



Environmental Monitoring Report

Project Number: 39149
June 2010

PRC: Western Guangxi Roads Development

Prepared by Communication Environmental Monitoring Center of Guangxi Zhuang
Autonomous Region

Nanning, PRC

For Guangxi Communications Department
Longlin-Baise Expressway Development

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**Communication Environmental Monitoring Center
Of Guangxi Zhuang Autonomous Region**

**MONITORING REPORT
(1st Biannual Report in 2010)**

Project Name: Environmental Monitoring in Construction Period of
Longlin – Baise Express Highway
Entrusted by : Longlin – Baise Express Highway Development Co.
Ltd.
Category: Commission Monitoring
Date of Report: Jun. 25th, 2010

Communication Environmental Monitoring Center of
Guangxi Zhuang Autonomous Region (Sealed)





资质认定

计量认证证书

证书编号：2008 20 0700 U

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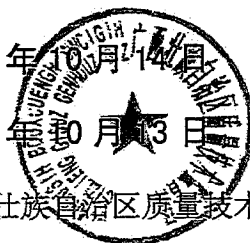
准许使用徽标



发证日期：2008年10月14日

有效期至：2011年10月13日

发证机关：广西壮族自治区质量技术监督局



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Chapter 1 Environmental Impact and Monitoring of Main Route of Longlin-Baise Express Highway

1. Source of Tasks and Overview of Environmental Protection of the Project

Entrusted by Construction Office of Longlin – Baise Express Highway since Dec. 2008, Communication Environmental Monitoring Center Of Guangxi Zhuang Autonomous Region has conducted environmental monitoring to the construction of Longlin – Baise Express Highway Project for 20 months. The major monitoring tasks include monitoring to the construction of main route and 4 local highways as well as environmental assessment to 700 rural roads. It is intended to provide the construction units with environmental management basis and reduce environmental pollution generated during construction of the highway by monitoring the ambient air, noise in the sensitive points within 60m to the construction sites as well water quality of the surface water bodies that the planned highway crosses. At the same time, supervision has also been carried out to the construction activities of construction units based on the EIA so as to encourage them to standardize their activities strictly in compliance with the pollution mitigation measures proposed in EIA.

In accordance with the requirements in *Technical Service Contract for Environmental Monitoring of Longlin – Baise Express Highway during Construction Period* as well as *Environmental Impact Assessment on Longlin – Baise Express Highway*, ambient air, acoustic and water environments have been identified as monitoring objects during the construction period based on the findings of field reconnaissance. For ambient air, the monitoring item is TSP and CO; for acoustic environment, they are Leq, L₁₀, L₅₀ and L₉₀; and for water environment, they're pH, SS, DO, COD_{MN}, NH₃-N and petroleum. Please refer to environmental monitoring plan in the annex.

This report summarizes the results of monitoring to the construction of the main route of Longlin – Baise Express Highway and relevant local highways as well as implementation status of environmental protection measures for rural roads during construction period from Jan. 2010 to Jul. 2010.

2. Construction Status and Major Environmental Impacts during the first Half of 2010

2.1 Analysis on Ambient Air Impact during Construction Period

From Jan. to Jul. 2010, the construction of the main route has entered the stage of paving and installation of beam in bridges. The main construction processes generating impact to ambient air are transport, loading and unloading of materials, paving and compacting of pavement, emission of exhausted gas by construction machines and vehicles with TSP and CO as major pollutants.

Spraying water is a simple and effective way to control fugitive dust. During construction period, to spray water on the road surface where vehicles pass through for four to five times every day can reduce fugitive dust by 70%. Experiences for other highway construction projects reveal that to spray water in construction sites for 4 ~ 5 times every day can effectively control fugitive dust generated in construction process and limit pollution scope of TSP to within 20 ~ 50m to dust source.

In conclusion, TSP is still the major pollution in this period. It is suggested to increase frequency of water spraying in construction site and construction time to greatly mitigate the TSP pollution.

2.2 Prediction and Evaluation to Acoustic Environment Impact during Construction Period

Noise pollution during construction period mainly comes from various large construction machines. Their noise can be taken as point source of pollution. Table 1 shows the predicted noise level with different distance to various construction machines, which is calculated based on the reference machine noise levels proposed by *EIA Standard for Highway Construction Project* as well as the reference levels estimated by analogy survey method.

Table 12 Noise Level of Highway Construction Machine

Unit: Leq[dB(A)]

No.	Type of Machine	Model	Distance from Monitoring Point to Construction Machine (m)	Max. Acoustic Level L_{max} (dB (A))
1	Wheel loader	ZL40	5	90
2	Wheel loader	ZL50	5	90
3	Motor grader	PY16A	5	90
4	Vibration roller	YZJ10B	5	86

5	Double-driving and double-vibrating roller	CC21	5	81
6	Macadam roller		5	81
7	Wheel roller	ZL16	5	76
8	Bulldozer	T140	5	86
9	Hydraulic wheel scraper	W4-60C	5	84
10	Generators (2)	FKV-75	1	98
11	Percussion drill	22	1	87
12	tapered reverse tilting concrete mixer	JZC350	1	79

It is suggested to make proper arrangement for construction and avoid construction at night (10: 00~06: 00). Besides, equipment with low acoustic level should be utilized as much as possible.

2.3 Analysis on Water Environment Impact during Construction Period

During construction period, water environment pollution caused by the planed highway mainly comes from disturbance of bridge construction to water bodies and discharge of wastewater by construction staff. Besides, if construction materials piled near water bodies is washed away by river flow or blown into rivers due to improper management, the quality of water bodies will also be affected to certain extent.

- Construction of Bridges

a. Analysis on Impact of Construction Wastes and Sludge to Water Environment

Construction of pile foundation and bored grouting pile foundation has been completed and installation of beam is the major work. At the current stage, the impact to the quality of water bodies mainly comes from construction wastes and wastewater generated from construction machines washing process.

① a little construction wastes, slurry and wastewater will be generated but only bring slight impact to water quality;

b. Impact of Waste Oil Generated by Construction

Currently, no impact of waste oil will be brought since various large structures used in bridge engineering will be precast in prefabrication sites and then hoisted to construction sites for installation. However, in construction of pile foundation, oil leaked from construction machines may enter water bodies after being washed by rainfall, which will result in increase

of petroleum concentration. Fortunately, the volume of such waste oil is very small so that it will not bring severe pollution.

c. Impact of Domestic Wastewater Discharged from Construction Campsites

Construction of the project will last 4 years. According to estimation, the total discharge volume of the wastewater will be 210,000m³ during the whole construction period.

In most cases, the existing residential houses will be rented or temporary shelters will be built as campsites. The domestic wastewater discharged from rented campsites will be used as agricultural fertilizer after being treated with existing facilities. For the campsites far away from residential areas, tertiary septic tanks will be set for standard-compliance treatment so that wastewater discharged by construction campsites will not bring pollution to surrounding environment.

d. Impact of Sheet Erosion Caused by Rainfall to Water Environment

During this period, excavation has greatly decreased but there are still lots of fill sideslopes, which will cause serious soil erosion, significantly affect surrounding surface water environment and even lead to blockage of rivercourse under the terrible meteorological conditions with serious drought and flooding this year..

Construction units have taken measures such as adopting plastic film to cover the cut or fill sideslopes, heaps of surface soil, heaping sites of materials and prefabrication sites without proper protection measures, or use geotextile bags to build retaining walls around heaps of surface soil and heaping site of materials.

2.4 Construction Impact on Chengbi Lake Nature Reserve

At the current stage, drilling, cast of pier and installation of bridge deck has been completed in Chengbi Lake Nature Reserve and constructions work mainly contains installation of beams in bridges.. Mitigation measures include: a) proper maintenance should be made to construction machine before it is used in reservoir so as to avoid leakage of fuel and water; b) contractors who carry out implementation in or around reservoir should work out an appropriate leakage prevention scheme so that prompt actions can be taken if leakage emergency happens; c) setting of construction campsites, storage of wastes and equipment is forbidden along the sections (K145+000~K152+000) within the buffer zone and experimental zone of the nature reserve.

3. Location of Monitoring Points, Monitoring Frequency, Items and Methods

1) Location of monitoring points and monitoring items

Monitoring points for ambient air and noise mainly include sensitive areas within 60m to the highway such as villages and schools while the focus of water quality monitoring are Chengbi lake Reservoir and Tangxing Reservoir. Please find table 2 and annex 1 for overview of monitoring points and photos of sensitive points.

Table 2 Location of Monitoring Points and Monitoring Items

No.	Name of Village	Pile No.	Distance to Roadside (m)	Number of Households in the first row facing the road	Elevation difference between point and road surface (m)	Surrounding Environment
Noise and ambient air monitoring points in Jan. 2010						
1	Lawei Village	K5+200	20m to the left	2	-2.3	Surrounded by dense bamboo woods, the village is located on a hill. Most of the houses are tiled ones.
2	Weile Primary School	K6+300	10m to the right	—	-2.0	With farmland at both sides, the school has two 3-story teaching buildings and 2m high enclosed walls. The planned highway is at its front and a hill at its back.
3	Muchang Primary School	K22+380	100m to the left	—		Without enclosed wall at the side backing against the hill, the school has 2 rows of one-store classrooms. There are 134 students and 5 teachers in the school.
4	Pingman Primary School	K44+500	60m to the right	—		Facing a hill in the north and back against the highway as well as paddy field, the school has 100 students and 5 teachers.

