ENVIRONMENT IMPACT ASSESSMENT
SUMMARY
OF
CUIJIA YING SHIPPING AND HYDROPOWER PIVOTAL PROJECT
AT THE HAN RIVER
(Final Report)

HUBEI PROVINCIAL COMMUNICATIONS BUREAU
JANUARY 2005
# TABLE OF CONTENTS

1.0 GENERAL .................................................................................................................. 1
  1.1 PROJECT BACKGROUND ..................................................................................... 1
  1.2 Preparation Basis ................................................................................................. 1

2.0 BRIEF INTRODUCTION TO THE PROJECT ................................................................. 2

3.0 ENVIRONMENT BASELINE ...................................................................................... 3
  3.1 Physical Environment ......................................................................................... 3
  3.2 Environment Protection Objects ........................................................................ 3
  3.3 Ambient Air Quality Baseline Survey ................................................................ 4
  3.4 Acoustic Environment Quality Baseline .............................................................. 4
  3.5 Surface Water Environment Quality Baseline ..................................................... 4
  3.6 Status of Soil Erosion .......................................................................................... 4
  3.7 Survey on Cultural Sites ...................................................................................... 4
  3.8 Situations of Socio-economy .............................................................................. 5

4.0 ENVIRONMENT IMPACTS ......................................................................................... 5
  4.1 Impacts on Water Environment .......................................................................... 5
  4.2 Impacts on Ecological Environment ................................................................... 6
  4.3 Impacts on Air Environment ................................................................................ 6
  4.4 Impacts on Acoustic Environment ...................................................................... 6
  4.5 Impacts on Resettlement Environment ............................................................... 7
  4.6 Impacts on Engineering Geological Environment .............................................. 7
  4.7 Impacts on Public Health .................................................................................... 7
  4.8 Impacts on Landscapes ....................................................................................... 7
  4.9 Impacts of Transmission Lines on Environment ................................................ 7
  4.10 Water Conservancy Assessment ....................................................................... 7
  4.11 Environment Risk Assessment .......................................................................... 8

5.0 PUBLIC CONSULTATION .......................................................................................... 8
  5.1 Survey Time and Personnel ................................................................................ 8
  5.2 Result of Public Survey ....................................................................................... 8
  5.3 The Complaint and Requirements of the Consulted Objects ............................... 9
  5.4 Information Disclosure ....................................................................................... 9

6.0 SUBSTITUTE SCHEME COMPARISON AND SELECTION ........................................ 9
  6.1 Analysis of Selection of Site Schemes ................................................................ 9
  6.2 Analysis of General Layout Schemes of the Pivot .............................................. 10
  6.3 Selection of Water Level Line Schemes .............................................................. 10
  6.4 Comparison Between With and Without ........................................................... 10

7.0 MEASURES FOR ENVIRONMENTAL PROTECTION .............................................. 10
  7.1 Measures for Environmental Protection During Construction ....................... 10
7.2 Measures for Environmental Protection in the Stage of Operation ... 14

8.0 Environment Management .......................................................... 16

8.1 Environment Management Organization and Responsibilities ....... 16
8.2 Environment Training Plan .......................................................... 17
8.3 The Legal Forces for Environmental Protection Action Plan......... 17

9.0 General Conclusion ........................................................................ 17
1.0 GENERAL

This document is the summary of the environment impact assessment of the Cuijiaying Shipping and Hydropower Pivotal Project at the Han River, providing the main conclusions of the environment impact assessment and environment management plan of the project, including related laws, law framework, applicable standards, important adverse impacts on social and socio-economic environment, substitute scheme comparison and selection, mitigating measure design, public consultation procedure, and the environment management plan of the project. This Summary can be submitted to the board of executive directors of the World Bank for review and approval and can be provided to the environment protection authorities, affected groups, non-governmental organizations and wide public as a brief report too.

1.1 Project Background

According to the principle of fully and reasonably utilize hydropower resources, Chinese government planned 16-level dams in Han River truck stream and canalized the truck stream of Han River in stairs so as to fully play the comprehensive functions of shipping, power generation, irrigation and flood control of Han River. Among the planned 16-level dams, there are 7 dams in Han River in Shaanxi Province. At present, the 2-level operation has been built in Shaanxi as well as Hubei. According to the order from the upper to the lower, the 9-level dams in Hubei Province are as follows: (1) Gushan; (2) Danjiangkou (built into); (3) Wangpuzhou; (4) Xijin; (5) Cuijiaying; (6) Yakou; (7) Nianpanshan; (8) Huajiawan and (9) Xinglong.

The Han River is the main branch of Changjiang River water system, with the advantages of very good natural conditions and regional advantages of developing water carriage and comprehensively utilizing water resources; which is listed as one of the main water carriage channels by Ministry of Communications. According to the objective conditions that Ministry of Communications regards the main water carriage channel of Han River by 2020 as the route goal in the third stage of Ministry of Communications and the development of Han River in stairs, Hubei Bureau of Communications prepared the internal river shipping development planning in 2002 and specified the construction time of each stair, namely: Xinglong in 2009, Huajiawan in 2014, Nianpanshan in 2014, Yakou in 2017, Cuijiaying in 2009, Xinjin in 2014 and Gushan in 2012.

