

ASIAN DEVELOPMENT BANK

SUMMARY ENVIRONMENTAL IMPACT ASSESSMENT

AND

SUMMARY INITIAL ENVIRONMENTAL EXAMINATIONS

ANHUI FUYANG THERMAL POWER PROJECT

IN THE

PEOPLE'S REPUBLIC OF CHINA

May 1998

CURRENCY EQUIVALENTS

(as of 1 April 1998)

Currency Unit	=	Yuan (Y)
Y1.00	=	0.1203
\$1.00	=	8.3100

ABBREVIATIONS

AEPC	-	Anhui Electric Power Corporation
APS	-	Anhui Power System
CO ₂	-	Carbon Dioxide
ECPN	-	East China Power Network
EIA	-	Environmental Impact Assessment
FCAR	-	Fuyang City Administrative Region
IEE	-	Initial Environmental Examination
HYGC	-	Hengyuan Power Generating Company
MEP	-	Ministry of Electric Power
MVA	-	MegaVolt-Ampere
NEPA	-	National Environmental Protection Agency
NEPRI	-	Nanjing Environmental Protection Research Institute
NO _x	-	Nitrogen Oxides
PCB	-	Polychlorinated Biphenyl
PRC	-	People's Republic of China
SEIA	-	Summary Environmental Impact Assessment
SIEE	-	Summary Initial Environmental Examination
SO ₂	-	Sulfur Dioxide
TA	-	Technical Assistance
TSP	-	Total Suspended Particulate

WEIGHTS AND MEASURES

m ³	-	cubic meter
°C	-	degree Celsius
dB	-	decibel
ha	-	hectare
kg	-	kilogram
kJ	-	kilojoule
km	-	kilometer
kV	-	kilovolt
MW	-	megawatt
m	-	meter
mg	-	milligram
MJ	-	megajoule
mm	-	millimeter
mt	-	metric ton
sec	-	second
ug	-	microgram

NOTE

- (I) The fiscal year (FY) of the Government and its agencies ends on 31 December
- (ii) In this Report, "\$" refers to US dollar.

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I. INTRODUCTION

1.. The Government of the People's Republic of China (PRC) has requested the Bank to provide loan assistance for the Anhui Fuyang Thermal Power Project (the Project). The Project includes (i) Part A: Fuyang Power Plant; (ii) Part B: Anhui Power System Improvement; and Part C: Fuyang Afforestation. The respective executing agencies are (i) the Anhui Fuyang Hengyuan Power Generating Company (HYGC), which has been set up to construct, own and operate the power plant; (ii) the Anhui Electric Power Corporation (AEPC); and (iii) the Fuyang Municipal Government (FMG). The Project scope is as follows:

(i) **Part A: Fuyang Power Plant**

- (a) **Part A1: The Power Plant:** construction of a 2 x 600 megawatt (MW) coal-fired power plant near Zhoupeng Township in the Fuyang City Administrative Region (FCAR) and either three or four 4.5 kilometer (km) 220 kilovolt (kV) power transmission circuits from the power plant to Fudong; and
- (b) **Part A2: Equipment resulting from Institutional Strengthening:** procurement of computer equipment and associated software resulting from institutional strengthening of HYGC.

(ii) **Part B: Anhui Power System Improvement**

- (a) **Part B1: Transmission Reinforcement and Loss Reduction:** construction of a new 220/500kV substation at Fudong, a new 500/220 kV substation at Chuzhou, 252 km of 500kV single circuit transmission line; upgrading of supervisory control and communications equipment at the Anhui Power System (APS) load dispatch center; and provision of reactive power compensation at several locations on the APS to reduce losses;
- (b) **Part B2: Rural Electrification:** expansion of rural electrification in the FCAR involving about 1,300 km of 35kV subtransmission lines, about 100 x 35kV substations with approximately 500 megavolt-ampere (MVA) of transformer capacity in total, and about 0.27 million consumer (household) connections;
- (c) **Part B3: Closure of Old Plants:** closure of 21 small, inefficient, and polluting coal-fired power generating units in sizes ranging from 6 to 25 MW with a total capacity of 273 MW; and
- (d) **Part B4: Equipment resulting from Institutional Strengthening:** provision of computer equipment and associated software resulting from institutional strengthening of AEPC.

- (iii) **Part C: Fuyang Afforestation:** implementation of an afforestation program from 1998 to 2005 to increase the planted area by 72,000 ha equivalent (with about 72 million large size trees such as Poplar and Paulonia) to increase forest cover in the region from 15.3 to 17 percent.

2.. The Bank's environmental classification for the Project as a whole is Category A. Given the nature of the Project components and the significance of anticipated environmental impacts, Part A1 is classified under environmental category A, requiring a full environmental impact assessment (EIA); Parts B1, B3, and C under environmental category B, requiring initial environmental examinations (IEEs); and Parts A2, B2, and B4 under environmental category C.

3.. AEPC, as proponent of Part B of the Project, and representing HYG, the proponent of Part A of the Project, commissioned a team headed by the Nanjing Environmental Protection Research Institute (NEPRI) to prepare an EIA report for Part A1. The EIA, prepared in accordance with the environmental regulatory requirements of the PRC and the Bank, was completed in March 1996, and was reviewed and approved by the National Environmental Protection Agency (NEPA) on 3 April 1996. The EIA was also reviewed by environmental experts engaged under Bank-financed technical assistance (TA)¹ and revised in November 1996. The IEEs for Parts B1, B3 and C were also prepared by NEPRI in accordance with the Bank's requirements either as an integral part of the original EIA for Part A1 or as supplementary reports. This Report consists of one summary environmental impact assessment (SEIA) for Part A1, and three summary initial environmental examinations (SIEEs) for Parts B1, B3, and C, and was prepared by the subproject implementing agencies. It gives a synopsis of baseline data and field methods used in preparing the EIA and IEE reports, together with the results of investigations and their conclusions. The Bank's assessment of the report and evaluation of the environmental impacts related to the Project components will be included in the documentation presented to the Board together with loan documentation in support of the Project. The Bank's Environment Specialists visited the Project site in June 1997 and in March/April 1998 to verify critical aspects of the environmental reports. In accordance with Bank requirements, this report is circulated to the Bank's Board of Directors in advance of Board consideration of the Project, expected later in 1998. The EIA and IEEs referred to are available at AEPC's Project Office.

II. SUMMARY ENVIRONMENTAL IMPACT ASSESSMENT OF THE FUYANG POWER PLANT

A. Description of Part A1: The Power Plant

4.. Up to 1993, all electricity supplies to the Fuyang City Administrative Region (FCAR) relied on one 220 kV transmission line from the Huaibei Power Plant passing from Guoyang to Fuyang. With Fuyang located at the end of that 220kV line, both power supply adequacy and reliability were poor. This situation was improved somewhat after 1993 with a second interconnection to Mengcheng in the Huainan area. However, the FCAR power system still remains a relatively small and unreliable element of the Anhui Power System (APS) and the shortage of electricity is still a serious problem in the FCAR. Of a total population of 13 million people, 7 million do not have electricity. In 1997, the annual average per capita electricity consumption in FCAR was limited to 193 kWh² and in rural areas was even lower at 66 kWh. Only 70 percent of FCAR's electricity demand for agricultural use could be supplied in that year. While 68 percent of the rural population had access to electricity (meaning 4 million persons in FCAR still have to be connected), those in rural areas with access to electricity suffered regular load shedding during peak load periods. Electricity supply constraints are a major reason for the FCAR's suppressed economic growth. The maximum load and energy consumption in the FCAR are forecast to grow at an average of 12.8 percent and 10.5 percent annually from 1998 - 2000 to reach 640 MW and 3,550 GWh respectively by the year 2000. From 2001 - 2005, the maximum load and energy consumption are both forecast to grow at an average of 9.1 percent to reach 990 MW and 5,500 GWh by the year 2005. The proposed 1200-MW Fuyang power plant (the Plant) will significantly improve the currently unreliable and poor quality electricity supply in the FCAR (including avoidance of load shedding) together with the scope for improved system operation, and will thereby benefit consumers supplied by both the APS and the East China Power Network (ECPN).

5.. The Plant will be located in Zhoupeng Township of Fuyang City, which is situated in the northwestern portion of Anhui Province. The Plant will be a modern coal-fired power

¹ PPTA No. 2341-PRC: *Anhui Fuyang Thermal Power Plant Project*, for \$500,000, approved on 5 June 1995.

² About one fifth of the national average.

generating facility consisting of two sets of supercritical boiler-turbine-generator units, each with a capacity of 600 MW. Its energy conversion efficiency, at 45 percent, is about 5 percent higher than a conventional subcritical plant and, in comparison with such a plant, will save about 141,000 mt of coal per year, reduce ash impoundment by about 37,000 mt per year, and reduce emissions of sulfur oxides, nitrogen oxides and particulates by 0.14 mt, 0.1 mt and 0.05 mt per year, respectively.

6.. Space for the construction of additional future units will be designated. The first and second units are targeted to be put into commercial operation by 2003 and 2004. The Plant layout is given in Appendix 1. The Plant will be equipped with natural draft cooling towers. Makeup water for the cooling towers will be withdrawn at a rate of 1.2 cubic meters (m³)/second (sec), primarily from the Ying River with the Cihuaixing River as a backup source. Groundwater wells will be provided to supply potable water during most periods.