5	Bantao Village	K62+120	5m to both left and right	18		As the location of former township government and trading center for surrounding area, the village has east-west streets and south-north houses. Bantao Reservoir and a railway are to its south.
6	Nashe Village	K65+800	5m to both sides	8		With dense houses, the village is neighboring to the existing secondary highway. There are ponds and dry land in the front or at the back of most houses. The planed highway will cross the village center.
7	Pingji Village	K76+000	5m to the right	8	-3	Half of the houses in the village are 2-story or 3-story brick-concrete composite ones and the other half are tiled ones. A hill well covered by flourishing vegetation is at its back and paddy field are at both sides.
8	Lucheng Junior Middle School	K78+900	40m to the left	—	0	There is a 3-story teaching building accommodating 15 classes of 700 students and 47 teachers in the school. 500 of them live there.
Noise and ambient air monitoring points in Feb. 2010						
1	Nashe Village	K65+800	5m to both sides	8		With dense houses, the village is neighboring to the existing secondary highway. There are ponds and dry land in the front or at the back of most houses. The planed highway will cross the village center.
2	Hongqi Village	K87+ 800	60m to the right	7	-30	In the village, there are dense houses distributed along the existing secondary highway. Most of them are brick-concrete composite ones and facing the north.
3	Yanzhan Village	K90+600	20m to the right	4		In the village, there are dense houses distributed along the existing secondary highway. Most of them are brick-concrete composite ones and facing the north.

4	Pingwang Village	K108+300	30m to the left	5	-6	Located on a hill and surrounded by flourishing vegetation, the village has dense brick-concrete composite houses all equipped with aluminium alloy windows.
5	Xianke Primary School in Liangba Village	K126+450	10m to the right		0	With a 3-story teaching building facing the planed highway and no enclosed wall, the school has 6 classes of 190 students and and 19 teachers.
6	Nami	K128+800	30m to the right	10	0	Strechting from the toe to the middle of a hill and surrounded by flourishing vegetation, the village has dense brick-concrete composite houses all equipped with aluminium alloy windows.
7	Wanyu Village	K149+500	24m to the right	8	+8	Neighboring the existing National Highway 324, the village is on a earth hill. Most houses there are brick-concrete composite ones. There is vegetation around
8	Xinzhai Village	LK15+200	10m to both sides	6	+3	Located in the middle of a hill, the village is surrounded by bamboo woods. Provincial Highway 332 is to the northeast and 300m far from it.
9	Nade Village	K132+500	20m to the right	9	-12	Surrounded by flourishing vegetation, the village is concentrated at the middle of a hill. Houses there are facing the south and most of them are 3-story ones.

Noise and ambient air monitoring points in Mar. 2010

No.	Name of Village	Pile No.	Distance to Roadside (m)	Number of Households in the first row facing the road	Elevation difference between point and road surface (m)	Surrounding Environment
1	Shitou Village	K46+450	右 5	8	+5	—
2	Zheshu Village	K49+900	右 35	8		—

3	Bantao VillageK62+120	K78+900	左 40	—	-20	—
4	Bantao Village	K62+120	5m to both left and right	18		As the location of former township government and trading center for surrounding area, the village has east-west streets and south-north houses. Bantao Reservoir and a railway are to its south.
5	Pingwang Village	K108+300	30m to the left	5	-6	Located on a hill and surrounded by flourishing vegetation, the village has dense brick-concrete composite houses all equipped with aluminium alloy windows.
6	Changzhai Village	K115+850	22m to the right	10	-1	With a hill at the back and dry land in the front, village is facing the south. There are dense brick-concrete composite houses there.

6	Changzhai Village	K115+850	22m to the right	10	-1	With a hill at the back and dry land in the front, village is facing the south. There are dense brick-concrete composite houses there.
7	Nami	K128+800	30m to the right	10	0	Stretching from the toe to the middle of a hill and surrounded by flourishing vegetation, the village has dense brick-concrete composite houses all equipped with aluminium alloy windows.
8	Wanyu Village	K149+500	24m to the right	8	+8	Neighboring the existing National Highway 324, the village is on a earth hill. Most houses there are brick-concrete composite ones. There is vegetation around

Noise and ambient air monitoring points in Apr. 2010

No.	Name of Village	Pile No.	Distance to Roadside (m)	Number of Households in the first row facing the road	Elevation difference between point and road surface (m)	Surrounding Environment
1	Weile Village	K6+200	10m to the left	5	+5.0	As the former location of Weile Township government the village is surrounded by pine woods and National Highway S324 passes its northwestern corner.
2	Muchang Village	K22+350	10m to the left	8	+3.0	With lots of tiled houses, the village is located on a slope. There are sparse trees among the houses.
3	Zhenian Village	K27+700	25m to the right	7	+10	Located at the halfway up the hill, the village has brick-and-concrete composite houses scattering on the hill. There are sparse trees between houses.
4	Jiuzhou Town	K40+600	30m to the left	4	-10	Most part of the town is far from the planned highway. There is a market facing the highway with dense frame buildings. Most of them are lower than the highway.
5	Pingman Village	K44+300	30m to the left	7		Back against a hill and facing paddy field, the village has dense houses. Most of them are frame-structure building

6	Zheshu Village	K49+900	35m to the right	8	+2	At the left side of the old class II highway, houses in the village are mostly brick-and-concrete composite ones. There are flourishing trees around it.
7	Bantao Village	K62+120	5m to both left and right	18		As the location of former township government and trading center for surrounding area, the village has east-west streets and south-north houses. Bantao Reservoir and a railway are to its south.
8	Hongqi Village	K87+ 800	60m to the right	7	-30	Distributed along the original class II highway, houses in the village are mostly brick-and-concrete buildings and quite dense. Most of them are facing the north .
Noise and ambient air monitoring points in May 2010						
1	Lawei Village	K5+200	20m to the left	2	-2.3	Surrounded by dense bamboo woods, the village is located on a hill. Most of the houses are tiled ones.
2	Weile Primary School	K6+300	10m to the right	—	-2.0	With farmland at both sides, the school has two 3-story teaching buildings and 2m high enclosed walls. The planned highway is at its front and a hill at its back.
3	Muchang Village	K22+350	10m to the left	8	+3.0	With lots of tiled houses, the village is located on a slope. There are sparse trees among the houses.
4	Pingman Primary School	K44+500	60m to the right	—		Facing a hill in the north and back against the highway as well as paddy field, the school has 100 students and 5 teachers.
5	Bantao Village	K62+120	5m to both left and right	18		As the location of former township government and trading center for surrounding area, the village has east-west streets and south-north houses. Bantao Reservoir and a railway are to its south.

6	Nashe Village	K65+800	5m to both sides	8		With dense houses, the village is neighboring to the existing secondary highway. There are ponds and dry land in the front or at the back of most houses. The planed highway will cross the village center.
7	Pingji Village	K76+000	5m to the right	8	-3	Half of the houses in the village are 2-story or 3-story brick-concrete composite ones and the other half are tiled ones. A hill well covered by flourishing vegetation is at its back and paddy field are at both sides.
8	Lucheng Junior Middle School	K78+900	40m to the left	—	0	There is a 3-story teaching building accommodating 15 classes of 700 students and 47 teachers in the school. 500 of them live there.
2010 年 6 月噪声、大气监测点位						
1	Bangba Village	K5+500	右 40	3	-2.8	—
2	Weile Village	K6+200	左 10	5	+5.0	—
3	Hope Primary School in Zhenian Village	K27+700	45m to the right	—		Surrounded by flourishing vegetation and residential buildings, the school has 120 students and 6 teachers. 60 of them live there. There is a 3-store teaching building and a 2-store dormitory.
4	Pingman Village	K44+300	30m to the left	7		Back agaisnt a hill and facing paddy field, the village has dense houses. Most of them are frame-structure building
5	Nami	K128+800	30m to the right	10	0	Strechting from the toe to the middle of a hill and surrounded by flourishing vegetation, the village has dense brick-concrete composite houses all equipped with aluminium alloy windows.
6	Yanka Village	LK4+100		4	+5	Houses in the village are scattered on a hill. A stream flows through it and vegetation there is flourishing.

7	Nalai Village	LK5+200		6	+6	With a stream flowing through, the village is at the foot of the a hill.
8	Nanka Village	LK11+100	30m to the left	5	+2	Sparsely distributed along the middle of a hill, thevillage is surrounded by woods. most houses are frame-structure ones.
9	No. 9 mixing station	K100+200				
Water quality monitoring sections						
500m to the left and right of the bridge crossing Chengbi River Reservoir			—		pH value, COD, DO, NH3-N, SS and petroleum	
500m to the right of Tangxing Reservoir Bridge			—		pH value, COD, DO, NH3-N, SS and petroleum	

Location of noise monitoring point is 1m in the front of sensitive houses while that for ambient air monitoring is 1m in front of the houses in the first row facing the planed highway.

2. Sampling Frequency

Please find table 3 for sampling frequency

Table 3 Sampling Frequency

Items	No. of monitoring days	Monitoring frequency (time/day)	Monitoring periods		Sampling time (h)
			In daytime	At night	
Noise (construction noise and environmental noise)	2	2	8: 00~12: 00	22: 00~24: 00	20min
TSP	2	1	8: 00~20: 00		12
CO	2	1	8: 00~02: 00		18
Surface water	2	1	—		—

3. Technical Basis and Monitoring Instruments

Technical basis and monitoring instruments are listed in table 4.