In view of comprehensive benefit, the reason why Hubei selected Cuijiaying as the third largest dam in Hubei for construction is that this dam is adjacent to Xiangfan, the second largest city in Hubei; after it is built, it can release the contradictions in the aspects such as irrigation, urban power supply, harbor and water level of the channel and so on in Xiangfan.

1.2 Preparation Basis

1.2.1 World Bank Requirements

The World Bank requirements include primarily the Bank’s ten safeguard policies, including Operational Policies (OP), Best Procedure (BP), Good Practice (GP) and Operational Directives (OD).
Among these safeguards policies, Environmental Assessment (OP4.01) is the primary requirements and thus will be fully applied in this report and other EA documentation. In addition, other safeguard policies will first be screened during the EA and fully applied if triggered by the screening. Safety of Dams (OP/BP4.37), Natural Habitats (OP/BP4.04), Pest Management (OP4.09) and Forestry (OP/GP4.36) will be applied in this Report too. Involuntary Resettlement and Cultural Property will be applied in by two separate teams.

Since there are no project components that involve international waterways (OP/BP/GP7.50), indigenous people (OD4.20) or disputed areas (OP/BP/GP7.60) as defined under OP7.60, policies related to these subjects will not be applied in the report.

1.2.2 National laws and regulations
1). Environmental Protection Law of PRC;
2). Environment Impact Assessment Law of PRC;
3). Land Management Law of PRC;
4). Noise Pollution Prevention Law of PRC;
5). Air Pollution Prevention Law of PRC;
6). Water Pollution Prevention Law of PRC;
7). Solid Waste Pollution Prevention Law of PRC;
8). Water and Soil Conservation Law of PRC;
9). Anti-flood Law of PRC.

2.0 BRIEF INTRODUCTION TO THE PROJECT

The Cuijiaying Shipping and Hydropower Pivotal Project is a comprehensive application project mainly featured as shipping one and compromises to generate hydropower with the hydropower generated to promote shipping, its normal impounded level is 63.23m and its corresponding reservoir volume is 285 million m$^3$, and its installed capacity is 96MW. The total capacity of the reservoir is 10~1.0×10$^8$ m$^3$, this project is decided as Class II with Large (2) type scale. The installed capacity of the hydropower station is 50~300MW, the project class is Class III, its scale is middle scale; As for the integrated application water conservancy and hydropower pivot project, the standard specifies that the highest class will govern for the whole pivot project when classification figures belong to several different classes, therefore, this project is classified as Class II.

The pivot building is composed of shiplock, hydropower station, sluice gate and earth dam. According to the pivot classification standard, permanent buildings belong to Class II, secondary buildings Class III, and temporary buildings Class IV.

The pivot is situated at 17km at the downstream of Xiangfan City of HUBEI Province with control drainage area of 13.06×10$^4$ km$^2$, normal impounded level of 63.23m, backwater length of about 39.8km up to Xinji, and it is composed of water release gate, dam, shiplock and powerhouse.
1. Water release gate
It is of RC lock-and-dam structure, designed as per Class II hydraulic structure, with gate top elevation of 66m, design flood discharge capacity of 19600m$^3$/s and total gate length of 543.2m.

2. Dam
It is of clay inclined wall grit shell structure, with the dam top elevation just the same as that of water release gate, top width of 6.5m (communication requirements have been considered) and total dam length of 1324m.

3. Shiplock
Its hydraulic structure is of dock structure with lock chamber’s effective dimension of $180 \times 23 \times 3.5\text{m}$ and the design annual maximum trafficability of $1425.6 \times 10^4\text{t}$.

4. Powerhouse
Its installed capacity is 96MW (5 power generating units) and two circuits of 110kV HV lines are connected with the Xiangfan city power network.

Its geographical location is shown in the attached drawing No1.

3.0 ENVIRONMENT BASELINE

3.1 Physical Environment
As located in northern monsoon climate area of subtropical zone, the Han River, enjoys abundant precipitation in spring and summer and limited precipitation in autumn and winter. Statistics show that annual average rainfall is 700~1300mm. The number of days of precipitation reduces gradually to the north from the south, with annual average precipitation days at about 120 days, and the maximum daily rainfall reached 60 - 100 mm. Rainfall distribution is extremely uneven within the year, with the majority concentrated from May to October.

Annual average evaporation is 900 - 1300 mms in the basin of Han River. It is greater in the lower reaches than in the upper reaches, greater in the river valley than in the mountain areas, greater in the north bank than in the southern bank. The atmospheric pressure is lower in summer than in winter. Evaporation reaches maximum in June or July and minimum in January, February.

Annual average temperature in the basin ranges 15~17$^\circ$C, and 22~34$^\circ$C in July, with extreme temperature reaching more than 43 $^\circ$C in some areas. Temperature is lowest in January, with annual average temperature at 2~4$^\circ$C, and the lowest average at $-2^\circ$C and the extreme at $-14^\circ$C. The whole basin has 220-260 days of frost-free period on average, and there is not record of ice coverage in the whole river.