7.. The main source of coal (design coal), for which the Plant has been primarily designed, will come from the Luan Mine in Shanxi Province. The Plant has also been designed to operate using an alternative backup source of coal from Huaibei in Anhui Province (referred to as the check coal) in the event of failure of supply from the Luan mine. The heating value of the Luan design coal is 25,250 kilojoules (kJ)/ kilogram (kg), and the heating value of the alternative Huaibei check coal is about 19,600 kJ/kg. The Luan Mine has adequate reserves to supply coal for the proposed life of the Plant. An agreement to supply 3,500,000 tons of coal annually has been signed between AEPC, representing HYGCC, and the relevant coal bureaus.¹ The coal characteristics are shown in Table 1 below:

Table 1: Results of Coal Quality Analysis for the Fuyang Power Plant

Type of Coal	Coal Source	Carbon (%)	Hydrogen (%)	Oxygen %	Nitrogen (%)	Sulfur %	Ash %	Volatile Compounds %	Water %	Low Heating Value MJ/kg (Kcal/kg)
Design Coal	Luan mines in Shanxi	64.92	3.52	4.18	1.15	0.33	18.00	16.75	7.9	25.25 (6,030)
Check Coal	Huaibei mines in Anhui	52.41	2.78	3.9	0.88	0.38	25.99	20.32	13.91	19.60 (4,680)

MJ = megajoule; kg = kilogram; kcal = Kilocalorie.

8.. Coal is to be transported from the Luan Mine in Shanxi Province to the Plant site via the Beijing-Kowloon railway line. The Government plans to haul 35 million tons of coal annually via this railway trunk from the coal belt in the northwestern provinces to the south and southeast. Location of the Plant at the Fuyang railway hub will result in about 10 percent of the coal trains terminating at Fuyang rather than proceeding further to the south or southeast. A special 4.8 km long railway spur will be constructed for the Plant, which will be connected to the Beijing-Kowloon railway line at Wuming Station north of the Plant site. This special spur line will be primarily used for coal transportation during Plant operation and for some material and equipment delivery during Plant construction.

9.. There are several bituminous highways around the Plant site, six of which are arterial highways. The nearest highway to the Plant site is the Fu-Guo Highway, approximately 500 m from the site. There are several local mud-rock-type country roads around the site. The bituminous highway and the local roads will need to be upgraded where necessary for them to be used for the transportation of material and/or equipment required for the Plant.

¹

Based on the more conservative case of using check coal for 6500 hours per year at full load.

10.. The Ying and Cihuaixing Rivers, which pass near the Plant site, are connected to the Shanghai port by a system of canals and locks and are navigable by 300-ton capacity barges. Therefore, heavy equipment and material for the Plant can be transported to the Plant site from the Shanghai port by barge. A wharf is proposed to be constructed on the Cihuaixing River for unloading Plant equipment and material.

11.. While an assurance has been given that as much dry ash and slag as possible will be utilized, it will be necessary to dispose of that which is unused. An ash disposal site will be located 9 km west of Fuyang municipality and 12 km southwest of the Plant in the low-lying region of what used to be the bed of the Laoquan River. Part A1 includes both preparatory civil works at the ash disposal site and the construction of a 13.5 km pipe line through which a mixture of ash/slag and water in a ratio of 1:3.4, with a consistency like that of a paste, will be pumped to the disposal site.

12.. Part A1 also includes the construction of either three or four 220 kV transmission lines which are expected to be strung on double circuit towers for 4.5 km from the Plant to the new Fudong substation. Also, in addition to the afforestation program under Part C of the Project, a 30 m greenbelt will be established around the Plant surroundings and further trees will be planted in the vicinity of the ash disposal site.

B. Description of the Environment

1. Physical Environment

13.. Fuyang City and the Plant site are located in the floodplain formed by the continuous movement and alluviation of the Yellow River. Situated in the northwest part of Anhui Province and to the southwest of the Huaibei Plain, Fuyang City has geographical coordinates of 32°45' N by 115°56' E. The surroundings of the proposed Plant site are open and flat. The terrain is higher in the northwest region and lower in the southwest. Natural elevations vary between 30.1 and 29.5 m (Yellow Sea Elevation System).

14.. The subsurface conditions at the Plant site consist of alluvial soils deposited in the Quaternary period. Drilling to a depth of 50 m encountered primarily silty clay soils with some silt layers. This kind of soil is abundant in calcium carbonate; average pH is 8.4. An ancient river course, consisting primarily of sand, was encountered in the western part of the site area. The existing elevation of the site area is approximately 29.8 m, with groundwater encountered at a depth of approximately 1.3 to 2.5 m.

15.. The bottom of the ash disposal site in the old Laoquan river bed has yellow silt loam and clay as the foundation earth. The parent materials in this case are sediment deposits from the nearby Huai River.

16.. There are no cultural relics or natural protection areas in the vicinity of the Plant or ash disposal site. Also, no mines or underground historic relics are found below either of these sites.

17.. FCAR is in the monsoon climate area of a warm temperature zone and is characterized by four distinct seasons. The climate is mild with moderate rainfall and plenty of sunshine. The annual average temperature is 14.9 degree Celsius (°C) with a maximum of 41.1°C and a minimum of -20.0°C. The average annual rainfall is 889 millimeter (mm), and the annual evaporation capability is 1,510 mm. The average wind speed is 2.7 m/sec prevailing from the east.

18.. In 1995, 58.6 percent of the total land in the Fuyang area was used for agricultural purposes. The main crops are grain and oil crops, such as wheat, soybean, sweet potato, peanut, cotton, etc. The total grain crop output was 673,100 mt and the total plant oil output was 13,200 mt in 1995.

19.. Situated in the Huai River Valley, the area close to the municipality of Fuyang has several large rivers, both natural and human-made. The Ying and Quan Rivers are both natural rivers, whereas the Cihuaixing River is human-made. All rivers are equipped with sluice gates and flow control stations to control and adjust water flow. Of the arable land, 96 percent is capable of being controlled to prevent floods, 45.3 percent can drain floodwaters, and 33.6 percent are irrigable.

20.. Ambient air quality monitoring was carried out as part of the EIA study. The concentrations of sulfur dioxide (SO₂), nitrogen oxides (NO_x), and total suspended particulate (TSP) were monitored in two separate groups. The first group was monitored at five permanent sampling stations clustered within the Fuyang urban area, about 9 km south of the Plant site. The second group was monitored at seven temporary sampling stations with distances varying from 2 to 11 km from the Plant site.

21.. The maximum monitored background concentrations of TSP and NO_x exceeded the country's ambient air quality standards at some monitoring stations¹ for some averaging times. The one-time standard for TSP (which is, in practice, a 30-minute average) was exceeded at three of the continuous monitoring stations and three of the temporary stations. The 24-hour standard for TSP was exceeded at all of the continuous and temporary monitoring stations. The one-time standard for NO_x was exceeded at only one of the continuous monitoring stations.

22.. Given the locations of those monitoring stations where the standards were exceeded², the monitored high pollutant concentrations of TSP and NO_x are considered to be due to vehicle traffic and wind-blown dust, rather than to industrial pollution emissions. The EIA indicates that measures such as programs to monitor vehicle exhaust emissions and renovate roads are being implemented by the local government to reduce pollution due to vehicles and improve road conditions, and that these measures are expected to reduce the pollutant concentrations significantly.

23.. Presently, a brewery, a radio factory, and other factories discharge wastewater directly into the Quan River. A paper mill, a chemical fertilizer plant, a general chemical plant, a meat packing factory, and a printing and dyeing factory discharge wastewater either directly or indirectly into the Ji River. A pulp and paper mill, a tannery, a brewery, textile mills, and pharmaceutical factories discharge wastewater either directly or indirectly into the Ying River.

24.. In the PRC there are five classes of water according to their uses. They are Class I - water from natural sources, Class II - sources of water that can be used for municipal drinking, Class III - municipal drinking water with treatment, Class IV - water supply that can be used for industrial purposes, and Class V - industrial cooling water and irrigation water. Environmental monitoring of surface water conditions in the Fuyang area resulted in the following findings:

- (i) water quality of the Cihuaixing River meets the Class III water standard;
- (ii) the chemical oxygen demand of the Ying River exceeded Class IV surface water standards;
- (iii) several indices of the Quan River exceeded the Class IV surface water standards;
- (iv) the Zhangzhuang section of the Ji River is regulated as Class IV surface water; and

¹ The affected monitoring stations were located near a truck transportation company, a bus station, a railway station and construction sites.

² Near roads and construction sites.

- (v) the chemical oxygen demand of the Wummingou Channel exceeded allowable limits.

These findings show that the surface water in Fuyang area is already exposed to industrial and other types of pollutants and it cannot be used for drinking purposes without treatment.

25.. The surroundings of the Plant site are open and flat farmland containing several villages scattered outside the boundaries of the site. There are no noise-sensitive buildings or areas in the vicinity. The acoustic environment is relatively simple and the environmental noise is stable. The only noise sources are natural and those of daily life. The measured noise levels at the site and the surrounding area ranged between 35.8 and 39.8 decibel A (dB[A])¹ during the day and between 34.8 and 37.9 dB(A) at night compared to the standard levels of 65 and 55 dB(A) for day and night times respectively.

26.. Based on a geologic survey, the Fuyang area is poor in mineral deposits. Only a small amount of iron ore deposits have been discovered. They are not being mined currently.

2. Ecological Environment

27.. The Plant site is located in an area which has more than 50 species of terrestrial plants. Wild vertebrates in the site area consist of 15 orders, 22 families, and 54 species, including amphibians, reptiles, and birds. The site area also contains 12 species of aquatic plants and 10 species of fish. No endangered or rare animals or plants protected by the Government are found in the site area.

28.. The zonal vegetation in the site area is composed of deciduous broadleaf trees. The main species of trees are the Paulownia Fortunei, Poplar, Chinese Toon, Chinaberry, and Pagoda tree. There are no large forests in the area.

29.. With several natural rivers and human-made canals close to the municipality of Fuyang, equipped with sluice gates and flow control stations, it is estimated that a water surface area of 169.7 ha can be made available for fish production. About 74.2 ha of this is already developed. The main fish species are carp, blunt-snout, etc. The aquatic plants are mainly reeds, lotus root, and cattail. Reeds take up more than 90 percent of the total aquatic planting areas.