Table 4 Technical Basis and Monitoring Instruments and Equipment

No.	Monitoring items	Monitoring Basis		Instruments and Equipment	
		Sources of monitoring methods	Detection Limit mg/m ³	Name, model/specification	Management NO.
1	Noise	<i>Standard of Ambient Air Quality</i> (National Standard GB3096-2008)	—	HS6288 Multi-function noise analyzer	JHZX-YQ-024~25
2	TSP	Gravimetry (National Standard GB/T15432-1995)	0.001	TSP intelligent sampling tank	JHZX-YQ-013~16

3	CO	Non-dispersive infrared analysis method GB9801-88	0.3	GXH-3011A1	JHZX-YQ-058
4	pH value	Glass electrode method (GB6920-86)	0.02pH	Thermo Orion868 pH measurement device	JHZX-YQ-022
5	SS	Gravimetric method (GB11901-89)	4 mg/L	BS210S electronic balance	JHZX-YQ-037
6	COD	Potassium Dichromate Method (GB11914-89)	5 mg/L	Buret	
7	DO	Analyzing Method of Electro Chemical Probe Determination GB11913-1989	0.2	DO110 Portable DO meter	JHZX-YQ-065
8	Petroleum	Infrared spectrophoto (GB/T16488-1996)	0.01mg/L	OIL420 Infrared oil meter	JHZX-YQ-021
9	NH3-N	Nessler's reagent spectrophotometry(GB7479-87)	0.025mg/L	UV-1800 UV-Vis	JHZX-YQ-064

4. Monitoring Basis and Assessment Standard

4.1 Monitoring Basis

- 1) *Environmental Impact Assessment on Longlin – Baise Express Highway*
- 2) *Technical Service Contract for Environmental Monitoring of Longlin – Baise Express Highway during Construction Period*
- 3) *Monitoring and Analysis Methods for Air and Waste Air (4th edition)*
- 4) *Technical Specification for Environmental Monitoring (Volume III)*
- 5) *Corpus of Environmental Protection Standards*

4.2 Assessment Standards

Table 5 Assessment Standards

Assessment Items	Assessment Standards
pH value, COD, DO, NH3-N, SS and petroleum	<i>Standard of Surface Water Resource Quality</i> (National Standard GB3838-2002), <i>Standard of Surface Water Resource Quality</i> (SL 63-94) is applicable for SS
Noise	<i>Standard of Acoustic Environment of Urban Area</i> (National Standard GB3096-2008)
TSP、CO	<i>Standard of Ambient Air Quality</i> (National Standard GB3095-1996)

Grade II standards of *Standard of Surface Water Resource Quality* (National Standard GB3838-2002) was applicable for monitoring section at Chengbi River Reservoir Bridge while grade III was for Tangxing Reservoir Bridge. Please find table 6 for details

Table 6 Applicable Standards for Surface Water Environment

Pollutants		
Items	Grade II (mg/L, but not for pH value)	Grade II I (mg/L, but not for pH value)
pH value	6~9	6~9
SS	25	30
DO	6	5
COD	4	6
NH3-N	0.5	1.0
Petroleum	0.05	0.05

Corresponding standards in *Standard of Acoustic Environment of Urban Area* (National Standard GB3096-93) are adopted. Table 7 shows the details.

Table 7 Applicable Standards for Ambient Air Quality

Unit: Equivalent Continuous A Sound Leq [dB(A)]

Grade	In daytime	At night	Applicable Scope
2	60	50	Areas and schools beyond 30m to the boundary line of planed highway
4	70	55	Area within 30m to the boundary line of planed highway

Grade II standards of Standard of Ambient Air Quality (National Standard GB3095-1996) are applicable for the ambient air around the highway. Please find table 8 for details.

Table 8 Applicable Standards for Ambient Air

Name of pollutants	Sampling time	Concentration detention limits for grade II	Unit of concentration
TSP	Daily average	0.30	mg/m ³
CO		4.0	

Relevant detention limits in *Integrated Discharge Standard for Atmospheric Pollutants* (National Standard GB16297-1996) is adopted for concrete mixing system. Please find table 9 for details

Table 9 Integrated Discharge Standard for Atmospheric Pollutants

Pollutants	Monitoring concentration threshold of fugitive emission.	
	Monitoring point	Concentration (mg/m ³)

Particulates	The point with the highest concentration	1.0
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5. Analysis Methods and Quality Control Measures

In order to ensure representativeness, accuracy and comparability of the monitoring data, strict quality control measures were taken in the whole process of the environmental monitoring. Monitoring devices were checked and identified to be acceptable by metrological service department, and also adjusted according to relevant regulations before being used. 100 % of the operators undertaking the monitoring and analysis tasks were qualified with working certification issued by National Environmental Monitoring Center.

6. Monitoring Result

Please refer to table 10-1~7, table 11-1~7 and table 12-1~7 for details.

Table 10-1 Noise Monitoring Results of Residential Areas in Jan. 2010

Unit: dB(A)

No.	Locations of monitoring points	Jan. 11 th		Jan. 12 th	
		In daytime	At night	In daytime	At night
1 [#]	Lawei Village K5+200	$L_{eq}=54.3$	No construction	$L_{eq}=55.8$	No construction
		Pavement rolling		Pavement rolling	
2 [#]	Weile Primary School K6+300	$L_{eq}=54.2$	No construction	$L_{eq}=54.8$	No construction
		Pavement rolling		Pavement rolling, sludge conveyance	
3 [#]	Muchang Village K22+380	$L_{eq}=54.8$	No construction	$L_{eq}=55.6$	No construction
		Pavement rolling, sludge conveyance		Pavement rolling	
4 [#]	Pingman Village K44+300	$L_{eq}=58.1$	No construction	$L_{eq}=57.4$	No construction
		Excavation and pavement rolling		Excavation, pavement rolling,	
5 [#]	Bantao Village K62+120	$L_{eq}=56.8$	$L_{eq}=54.5$	$L_{eq}=58.3$	$L_{eq}=56.1$
		Pavement rolling		Excavation, pavement rolling,	
6 [#]	Nashe Village K65+800	$L_{eq}=57.5$	$L_{eq}=51.4$	$L_{eq}=57.5$	$L_{eq}=51.1$
		Excavation and pavement rolling		Pavement rolling, sludge conveyance	
7 [#]	Pingji Village K76+000	$L_{eq}=55.3$	No construction	$L_{eq}=54.7$	No construction
		Excavation and pavement rolling		Excavation, pavement rolling,	

8#	Lucheng Junior Middle School K78+900	$L_{eq}=58.7$	No construction	$L_{eq}=58.5$	No construction
		Pavement rolling and sludge conveyance		Excavation, pavement rolling,	

Table 10-2 Noise Monitoring Results of Residential Areas in Feb. 2010

Unit: dB(A)

No.	Locations of monitoring points	Feb. 4 th		Feb. 5 th	
		In daytime	At night	In daytime	At night
1#	Nashe Village K65+800	57.2	No construction	56.9	No construction
		Pavement rolling and sludge conveyance		Pavement rolling and sludge conveyance	
2#	Hongqi Village K87+800	55.8	49.7	55.2	50.6
		Pavement rolling and sludge conveyance		Pavement rolling and sludge conveyance	
3#	Yanzhan Village K90+600	56.3	50.5	56.6	49.7
		Pavement rolling and sludge conveyance		Pavement rolling and sludge conveyance	
4#	Pingwang Village K108+300	56.8	No construction	57.2	No construction
		Pavement rolling and sludge conveyance		Pavement rolling and sludge conveyance	
5#	Xianke Primary School in Liangpa Village K126+450	54.3	50.2	54.5	50.6
		Pavement rolling and sludge conveyance		Excavation, pavement rolling, sludge conveyance	
6#	Nami K128+800	58.6	No construction	58.3	No construction
		Pavement rolling and sludge conveyance		Excavation, pavement rolling, sludge conveyance	
7#	Wanyu Village K149+500	56.2	No construction	56.8	No construction
		Pavement rolling and sludge conveyance		Pavement rolling and sludge conveyance	
8#	Xinzhai Village LK15+200	55.0	No construction	54.9	No construction
		Pavement rolling and sludge conveyance		Excavation, pavement rolling, sludge conveyance	

Table 10-3 Noise Monitoring Results of Residential Areas in Mar. 2010

Unit: dB(A)

No.	Locations of monitoring points	Mar. 20 th		Mar. 21 st	
		In daytime	At night	In daytime	At night
1 [#]	Shi Toulin Village K46+450	61.3	—	59.4	—
Construction Status		Pavement rolling	No construction	Pavement rolling	No construction
2 [#]	Zheshu Village K49+900	58.5	—	59.9	—
Construction Status		Pavement rolling	No construction	Pavement rolling	No construction
3 [#]	Bantao Village K62+120	58.7	—	60.2	—
Construction Status		Pavement rolling	No construction	Pavement rolling	No construction
4 [#]	Xinning Village K95+700	57.3	54.8	58.3	54.1
Construction Status		Excavation	Pavement rolling	Pavement rolling	Pavement rolling
5 [#]	Pingwang Village K108+300	57.7	—	58.5	—
Construction Status		Pavement rolling	No construction	Pavement rolling	No construction
6 [#]	Changzhai Village K115+850	56.4	—	58.1	—
Construction Status		Pavement rolling	No construction	Pavement rolling	No construction
7 [#]	Nami K128+800	57.8	—	56.0	—
Construction Status		Pavement rolling	No construction	Pavement rolling	No construction
8 [#]	Wanyu Village K149+500	59.3	51.2	58.6	49.8
Construction Status		Pavement rolling	No construction	Pavement rolling	No construction