3.2 Environment Protection Objects
3.2.1 Environment protection objects in the aspects of ambient air and noise
Environment protection objects in the aspects of ambient air and noise are Qianying
Figure 1  The geographical location of Cuijiaying Shipping and Hydropower Pivotal Project
Team No.5 and Qianying Team No.6 of Panggong Township, Zhongzhou Team No.3 and Zhongzhou Team No.4 and Shangzhou Team No.4 of Dongjin Township which depart the dam site 400~600m.

3.2.2 Protection objects of water environment and ecological environment
The Xiangfan city water intakes and industrial water intakes, the water quality and fishes and it’s spawning beds of the Xiangfan section of the Han River are protection objects of water environment and ecological environment.

3.2.3 Protection objects of Cultural Relics
There are two cultural relics within the inundation line.

The environment protection objects are shown in Fig. 2.

3.3 Ambient Air Quality Baseline Survey
The hourly values and daily average concentrations of SO$_2$, NO$_2$ and PM$_{10}$ within the assessment region are consistent with Class II of the AMBIENT AIR QUALITY STANDARD (GB3095-1996), the ambient air quality baseline is good.

3.4 Acoustic Environment Quality Baseline
The monitored noise values at day time and night time within the region are consistent with the assessment standard, the ambient noise quality of the assessment region is good.

3.5 Surface Water Environment Quality Baseline
The surface water quality of the Han River main stream is ok in general and that upstream of mouths of the Xiaoqing River and the Tangbai River exceed the standard because they are polluted by their coming water from upstream, the main pollution factors are permanganate index, BOD$_5$, NH$_3$-N and total P.

3.6 Status of Soil Erosion
This project is located at juncture of Fancheng District and Xiangyang District of Xiangfan City, the project involves smaller scope, and mainly bank terrace, The permissible value of soil erosion of location area of project is 500t/Km$^2$·a. Left bank of Pivot area of this project and Fenghuangtan beach area in central river, the soil erosion is mainly mired erosion, and only a few slight erosion in bank slope; bank slope of right bank is relatively steeper, moderate erosion, and the surface relief of terrace is gently, mainly mired erosion; the earth material field is located at gentle woodland, soil erosion is slight erosion; the rock material field is grass brushland, steeper slope, moderate erosion. In general, the state of water and soil conservation of project area is relative better, and primary soil erosion is few.

3.7 Survey on Cultural Sites
At the end of June 2004, Hubei Cultural Relics Archaeological Exploitation Institute organized the second investigation based on the first investigation. Through the
Figure 2  The general layout of environment protection objects of Cuijiaying Shipping and Hydropower Pivotal Project
second investigation, it was found that some of the cultural relics determined by the first investigation were not in accordance with the requirement of cultural relics protection condition of this project. Therefore, the cultural relics in the dam area and the inundation area were readjusted and checked again. Two cultural sites were found in the water saving reservoir area of Cuijiaying Shipping and Hydropower Pivotal Project, which were distributed in the grade one and grade two mesa at the right bank of the river. The types of the cultural sites were underground ancient relics and graves.

3.8 Situations of Socio-economy

Xiangfan has a history of more than 2800 years, and has been developed into the national hub of communications, a new developing industry and regional key city. The territory area of urban district of Xiangfan reaches 326.26 km², with a population of 5,773,800 (By the end of 2002).

In recent years, Xiangfan implements reforms concerning science and education with investment spurring, export-oriented economic development strategy that drives economy to harvest great achievement in economy and all respects. Its GDP reached 45.62 billion in 2002, up by about 8.5%, agricultural gross output value was 16.501 billion Yuan, up by 1.2%; The whole city completed investment in fixed assets to total 9.678 billion Yuan, 10% in increase annually. Disposable income and net income for peasant per capita totaled 6506 and 2564 Yuan respectively, with annual rise at 7.22% and 3.43%.

4.0 ENVIRONMENT IMPACTS

4.1 Impacts on Water Environment

The disposed waste water from daily life has little impact on Hanjiang River, the sediment-flushed waste water in sand-stone system during the period of construction contains high concentration SS. It would increase the concentration SS of water within backward position 1000m during the periods of middle water and low water without disposal. So depositing pool is planned to deal with the polluted water of which has little impacts on water environment.

The analysis of influence on water temperature shows that the water temperature structure of the reservoir area during the operation period is of mixed type, and the natural water temperature will not be altered by the construction of the dam. The natural characteristics of water temperature of the river channels can basically be maintained within the reservoir area.

The navigating and generating electricity of the Project hardly has impacts on water quality, and its polluted source mainly comes from water for daily life after the accomplishment, which has small portion in winter compared with Hanjiang River’s runoff. If waste water from factory and daily life is disposed to accord with standard,
running into Hanjiang River, it will impact on water quality of Hanjiang River within limited range of discharging spot, and can’t change the degree of water quality in Hanjiang River.

The minimum release flow of the Cuijiaying Reservoir is $490 \text{m}^3/\text{s}$, which can meet the water consumption requirements of production, living and ecological environment.

