS* ● *S* ○ *U* ○ *HU*	○ *HS* ● *S* ○ *U* ○ *HU*
☐ *Implementation agency performance*	○ *HS* ● *S* ○ *U* ○ *HU*	○ *HS* ● *S* ○ *U* ○ *HU*
☐ *Overall*	○ *HS* ● *S* ○ *U* ○ *HU*	○ *HS* ● *S* ○ *U* ○ *HU*

Annex 7. List of Supporting Documents

1. Gas Reserves Study (Sproule Associates Ltd), 1993/94
2. SPA Gas Transmission and Distribution Rehabilitation Study (Novacorp International), 1993/94
3. Environmental Assessment Report (SPA and DHV), 1993
4. Sichuan Gas Allocation and Pricing Study (NERA), 1993/94
5. CNPC Restructuring Study (Coopers & Lybrand), 1994
6. Staff Appraisal Report No. 12265-CHA of February 17, 1994
7. Gas Market Study (Sofregaz/PCL Southwest), 1999/00
8. Report on Workshop on China Oil & Gas Sector Regulatory Reform (IESM/World Bank/PPIAF), December 2000
9. Modernizing China's Oil & Gas Sector, Structural Reform and Regulation (IESM/World Bank), March 2001
10. Report on Workshop on China's Downstream Gas Sector Regulatory Framework (IESM/World Bank/PPIAF), April 2002
11. China: Economic Regulation of Long Distance Gas Transmission and Urban Gas Distribution (IESM/World Bank/PPIAF), August 2002
12. Draft Report on the Implementation of the Regulatory Framework of China's Downstream Gas Sector, May 2003
13. Aide Memoires and Annexes of supervision missions and ICR mission.
14. ICR data (August 7, 2003) from PCL Southwest.

Additional Annex 8. Legal Covenants

Agreement	Description of Covenant	Covenant Status
IBRD Loan Agreement and GEF Grant Agreement Ref.: 2.02(b)	Borrower to open and maintain two separate bank accounts (CNPC and SPA) acceptable to the Bank	**C**
IBRD Loan Agreement Ref.: 3.04	Borrower shall carry out the Sichuan Gas Pricing and Allocation Reform Plan, agreed with the Bank, in a manner satisfactory to the Bank	**CP**
IBRD Loan Agreement Ref.: 3.05	Borrower shall revise/adopt accounting standards for the oil and gas sector consistent with internationally accepted accounting standards	**C**
IBRD L. A & GEF G.As4.01(a)(i)	To maintain project records and accounts reflecting expenditures	**C**
IBRD L. A & GEF G.A. Ref.: 4.01(ii)	To retain these records and accounts for one year after the Bank has received the audit report	**C**
IBRD L. A & GEF G.A. Ref.: 4.01(iii)	Enable the Bank to examine such records	**C**
IBRD L. A & GEF G.A. Ref.: 4.01(b)(i)	Have records referred to in 4.01(a)(i) audited.	**CD**
IBRD L. A / GEF G.A. Ref.: 4. 01(b) (ii)	Submit audit reports six months after the end of each year.	**CD**
IBRD L. A & GEF G.A. Ref.: 4. 01 (iii)	Submit reports when requested by the Bank.	**C**
IBRD Project Agreement : 37160 and GEF Project Agreement: TF028693		
IBRD P. A & GEF P.A. Ref.: 2.07	Maintain Project Management Office.	**C**
IBRD P. A & GEF P.A. Ref.: 2.08	Carry out environmental management program (gas leak detection and reduction)	**C**
IBRD P. A.Ref.: 2.09	Carry out internal audit action plan.	**C**
IBRD P. A & GEF P.A. Ref.: 3.03	PCL shall take out and maintain with responsible insurers, or make other provisions satisfactory to the Bank for insurance against such risks and in such amounts as shall be consistent with appropriate practice.	**C**
IBRD P. A & GEF P.A. Ref.: 4.01 (a&b)	PCL maintain records and accounts of the project expenditures	**C**
IBRD P. A. Ref.: 4.01(c)/ GEF PA 4.01 b	PCL project records audited and furnished to the Bank no later than six months of each year.	**C**
IBRD P. A. Ref.: 4.02(a)	Operating Revenues.	**C**
IBRD P. A. Ref.: 4.02(b)	Cash Generation.	**C**
IBRD P. A. Ref.: 4.02(c)	Internal Rate of Return 12%.	**C**
IBRD P. A. Ref.: 4.03	PCL Southwest furnish annually a rolling long-term financial plan and exchange views with Bank.	**C**