Table 10-4 Noise Monitoring Results of Residential Areas in Apr. 2010

Unit: dB(A)

No.	Locations of monitoring points	Apr. 17 th		Apr. 18 th	
		In daytime	At night	In daytime	At night
1 [#]	Weile VillageK6+200	61.1	51.6	59.8.	—
Construction Status		Paving and rolling of pavement	勾机	Pavement rolling	No construction
2 [#]	Muchang Primary SchoolK22+380	52.5	—	53.7	—
Construction Status		Excavation	—	Hook machine	—
3 [#]	Zhenian Village K27+700	59.4	—	58.1	—
Construction Status		Conveyance and pavement rolling	—	Conveyance and pavement rolling	—
4 [#]	Jiuzhou VillageK40+600	60.8	—	61.7	51.5
Construction Status		Conveyance and pavement rolling	—	Conveyance and pavement rolling	—
5 [#]	Pingman VillageK44+300	61.4	50.8	62.1	51.7
Construction Status		Conveyance and pavement rolling	—	Conveyance and pavement rolling	—
6 [#]	Zheshu VillageK49+900	58.3	—	59.5	—
Construction Status		Conveyance and pavement rolling	—	Conveyance and pavement rolling	—
7 [#]	Bantao VillageK62+120	57.1	—	58.3	—
Construction Status		Excavation and bulldozing	—	Pavement rolling	—
8 [#]	Hongqi VillageK87+800	58.0	—	57.6	—
Construction Status		Excavation and bulldozing	—	Pavement rolling	—

Table 10-5 Noise Monitoring Results of Residential Areas in May 2010

Unit: dB(A)

No.	Locations of monitoring points	May 19 th		May 20 th	
		In daytime	At night	In daytime	At night
1 [#]	Nashe VillageK65+800	58.3	—	59.9	—
Construction Status		Pavement rolling and sludge conveyance	No construction	Pavement rolling and sludge conveyance	No construction
2 [#]	Pingji VillageK76+000	58.5	—	57.7	—
Construction Status		Excavation and pavement rolling	No construction	Excavation and pavement rolling	No construction
3 [#]	Lucheng Junior Middle SchoolK78+900	55.8	—	56.1	—
Construction Status		Paving and rolling of pavement, sludge conveyance	No construction	Pavement rolling and sludge conveyance	No construction
4 [#]	Yanzhan VillageK90+600	61.7	52.2	60.4	50.3
Construction Status		Pavement rolling and sludge conveyance	No construction	Pavement rolling and sludge conveyance	No construction
5 [#]	Xinning VillageK95+700	60.1	—	59.4	—
Construction Status		Pavement rolling and sludge conveyance	No construction	Pavement rolling and sludge conveyance	No construction
6 [#]	Changzhai VillageK115+850	59.3	—	58.2	—
Construction Status		Pavement rolling and sludge conveyance	No construction	Pavement rolling and sludge conveyance	No construction
7 [#]	Xianke Primary School in Liangpa VillageK126+4	52.1	—	51.3	—

	50				
Construction Status		Excavation	No construction	Excavation	No construction
8 [#]	Xiatang VillageK144+000	56.9	—	57.7	—
Construction Status		Pavement rolling and sludge conveyance	No construction	Pavement rolling and sludge conveyance	No construction

Table 10-6 Noise Monitoring Results of Residential Areas in Jun. 2010

Unit: dB(A)

No.	Locations of monitoring points	Jun. 12 th		Jun. 13 th	
		In daytime	At night	In daytime	At night
1 [#]	Bangba Village	65.1	51.6	66.8	—
Construction Status		Paving and rolling of pavement	Hook	Pavement rolling	No construction
2 [#]	Weile Village	62.5	—	63.7	—
Construction Status		Excavation	—	Hook machine	—
3 [#]	Hope Primary School in Zhenian	63.4	—	64.1	—
Construction Status		Conveyance and pavement rolling	—	Conveyance and pavement rolling	—
4 [#]	Pingman VillageK44+300	60.8	—	61.7	52.5
Construction Status		Conveyance and pavement rolling	—	Conveyance and pavement rolling	勾机
5 [#]	Nami	65.4	—	62.1	—
Construction Status		Conveyance and pavement rolling	—	Conveyance and pavement rolling	—
6 [#]	Yanka Village	58.8	—	59.5	—
Construction Status		Conveyance and pavement rolling	—	Conveyance and pavement rolling	—
7 [#]	Nalai Village	57.1	53.4	60.3	51.4

Construction Status		Excavation and bulldozing	Hook	Pavement rolling	Hook machine
8#	Nanka Village	58.5	—	59.6	—
Construction Status		Excavation and bulldozing	—	Pavement rolling	—

Table 11-1 Ambient Air Quality Monitoring Results in Jan. 2010

Unit: mg/m³

location of points		date		item	
				Jan. 11	Jan. 12
Lawei Village K5+200	TSP	Average daily	0.280	0.295	
	CO		1.0	1.0	
Pingman Village K44+300	TSP		0.200	0.214	
	CO		0.9	0.8	
Bantao Village K62+120	TSP		0.218	0.221	
	CO		0.9	0.9	
Lucheng Junior Middle School K78+900	TSP		0.278	0.261	
	CO		1.2	1.1	

Table 11-2 Ambient Air Quality Monitoring Results in Feb. 2010

单位: mg/m³

location of points		date		item	
				Feb. 4	Feb. 5
Nashe Village K65+800	TSP	Average daily	0.239	0.221	
	CO		1.3	1.2	
Yanzhan Village K90+600	TSP		0.256	0.272	
	CO		1.0	1.1	
Xianke Primary School in Liangba Village K126+450	TSP		0.235	0.231	
	CO		1.3	1.0	
Wanyu Village K149+500	TSP		0.165	0.171	
	CO		1.0	1.2	

Table 11-3 Ambient Air Quality Monitoring Results in Mar. 2010

Unit: mg/m³

date				Mar. 20	Mar. 21
location	item				
Shi Toulin Village K46+450	TSP	Average daily		0.201	0.207
	CO			2.1	2.3
Bantao Village K62+120	TSP			0.186	0.174
	CO			1.9	1.7
Pingwang Village K108+300	TSP			0.165	0.148
	CO			1.7	1.6
Nami K128+800	TSP			0.154	0.189
	CO			1.6	1.9

Table 11-4 Ambient Air Quality Monitoring Results in Apr. 2010

Unit: mg/m³

date				Apr. 17	Apr. 18
location	item				
Weile Village K6+200	TSP	Average Daily		0.195	0.190
	CO			3.4	3.3
Muchang Primary School K22+380	TSP			0.231	0.237
	CO			1.7	2.0
Zheshu Village K49+900	TSP			0.218	0.192
	CO			2.6	2.2
Bantao Village K62+120	TSP			0.184	0.182
	CO			2.0	2.2

Table 11-5 Ambient Air Quality Monitoring Results in May 2010

date				May 19	May 20
location	item				
Pingji Village K76+000	TSP	Average daily		0.223	0.227
	CO			1.9	2.0
Lucheng Junior Middle School K78+900	TSP			0.211	0.205
	CO			1.0	1.0
Changzhai Village K115+850	TSP			0.248	0.236
	CO			1.6	1.2
Xianke Primary School K126+450	TSP			0.204	0.201
	CO			1.0	1.2

Table 11-6 Ambient Air Quality Monitoring Results in Jun. 2010

Unit: mg/m³

date		Item	date	Jun. 12	Excessive rate (%)	Jun. 13	Excessive rate (%)
location	Item						
Bangba Village	TSP	Average daily		0.258	—	0.273	—
	CO			1.2	—	1.1	—
Hope Primary School	TSP			0.297	—	0.286	—
	CO			1.0	—	0.8	—
Nami	TSP			0.467	55.7	0.478	59.3
	CO			1.4	—	1.2	—
Nalai Village	TSP			0.254	—	0.288	—
	CO			1.2	—	1.1	—
No.9 mixing station	TSP			1.254	25.4	1.288	28.8
	CO			1.2	—	1.1	—

Table 12-1 Surface Water Environmental Quality Monitoring Results in Jan.