**4.2 Impacts on Ecological Environment**

The Project will decrease the quantity of local farm, make agricultural environment into water environment changing original function.

Animals in this group are wader of water birds, passerine birds in grassland, beasts looking for food, snakes and lizards. Normally seen beasts are weasels and ferret-badgers. There are a lot of wader animals of the reservoir area. Among the affected animals, wader animals that move about river beach and shallow water area are influenced seriously. The inundations of sandbank and river-beach are permanent and nonreversible. The newly-formed banks are mostly steep without forming shallow water area. Such cannot substitute the previous beach and shallow water area in the river valley, which means that the wader animals have lost their habitats and have to move to other places.

The fish population, which is accustomed to spacious water, increases greatly after the accomplishment of the Cuijiaying Pivot. Though the construction of the Dam will have bad effects on the breeding and developing of economic fish in the Hanjiang River’s backward position, it can be beneficial to fish’s living through the winter and some fish’s fattening. As time goes, they will have gradually adapted to this changing environment, and also succeeded in reproduction, ingestion, growth and living through the winter in Middle and lower reaches of Hanjiang River below the Dam, and a certain population will have respectively survived.

**4.3 Impacts on Air Environment**

Impacts of the project on ambient air happens mainly during construction period, because the construction area is far away from the surrounding villages, the construction will have impacts on the constructors and their residential area, so the protection to the work of the workers in stone pit should be strengthened.

**4.4 Impacts on Acoustic Environment**

According to the construction plan of the Project, the sensitive point that is nearest to the noise source is Qianying Team No.6 on the right bank, about 400m from the construction site and within the construction zone. Based on the analogy analysis of the predictive values of fixed noise source, nighttime construction will possibly cause excessive noise value in the sensitive point. In other area, construction in daytime or nighttime will not have environmental impacts.
4.5 Impacts on Resettlement Environment

The issues of migrating resettlement of project construction are somewhat sensitive. For the sake of project construction, some people have to give up the existing quiet life and reestablish their livelihood; some people have to newly engage in land development for agricultural production. The issues of migrating resettlement will cause some negative impacts on the social environment if not properly resolved. Therefore, it is required to thoroughly carry out the plans for migrating resettlement and do well the works, such as settle the problems of water supply in the migrating areas and the grain ration for the migrants during the transition period. Such will help to accelerate the project construction.

4.6 Impacts on Engineering Geological Environment

It is preliminarily estimated that the leaking volume is not too much. The level near the dam site will be greatly raised, wind and waves may cause impacts on bank slope stability. The water levels of obstruction section of the river course all never went beyond the native riverbed, and the geological environment didn’t change a lot, so the conducing earthquake of the reservoir will not exceed the basic intensity.

4.7 Impacts on Public Health

After water retaining of the reservoir, the project will not have adverse impacts on the people’s health. On the other hand, operation of the project will promote the local economy and living standard. The cultural information exchanges will be also enhanced. People’s living ideas will also undergo changes, which will make them attach to the good living habits. Therefore, the bad factors that affect people’s health will disappear gradually and the occurrence of various epidemic diseases will be controlled.

4.8 Impacts on Landscapes

For the bare field that caused by digging and taking soil, should take ecosystem measures such as planting trees, growing grass etc. to recover its original nature landscape. The developments of the big dam can't create harmful affects to the closest nature landscape of Mount Yan, let alone other ones or scenery and famous spots. The engineering design should not only be considered to satisfy its usage function, but also be proceeded the special landscape designs as a new scenery from the esthetic angle, after the engineering being set up, it can add a new bright scenery line for the Xiangfan City.

4.9 Impacts of Transmission lines on Environment

The places where the electric transmission line passes are mostly city roads. No primitive forest and water source forest are identified, or any rare and endangered animals and plants. Except for some occupation of land, it will not have serious impacts on the environment.

4.10 Water Conservancy Assessment

Foundation excavation of permanent building of Pivot project $330.80 \times 10^4 \text{m}^3$, 
excavation of temporary works $963.41 \times 10^4 \text{m}^3$, total excavation earthwork $1294.21 \times 10^4 \text{m}^3$. Backfilling of project $197.04 \times 10^4 \text{m}^3$ (compaction earthwork), total waste earthwork caused by project $1016.33 \times 10^4 \text{m}^3$. In which, $937.25 \times 10^4 \text{m}^3$ is piled up centrally in excavation waste dump of left bank; $79.08 \times 10^4 \text{m}^3$ waste slag caused by exploitation of material yard will be used for land leveling of excavation surface then and there. The waste slag is mainly from excavation of permanent works and open diversion channel.

The soil erosion amount of this project during construction is $141.32 \times 10^4 \text{t}$, soil erosion amount during operation $0.5632$ million $\text{t}$, and gross amount of soil erosion of forecasting period $197.64 \times 10^4 \text{t}$.

4.11 Environment Risk Assessment

The main environment risks of the pivot are geological accidents of dam breaking and earthquake; The main accidents during operation are collision, stranding, fire and shipwreck accident. The proportion of serious accident of shipping that have serious impacts accounts for about $2.5 \times 10^{-4}/\text{a}$ of the total numbers of accidents.