3. Socioeconomic Environment

30.. The total population in Fuyang Municipality (urban area) was 1.7 million in 1995 with an employment rate of 55.6 percent. Of the working population, 55.2 percent are employed in the agriculture sector, 28.0 percent in the service sector, and 16.8 percent in the industrial sector.

31.. In 1994, females accounted for 49 percent of workers in agriculture, 39 percent in industry, and 40 percent in services. Of the unemployed women, 47 percent are studying in schools, 31 percent are homemakers.

32.. There is one municipal library, one museum, three radio broadcasting stations, and four television stations in the city area. Forty-two hospitals with a combined 3,401 hospital beds serve the medical needs of the city residents. The main recreation facilities in the city are one stadium and five gyms. There are two homes for the elderly.

¹ dB(A) = "slow" response A-scale decibel where the sound pressure is weighted in accordance with the A curve of IEC Publication 179.

33.. Several cultural sites are located within the limits of Fuyang City. They include the City Wall Relic from the Song Dynasty, the Liu Gong Memorial Temple from the Nansong Dynasty, the West Lake Relic of ancient Yingzhou City, the Zifu Temple from the Song Dynasty, and the Kuixing Tower from the Ming Dynasty. None of these cultural sites are within a 10-km radius of the Plant site.

34.. There are nine highways, including two national highways connecting Fuyang City to other main cities both within and outside the province. Fuyang City is one of the important hubs of PRC's railway transportation system. Altogether, there are five railway lines that branch out from Fuyang City. A new airport for Fuyang City is nearing completion and will provide connecting flights to Hefei and Beijing.

C. Environmental Impacts and Mitigation

35.. The environmental impacts of the Plant can be grouped into those associated with construction and those associated with operation. These impacts will be discussed separately.

1. Physical Environment

a. Construction Phase

36.. The main impacts on the environment during the construction period are related to the preemption of land, fugitive dust emissions, soil erosion and runoff, sewage disposal, and construction noise. To minimize potential environmental impacts during the construction period, the EIA recommends the following mitigation measures: (i) controlling construction noise and avoiding operation of high-noise machinery at night, as much as possible; (ii) implementing measures to conserve water and soil, and protect vegetation in the construction areas; (iii) reducing soil erosion by providing temporary surface coverage of exposed soil; (iv) periodically sprinkling roads and construction areas with water to control fugitive dust emissions; (v) implementing a program to revegetate and reclaim disturbed areas; (vi) providing construction personnel with proper living accommodation, sanitary facilities, and medical care; and (vii) discharging domestic sewage only after it is treated to satisfy the requirements of applicable standards.

b. Operational Phase

37.. During the operational phase of the Plant, the main environmental impacts will be related to (i) coal transportation, (ii) coal handling and storage, (iii) flue gas emissions resulting from coal combustion, (iv) ash disposal activities, (v) water supply, (vi) wastewater discharges, and (vii) noise emissions. To minimize potential environmental impacts during operation, a range of mitigation measures will be implemented as an integral part of the Project.

i. Coal Transportation

38.. Transportation of coal to the Plant will require the construction of a dedicated railway spur approximately 4.8 km in length connected to the Beijing-Kowloon railway line at Wuming Station north of the site. Measures will be taken to minimize the amount of land disturbed for construction of this railway spur, and to revegetate and reclaim disturbed land as soon as possible. When the Plant is operating, several coal trains will travel on this railway spur each day. The noise that will result is estimated to be in compliance with the country's national standard for railway noise, GB 12525-90.

39.. In addition to the impacts along the dedicated railway spur, the coal trains traveling to the Plant will have similar impacts such as noise and dust along the entire south-bound route from the Luan Mine in Shanxi Province. However, the Government already has plans to haul 35 million tons of coal along this route annually; the Plant will not increase the amount of coal carried, but will simply cause about 10 percent of the coal trains to stop at Fuyang rather than proceed farther south. Therefore, coal transportation to the Plant will not result in any additional adverse environmental impacts along the main rail line over and above those which already exist.

ii. Coal Handling and Storage

40.. The Plant will keep a limited stock of coal on the site, sufficient for approximately 24 days of operation with the design coal or 18 days of operation with the check coal. The coal stock will be used and replaced regularly, and will be carefully stacked to ensure consolidation of the stacks. Rainwater runoff from the coal stack areas will be routed to a settling basin and then to an industrial wastewater treatment system. In addition, a water spray system will be installed to dampen the surface of the stacks and to control dust emissions.

iii. Atmospheric Discharges

41.. Design coal will have less than 0.35 percent sulfur content and 18 percent ash content while the check coal will have less than 0.4 percent sulfur content and 26 percent ash content. As very low sulfur coal will be used, emission concentrations of SO₂ for the design coal will be 2.354 t/hour which is only 10.8 percent of the PRC's national standard (see Table 1 of Appendix 2) and no flue gas desulphurization plant is proposed. The power plant is not required to meet the NO_x limit specified in the new regulation applied from 1 January 1997, because the EIA of the Plant was approved before the implementation of the new regulation. Nevertheless, NO_x emissions will be controlled within the new standard by the adoption of low NO_x combustion technology. The predicted emission concentrations of NO_x from the Plant is 2.482 t/hour. Fly ash in the flue gases from the boilers will be collected using high efficiency electrostatic precipitators with particulate removal efficiency not less than 99.5 percent resulting in a dust emission concentration in flue gases of 94 milligrams (mg)/Nm³ which corresponds to 38.7 percent of the PRC emission standard as shown in Table 2 of Appendix 2. Flue gases from both units will be exhausted through a common 210 m-high stack with on-line stack monitoring equipment to measure NO_x, SO₂, and particulate concentrations.

42.. In the EIA, pollutant concentrations due to operation of the Plant were predicted using a dispersion model similar to that recommended by the United States Environmental Protection Agency. One year of sequential hourly meteorological data was input to the dispersion model. Daily values were calculated by averaging a series of one-time predictions, and annual values were calculated by averaging a series of daily predictions. The predictions on air quality impacts conducted in the EIA indicate that total SO₂ levels, which include incremental emissions from the Plant will be well below the national ambient air quality standard for SO₂ and that ambient NO_x levels estimated using similar calculations will also be below the ambient air quality standard (except in one monitoring site where the level is marginally higher than the ambient standard) as shown in Tables 1 and 2 of Appendix 3. With regard to TSP emissions, data taken from monitoring sites show that existing TSP levels exceed the national air quality standard. It should be noted, however, that those monitoring stations where standards were exceeded were located near a truck terminal, bus and rail station, and construction site. The incremental TSP contribution from the new Plant is expected to be negligible considering the electrostatic precipitator's high collection efficiency. Overall however, the significant TSP level reduction due to the closure of old and inefficient power plants will more than offset the marginal TSP contribution from the Plant.

43.. While Part A1 of the Project (The Power Plant) will result in an increase in the emission of CO₂, Part B3 (Closure of Old Plants), Part B2 (Rural Electrification) and Part C (Fuyang Afforestation) will contribute to its reduction. The estimated annual CO₂ emission increase due to the Plant and the annual CO₂ reduction by other Parts of the Project are given in Table 2 below:

Table 2: Impact of CO₂ Emissions and (Reductions) due to The Project

Component	Impact
(i) Part A1 : Fuyang Power Plant (2 x 600 MW):	6,000,000 tons/year
(ii) Part B3 : Closure of 21 old power units (272 MW):	(1,100,000 tons/year)
(iii) Part B2 : Rural electrification program:	(1,250 tons/year)
(iv) Part C : Afforestation program:	(329,200 tons/year)

iv. Ash Disposal

44.. Ash utilization is desirable to avoid the environmental impacts that can result from ash disposal. Most of the ash produced by the Plant will be utilized for brick and cement production, road construction, or similar uses. The ash/slag utilization plan is shown in Table 3.

Table 3: Ash/Slag Utilization Plan

User	Usage	Consumption (10 ³ tons/year)	Status of Operation
Fuyang Municipal Cahua Cement Plant	Mixing material	10	Operating
Zhoupeng Town Brick Factory	Mixing 25 percent flyash instead of clay	49	Operating
Fuyang Municipal Traffic Bureau	Highway construction	182	Between 2000 and 2010

45.. Any ash that cannot be utilized will be pumped to the ash disposal area. This area is approximately 13.5 km southeast of the Plant site. The ash disposal site is divided into three phases. The Phase I site has an area of 128 ha and storage capacity of 10.437 x 10⁶ m³, which is sufficient to store the ash from the proposed two 600MW supercritical generating units for ten years. The Phase II and III areas are reserved for future use. The ash is proposed to be pumped to the ash disposal site, with a consistency in the form of a paste, through a pipeline from the Plant utilizing treated sewage and industrial waste water including cooling tower blowdown water. The ash disposal site and ash sluicing system are designed so that there will be no discharge of ash site water to surface water bodies. The soil of the ash disposal site mainly consists of clay, and its permeability is relatively small. For the reduction of groundwater contamination by toxic elements from the ash, the ash disposal site will be properly compacted to achieve a low permeability. A dike will also be built with sufficient clay thickness to reduce the percolation and seepage of the wastewater to the surroundings.

v. Water Supply

46.. The Plant will adopt a recirculatory cooling water system using cooling towers. For the two 600MW power generating units being considered, makeup water for the Plant cooling towers will be withdrawn at a rate of 1.2 m³/sec from the Ying and Cihuaixing Rivers. The flows in these rivers are controlled by check gates and locks used for waterway transportation. The Ying River is considered capable of supplying this makeup water for approximately 97 percent of the time but it cannot supply the water during periods when the river gates are being repaired. The water from the Cihuaixing River would not be available during dry seasons. Therefore, the withdrawal of water from these two sources needs to be carefully sequenced to obtain the

required makeup water for the Plant. The local water conservancy authorities have provided an assurance that the flow in both rivers will not be arrested simultaneously for repairs of the flood and navigation gates.