2010

Unit: mg/L

Secions	Item	Results	Dates	PH	COD _{Mn}	Petroleum	SS	DO	NH ₃ -N
500m to the left of Chengbi River Reservoir Bridge	0.5m to river surface	Jan. 11	Left	7.77	2.5	0.01L	19	6.4	0.163
			Right	7.80	2.6	0.01L	18	6.2	0.161
		Jan. 12	Left	7.88	2.5	0.01L	19	6.6	0.164
			Right	8.00	2.6	0.01L	20	6.4	0.163
	0.5m to river bottom	Jan. 11	Left	7.85	2.6	0.01L	21	6.1	0.166
			Right	7.89	2.5	0.01L	20	6.4	0.165
500m to the right of Chengbi River Reservoir Bridge	0.5m to river surface	Jan. 11	Left	8.04	2.4	0.01L	23	6.4	0.164
			Right	8.00	2.3	0.01L	21	6.1	0.165
		Jan. 12	Left	7.98	2.3	0.01L	22	6.4	0.173
			Right	7.97	2.5	0.01L	20	6.3	0.169
	0.5m to	Jan. 11	Left	7.92	2.3	0.01L	22	6.3	0.172
			Right	7.95	2.4	0.01L	20	6.1	0.172

	river botto	Jan. 12	Left	8.01	2.4	0.01L	21	6.2	0.176
			Right	7.97	2.4	0.01L	20	6.0	0.175
500m to the left of Tangxing Reservoir Bridge	0.5m to river surface	Jan. 11	Left	8.04	1.7	0.01L	23	5.6	0.177
			Right	8.01	1.6	0.01L	22	5.4	0.174
	Jan. 12	Left	8.06	1.8	0.01L	21	5.6	0.180	
		Right	8.05	1.7	0.01L	19	5.3	0.179	
500m to the left of Tangxing Reservoir Bridge	0.5m to river bottom	Jan. 11	Left	8.01	2.0	0.01L	20	5.7	0.175
			Right	8.02	2.0	0.01L	18	5.4	0.176
	Jan. 12	Left	8.05	1.9	0.01L	18	5.5	0.182	
		Right	8.02	1.9	0.01L	19	5.4	0.180	

Table 12-2 Surface Water Environmental Quality Monitoring Results in Feb.

2010

Unit: mg/L

Secions		Item Results Dates		PH	COD _{Mn}	Petroleum	SS	DO	NH ₃ -N
500m to the left of Chengbi River Reservoir Bridge	0.5m to river surface	Feb. 4	Left	8.11	2.3	0.01L	20	5.5	0.155
			Right	8.09	2.4	0.01L	22	5.7	0.152
	Feb. 5	Left	8.11	2.3	0.01L	21	5.5	0.164	
		Right	8.13	2.3	0.01L	22	5.6	0.156	
	0.5m to river bottom	Jan. 11	Left	7.98	2.4	0.01L	23	5.2	0.167
			Right	7.95	2.3	0.01L	22	5.3	0.162
Jan. 12	Left	7.96	2.4	0.01L	24	5.4	0.158		
	Right	7.97	2.5	0.01L	22	5.3	0.163		
500m to the right of Chengbi River Reservoir Bridge	0.5m to river surface	Jan. 11	Left	7.88	2.4	0.01L	23	5.3	0.175
			Right	7.91	2.2	0.01L	20	5.5	0.171
	Jan. 12	Left	7.93	2.3	0.01L	22	5.2	0.164	
		Right	7.95	2.4	0.01L	19	5.3	0.168	
	0.5m to river bottom	Jan. 11	Left	7.98	2.5	0.01L	23	5.2	0.172
			Right	7.96	2.3	0.01L	21	5.4	0.176
Jan. 12	Left	8.12	2.2	0.01L	20	5.4	0.175		
	Right	8.13	2.2	0.01L	22	5.6	0.168		
500m to the left of Tangxing	0.5m to	Jan. 11	Left	7.95	1.9	0.01L	24	5.5	0.194
			Right	7.98	1.8	0.01L	23	5.3	0.187

Reservoir Bridge	river surfa	Jan. 12	Left	8.15	1.8	0.01L	21	5.6	0.193
			Right	8.16	1.7	0.01L	22	5.5	0.187
500m to the left of Tangxing Reservoir Bridge	0.5m to river surface	Jan. 11	Left	8.14	1.7	0.01L	24	5.3	0.185
			Right	8.15	1.8	0.01L	22	5.4	0.178
	0.5m to river bottom	Jan. 12	Left	8.13	1.9	0.01L	23	5.3	0.183
			Right	8.10	1.9	0.01L	21	5.5	0.181

Table 12-3 Surface Water Environmental Quality Monitoring Results in Mar.

2010

Unit: mg/L

Secions	Item	Results	Dates	PH	COD _{Mn}	Petroleum	SS	DO	NH ₃ -N
500m to the left of Chengbi River Reservoir Bridge	0.5m to river surface	Mar. 20	Left	7.97	2.1	0.01L	20	6.4	0.177
			Right	8.01	2.3	0.01L	22	6.3	0.162
	Mar. 21	Left	8.01	2.1	0.01L	22	6.5	0.173	
		Right	8.02	2.4	0.01L	21	6.3	0.161	
	0.5m to river bottom	Mar. 20	Left	7.99	2.5	0.01L	22	6.3	0.169
			Right	8.04	2.2	0.01L	21	6.4	0.154
Mar. 21	Left	8.03	2.0	0.01L	21	6.2	0.169		
	Right	7.99	2.1	0.01L	21	6.3	0.161		
500m to the right of Chengbi River Reservoir Bridge	0.5m to river surface	Mar. 20	Left	8.13	2.5	0.01L	20	6.4	0.174
			Right	8.08	2.3	0.01L	21	6.2	0.179
	Mar. 21	Left	8.10	2.5	0.01L	22	6.4	0.172	
		Right	8.15	2.2	0.01L	23	6.0	0.175	
	0.5m to river bottom	Mar. 20	Left	7.97	2.4	0.01L	20	6.3	0.150
			Right	8.04	2.1	0.01L	20	6.1	0.165
Mar. 21	Left	7.95	2.3	0.01L	19	6.5	0.153		
	Right	8.10	2.2	0.01L	21	6.2	0.166		
500m to the left of Tangxing Reservoir Bridge	0.5m to river surface	Mar. 20	Left	8.02	3.5	0.01	26	5.3	0.552
			Right	8.05	3.2	0.01L	25	5.2	0.534
	Mar. 21	Left	8.11	3.3	0.01	27	5.5	0.551	
		Right	8.04	3.6	0.01L	25	5.2	0.536	
500m to the left of Tangxing	0.5m to	Mar. 20	Left	8.17	3.7	0.01L	24	5.3	0.523
			Right	8.14	3.4	0.01L	24	5.3	0.520

Reservoir Bridge	river botto	Mar.21	Left	8.19	3.3	0.01L	25	5.5	0.528
			Right	8.13	3.4	0.01L	24	5.1	0.519

Table 12-4 Surface Water Environmental Quality Monitoring Results in Apr.

2010

单位: mg/L

Secions		Item Results Dates		PH	COD _{Mn}	Petroleu m	SS	DO	NH3- N
500m to the left of Chengbi River Reservoir Bridge	0.5m to river surfa ce	Apr 17	Left	8.07	2.2	0.01L	23	6.6	0.164
			Right	8.04	2.3	0.01L	21	6.4	0.156
	Apr 18	Left	7.91	2.0	0.01L	21	6.1	0.169	
		Right	7.92	2.2	0.01L	18	6.1	0.161	
	0.5m to river botto m	Apr 17	Left	7.95	2.4	0.01L	23	6.5	0.160
			Right	7.94	2.4	0.01L	23	6.5	0.151
Apr 18	Left	8.01	2.2	0.01L	20	6.0	0.173		
	Right	8.04	2.1	0.01L	18	6.1	0.165		
500m to the right of Chengbi River Reservoir Bridge	0.5m to river surfa ce	Apr 17	Left	8.05	2.3	0.01L	22	6.6	0.177
			Right	8.11	2.4	0.01L	23	6.5	0.173
	Apr 18	Left	8.01	2.2	0.01L	18	6.2	0.175	
		Right	8.05	2.0	0.01L	17	6.2	0.175	
	0.5m to river botto m	Apr 17	Left	8.07	2.5	0.01L	22	6.4	0.164
			Right	8.04	2.3	0.01L	23	6.5	0.162
Apr 18	Left	8.05	2.1	0.01L	19	6.0	0.163		
	Right	8.00	2.1	0.01L	19	6.1	0.163		
500m to the left of Tangxing Reservoir Bridge	0.5m to river surfa ce	Apr 17	Left	8.13	3.7	0.01L	27	5.4	0.531
			Right	8.15	3.5	0.01L	25	5.3	0.544
	Apr 18	Left	7.91	3.1	0.01L	25	5.0	0.520	
		Right	7.94	3.2	0.01L	24	5.0	0.546	
500m to the left of Tangxing Reservoir Bridge	0.5m to river botto m	Apr 17	Left	7.97	3.6	0.01	25	5.5	0.537
			Right	7.94	3.6	0.01	26	5.6	0.533
	Apr 18	Left	8.09	3.2	0.01L	23	5.3	0.542	
		Right	8.03	3.3	0.01L	24	5.3	0.539	

Table 12-5 Surface Water Environmental Quality Monitoring Results in May.