5.0 PUBLIC CONSULTATION

5.1 Survey time and personnel

During the preparation of this Outlines in December 2003, there were a total of 580 people participated in the consultation exercise, including those directly affected by the project in the area as villages, institutions and enterprises, as well as local environmental, tourist, forest, garden, water conservancy, agriculture, forest, and communication authorities.

The inquiry and consultation of this project in the period of report was carried out in April 2004. There are about 2000 persons participating in the consultation and the informal discussion. The inquiry modes are public meetings, public opinion survey and informal discussion. All of 2000 persons come from the areas affected by this project.

5.2 Result of public survey

With carrying out the work of the construction of the project in initial stage, the panned project has been understood by more and more people. In the persons surveyed, about 98.8% agree the construction of the project after discussion and exchange of ideas.

The ones who know this policy account for 58.8%, the ones who does not know the policy accounts for 41.2%; the ones who want to be resettled on the local account for 87.3% and the ones who want to leave the local only account for 12.7%, no one disobey the policy of removal and resettlement.

Most of the public (accounting for 81.7%) think the influence on the water environment from the construction of the project is the largest, 68.1% of them think
the construction of the project will have great influences on the ecological environment, 1.1% of them think the construction of the project will bring about a certain noise influence and 0.2% of them think it will have influence on the atmosphere. As to the measures that shall be taken to slow down the influences on the environment, 85.7% of them think the measure of improving it in limited period is a very good measure; 34.1% of them require to strengthen management.

5.3 The complaint and requirements of the consulted objects

It is found in public inquiry and survey that the public near the project care most for the purchased land, inundated land and the compensation for removing the house and all of them require that the regulations of the policy be strictly carried out for reasonable compensation so that they can benefit from the project. The villagers in the affected area who accept the interview, not only support the construction of the project, but also care more for the problems of inundation and resettlement as well as the estimation of the influences on the geological aspect, firstly, they are afraid that after the project is built and the houses and lands are inundated, their lives in the future will be influenced; secondly, they are afraid the collapse of the reservoir bank will further damage the lands on which they rely for existence; therefore, they hope the related authorities give great attention to the estimation and the protection measures.

5.4 Information Disclosure

During the first round of public consultation, a simple data sheet was prepared and passed around to the affected people. In the second round, the decision-making schemes of the project (EIA report and RAP) will be placed in the public libraries in the Xiangfan city. Copies of these documents will also be placed in selected townships to be more readily accessed by the rural public. The objective is for the affected public to understand the EA process, engineering components, results of impact assessments and mitigation measures planned. The public will be further invited to express their concerns and opinions on EA results, which will be included in the EMP where appropriate.

6.0 SUBSTITUTE SCHEME COMPARISON AND SELECTION

6.1 Analysis of Selection of Site Schemes

The arrangements of the project at the upper and the lower site are similar, and so do shipping, operation and construction conditions. The engineering geological conditions of the upper site is a little better than those of the lower site, the quality of bill of the civil works are relatively large; but the quantity of removal for construction of the dormitory area of Hubei Pharmaceutical Factory is large, it is difficult and the expense is high, the total static investment in the project is RMB 12,460,000 more than the one of the lower site; furthermore, the indexes of water power utilization of the upper site is a little lower than those of the lower site. Through comprehensive analysis, the lower site will be the recommended site in this stage.
6.2 Analysis of General Layout Schemes of the Pivot

Both schemes can meet the need of discharging flood. As to the shipping condition, Scheme I is better than that of Scheme II. After taking engineering measures and optimizing the opening and closing of the water release gate, both schemes can meet the need of shipping. There are some differences in operation and construction conditions as well as the engineering geology and power generation benefit, Scheme I is arranged compactly, and continuous arrangement of the water release gate and earth dam is better for construction and convenient for operation, management and maintenance. The geological conditions of the shiplock are good, the quantity of bill and the investment will be saved; through comprehensive analysis, Scheme I will be the recommended scheme of the arrangement of pivotal project in this stage.

6.3 Selection of Water Level Line Schemes

From the analysis it can be seen that the higher the water level is, the larger the influences on social and ecologic environment are; in order to reduce the contradiction of many people with little land after the reservoir begins water storage; and the larger the protection project for the inundated land is; while the lower the water level is, the connection between backwater and the approach channel at the lower reaches is poor, it is necessary to improve it, in this way, the influence on surface water and aquatic organism will be strengthened. the high water level scheme can make the installed capacity and electric quantity of Cuijiaying project be maximum, the unit electric energy and unit kilowatt benefit index be the best, the unconnection of the shipping within the reservoir area be shortest and the secondary improvement bill of quantities be least.

6.4 Comparison between With and Without

After Cuijiaying Shipping and Hydropower Pivot is built, it has bad influences on the ecological environment, inundation, the stability of the bank, aquatic organism, air, noise and sand aggradations; it only has positive influences on sight and the social environment in the site area; however, if it is not built, the transportation pressure of the highway and the noise along the highway will be increased and the influences on the air environment will increase. It only in view of the environmental angle, building it will bring about more environmental problems than not building it. However, in light of the comprehensive social development need, if enough attention is given to the possible environmental problems in construction period and proper measures are taken to make the environmental influences reduce to the lowest degree, building it is very significant.