47.. The Cihuaixing River can be used for Plant makeup water and potable water, but the quality of water from the Ying River is too poor to use as potable water. Therefore, groundwater wells will be provided to supply potable water when makeup water must be taken from the Ying River.

48.. Approval has been obtained from the Water Conservancy Administration for water withdrawal from the Ying and Cihuaixing rivers and from groundwater. Water intakes and pumphouses will be constructed, on the Ying River and Cihuaixing River, with approximate pipeline lengths of 4 km and 1.5 km respectively.

vi. Wastewater Discharges

49.. The water use plan for the Plant calls for most wastewater to be treated and reused within the Plant (not discharged to the environment); thus, the potential environmental concerns will be minimized. The basic plan is for sewage and industrial wastewater to be treated and then used to sluice ash to the ash pond. Normally, there will be no discharge of wastewater to the environment, but under abnormal conditions, it may be discharged through the Wuming ditch into the Ji River.

50.. Rainfall runoff, cooling tower blowdown water, and production service water are not considered wastewater in the PRC and, therefore, can be discharged directly to the Cihuaixing River.

vii. Noise Pollution

51.. The principal noise emanating equipment such as turbine generators, coal mills, forced and induced fans, and ash slurry pump, are located in the main powerhouse building. Noise control and abatement equipment and facilities, such as silencers for boiler blowdown, sound insulation hoods for turbine generators, sound reducing covers for pipes, will be designed and provided in the Plant. There are no noise sensitive areas or facilities within 1 km of the Plant, and noise impacts are not considered significant.

viii. Transmission Line

52.. Electromagnetic fields at the edges of the 4.5 km long 220kV transmission line corridors will comply with international guidelines. There will be no significant interference with communication or transportation facilities.

2. Ecological Environment

53.. Because the Plant site and ash disposal site have been subjected to intensive human activities for many years, the natural environment is already modified. No endangered/ rare plant or animal species are known to occur in the area in which those sites are located. Development of the Plant site will require clearing of farmland and the subsequent loss of cultivated crops, but a great deal of similar habitat is available in the surrounding region.

54.. The land is primarily agricultural, used for growing crops such as wheat, soy beans, peanuts, and sweet potatoes. No wetlands or bodies of water will be crossed by the 220 kV transmission lines, except the Huia River, a 20-m wide brook, and several irrigation canals. The 220 kV transmission lines will span those bodies of water without impacting them. No

significant cultural resources, endangered or protected species, or flightways for migratory birds will be crossed.

3. Socioeconomic Environment

55.. Power plant construction and operation can produce negative socioeconomic impacts by displacing existing users of land and water and by attracting immigrants from outside the local area. However, positive socioeconomic impacts are also produced through increased opportunities for employment and the availability of electricity for the local population.

a. Land Acquisition

56.. Part A1 of the Project requires land acquisition of 284 ha, of which 242 ha is permanently occupied and 42 ha is used for temporary purposes. Plant facilities will permanently occupy 57 ha of land that is presently used as crop land. The ash disposal site will occupy another 128 ha of low-lying land that is not farmed, but may be used for other purposes, such as raising fish and crabs in small temporary ponds. Other areas required include those for the railway spur, roads and pipelines.

b. Involuntary Resettlement Plan

57.. An Involuntary Resettlement Plan (the Plan) has been prepared in accordance with the Bank's and the PRC's policies. It details socio-economic information relating to permanent and temporary land acquisition, affected households, farmlands, enterprises and infrastructure, and how affected persons continue to be consulted. It also includes information on relevant laws pertaining to resettlement in the PRC, the institutions responsible for preparing and implementing the Plan as well as detailing how the resettlement and rehabilitation will be financed, implemented and monitored.

58.. To mitigate the potential adverse impacts on the farmers and residents displaced by the Plant, the local government will, under the Plan:

- (i) Construct new residential buildings, considering the needs and customs of the displaced families;
- (ii) Pay compensation money directly to displaced farmers and residents;
- (iii) Use additional compensation money to establish enterprises to provide employment opportunities for displaced farmers; and
- (iv) Establish training programs to help displaced farmers acquire the skills necessary for employment in other industries.

c. Affected Households

59.. Part A1 affects 805 rural people in the countryside around Fuyang municipality. Some of these people will also lose other assets such as young crops, sheds, pigsties, wells, walls, fish ponds, electricity poles, tombs, crops and fruit trees. In addition, 610 people at Houli administrative village will lose housing, other assets and farmland. They will be moved to Zhouping Township and receive assistance in restoring their housing and livelihoods.

d. Compensation

60.. The objectives of the compensation program are to ensure that:

- (i) compensation is provided according to the PRC Land Administration Law and Fuyang Municipality regulations;

- (ii) compensation is equitable for similar properties with no consideration being given to depreciation;
- (iii) compensation is paid prior to acquisition of land and prior to new house construction to displaced persons;
- (iv) compensation criteria and levels are negotiated fairly between the Fuyang Municipal Resettlement Arrangement Office (FMRAO) and village resettlement representatives having regard to all of the other stated objectives.

61.. The Project compensation criteria were decided through a consultation meeting including representatives from the East China Electric Power Design Institute¹, and provincial and municipal government representatives as well as those from FMRAO and the affected villages. Compensation was classified into various types being (i) Household and associated personal facilities; (ii) Other land acquisition (both permanent and temporary); (iii) Crops - based on age, productivity and market price; and (iv) Infrastructure such as power and telephone lines etc. The negotiated compensation levels are given in the Plan.

e. Employment

62.. A program to hire people from the local area to work on construction of the Plant will be established, but it still may be necessary to bring in several thousand workers from outside the area during Plant construction. Any construction workers who move into the area will live in a temporary housing camp provided with drinking water, sewerage, and medical facilities. Other large construction projects in Anhui Province have not led to inflation, overcrowding of facilities, or cultural conflicts due to the influx of outside workers.

63.. Women will have equal opportunities to obtain jobs associated with the Plant. Women currently hold 25 to 30 percent of existing power plant jobs, some at senior levels. More than 80 percent of women surveyed in the local area thought the Plant would increase their job opportunities, and more than 65 percent thought the Plant would improve their quality of life.

f. Rural Electrification

64.. The Plant will result in a significant increase in rural electrification with corresponding benefits to the local economy and quality of life. Approximately 40 percent of people in the local area now have electricity in their homes; this figure is expected to increase to approximately 95 percent after the Plant begins to operate. Access to electricity is limited by structural factors and power availability, not by cost. The Project, itself, may not cause the local end use cost of electricity to increase. However, in conjunction with the Project, a provincial study of power tariffs will be undertaken to rationalize and simplify end-use tariffs.

4. Risk Assessment

65.. The primary risks of Part A1 of the Project evaluated in the EIA include flooding of the Plant site, and self-ignition of the coal pile. The Plant site is bounded to the north by the Cihuaixing River and to the west by the Ying River. High water levels in these rivers could pose flood dangers to the Plant. However, all design dam heights are 0.95 m higher than the 100-year flood levels. The EIA recommends that the left dike on the Ying River and related dikes should be reinforced to minimize the risk of flooding the Plant site. The 100-year flood levels, near the Plant site, in the Cihuaixing and Ying rivers are 34.45 m and 34.88 m respectively. The Ying River embankment on the Plant side has a top elevation between 34.36 m and 34.86 m. Therefore, this embankment is proposed to be raised to an elevation of 35.88 m to provide protection against a 100-year flood in the Ying River. The south embankment of the Cihuaixing River has a top

¹ The Institute responsible for the design of the proposed Fuyang Thermal Power Plant.

elevation varying between 35.36 m and 36.66 m, which is higher than the 100-year flood level of 34.45 m in the river and, hence, provides flood protection.

66.. Because coal is a fossil fuel, it has the potential to spontaneously combust or to ignite if contact is made with an appropriate heat source. To prevent combustion of the coal in the stockpiles, the following two preventive measures will be taken: (i) installation of safety monitoring equipment to measure the interior temperature inside the coal pile; and (ii) installation of a water-spraying system to dampen the surface of the coal stacks which will not only assist in preventing spontaneous combustion but will also control fugitive dust emissions.

D. Alternatives

67.. Without the Project, there will be (i) continued restrictions on economic development in the FCAR; (ii) continued underutilization of existing industrial capacity because of power shortages; (iii) restriction of rural consumers having access to electricity and a continued unreliable supply to those rural consumers already connected to the grid; (iv) an increase in people migrating to coastal provinces, which will strain the existing social infrastructure in these coastal provinces further, and also lead to a loss of skilled labor critical to the balanced economic development of the FCAR and Anhui Province; and (v) an incentive for local governments, such as the Fuyang Municipal Government, to implement short-term solutions to the power shortage problem by installing low efficiency and high polluting smaller-sized units that will exacerbate further the already poor energy utilization efficiency and increase the already widespread and severe environmental problems.

68.. As part of the least-cost planning study of supply options for the FCAR, APS, and greater ECPN, the technical, economic, financial, social, and environmental aspects were considered in detail to select the Plant size, location, fuel type, and implementation schedule. The adoption of 600-MW size units based on advanced supercritical steam cycle technology instead of smaller sized units based on subcritical steam cycle technology will assist in improving efficiency of coal use, maximizing the benefits of network integration with the ability to supply part of the generated power to the ECPN, reducing adverse environmental impacts and enhance power system stability. A comparison of the coal consumption of 600MW supercritical units compared with subcritical 300MW and 600MW units is given in Table 1 of Appendix 4. The amount of pollutants emitted by the different types of units is given in Table 2 of Appendix 4 considering a 1200 MW plant burning design coal.

69.. Gas and oil are limited in Anhui Province and the importation of these fuels from other provinces or from abroad is constrained by the transport facilities. About 41 percent of the limited hydroelectric potential, estimated at 1160 MW, has already been developed but constitutes less than 7 percent of APS installed capacity which is dominated by coal-fired plant. Wind, solar, and biomass energy resources available are insufficient to generate the amount of electricity required and relatively less economic.