2010

Unit: mg/L

Secions	Item		Results	PH	COD _{Mn}	Petroleum	SS	DO	NH ₃ -N
	Dates								
500m to the left of Chengbi River Reservoir Bridge	0.5m to river surface	May 19	Left	8.11	2.4	0.01	20	6.5	0.204
			Right	8.15	2.4	0.01L	21	6.5	0.201
	0.5m to river surface	May 20	Left	8.16	2.5	0.01L	22	6.4	0.205
			Right	8.12	2.4	0.01L	22	6.6	0.203
	0.5m to river bottom	May 19	Left	8.05	2.2	0.01L	18	6.2	0.190
			Right	8.06	2.1	0.01L	17	6.3	0.194
0.5m to river bottom	May 20	Left	8.09	2.1	0.01L	18	6.3	0.194	
		Right	8.11	2.1	0.01L	18	6.1	0.196	
500m to the right of Chengbi River Reservoir Bridge	0.5m to river surface	May 19	Left	8.15	2.6	0.01L	21	6.7	0.198
			Right	8.17	2.4	0.01	20	6.8	0.194
	0.5m to river surface	May 20	Left	8.13	2.5	0.01L	20	6.6	0.198
			Right	8.15	2.5	0.01L	22	6.8	0.195
	0.5m to river bottom	May 19	Left	8.08	2.2	0.01L	16	6.3	0.184
			Right	8.09	2.3	0.01L	17	6.4	0.188
0.5m to river bottom	May 20	Left	8.08	2.2	0.01L	17	6.4	0.185	
		Right	8.06	2.1	0.01L	15	6.5	0.187	
500m to the left of Tangxing Reservoir Bridge	0.5m to river surface	May 19	Left	8.03	3.5	0.01	28	5.2	0.573
			Right	8.05	3.5	0.02	26	5.4	0.577
	0.5m to river surface	May 20	Left	8.01	3.6	0.01	26	5.4	0.570
			Right	8.04	3.4	0.01	27	5.5	0.572
500m to the left of Tangxing Reservoir Bridge	0.5m to river bottom	May 19	Left	8.01	3.3	0.01 L	24	5.2	0.555
			Right	8.01	3.3	0.01 L	23	5.3	0.551
	0.5m to river bottom	May 20	Left	8.04	3.2	0.01L	24	5.1	0.554
			Right	8.02	3.1	0.01L	25	5.1	0.550

Table 12-6 Surface Water Environmental Quality Monitoring Results in Jun. 2010

Unit: mg/L

Secions	Item	Results	Dates		PH	COD _M _n	Petroleum	SS	DO	NH ₃ -N
500m to the left of Chengbi River Reservoir Bridge	0.5m to river surface	Jun. 12	Left	7.77	2.5	0.01L	19	6.4	0.163	
			Right	7.80	2.6	0.01L	18	6.2	0.161	
		Jun. 13	Left	7.88	2.5	0.01L	19	6.6	0.164	
			Right	8.00	2.6	0.01L	20	6.4	0.163	
	0.5m to river bottom	Jun. 12	Left	7.85	2.6	0.01L	21	6.1	0.166	
			Right	7.89	2.5	0.01L	20	6.4	0.165	
		Jun. 13	Left	7.84	2.6	0.01L	22	6.5	0.167	
			Right	7.90	2.5	0.01L	21	6.3	0.166	
500m to the right of Chengbi River Reservoir Bridge	0.5m to river surface	Jun. 12	Left	8.04	2.4	0.01L	23	6.4	0.164	
			Right	8.00	2.3	0.01L	21	6.1	0.165	
		Jun. 13	Left	7.98	2.3	0.01L	22	6.4	0.173	
			Right	7.97	2.5	0.01L	20	6.3	0.169	
	0.5m to river bottom	Jun. 12	Left	7.92	2.3	0.01L	22	6.3	0.172	
			Right	7.95	2.4	0.01L	20	6.1	0.172	
		Jun. 13	Left	8.01	2.4	0.01L	21	6.2	0.176	
			Right	7.97	2.4	0.01L	20	6.0	0.175	
500m to the left of Tangxi Reservoir Bridge	0.5m to river surface	Jun. 12	Left	8.04	1.7	0.01L	23	5.6	0.177	
			Right	8.01	1.6	0.01L	22	5.4	0.174	
		Jun. 13	Left	8.06	1.8	0.01L	21	5.6	0.180	
			Right	8.05	1.7	0.01L	19	5.3	0.179	
	0.5m to river bottom	Jun. 12	Left	8.01	2.0	0.01L	20	5.7	0.175	
			Right	8.02	2.0	0.01L	18	5.4	0.176	
		Jun. 13	Left	8.05	1.9	0.01L	18	5.5	0.182	
			Right	8.02	1.9	0.01L	19	5.4	0.180	

7. Environmental Protection Measures Taken on Each Contract Section to Mitigate Environment Impact during Construction Period.

Through field survey, it is found that corresponding measures have been taken to mitigate major environmental impacts on each contract section during the first half of the year. Please find table 13-1~15 for details.

Table 13-1 Implementation of Environmental Management (NO.1-2 Contract Section)

Environmental impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes: ✓	No:				
Impacts on surface water quality	Slurry generated in drilling and pier construction	Yes: ✓	No:	Effect is fairly good since no impact has been brought to residential in Shali Village	Jan. ~ Jun. 2010	K17+010 K17+910	No1-2
	Recycling utilization of slurry	Yes: ✓	No:				
	Oil leakage of equipment and ships	Yes:	No:				
	Waste water discharged from bridge construction sites (prefabrication site)	Retaining the wastewater and divert it into temporary settling tanks	Yes: ✓	No:	Effect is fairly good since no impact has been brought to residential in Shali Village	Mar. 2009 ~ Feb. 2010	K14+500, K16+200 K17+300
Wastewater containing sediments and pollutants generated during tunnel construction	Setting SS separation system	Yes:	No: ✓	Effect is fairly good since no impact has been brought to residential in adjacent of construction sites	Jan. ~ Jun. 2010	K12+750, K13+980 K20+650	No1-2

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes: ✓	No:				
Domestic wastewater discharged from construction campsites	Treating with tertiary septic tanks	Yes: ✓	No:	Effect is fairly good since no impact has been brought to residential in Shali Village	Jan. ~ Jun. 2010	K12+750, K13+980 K14+850, K15+900 K17+410, K20+650	No1-2
	Impacts of transport route	Yes: ✓	No:				No1-2
	Impacts of construction near sensitive points	Yes: ✓	No:			K13+980	No1-2
	Impacts of concrete mixing stations to sensitive points	Locating the stations far from sensitive points	Yes: ✓	No:			No1-2
Noise impact	Impacts of construction at night to sensitive points	Yes: ✓	No:	No impacts have been brought to surrounding residents	Jan. ~ Jun. 2010		No1-2
	Impacts of blasting	Informing residents living within 500m to the sites in advance	Yes: ✓	No impacts have been brought to surrounding residents	Jan. ~ Jun. 2010	K12+750, K13+980 K14+850, K15+900 K18+980, K20+650	No1-2
Impacts on ambient air	Impacts of quarries, mixing stations and asphalt station to sensitive points	Yes: ✓	No:	No impacts have been brought to surrounding residents	Jan. ~ Jun. 2010	K12+780, K13+980 K14+200, K14+800 K16+200, K17+420 K19+200, K20+500	No1-2

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes:	No:				
Impact of fugitive dust generated from cement and aggregate centralized treatment spots	Installing dust removal equipment	Yes:	No:				No1-2
	Impacts of transport routes near sensitive points to those points	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010		No1-2
	Fugitive dust generated by transport vehicles	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010		No1-2
	Impact of high-speed transport	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010		No1-2
Slurry generated in drilling and pier construction	Recycling utilization of slurry	Yes: ✓	No:	Effect is fairly good since no impact has been brought to residential in Shali Village	Jan. ~ Jun. 2010	K17+010 K17+910	No1-2
	Waste generated during drilling being settled in settling tanks	Yes: ✓	No:				
Oil leakage of equipment and ships	Checking the maintenance of construction equipment	Yes:	No:				
	Retaining the wastewater and divert it into temporary settling tanks	Yes: ✓	No:	Effect is fairly good since no impact has been brought to residential in Shali Village	Jan. ~ Jun. 2010	K14+500, K16+200 K17+300	No1-2
Impacts of emergency accidents	Working out leakage prevention scheme for emergency accidents	Yes: ✓	No:				No1-2
	Impacts of construction campsites at the road section	Yes:	No:				

Impact on Chengbi Lake Nature Reserve

Table 13-2 Implementation of Environmental Management (NO. 2-1 Contract Section)

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes: ✓	No:				
Impacts on surface water quality	Slurry generated in drilling and pier construction	Recycling utilization of slurry	Yes: ✓	No:	Jan. ~ Jun. 2010	K22+800~K24+000 Muchang Sandaohu K31+000~K32+400Banjian Village	NO. 2-1
	Oil leakage of equipment and ships	Waste generated during drilling being settled in settling tanks	Yes: ✓	No:	Jan. ~ Jun. 2010	No	
	Waste water discharged from bridge construction sites (prefabrication site)	Checking the maintenance of construction equipment	Yes:	No:	Jan. ~ Jun. 2010	No	
	Wastewater containing sediments and pollutants generated during tunnel construction	Retaining the wastewater and divert it into temporary settling tanks	Yes: ✓	No:	Jan. ~ Jun. 2010	Left of hollow-core slab prefabrication site	NO. 2-1
	Domestic wastewater discharged from construction campsites	Setting SS separation system	Yes: ✓	No:	Jan. ~ Jun. 2010	K24+900~K25+700 Longtian Tunnel	NO. 2-1
	Impacts of transport route	Treating with tertiary septic tanks	Yes: ✓	No:	Jan. ~ Jun. 2010	Left of hollow-core slab prefabrication site	NO. 2-1
	Impacts of construction near sensitive points	Optimizing alignment	Yes: ✓	No:	Jan. ~ Jun. 2010	Left of hollow-core slab prefabrication site	NO. 2-1
	Noise impact	Utilizing low-noise-level equipment	Yes: ✓	No:	Jan. ~ Jun. 2010	Left of hollow-core slab prefabrication site	NO. 2-1
			Yes: ✓	No:	Jan. ~ Jun. 2010		
			Yes: ✓	No:	Jan. ~ Jun. 2010		