7.0 MEASURES FOR ENVIRONMENTAL PROTECTION

7.1 Measures for Environmental Protection during Construction

7.1.1 Measures for water quality protection

The discharging opening shall be arranged near the place in Hanjiang River as much
as possible where the middle thread flow speed is relatively larger, the density of the suspended matters in the waste water in the foundation pit can meet the corresponding discharging standard after standing for 2 hours. Furthermore, the standing time shall be prolonged properly in low flow season or when the strength of excavating the foundation pit and pouring concrete is relatively larger, and the neutralization agent shall be poured into it properly depending on the pH value of the waste water so as to ensure SS reaches up to the discharge standard of 70mg/l to reduce the pollution influences on the water quality of Han River from the drainage of the foundation pit.

One sandy and rock materials processing system will be respectively arranged for this project at each bank of the site. In order to protect the water quality of Hanjiang River, the waste water discharged from the systems shall be treated before being discharged (SS shall reach up to the discharge standard of 70mg/l). the waste water in the sandy and rock materials processing system at each bank of the site will be mainly pre-treated in sand basin and then enter the reaction basin and sedimentation tank for treatment.

Septic tank will be arranged in construction sites and the secondary embedded sewage treatment station shall be arranged in the management station, in this way, the domestic sewage from the construction sites will be discharged to the secondary treatment station after pre-treatment in septic tank, and then it will be discharged after meeting Grade I standard in Comprehensive Discharging Standard of Sewage through secondary treatment.

The ship for construction and the ship coming and going shall not directly discharge the oily sewage in the construction river section of this project and it is necessary for them to install and use oil-water separator according to related specification so as to ensure the soil density in the oily sewage from the ship is less than 10mg/L after treatment by the separator before it is allowed to discharge.

In order to protect the water quality of Hanjiang River from being influenced by the construction activities, any activity related to the harmful water quality shall be strictly prohibited in construction period, for example, the activity of directly discharging industrial solid waste, domestic garbage, ordure, production waste drainage and domestic sewage into the water body.

7.1.2 Prevention and improvement measures for atmospheric pollution

In order to reduce the healthy influences on the workers and constructors in construction sites from the dust, the transportation of the materials for construction shall adopt airtight mode as much as possible; the air-tightness of the machinery for transportation shall be checked and maintained.

The construction sites and the roads for transporting the materials for construction shall be watered to restrain the dust; as to the watering frequency and the amount,
they will be determined depending on the weather and the road condition; the air quality of the surrounding environment of construction site and the roads for construction shall be protected.

In order to avoid the influences on the constructors and workers from the dust in the construction site, the mixing plant shall be provided with dust collection facilities; furthermore, the management and maintenance of the devices shall be strengthened.

7.1.3 Prevention and improvement measures for noise pollution

In order to reduce the damage on constructors from the noise of the devices for construction, the devices with high noise shall be far away from the construction sites. As to the selection of the devices for construction, it’s better to select the devices and process with low noise; at the same time, the maintenance of the devices shall be strengthened; as to the devices with large vibration, the vibration reduction engine base shall be adopted.

The acoustical damper shall be provided at the air intake and outtake of the fixed equipment and the machinery such as excavator and transport truck; as to the machinery with high noise, the vibration reduction and noise reduction facilities shall be installed, if necessary, the temporary simple acoustical barrier shall be arranged around the machinery with high noise.

The construction time shall be strictly organized and controlled and it is prohibited to carry out construction at night with the machinery with high noise. The construction time of the project shall be strictly controlled in 8:00~12:00 in the morning and 14:00~20:00 in the afternoon.

7.1.4 Protection measures for ecological environment

the underwater excavation works shall not be carried out in the spawning season of aquatic organism. the works shall not be carried out in May and June as much as possible.

The constructors are forbidden to directly throw the various wastes into the water body, especially the poisonous and harmful matters.

The excavation waste dump shall be selected above the flood inundation line; the slag retaining wall, intercepting ditch and trench drain shall be provided around the excavation waste dump to avoid the pollution of the water quality and the influences on the inhabitation environment of the aquatic organism.

All plants in the reservoir area shall be cleaned up before water storage; the fruit trees that can be transplanted shall be transplanted as much as possible; otherwise, all of
them will be cut down; the trees that is cut down shall be use as much as possible; otherwise, they shall be burned on the site and the woody ashes shall be used as fertilizer.

7.1.5 Measures for public health

Do well in the sanitary quarantine inspection work for the constructors; make medical examination to understand the healthy conditions and germ carrying situation of the constructors before them enter the construction sites; control the occurrence and extension of the diseases.

Perform sanitary monitoring and control system, supervise and manage the food entering the construction sites to ensure good food sources and food processing.

Monitor and control the drinking water for the constructors, and carry out sedimentation and sterilization before use.

The domestic garbage in construction site shall be collected and treated in form of centralization, if necessary, the special refuse wagon shall be provided to transport the domestic garbage to the urban garbage treatment site for treatment.