70.. The Plant site was selected because (i) economic development of the FCAR is constrained by its power system which is a relatively small and unreliable part of the APS; (ii) its proximity to a major railway hub, through which the recently constructed Beijing to Kowloon ((Jing-Jiu) trunk railway passes, will result in about 10 percent of the southbound coal trains on this railway line terminating at Fuyang to supply the Plant rather than proceeding south or south east should such a plant be located in those regions; (iii) transportation of coal from the Luan mine to Fuyang is more economic than locating a power plant at Luan minemouth and transmitting electrical energy to Fuyang; (iv) water and a suitable ash disposal site are located nearby; and (v) with the inclusion of 500 kV transmission reinforcement, the Plant will be able to supply part of its generated power to the ECPN.

71.. A wet (hydraulic) ash handling and storage system was chosen in preference to a dry one because (i) transportation of dry ash to the disposal site 12 km away could generate dust; (ii) no additional water consumption would be required because recycled water would be mixed with ash to create a paste for pumping to the disposal site; and (ii) the disposal site consists of a natural clay lining which, upon compaction, will achieve low permeability.

E. Cost-benefit Analysis

72.. The estimated total investment for the proposed Plant is about Y12,800 million. Of this amount, about Y529 million will be allocated for environmental safeguards and management measures to ensure the proposed development is environmentally acceptable. These measures account for 4.1 percent of the total Plant cost. The estimate for capital costs of environmental mitigation measures is shown in Appendix 5. The total cost of environmental protection would be higher when the operation and maintenance costs are incorporated.

73.. Incremental electricity from the Plant will benefit consumers in the FCAR and ECPN and also enable the closure of 21 old and inefficient power generating units with a total capacity of 273 MW (ten by the end of 1998, five by 2003, and six by 2008). The closure of these units, along with the reduced utilization of other low efficiency units, will substantially lower the level of TSP in the atmosphere. Benefits from the reduction of TSP, as well as carbon sequestration benefits from the proposed afforestation program, were internalized in the Project economic analysis together with the effects due to Plant emissions and the results show that the Project will have a net positive contribution on the environment, despite the Plant emitting additional amounts of SO₂, NO_x, and CO₂. Financial and economic analyses for the Project indicate that the internal rates of return for the base case are 14.2 percent and 18.7 percent, respectively.

74.. The Project is expected to generate a significant increase in the annual income of the people living in the FCAR. In addition, the Project is expected to offer additional employment opportunities in the area.

F. Monitoring

75.. In the PRC, NEPA and its offices in the provinces, districts, cities, and counties have the responsibility to monitor environmental quality. Industries discharging pollutants are charged with the responsibility to monitor the quality and quantity of their discharges and to submit reports at specified intervals to the NEPA office at the corresponding level of government. In addition to the NEPA system, the State Power Corporation (SP) has its own internal requirements for the protection of the environment. Each power utility has its own environmental protection and monitoring units. These units are under the supervision of the corresponding level of SP and regulatory control is under the corresponding level of the NEPA system. A department will be established within the organization of the Plant to be responsible for environmental safeguards and occupational health and safety. Under this department, there will be a unit responsible for carrying out all the environmental monitoring functions. The Unit will be staffed with professional monitoring technicians who have successfully completed training and passed an examination. They will perform the required environmental monitoring under the supervision of national and local government agencies.

76.. The types of environmental monitoring that will be conducted for the Plant are shown in Table 4 below:

Table 4: Types of Environmental Monitoring

Type of Monitoring	Frequency
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Construction wastewater discharges	Monthly
Construction dust and noise	Twice a month
Operational TSP, SO ₂ , and NO _x emissions	Continuously
Ambient TSP, SO ₂ , and NO _x concentrations	Quarterly
Operational wastewater discharges	Every 10 days
Ambient ground and surface water quality	Quarterly
Operational plant noise levels	Quarterly
Ambient noise levels	Quarterly

77.. This level of environmental monitoring is typical for new power plants in the PRC and should be sufficient to demonstrate compliance with the applicable environmental requirements.

78.. An acceptance checklist for environmental compliance measures will be completed before the Plant begins normal operation. The monitored data will be submitted to the Bank annually.

G. Public Involvement

79.. The following forms of public participation were adopted in the process of preparing the EIA for the Plant: (i) holding a public symposium to solicit opinions of all communities concerned including the Local People's Congress, (ii) conducting a public consultative survey to collect public opinions in the Project area, and (iii) disseminating information to the public through local media.

80.. The public symposium was held on 8 November 1995 with a panel of 24 participants including representatives of the Local People's Congress; Political Consultative Conference; Women's Association; and relevant departments of the provincial and municipal governments including the planning commissions, agriculture bureaus, communication bureaus, and the governments of the townships and villages in the vicinity of the Plant. The Standing Committee of the Fuyang Municipal People's Congress presented its comments, on 10 November 1995, in the support of the Project since it would alleviate the severe shortage of electric power supply in the FCAR, promote the development of local economy, and accelerate the speed of industrialization in the area.

81.. A total of 135 questionnaires were distributed for the public survey on 12 November 1995. The area surveyed contained three villages to be affected by the Plant site, five villages affected by the spur railway line, and two villages located in close proximity to the ash disposal site. Of the responses received, 91.8 percent said that the main constraint to the development of the local economy is the shortage of electricity. All of the answers supported the construction of the Plant and 89.6 percent deemed that the Plant would promote the development of the local economy. Those surveyed anticipated the main environmental problems to be traffic (44.4 percent), impacts on agriculture (34.8 percent), and health effects on local people (11.1 percent). Eighty persons who responded to the survey would be affected by the Plant. Seventy-eight of them replied that the compensation scheme is appropriate and two did not respond. Eleven were people who would need to be relocated and all of them thought that the resettlement scheme is rational and that their living conditions would be improved.

H. Conclusions

82.. Based on the assessment of the environmental aspects of the Plant and the proposed mitigating measures to be constructed, operated and maintained, it is concluded that all environmental, occupational, health, safety, and socioeconomic impacts can be mitigated to levels that fully comply with applicable guidelines of the Bank and the requirements of the Government.

III. SUMMARY INITIAL ENVIRONMENTAL EXAMINATION OF TRANSMISSION REINFORCEMENT AND LOSS REDUCTION

A. Description of Part B1: Transmission Reinforcement and Loss Reduction

83.. Part B1 includes construction of the following three main items: (i) a 220/550 kV step-up substation at Fudong, (ii) a 500/220 kV step-down substation at Chuzhou, and (iii) 252 km of 500 kV single circuit transmission line linking the Fudong Substation, Luohe Power Plant, and Chuzhou Substation (see Map 3).

84.. The Fudong 220/500 kV substation will be located about 4.5 km from the Plant on the other side of the Fuyang - Guoyang highway and the Jing-Jiu railway line and about 13.5 km from Fuyang municipality. The site, which occupies 10 ha of land is about 500m from Yaohouyin village and is flat with elevation 29.81 - 30.18m. The Chuzhou 500/220 kV substation will be located near Duntang village in the Zhulong district of Chuahou city which is part of the Chuzhou City Administrative Region (CCAR) and is located about 22km from Chuzhou city. The site, which will occupy 8 ha, is flat with elevation 41.0 - 42.3m. Neither of the selected sites will require relocation of any houses.

85.. The 500 kV transmission line consists of two parts: Section I: the line from the Fudong substation to the Luohe Power Plant, and Section II: from the Luohe Power Plant to the Chuzhou substation. Section I is 132 km long and will pass through Yingdong and Lixin counties in the FCAR and Fengtai, Datong and Panji Counties in Huainan before crossing the Huai River to connect to the Louhe Power Plant. Section II is 120 km and will pass though Panji county in Huainan, Changfeng County in Hefei, and Dingyuan and Nanqiao Counties in the CCAR. The total number of towers will be 591 and the land occupied by tower foundations is estimated at 6.6 ha.

B. Description of the Environment

1. Physical and Ecological Environment

86.. The transmission line will be located on the Huaibei plains, and will cross rural areas. It will pass mainly through farm fields, brooks, dry gullies, highways, and railways. Most of the area along the proposed line is land that has been cultivated for many years, and the major planted crops are grain and crops for oil producing, including wheat, soy bean, peanut, sweet potato, etc. Also, there are artificial forest farm networks (shelter belts) and no rare or endangered species are reported in the Project area. There are no ecologically important areas, and no passageways or migratory routes of birds and wildlife along the transmission route. The transmission line and substations are not expected to have any adverse impact on or interfere with other power utilities, traffic or any drainage patterns.

2. Socioeconomic Environment

87.. In the neighborhood of the Fudong substation, there are a few inhabitants' houses 50 m from the northern corner of the site. Apart from these, there are no other residential quarters within a range of 200m. At the proposed Chuzhou substation site, there are a few houses about 50 m from the substation's eastern boundary. No other residential quarters are within a range of 150 m. The transmission line will pass through some village neighborhoods entailing the relocation of some houses.

88.. The villages along the line have their own primary schools and markets, and the townships have their own middle schools and self-sufficient commercial networks. However, they have no major cultural, recreation or entertainment places, tourist spots, or places of historic interest or scenic beauty. Also, there are no archeological, historical or cultural sites/monuments along the line route or near the substation sites, nor within a 3 km corridor of the route and sites.

C. Environmental Impacts and Mitigation

1. Transmission Line Routing Criteria

89.. Rigorous criteria for the routing of the transmission lines as well as location of the substations at Fudong and Luohe have been applied to minimize environmental and social disturbances in the Project area while recognizing that their designs should be as economical as possible and meet power system planning requirements. These criteria took the following into consideration:

- (i) avoidance, where feasible, of major infrastructure facilities and industrial enterprises;
- (ii) avoidance, where possible, of village settlement, urban areas and city planning areas;
- (iii) avoidance, where possible, of good-quality cultivated land;
- (iv) utilization of existing national and local roads to provide access to the proposed alignments;
- (v) avoidance, to the extent practical, of areas with dangerous topographic features or bad geology;
- (vi) avoidance of mineral deposits with possible potential for exploitation;
- (vii) avoidance of relocation of any ethnic minorities and protection of their cultural identity and local traditions; and
- (viii) avoidance, where possible, of passing through areas of primary forests and economically important trees.