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section	
		Yes: ✓	No:					
Impacts on ambient air	Impacts of concrete mixing stations to sensitive points	Yes: ✓	No:	Good	Jan. ~ Jun. 2010	K42+300 mixing station	NO. 2-1	
	Impacts of construction at night to sensitive points	Yes: ✓	No:	Good	Jan. ~ Jun. 2010		NO. 2-1	
	Impacts of blasting	Yes: ✓	No:	Good	Jan. ~ Jun. 2010	K22+800~K24+000 Muchang Sandaohu K31+000~K32+400Banjian Village	NO. 2-1	
	Impacts of quarries, mixing stations and asphalt station to sensitive points	Yes: ✓	No:	Very good	Jan. ~ Jun. 2010	Left of K32+500 mixing station	NO. 2-1	
	Impact of fugitive dust generated from cement and aggregate centralized treatment spots	Yes: ✓	No:		Jan. ~ Jun. 2010			
	Impacts of transport routes near sensitive points to those points	Water spraying	Yes: ✓	No:	Very good	Jan. ~ Jun. 2010	The whole route	NO. 2-1
	Fugitive dust generated by transport vehicles	Covering with water-proofing clothes	Yes: ✓	No:	fairly good	Jan. ~ Jun. 2010	The whole route	NO. 2-1
	Impact of high-speed transport	Reducing the speed	Yes: ✓	No:	Very good	Jan. ~ Jun. 2010	The whole route	NO. 2-1

Table 13-3 Implementation of Environmental Management (NO. 2-2 Contract Section)

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section	
		Yes: ✓	No:					
Impacts on surface water quality	Slurry generated in drilling and pier construction	Yes: ✓	No:	Very good	Jan. ~ Jun. 2010	Shitoulin Reservoir K47+160 1# bridge、K47+535 2# bridge、K47+885 3# bridge	NO. 2-2	
	Waste generated during drilling being settled in settling tanks	Yes: ✓	No:					
	Oil leakage of equipment and ships	Checking the maintenance of construction equipment	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K47+160 1#bridge in reservoir	NO. 2-2
	Waste water discharged from bridge construction sites (prefabrication site)	Retaining the wastewater and divert it into temporary settling tanks	Yes: ✓	No:	Good	Jan. ~ Jun. 2010	K39+700 Jiuzhou Prefabricated site	NO. 2-2
Noise impact	Wastewater containing sediments and pollutants generated during tunnel construction	Setting SS separation system	Yes:	No:	Jan. ~ Jun. 2010		NO. 2-2	
	Domestic wastewater discharged from construction campsites	Treating with tertiary septic tanks	Yes: ✓	No:	Jan. ~ Jun. 2010	K39+145 1# bridge of Jiuzhou	NO. 2-2	
Noise impact	Impacts of transport route	Optimizing alignment	Yes: ✓	No:	Jan. ~ Jun. 2010	K42+300 mixing station	NO. 2-2	
	Impacts of construction near sensitive points	Utilizing low-noise-level equipment	Yes: ✓	No:	Jan. ~ Jun. 2010	K43+240Pingman Primary School	NO. 2-2	

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes: ✓	No: ✗				
Impacts on ambient air	Impacts of concrete mixing stations to sensitive points	Locating the stations far from sensitive points	Yes: ✓	No: ✗	Good	Jan. ~ Jun. 2010	K42+300 搅拌站 NO. 2-2
	Impacts of construction at night to sensitive points	Optimizing construction period. Construction from 22:00 to 06:00 is prohibited.	Yes: ✓	No: ✗	Good	Jan. ~ Jun. 2010	K44+000~K44+300 K48+500~K44+800 NO. 2-2
	Impacts of blasting	Informing residents living within 500m to the sites in advance	Yes: ✓	No: ✗	Good	Jan. ~ Jun. 2010	K39+320~K39+500 K44+700~K44+910 NO. 2-2
	Impacts of quarries, mixing stations and asphalt station to sensitive points	Setting the spots beyond 300m in leeway direction to the residential areas nearby	Yes: ✓	No: ✗	Very good	Jan. ~ Jun. 2010	K42+300 mixing station NO. 2-2
	Impact of fugitive dust generated from cement and aggregate centralized treatment spots	Installing dust removal equipment	Yes: ✓	No: ✗		Jan. ~ Jun. 2010	
	Impacts of transport routes near sensitive points to those points	Water spraying	Yes: ✓	No: ✗	Very good	Jan. ~ Jun. 2010	K42+887access road K39+145access road NO. 2-2
	Fugitive dust generated by transport vehicles	Covering with water-proofing clothes	Yes: ✓	No: ✗	Fairly good	Jan. ~ Jun. 2010	K35+117~K46+500 NO. 2-2
	Impact of high-speed transport	Reducing the speed	Yes: ✓	No: ✗	Very good	Jan. ~ Jun. 2010	K35+117~K46+500 NO. 2-2

Table 13-4 Implementation of Environmental Management (NO.3-1 Contract Section)

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section	
		Yes: ✓	No:					
Impacts on surface water quality	Slurry generated in drilling and pier construction	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K52+000-K62+320	No. 3-1	
	Waste generated during drilling being settled in settling tanks	Yes: ✓	No:					
	Oil leakage of equipment and ships	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K52+000-K62+320	No. 3-1	
	Checking the maintenance of construction equipment	Yes: ✓	No:					
	Waste water discharged from bridge construction sites (prefabrication site)	Retaining the wastewater and divert it into temporary settling tanks	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K52+000-K62+320	No. 3-1
	Wastewater containing sediments and pollutants generated during tunnel construction	Setting SS separation system	Yes: ✓	No:				
Noise impact	Domestic wastewater discharged from construction campsites	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K52+000-K62+320	No. 3-1	
	Impacts of transport route	Optimizing alignment	Yes: ✓					No:
	Impacts of construction near sensitive points	Utilizing low-noise-level equipment	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K52+000-K62+320	No. 3-1
	Impacts of concrete mixing stations to sensitive points	Locating the stations far from sensitive points	Yes: ✓	No:				

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes: ✓	No:				
Impacts on ambient air	Impacts of construction at night to sensitive points	Optimizing construction period. Construction from 22: 00 to 06: 00 is prohibited.	Yes: ✓	No:	Jan. ~ Jun. 2010	K52+000-K62+320	No. 3-1
	Impacts of blasting	Informing residents living within 500m to the sites in advance	Yes: ✓	No:	Jan. ~ Jun. 2010	K52+000-K62+320	No. 3-1
	Impacts of quarries, mixing stations and asphalt station to sensitive points	Setting the spots beyond 300m in leeway direction to the residential areas nearby	Yes: ✓	No:	Jan. ~ Jun. 2010	K52+000-K62+320	No. 3-1
	Impact of fugitive dust generated from cement and aggregate centralized treatment spots	Installing dust removal equipment	Yes: ✓	No:	Jan. ~ Jun. 2010	K52+000-K62+320	No. 3-1
	Impacts of transport routes near sensitive points to those points	Water spraying	Yes: ✓	No:	Jan. ~ Jun. 2010	K52+000-K62+320	No. 3-1
	Fugitive dust generated by transport vehicles	Covering with water-proofing clothes	Yes: ✓	No:	Jan. ~ Jun. 2010	K52+000-K62+320	No. 3-1
	Impact of high-speed transport	Reducing the speed			Jan. ~ Jun. 2010		

Table 13-5 Implementation of Environmental Management (NO. 3-2 Contract Section)

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes: ✓	No:				
Impacts on surface water quality	Slurry generated in drilling and pier construction	Recycling utilization of slurry	Yes: ✓	No:	Jan. ~ Jun. 2010	AKO+735 K68+001 和	No. 3-2
		Waste generated during drilling being settled in settling tanks	Yes: ✓	No:			
	Oil leakage of equipment and ships	Checking the maintenance of construction equipment	Yes:	No:	Jan. ~ Jun. 2010		
	Waste water discharged from bridge construction sites (prefabrication site)	Retaining the wastewater and divert it into temporary settling tanks	Yes: ✓	No:	Jan. ~ Jun. 2010	K68+400	No. 3-2
	Wastewater containing sediments and pollutants generated during tunnel construction	Setting SS separation system	Yes:	No:	Jan. ~ Jun. 2010		
Noise impact	Domestic wastewater discharged from construction campsites	Treating with tertiary septic tanks	Yes:	No: ✓	Jan. ~ Jun. 2010		
	Impacts of transport route	Optimizing alignment	Yes:	No:	Jan. ~ Jun. 2010		
	Impacts of construction near sensitive points	Utilizing Low-noise-level equipment	Yes:	No: ✓	Jan. ~ Jun. 2010		