Notes: C – complied with; CD – Complied with after delay (due to SARs)

Additional Annex 9. Resettlement

Sichuan Gas Development and Conservation Project

Report on Resettlement

This report is based on a review conducted by a Bank mission which visited China in July 2003 for the preparation of the Implementation Completion Report of the project. It covers the resettlement actions taken by the agency responsible (SPA/PCL Southwest) for the implementation of investment component of the project. It includes, the scope of concerned project activities and related acquisition/ settlement, compensation policy and rehabilitation measures, institutional arrangements and the outcome.

Scope

Resettlement activities under the project pertained to the drilling of 128 gas wells including a few water removing facilities and the construction of pipelines of about 1000 kilometers cumulative length. These activities were spread over eleven counties in Chongqing Municipality and Sichuan Province. A typical gas well required permanent acquisition of about 18 mu (15 mu equal 1 hectare) of land while temporary occupation of an average of about 11 mu per km of pipeline built was needed for pipeline construction. According to the statistics provided by the implementing agency, a total of 14,130 mu or 942 hectares of land areas were acquired for the project, including 11,680 mu or 779 hectares for temporary land occupation and 2,450 mu or 163 hectares for permanent land acquisition. The actual permanent acquisition of land was 27 hectares or 14% less and the actual temporary land occupation was 79 hectares or 11% more than the appraisal estimate. The project activities and related acquisitions are summarized in the following table.

Scope of Land Acquisition and Resettlement for Sichuan Gas Development Project

Types of Component	Permanent land acquisition (hectares)	Temporary land occupation (hectares)	Total land Acquisition (hectares)
Gas Wells & facilities	161.7	64.8	226.5
Gas Pipelines	1.6	714.0	715.6
Total	163.3	778.8	942.1

Compensation Policy and Rehabilitation Measures

Land acquisition and resettlement was conducted in accordance with the laws of the People's Republic of China, and the regulations of Sichuan Province and Chongqing Municipality. The compensation for permanent land acquisition included the entitlements of the affected parties and the government taxes and fees.

A total of RMB223.8 million was paid as compensation. Of which, RMB166.5 million was for permanent land acquisition and RMB57.3 million was for temporary land occupation. Average compensation for permanent and temporary acquisition averaged RMB67, 951 per mu and RMB4,906 per mu respectively.

The compensation for permanent land acquisition involved in the various project activities ranged from RMB54,000 to RMB73,000 per mu. Of which, around RMB15,000 to RMB20,000 were paid to the

affected parties (based on 15 to 20 times the annual output value) and the rest as fees and taxes to the national, provincial and municipal governments.

The compensation for temporary use covered value of lost crops, and the restoration cost of the land, dwellings and attachments such as trees. It ranged from RMB1,200 to RMB12,000 per mu. The reason for such wide range of difference is that some pipeline construction involved relocation of dwellings and attachments, while in other cases only the occupation of arable land was involved.

Given the fact that almost all acquired lands are paddy land, with an average yield of around RMB1000 to RMB1200 per mu, the compensation paid appears adequate. The mission visited one gas well (#86) construction site in Dianjiang County, Chongqing Municipality. A total of 13 mu of cultivated land were acquired in Pingle Village, Shaping Township. Based on Chongqing Municipality regulations, the compensation of Y16,000 per mu was paid to the affected group in the village, which was then divided among all group members. Additionally, the construction of gas well brought about new business opportunities. The villagers were quite pleased with the compensation paid and with some of the business opportunities provided by the project.

Institutional Arrangement

The institutional arrangements to administer the process of land acquisition and resettlement have included a land acquisition office in PCL Southwest's head office at Chengdu and an office in the East Gas Region at Chongqing. These offices have dealt with all permanent land acquisition issues, from consultation, negotiation to compensation delivery. For temporary land occupation, most of compensation and rehabilitation matters were handled by the various field construction groups. The staff has been found to be well trained and well versed in concerned laws and regulations.

Conclusion

The process of land acquisition, compensation and resettlement has been well conducted. It indicates existence of well-established policies and availability of competent staff.