90.. Potential environmental impacts were screened by NEPRI based on the Bank's *Environmental Guidelines for Selected Industrial and Power Development Projects* (1993). Most of the impacts will be minimized through application of the routing criteria mentioned above.

2. Design and Construction Stage

a. Transmission Line Design

91.. Transmission line design characteristics are established by existing design standards and siting and routing criteria provided by AEPC, which take environmental considerations into account, as noted above in paragraph 89. The transmission lines require a right of way of above 60 m for 500-kV lines and about 30 m for 220-kV lines depending on final design. The main steel tower types will be self supporting and guyed types. Design standards address minimum vertical clearances of the conductor catenaries above certain terrain conditions and crops, and minimum horizontal clearance to various types of infrastructure. Agreements have been reached with various agencies regarding the electromagnetic effects of the transmission lines on telecommunication lines, radio communication installations, broadcasting and TV stations. Adequate conductor shielding and grounding are considered to reduce interference and to prevent effects on communication lines. Full attention is paid to electrostatic induction such that electrical shock hazards are minimized, and safe distances and heights are respected. When routed near airfields, the design includes safe distances, direction and height of the towers, according to the requirements of the Government.

92.. The transmission lines will be designed in such a fashion that the maximum electric field strength at the line corridors will be less than 5kV/m. Houses located outside of the outer phase of the line where the induced electric field strength is greater than 4 kV/m, measured at one meter above the ground, will be relocated such that no person in the area should be permanently exposed to an induced electric field strength greater than 4 kV/m. The accepted international exposure limit for up to 24 hours per day, based on the principle of prudent avoidance of induced electric fields, is 5 kV/m.¹

¹ Guidelines issued by the Australian National Health Research Council.

b. River Crossing

93.. The transmission line will cross over the Huai River nearby the Luohe Power Plant. It will utilize existing concrete towers on both sides of the River and will not bring about any impacts on the River. The line will directly cross other brooks and rivers.

c. Vegetation

94.. The clearing of transmission line corridors and construction of roads linking the substations with existing roads will lead to a loss of vegetation. The construction of the transmission lines will not bring about any significant impact on vegetation. After stringing of the line, cropping can continue between the towers because there will be sufficient clearance between the conductors and the crops.

d. Substation Design

95.. Fudong substation design includes (i) a 220 kV double bus arrangement with 12 x 220 kV circuits initially including the four circuits to the Plant, two circuits looping in and out from the nearby Mengcheng - Fuyang 220kV line and additional circuits to Fuyang No.2, Woyang and Taihe; (ii) 5 sets of 45 MVAR reactors on the 220 kV bus; (iii) a 750 MVA 220/500 kV stepup transformer; and (iv) a 500 kV "one and one half circuit breaker" bus arrangement with one single 500 kV circuit to Luohe power plant in Huainan. The site area referred to in para. 84 allows for future expansion to a total of 16 x 220 kV circuits, 5 x 500 kV circuits and two 750 MVA 220/500 kV transformers. Likewise, Chuzhou substation design includes (i) a 500 kV "one and one half circuit breaker" bus arrangement with one single incoming 500 kV circuit from Luohe; (ii) a 750 MVA 500/220 kV stepdown transformer; (iii) a 220 kV double bus arrangement with 5 x 220 kV outgoing circuits to various counties within CCAR; and (iv) 5 sets of 45 MVAR reactors on the 220 kV bus. The site area referred to in para. 84 allows for future expansion to a total of 4 x 500 kV circuits, two 750 MVA 500/220 kV transformers and 14 x 220 kV circuits. Each substation will include buildings to house control and protection equipment and for administration and operations and maintenance requirements. Each site will require an appropriate access road.

96.. The substation locations and designs have considered the need to avoid interfering with telecommunication lines and radio communication installations. The presence of highways close to the location of each substation, ensures adequate transportation facilities during construction and for operations and maintenance. Substations will be surrounded by a boundary wall or fence, limiting access to authorized personnel only.

e. Substation Drainage

97.. In normal operation, the substations will not discharge any waste water. However, when replacing the transformer oil, they will generate some oil-contaminated waste water. Drainage of the substation area is typically channeled to peripheral ditches, which drain towards existing natural or artificial drainage systems. Transformers and high-voltage reactors are typically underlain by oil pits to handle any accidental oil spill, and PCB (Polychlorinated Biphenyl) insulation is not in use in the PRC. All waste water, including that from control and administrative buildings, will be collected and appropriately treated before discharging.

f. Land Acquisition and Resettlement

98.. Construction of tower foundations for 252 km of power transmission lines, together with substations at Fudong and Chuzhou, requires permanent land acquisition of 22.6 ha. This will affect people at substation sites and small rural sites from Fudong through Luohe to Chuzhou

along the narrow rural transmission corridors. In total, 1,011 people will lose small amounts of land and other assets, including 689 people in 153 households losing their housing. Five enterprises will lose parts of their buildings or equipment from tower construction. The total cost for land acquisition, house removal, and resettlement at the two substations and over the length of the transmission line is estimated at Y29.8 million .

99.. AEPC will be responsible for the compilation of the resettlement plan and compensation payment. The Municipal Resettlement Arrangement Office and the township resettlement arrangement offices are responsible for the implementation activities. The resettlement action plan was prepared in accordance with Bank policy and takes an approach similar to that described in the SEIA for Part A1.

3. Operation Stage

a. Operational Arrangements

100.. AEPC presently manages most of the APS including 6,013 MW of generating capacity and all of the APS at 220kV and below. In addition, the East China Electric Power Group Company has delegated authority to AEPC to manage some of the 500 kV network within the APS. As mentioned above, issues related to electromagnetic fields, electrostatic induction and electric field intensity, are being adequately addressed in the design of the transmission system reinforcement and their effects will be subsequently monitored. Weather effects and other environmental conditions on the operations of the lines such as ice loading and pollution flashover on insulators are being taken into account during design and will be monitored during operations.

b. Noise

101.. The noise generated by high voltage transmission lines is mainly caused by corona discharge, occurring generally in seriously polluted atmospheres under bad meteorological conditions, such as high humidity, strong wind, and torrential rain. Noise from the substations is generated from equipment operation and the circulation of cooling water. Such equipment includes main transformers, circuit breakers, circulating pumps, cooling fans, and oil circulating pipelines.

102.. According to a comparison with other projects, the predicted noise level would be 53-59 dB(A), at the transmission line corridor edge, 48.5 dB(A) at 20 m from the corridor edge, and 45 dB(A) at 30 m. At the enclosing walls of the transformer substations, the estimated noise level will not exceed 52 dB(A). These results will satisfy the PRC standards for environmental noise in urban areas.

c. Interference to Radio and Television

103.. Radio interference incurred by transmission lines is mainly due to corona discharge and gap discharge (spark discharge). Interference is posed mainly to radios, televisions, and electronic appliances of the residents living close to transmission lines. The predicted results show that the transmission line and substations will satisfy the requirements on interference standards for radios and televisions.

D. Monitoring

104.. AEPC will bear the responsibility for ensuring that Part B1 of the Project complies with environmental requirements during construction and operation. An environmental protection and monitoring office will be established within AEPC before the commencement of Part B1 of Project implementation, with adequate financial, material, and staff resources.

105.. Environmental management and monitoring programs for both substations and the transmission lines are shown in Appendix 6.

E. Findings and Recommendations

106.. Based on the IEE, no significant environmental impacts are foreseen. However, the transmission lines and substations will entail social impacts including relocation of a limited number of households and land acquisition for towers along the proposed lines and at the proposed sites of substations. Assurances have been given by AEPC that resettlement and land acquisition will be appropriately carried out in accordance with the Resettlement Action Plan. The transmission line mainly passes through agricultural land. There are no primary forests or valuable species of trees along the line. There are also no ecologically important areas, nor passageways or migratory routes and wild life along the line.

F. Conclusions

107.. The environmental impact screening of Part B1 of the proposed Project has not identified any major adverse environmental impacts. All minor adverse environmental impacts can be mitigated and such mitigation measures have been adequately formulated and incorporated into the Project design to ensure that environmental impacts are within acceptable levels. Therefore, no detailed EIA is considered necessary.

IV. SUMMARY INITIAL ENVIRONMENTAL EXAMINATION OF CLOSURE OF OLD PLANTS

A. Description of Part B3: Closure of Old Plants

108.. At present, Anhui Province has an installed power generating capacity of 6,730 MW. Some of the older medium or low pressure coal-fired generating units installed in the 1950s and 1960s with little or no pollution control can be closed under Part B3 and decommissioned gradually as larger and more efficient units, such as those proposed for the Fuyang Thermal Power Plant (the Plant), come into operation.

109.. Considering the commissioning schedule of the Plant, AEPC has worked out a Plan for Decommissioning Old Units with the owners of the older units referred to below. The Plan, which is Part B3 of the Project, involves 21 units with a total installed capacity of 273 MW in the following six power plants:

- (i) Tianjiaan Power Plant: Located in Huainan City of Anhui Province, has eight old units built in the 1950s, of which four units are 6 MW, one is 12 MW and three are 25 MW. All were dismantled following the decision to construct the Plant;
- (ii) Sudong Power Plant: Located in Sudong City of Anhui Province, has one 12 MW unit, built in the 1960s, that is scheduled to be dismantled by 1998;
- (iii) Tongling Power Plant: Located in Tongling City of Anhui Province, has two old units (one 12 MW unit and one 25 MW unit), built in the 1960s, that are scheduled to be dismantled in 1998 and 2008;
- (iv) Wuhu Power Plant: Located in Wuhu City of Anhui Province, has six old units (two 6 MW units and four 12 MW units), set up in the 1960s, that are scheduled to be dismantled from 2003 and 2008;

- (v) Maanshan Power Plant: Located in Maanshan City of Anhui Province, has four old units set up in the 1960s (one 6 MW unit, one 10 MW unit, and one 12 MW unit). All are to be dismantled in 2003;
- (vi) Hefei Power Plant: Located in Hefei City of Anhui Province, has one 25 MW unit, built in the 1960s, that will be dismantled in 2008.