7.1.6 Treatment measures of solid waste

Since the construction period of this project is long, various solid wastes produced at the construction sites and pivotal projects in the construction and production process shall be properly treated and it is forbidden to throw them randomly. The domestic wastes such as the wasted concrete block and parts of the devices shall be piled in the form of centralization and finally they shall be buried at the place near the construction site that will not influence the sight. As to the domestic garbage in construction period, the garbage can and garbage bag shall be arranged to collect it, then it shall be transported to the urban garbage treatment site for treatment through the cooperation between the owner and the local sanitary and environmental departments.

7.1.7 Measures for conservation of soil and water

Engineering protection measures will be taken for the inlet channel and outlet channel of the shiplock and the water release gate; as to the upstream slope of the earth dam at the left bank, dry paving will be adopted; as to the downstream slope grass protection will be adopted. Besides protecting the safety of the project, these engineering measures and plant measures can effectively protect the exposed area of the soil texture of the buildings and prevent the occurrence of new soil erosion.

The excavation waste dump will be arranged in the bank and it is use for the slag. The
excavation waste dump occupies the dry land in the ban. In order to improve the slag surface of the excavation waste dump, the 30m thick cultivated horizon of the surface layer shall be peeled off in pieces before abandoning the slag and be piled in the excavation waste dump in the form of centralization; furthermore, the temporary protection measures shall be taken to prevent the nutrient from loss.

7.1.8 Measures to slow down the bad influences on social environment

According to the regulation of cultural relics protection of the related departments, before construction, the negotiation with the local cultural relics protection departments shall be carried out firstly. Mark the place in advance where the cultural relics may be buried to protect them. Once the cultural relics are found in construction, the construction shall be stopped immediately to protect the site and then inform the cultural relics protection departments and the construction shall not be carried out again before the cultural relics protection departments take corresponding measures.

Furthermore, as to the existing cultural relics in the reservoir area that may be inundated, necessary excavation and treatment measures shall be taken before construction according to the opinions of the cultural relics protection departments.

The water catchment facilities in the reservoir area take bailing in Hanjiang River as the main and the construction of the hydropower project will not influence it; contrarily, it will play a role of stabilize the water catchment point. As to the existing drainage facilities, since the purification condition of water quality will become weak after the project is completed, therefore, it is necessary to intercept various blow-off lines to protect the water quality of Hanjiang River and send the sewage to Xiangfan Sewage Treatment Plant uniformly. At the same time, the construction of the planed sewage treatment factory shall be carried out in ahead of the construction of the main works in the reservoir area as much as possible so as to be good to collect the pollutants in reservoir area and protect the water quality in Hanjiang River.

7.2 Measures for environmental protection in the stage of operation

7.2.1 Protection measures for aquatic environment

(1) Measures of preventing oil seepage of the pivot
The unit selected shall not seep the oil; at the same time, the seeped oil collecting pit and accident treatment basin shall be arranged in the workshops; meanwhile, the oil-water separator shall be provided to treat various seepages and the oily sewage.

(2) Treatment of the domestic sewage in management station
Secondary sewage treatment system shall be provided in the management station. The sewage in management station will be discharged into the domestic sewage treatment station after pretreatment in septic tank; as to the secondary treatment of the sewage, it will adopt the embedded domestic sewage treatment unit.
Treatment of waste water from the ship
Strengthen the control over the domestic sewage and oily sewage; the ship shall be provided with necessary domestic sewage treatment facilities and oil-water separator according to the requirements of the related authorities; it is forbidden to discharge sewage from the ship in the reservoir area.

7.2.2 Treatment measures of solid waste
As to the domestic garbage from various ships, the storage cabinet shall be provided on the ships; the domestic garbage shall be collected in the form of centralization and then will be sent to the garbage treatment site on the bank for treatment.

The domestic waste in the management station will be collected in the garbage can and then will be transported to the urban garbage site for treatment.

7.2.3 Ecological environment
(1) Terrestrial ecological protection
Strengthen the construction of ecological protection forest system around the reservoir, effectively manage the various plants in the reservoir bank and the green area; if the dead tree is found, another tree shall be replanted in time.

As to the production migration area, control well the development scale of the land, prevent the excessive development of the farmland in the reservoir area and prohibit destroying the existing woodland.

Recover the vegetation in the wash land and put an end to opening up wasteland on the wash land so as to prevent the landslip and collapse of the river bank.

(2) Protection of animals
Strengthen the protection of the wild animals in the reservoir area and arrange personnel to protect them to prevent wide animals from being porches for.

Since the bottomland at the river valley is inundated, the kinds and the amount of the birds in the reservoir area will inevitably reduce. If the measures of building artificial watersplash zone are adopted and the sites for the birds for activities and seeking for food are increased, the influence degree will be reduced.

It is necessary to organize people to patrol for protection so as to avoid any animal hunting in the chaos of the animals or excessive disturbing. This will help to retain more animals to live in the reservoir area.