110.. The closure schedule is given in Table 1.

Table 1: Closure of Old , Inefficient and Polluting Small Units in Anhui Province (MW)

Power Plant	Year 1998	Year 2003	Year 2008	Total
Tianjiaan	1x12+4x6+3x25	-	-	111
Sudong	1x12	-	-	12
Tongling	1x12	-	1x25	37
Wuhu	-	2x6	4x12	60
Maanshan	-	1x6+1x10+1x12	-	28
Hefei	-	-	1x25	25
Total	135	40	98	273

B. Description of the Environment

111.. The Tianjiaan power plant is located in the suburb of Huainan city. The five other power plants include the Maanshan Power Plant located in the urban area of Maanshan city, and the Sudong, Tongling, Wuhu and Hefei power plants, which are in the suburbs of Suzhou, Tongling, Wuhu, and Hefei cities respectively.

112.. The amounts of coal consumed and air pollutants emitted from these old and polluting power plants that have either already been closed, or are planned to be closed, during the period 1996 to 2008 are shown in Table 2.

**Table 2: Coal Consumption and Pollutant Emissions
(ton/year)**

Retirement Year	Power Plant and Closure Capacity	Coal Consumption	SO ₂	Dust	NO _x	CO ₂
Before 1998	Tianjiaan 111MW	490,000	7,211	37,104	4,452	843,000
	Sudong 1x12 MW	46,400	354	765	420	96,000
	Tongling 1x12 MW	37,500	330	549	342	79,500
2003	Wuhu 2x6 MW	38,700	306	638	354	79,500
	Maanshan 28 MW	87,400	765	1,326	811	187,800
2008	Tongling 1x25 MW	78,100	690	2,295	708	166,500
	Wuhu 4x12 MW	154,800	1,224	11,484	1,404	321,000
	Hefei 1x25 MW	80,600	642	5,976	732	166,500
Total	273 MW	1,013,500	11,522	60,137	9,223	1,939,800

113.. For all the cities except for Suzhou, four to six air quality monitoring stations have been established and are under operation. The annual daily average (mean daily average for the year) concentrations of SO₂, NO_x, and TSP are shown in Appendix 7. These tables also show the effect of the plant closures referred to above (using a dispersion model).

C. Environmental Impacts and Mitigation

1. Negative Impacts

114.. Fugitive dust pollution could be caused during the demolition process of the decommissioned units, and during transport of equipment and construction waste. The dust pollution intensity is expected to be low and to last only a short time. The impact to the surroundings can be avoided as much as possible through the adoption of some preventive measures, such as establishing an enclosure when dismantling the units, and timely spraying of water.

115.. Noise pollution could also result from the demolition process. The process should be avoided at night to reduce the impact on the surroundings as much as possible.

116.. During the process of dismantling decommissioned units, any pipelines or other equipment wrapped in, or including asbestos will be dismantled according to relevant requirements in GB 4551-84 (Guidelines in Laying Asbestos/Cement Pipe Lines for Supplying Water or Coal Gas) and GB 4552-84 (Guidelines in Construction of Shaft for Asbestos/Cement Tubes).

117.. According to the environmental regulation included in Document No. 50 (91) of NEPA and the original Ministry of Energy (Stipulations on Preventing Power Installations Containing Polychlorinated Biphenyl and Their Waste from Polluting Environment) and the safety standards included in Document No. 35, 15 January 1991 of the original Ministry of Energy (Stipulations on Operation and Management of Power Installations Containing PCBs), there are no power installations containing PCBs currently in commission in the PRC. Therefore, there will be no pollution problem arising from PCBs during the process of dismantling decommissioned units.

118.. No land acquisition or resettlement is required, and no significant negative social impact is foreseen.

2. Positive Impacts

119.. Table 3 compares the emission rates SO₂, TSP, NO_x and CO₂ for the plants being closed (on the average) with those for the Fuyang Power Plant. As explained in para. 73, the reduction in TSP, in particular, contributes heavily to the Project's overall contribution to the environment.

120.. On decommissioning the old plants, ground concentrations of SO₂, NO_x, and TSP will be reduced as shown in Appendix 7. Reduction is particularly significant in Huainan: 26.9 percent for SO₂, 25.8 percent for NO_x, and 21.5 percent for TSP.

**Table 3: Coal Consumption and Emissions of Air Pollutants per kWh
(Unit: g/kWh)**

Items	Closure of Units (273 MW)	Fuyang Power Plant (2x600 MW)
Coal Consumption	616.50	353.30
SO ₂ Emission Rate	7.01	1.96
TSP Emission Rate	36.58	0.60
NO _x Emission Rate	5.61	2.07
CO ₂ Emission Rate	1,179.90	828.20

D. Monitoring

121.. The environmental protection bureaus of each of the concerned municipal governments, namely, Suzhou, Tongling, Wuhu, Maanshan, and Hefei, will be responsible for environmental supervision of the decommissioning of the old units. Environmental monitoring for air pollution and noise will be held once every week during the decommissioning period.

E. Findings and Recommendations

122.. Based on the IEE, the impacts of decommissioning the old units are not considered significant and are limited to the close environs of those units. Also, no negative social impacts are foreseen. However, during the decommissioning process, appropriate measures should be taken to minimize the impacts due to dust pollution and noise.

F. Conclusions

123.. Part B3 will improve energy efficiency in the power sector and contribute to the reduction of emissions of air pollutants such as SO₂, NO_x, and TSP, resulting in the improvement of local air quality surrounding the locations of these decommissioned units. The environmental screening process did not identify any significant adverse environmental impacts. Mitigation measures are appropriately incorporated in the component. Therefore, no detailed EIA study is considered necessary.

V. SUMMARY INITIAL ENVIRONMENTAL EXAMINATION OF FUYANG AFFORESTATION

A. Description of Part C: Fuyang Afforestation

124.. The afforestation program in the Fuyang area under Part C of the Project will be implemented over the period 1998-2005 and will include: (i) planting cypress, paulonia, willows, poplars, etc. on the embankments of the Cihuaixing, Ying and Quan rivers; and (ii) constructing a farm forest network¹ between the Cihuaixing and Quan rivers. The program will increase the planted area by 72,000 ha equivalent or 72 million large size trees and thereby increase the extent of forest cover in the region from 15.3 percent in 1997 to 17.0 percent in 2005 as shown in Table 1. This afforestation program will be in addition to the regular tree planting program of the Fuyang Municipal Government (FMG) in the FCAR.

Table 1: Forestry Production Planning Index (1998-2005)

Item	Unit	Base Amount in 1997	Target in 2005
Farm Forest Network	10 ³ ha	407.0	800.0
Life Timber Accumulation	million m ³	13.2	18.0
Annual Timber Cut	million m ³	0.72	0.9
Forest Coverage Rate	percent	15.3	17.0
Additional No. of Trees	million	-	72.0

B. Description of the Environment

125.. General information on the environment in the Fuyang area is given in previous sections. With the long history of agricultural cultivation, there are mostly artificial (person grown) forests in the Fuyang area instead of primary flora. The present status of the forest and vegetation is shown in Table 1 of Appendix 8. In 1997, the total area of the farm land was 2,080,533 ha, most of which (1,672,065 ha) was planted with food crops. The details are shown in Table 2 of Appendix 8.

C. Environmental Impacts and Mitigation

126.. It is anticipated that there will be less impact on soil erosion during site preparation due to the following two reasons: (i) the Fuyang area is open and flat with less surface runoff water; and (ii) most of the plants will be established as separate strips or blocks rather than in large plantations. The site will be recovered with earth as soon as possible after the completion of tree planting.

127.. Some or all of the four sides of cultivated fields will be planted as shelter belts, and also waste and abandoned land in the whole Fuyang area will be used for afforestation. There will be no land acquisition or involuntary resettlement under Part C.

128.. It is estimated that 330,000 tons of carbon dioxide (CO₂) potentially can be absorbed every year by the trees planted under Part C of the Project.

¹ "Farm forest network" is the combined area used for planting crops (farming), plus that area used for planting trees that will act as shelter belts encircling the farm crops.

D. Monitoring

129.. FMG will be responsible for the implementation of the whole afforestation program. Forestry bureaus at municipal and county levels will be executing organizations. The annual program will be the responsibility of the municipal and county governments. It will be implemented progressively at different levels.

130.. The higher level forestry administration of the FMG will supervise the implementation of the afforestation program. Monitoring will be carried out once a year during the Project period to check the number and coverage rate of newly planted trees and whether the increased afforestation area meets the target.

131.. Environmental protection bureaus in the municipal and county levels are responsible for environmental management of the afforestation program under Part C of the Project. They will supervise the implementation of mitigation measures such as those for soil erosion.

E. Findings and Recommendations

132.. No significant adverse environmental impacts are anticipated in the implementation of Part C of the Project. Rather, Part C is expected to improve the environment by promoting afforestation and enhancing the capacity of CO₂ absorption. Also, Part C will not entail any significant social impacts.

F. Conclusions

133.. It is concluded that adverse environmental impacts from the implementation of Part C of the Project are not significant. No further environmental assessment study is required prior to the implementation of that part.

APPENDIXES

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Appendix 1
(Plant Layout)

Table 1: SO₂ Emission Standard and Estimated Emissions

Item	Type of Coal	Emission Standard	Estimated Emissions	Est. Emissions / Emission Standard
Emission (t/hour)	Design coal	21.731	2.354	10.83 percent

Table 2: Particulate Emission Standard and Estimated Emissions

Item	Type of Coal	Emission Standard	Estimated Emissions	Est. Emissions / Emission Standard
Outlet concentration of the precipitator (dry flue gas) mg/Nm ³	Design coal	243	94	38.7 percent

Table 1: Air Quality Impacts of SO₂ (Design Coal)(Unit: µg/m³)

Monitoring Point	Measurement	Background (ambient) Level	Incremental Emission from the Plant	Total	PRC Standard
Qingying Gongyuan	Annual average of daily averages (ADA)	26	nil	26	60
	Peak daily average per annum (PDA)	56	6	62	150
Fuyang railway station	ADA	30	nil	30	60
	PDA	60	6	66	150
Tangying*	ADA	—	nil	—	60
	PDA	33	6	39	150
Zhaoxiaozhuang*	ADA	—	nil	—	60
	PDA	34	5	39	150
Zhoupengzhen*	ADA	—	nil	—	60
	PDA	25	4	29	150
Chihepu*	ADA	—	nil	—	60
	PDA	29	—	38	150
Wumingzhen*	ADA	—	nil	—	60
	PDA	35	5	40	150
Jiancezhan	ADA	28	nil	28	60
	PDA	44	4	48	150
Qiyungongsi	ADA	34	nil	34	60
	PDA	86	6	92	150
Junfenqu	ADA	22	nil	22	60
	PDA	56	5	61	150

* Background values were monitored in winter only.

Table 2: Air Quality Impacts of NO_x (Design Coal) in Terms of Peak Daily Average Per Annum [PDA] Concentration (NO_x National Standard=100 µg/m³)(Unit: µg/m³)

Monitoring Point	Background (ambient) Level	Incremental Emission from the Plant	Total
Qingying gongyuan	80	7	87
Huochezang	80	7	87
Tangying*	35	7	42
Zhaoxiaozhuang*	33	5	38
Zhoupengzhen*	42	5	47
Chihepu*	53	9	62
Wumingzhen*	21	6	27
Jiecezang	80	5	85
Qiyungongsi	102	6	108
Junfenqu	65	6	71

* Background values were monitored in winter only.

Table 1: Comparison of Coal-consumption of Various Turbine Generator (T-G) sets

Item	300MW Subcritical		600MW Subcritical		600MW
	Made in China	Partially Imported	Made in China	Imported	Supercritical Imported
Normal coal-consumption of generating-electricity (g/kwh)	422	400	385	368	353

MW = megawatt; g = gram; kWh = kilowatt-hour.

Table 2: Incremental Increase In Amount of Pollutants When Compared With 600MW Supercritical T-G Sets

	300MW Subcritical		600MW Subcritical		600MW
	Made in China	Partially Imported	Made in China	Imported	Supercritical Imported
SO ₂ , t/h	+0.432	+0.292	+0.200	+0.091	0
NO _x , t/h	+0.506	+0.342	+0.234	+0.107	0
Dust, t/h	+0.132	+0.089	+0.061	+0.028	0

SO₂ = sulfur dioxide; NO_x = nitrogen oxides; t/h = ton per hour; MW = megawatt.

ANHUI FUYANG THERMAL POWER PLANT

Table 1: Cost of Environmental Mitigation Measures

Environmental Protection Measures	Cost (Y10⁶)
1. Electrostatic Precipitators	124.41
2. 210-m High Stack	18.37
3. Ash and Slag Handling System	269.00
4. Ash and Slag Pond	103.64
5. Industrial Wastewater Treatment System	9.12
6. Sewage Treatment System	2.50
7. Environmental Monitoring Station	0.25
8. Afforestation Program	1.80
Total	529.09
Project Total Investment	12,786.20
Percentage of Environmental Investments to Total Investment	4.14

Table 1: Environment Management and Monitoring for Substations

Period	Key Environment Issue	Alleviating Measures	Responsible Department	Monitoring	Responsible Institution	Supervision Department
Construction	Noise	Adopting low noise construction machines, not using high-noise machine at night	Construction unit	Twice a month	Anhui Electric Power Corporation (AEPC)	Local Environmental Protection Bureau (EPB)
	Kicked-up dust	Construction enclosure	Construction unit	Twice a month	AEPC	Local EPB
	Agricultural ecology	Vegetation temporarily destroyed during construction to be duly recovered	Construction unit and AEPC	During construction	AEPC	Local EPB
	Living sewage	Septic tank treatment	Construction unit	Twice a month	AEPC	Local EPB
	Land occupying	Occupying as little land as possible during construction	Construction unit	During construction	AEPC	Local State Land Bureau
	Relocation	Compensation according to stipulation, relocated household to be duly and properly arranged	AEPC and local government	During construction	AEPC	Local government
Operation	Safety training	Carrying out education for construction personnel	Construction unit	During construction	AEPC	Local government
	Noise	Adopting low noise equipment as much as possible	AEPC	Twice a year	AEPC	Local government
	Electric field	Adopting screening measure where screening necessary	AEPC	Once after put into operation	AEPC	Local EPB
	Wastewater	Discharge after being treated	AEPC	Once a season	AEPC	Local EPB
	Safety education	Strengthening safety education for nearby residents	AEPC	Once before and after operation	AEPC	Local government

Table 2: Environmental Management and Monitoring of Transmission Lines

Period	Key Environment Issue	Alleviating Measures	Responsible Department	Monitoring	Responsible Institution	Supervision Department
Construction period	Noise	Adopting low noise construction machines as much as possible	Construction unit	Twice a month	Anhui Electric Power Corporation (AEPC)	Local Environmental Protection Bureau (EPB)
	Land occupying	Occupying as little farm land as possible, land temporarily used to be duly recovered	Construction unit and AEPC	During construction	AEPC	Local State Land Bureau (SLB)
	Crops	- Compensation according to stipulations for crops destroyed during construction - Crops temporarily destroyed to be duly recovered	AEPC	During construction	AEPC	Local agricultural bureau
	Trees	High arbors cut down under line corridor will be duly compensated by afforestation at other places	AEPC and local government	During construction	AEPC	Local forestry bureau
	Traffic crossing	Creation of transmission line to cross traffic will be completed within the time stipulated by negotiation with traffic department	Construction unit	During construction	AEPC	Local traffic bureau
	Cultural relics and scenic spots	Transmission line will steer clear of cultural relics and touring scenic spot	Design unit and construction unit	During construction	AEPC	Local cultural relics bureau
	Relocation	Transmission line will steer clear of densely located residential quarters, relocation to be duly compensated and arranged	Design unit and AEPC	During construction	AEPC	Local government
Operation period	Safety training	Safety training for construction personnel and nearby residents	Construction unit	During construction	AEPC	Local labor bureau
	Noise	Steering clear of residential quarter has been considered in design	AEPC	Once a half year	AEPC	Local EPB
	Electric field	Requirements of electric field intensity have been considered in design and screens adopted where necessary	AEPC	Once after normal operation	AEPC	Local EPB
	Traffic crossing	Traffic safety was considered in design, transmission line net height kept with sufficient safety margin (guyed pylon not to be adopted fundamentally)	AEPC	Check once after normal operation	AEPC	Local traffic bureau

Table 1: Regional Annual Daily Average Concentration of Sulfur Dioxide (SO₂)

Power Plant	City	SO ₂ Annual Daily Average Concentration (mg/m ³)		Percentage Reduction
		Current Status	Contribution by Units Designated for Closure	
Tianjiaan	Huainan	0.052	0.014	26.9
Sudong	Suzhou	-	0.001	-
Tongling	Tongling	0.056	0.002	3.6
Wuhu	Wuhu	0.036	0.003	8.3
Maanshan	Maanshan	0.014	0.002	14.3
Hefei	Hefei	0.028	0.001	3.6

Table 2: Regional Annual Daily Average Concentration of Nitrogen Oxides (NO_x)

Power Plant	City	NO _x Annual Daily Average Concentration (mg/m ³)		Percentage Reduction
		Current Status	Contribution by Units Designated for Closure	
Tianjiaan	Huainan	0.031	0.008	25.8
Sudong	Suzhou	-	0.001	-
Tongling	Tongling	0.021	0.002	9.5
Wuhu	Wuhu	0.017	0.003	17.6
Maanshan	Maanshan	0.042	0.002	4.8
Hefei	Hefei	0.026	0.001	3.8

Table 3: Regional Total Suspended Particles (TSP) Annual Daily Average Concentration

Power plant	City	TSP Annual Daily Average Concentration (mg/m ³)		Percentage Reduction
		Current Status	Contribution by Units Designated for Closure	
Tianjiaan	Huainan	0.242	0.052	21.5
Sudong	Suzhou	-	0.002	-
Tongling	Tongling	0.196	0.006	3.1
Wuhu	Wuhu	0.206	0.019	9.2
Maanshan	Maanshan	0.148	0.002	1.4
Hefei	Hefei	0.096	0.011	11.5

Table 1: Forest and Vegetation in the FCAR (1997)

Species of trees	Number (million)	Area (10³ ha)	Life timber accumulation (million m³)
Poplar tree	210	183	7
Paulownia tree	100	132	4
Confiferous tree	5	11	0.03
Broadleaf tree	97	60	1.17
Twig flora	185	20	-
Total	412^a	407	13.2

^a Twig flora is not included.

Table 2: Crops Planted in the FCAR (1997)

Item	Area (ha)
Food Crop	
Rice	94,456
Wheat	805,258
Corn	260,801
Cereal	133
Other kinds of grain	24,296
Chinese sorghum	5,668
Chinese beans	179,760
Other kinds of beans	25,121
Potato	276,572
Subtotal	1,672,065
Industrial Crop	
Oil Crops	108,525
Cotton	91,237
Fiber Crops	14,296
Sugar Crops	1,607
Subtotal	215,565
Others (vegetables, fruits, etc.)	192,923
Total	2,080,553