(3) Protection of fishes
It is suggested by the experts that a large number of fishes that eat the phytoplankton
shall be put into the reservoir, especially the local fishes. The local kinds mainly include Yichang dolphin fishes, Makou fish, bream, crucian and so on; in light of the kinds weifed in the present stage, they are the main kinds in this area.

They can purify the water quality to keep the amount of the fishes in a stable level; otherwise, the fishes in the reservoir will reduce rapidly and it will influence the ecological water environment.

Fishway will reduce the influence to migrating fish.

7.2.4 Conservation of water and soil
The repairs of the facilities of the main works and conservation of water and soil, as well the nursing of plants shall be carried out;

It is to enhance the afforestation of the office and residential areas.

8.0 ENVIRONMENT MANAGEMENT

8.1 Environment Management Organization and Responsibilities
The environmental management for the project shall be conducted by the Project Office of Hanjiang Shipping and Hydropower Development Co. Ltd., under which, the Project Environmental Protection Department shall be established and charged by specially-assigned persons. The responsibilities of the Department include the following aspects:

The department is administratively under the leadership of the Project Office and professionally under the guidance of the provincial and prefectural (city) environmental protection bureaus, being responsible for submitting the monthly report on environmental management and compiling the statements of environmental monitoring during construction period.

It will supervise the contractors to carry out the pollution preventive measures, participate in the works of project supervisor. It can issue warning notice and report to the Project Office if the contractors are found to violate environmental protection regulations or fail to effectively implement the pollution preventive measures. The department shall help to deal with the problems in case pollution accidents occur.

It will assist local governmental environmental protection department to establish new monitoring sections and bank monitoring points, as well help to undertake training for the managerial and monitoring staff.

According to the environmental problems found during the construction period, it will put forward suggestions for environmental protection measures during operational period to local environmental protection and navigation departments.
8.2 Environment Training Plan

All personnel including the administrative staff of the project office and construction workers have to receive environmental protection training at least one time. Key environmental administrative and monitoring personnel must go through the pre-post technical training for a period of 1~3 months.

8.3 The Legal Forces for Environmental Protection Action Plan

Environmental protection action plan is regarded as the guide for construction units to carry out the environmental protection measures. It is also the basis for environmental competent departments to inspect and approve the works of environmental protection. Therefore, the environmental protection action plan must have the same legal forces with the contract and bidding documents.

When the project employer intends to invite public bidding of the project construction, the environmental protection action plan shall be treated as one of the basic bidding documents sold to the bidders. It must be included in the bidding documents, of which, necessary charges required by various environmental protection measures can be listed in the construction budget.

When the project employer examines the bidding documents, it must consider the commitment specified in the EAP as one of the basis for document examination. When signing construction contract, it must include EAP as one of the works included in the contract. It should clarify that EAP is one of the basis for approval of the project quality, any environmental losses due to the failure in fulfilling EAP shall be borne by the contractor. The personnel in charge of the Project Office must acquire to well know the significance of EAP before project commencement and shall be responsible for making explanation to contractors.

The project supervisor must treat EAP as one of the basis for the supervisory works. Any works that have not fulfilled the environmental protection measures cannot be approved.

The contractors must assign special personnel to be responsible for the implementation of the EAP, formulate the alternatives of EAP implementation. All measures specified in the EAP must be carried out thoroughly according the schedule.

9.0 GENERAL CONCLUSION

The project will greatly speed up the economic development of the Hanjiang River drainage area. This project, based on the policy of 'electricity supporting navigation', has remarkable economic and social benefits.

The construction and operation will bring about some disadvantageous influences on the environment. For instance, the construction will damage the vegetation, worsen
soil erosion and bring about noise and dust pollution to the environment. In addition, the sanitary wastes and factory sewage of the construction area will pollute the accepting water body; due to the changes of hydrological conditions, the project during operational period will alter the living conditions of fish and the like aquatic life or even lead to the changes of the population of species of aquatic life; the self purifying capacity of the water body will be weakened during the operation period, which is not good for diffusing the contamination in the sewage. However, even with the above disadvantageous factors on the existing environment, the prediction of environmental impacts indicates that the disadvantageous influences of the project on the environment can be minimized to the acceptable limits as long as the measures for environmental protection and control mentioned herewith in the Report are carried out.

The construction unit shall reinforce the work of environmental management during construction period, intensify environmental protection education of the construction team, make close supervision, and advocate civilized construction. The contractor shall make specific provisions in the contract and promise the above pollution control measures during construction period, as well as draw up rigorous punishment for breach of the contract.

According to the relevant environmental protection specification, design paper, design notes and other design documents, construction contract and bid document and tender document, contract for construction environmental inspection and control and bid document, the construction control unit shall draw up the environmental control plan, and strictly abide by it.

Strengthen the work of environmental monitoring during construction period, and carry out regular or irregular environmental monitoring plans.

In the appraisal, it's admitted that the project plan has taken environmental protection into consideration, and the plans designed are economically and technically practicable with high operability. Carrying out the environmental protection plan as well as the countermeasures proposed in the report will bring the adverse impacts on environment well under control.

In general, Cuijiaying navigation hydropower pivot project is practicable from the view of environmental protection.