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes: ✓	No:				
Impacts on ambient air	Impacts of concrete mixing stations to sensitive points	Locating the stations far from sensitive points	Yes: ✓	No:	Reducing noise level and mitigating impact to surrounding residents	K65+000	No. 3-2
	Impacts of construction at night to sensitive points	Optimizing construction period. Construction from 22: 00 to 06: 00 is prohibited.	Yes: ✓	No:	Reducing noise level and mitigating impact to surrounding residents	K62+320~K68+650	No. 3-2
	Impacts of blasting	Informing residents living within 500m to the sites in advance	Yes: ✓	No:	There is no blasting accident	K62+320~K68+650	No. 3-2
	Impacts of quarries, mixing stations and asphalt station to sensitive points	Setting the spots beyond 300m in leeway direction to the residential areas nearby	Yes:	No:			
	Impact of fugitive dust generated from cement and aggregate centralized treatment spots	Installing dust removal equipment	Yes:	No:			
	Impacts of transport routes near sensitive points to those points	Water spraying	Yes: ✓	No:	Reducing fugitive dust	K62+320~K68+650	No. 3-2
	Fugitive dust generated by transport vehicles	Covering with water-proofing clothes	Yes:	No:			
	Impact of high-speed transport	Reducing the speed	Yes: ✓	No:	Reducing fugitive dust	K62+320~K68+650	No. 3-2

Table 13-6 Implementation of Environmental Management (NO.5 Contract Section)

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section	
		Yes: ✓	No:					
Impacts on surface water quality	Slurry generated in drilling and pier construction	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K93+448 及 K84+460	No5	
	Oil leakage of equipment and ships	Yes:	No:		Jan. ~ Jun. 2010			
	Waste water discharged from bridge construction sites (prefabrication site)	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K94+200、K83+650	No5	
	Wastewater containing sediments and pollutants generated during tunnel construction	Yes:	No:		Jan. ~ Jun. 2010			
	Domestic wastewater discharged from construction campsites	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K94+200、K83+850	No5	
	Impacts of transport route	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K93+448	No5	
	Impacts of construction near sensitive points	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K94+200	No5	
	Impacts of concrete mixing stations to sensitive points	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K94+200	No5	
	Noise impact	Recycling utilization of slurry	Yes: ✓	No:				
		Waste generated during drilling being settled in settling tanks	Yes: ✓	No:				

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes: ✓	No:				
Impacts on ambient air	Impacts of construction at night to sensitive points	Optimizing construction period. Construction from 22: 00 to 06: 00 is prohibited.	Yes: ✓	No:	Jan. ~ Jun. 2010	K93+448	No5
	Impacts of blasting	Informing residents living within 500m to the sites in advance	Yes: ✓	No:	Jan. ~ Jun. 2010	Blasting for subgrade and pile	No5
	Impacts of quarries, mixing stations and asphalt station to sensitive points	Setting the spots beyond 300m in leeway direction to the residential areas nearby	Yes: ✓	No:	Jan. ~ Jun. 2010	K94+200 and K83+850	No5
	Impact of fugitive dust generated from cement and aggregate centralized treatment spots	Installing dust removal equipment	Yes: ✓	No:	Jan. ~ Jun. 2010	K94+200 and K83+650	No5
	Impacts of transport routes near sensitive points to those points	Water spraying	Yes: ✓	No:	Jan. ~ Jun. 2010	K84+800, K86+000, K87+600, K89+000	No5
	Fugitive dust generated by transport vehicles	Covering with water-proofing clothes	Yes: ✓	No:	Jan. ~ Jun. 2010	Entrance of construction site	No5
	Impact of high-speed transport	Reducing the speed	Yes: ✓	No:	Jan. ~ Jun. 2010	K94+200	No5

Table 13-7 Implementation of Environmental Management (NO.6 Contract Section)

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes:	No:				
Impacts	Recycling utilization of slurry	Yes:	No:		Jan. ~ Jun. 2010		No construction of drilling

Environmental Impacts/problems		Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
on surface water quality	construction	Waste generated during drilling being settled in settling tanks	Yes:	No:				
	Oil leakage of equipment and ships	Checking the maintenance of construction equipment	Yes:	No:		Jan. ~ Jun. 2010		No use of ships
	Waste water discharged from bridge construction sites (prefabrication site)	Retaining the wastewater and divert it into temporary settling tanks	Yes: ✓	No:	Avoiding pollution of sand and sludge to bridge construction site	Jan. ~ Jun. 2010	K93+650~K104+800	No6
	Wastewater containing sediments and pollutants generated during tunnel construction	Setting SS separation system	Yes: ✓	No:	Avoiding environment pollution in tunnel construction site	Jan. ~ Jun. 2010	K93+650~K104+800	No6
	Domestic wastewater discharged from construction campsites	Treating with tertiary septic tanks	Yes: ✓	No:	Bringing no domestic wastewater pollution	Jan. ~ Jun. 2010	K93+650~K104+800	No6
	Impacts of transport route	Optimizing alignment	Yes: ✓	No:	Without noise complaint	Jan. ~ Jun. 2010	K93+650~K104+800	No6
Noise impact	Impacts of construction near sensitive points	Utilizing low-noise-level equipment	Yes: ✓	No:	Without noise complaint	Jan. ~ Jun. 2010	K93+650~K104+800	No6
	Impacts of concrete mixing stations to sensitive points	Locating the stations far from sensitive points	Yes: ✓	No:	Without noise complaint	Jan. ~ Jun. 2010	K93+650~K104+800	No6

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes: ✓	No:				
Impacts on ambient air	Optimizing construction period. Construction from 22:00 to 06:00 is prohibited.	Yes: ✓	No:	Without noise complaint	Jan. ~ Jun. 2010	K93+650~K104+800	No6
	Informing residents living within 500m to the sites in advance	Yes: ✓	No:	Greatly reducing complaint about blasting from residents	Jan. ~ Jun. 2010	K93+650~K104+800	No6
	Setting the spots beyond 300m in leeway direction to the residential areas nearby	Yes: ✓	No:	Without noise complaint	Jan. ~ Jun. 2010	K93+650~K104+800	No6
	Installing dust removal equipment	Yes: ✓	No:	Without noise complaint	Jan. ~ Jun. 2010	K93+650~K104+800	No6
	Water spraying	Yes: ✓	No:	Without noise complaint	Jan. ~ Jun. 2010	K93+650~K104+800	No6
	Covering with water-proofing clothes	Yes: ✓	No:	Without noise complaint	Jan. ~ Jun. 2010	K93+650~K104+800	No6
	Reducing the speed	Yes: ✓	No:	Without noise complaint	Jan. ~ Jun. 2010	K93+650~K104+800	No6

Table 13-8 Implementation of Environmental Management (NO. 7 Contract Section)

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes: ✓	No:				
Slurry generated in drilling and pier	Recycling utilization of slurry	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K105+285 1# bridge in Pingxiang, K106+000 2# bridge in Pingxiang,	No7

Environmental Impacts/problems		Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
Surface water quality	construction	Waste generated during drilling being settled in settling tanks	Yes: ✓	No:			K107+958 railway crossing bridge、K110+640 newly-built bridge、K114+455 Pinghou Bridge	
	Oil leakage of equipment and ships	Checking the maintenance of construction equipment	Yes:	No: ✓	No construction of ships	Jan. ~ Jun. 2010		
	Waste water discharged from bridge construction sites (prefabrication site)	Retaining the wastewater and divert it into temporary settling tanks	Yes: ✓	No:	Complying with standards	Jan. ~ Jun. 2010	No. 1 prefabrication site in Pingping (K105+000)、Hekou prefabrication site (K109+000)、tunnel construction site (K110+400)、Pinghou Prefabrication site in Yunsheng (K114+000)	№7
Noise impact	Wastewater containing sediments and pollutants generated during tunnel construction	Setting SS separation system	Yes:	No: ✓		Jan. ~ Jun. 2010		
	Domestic wastewater discharged from construction campsites	Treating with tertiary septic tanks	Yes: ✓	No:	Complying with standards	Jan. ~ Jun. 2010	Construction campsites	№7
	Impacts of transport route	Optimizing alignment	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	Access roads (K104+800 ~ K114+911.654)	№7
Noise impact	Impacts of construction near sensitive points	Utilizing low-noise-level equipment	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	The whole route (K104+800 ~ K114+911.654)	№7
	Impacts of concrete mixing stations to sensitive points	Locating the stations far from sensitive points	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	No. 1 prefabrication site in Pingxiang (K105+000)、Hekou prefabrication site (K109+000)、tunnel construction site (K110+400)、Pinghou Prefabrication site in Yunsheng (K114+000)	№7

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section	
		Yes: ✓	No: ✗					
Impact S ON ambien t air	Impacts of construction at night to sensitive points	Optimizing construction period. Construction from 22:00 to 06:00 is prohibited.	Yes: ✓	No: ✗	Fairly good		No.7	
	Impacts of blasting	Informing residents living within 500m to the sites in advance	Yes: ✓	No: ✗	Fairly good		No.7	
	Impacts of quarries, mixing stations and asphalt station to sensitive points	Setting the spots beyond 300m in leeway direction to the residential areas nearby	Yes: ✓	No: ✗	Fairly good	No. 1 prefabrication site in Pingxiang (K105+000) 、 Hekou prefabrication site (K109+000) 、 tunnel construction site (K110+400) 、 Pinghou Prefabrication site in Yunsheng (K114+000)	No.7	
	Impact of fugitive dust generated from cement and aggregate centralized treatment spots	Installing dust removal equipment	Yes: ✓	No: ✗		Jan. ~ Jun. 2010		
	Impacts of transport routes near sensitive points to those points	Water spraying	Yes: ✓	No: ✗	Fairly good	Jan. ~ Jun. 2010	The whole route (K104+800~K114+911.654)	No.7
	Fugitive dust generated by transport vehicles	Covering with water-proofing clothes	Yes: ✓	No: ✗	Complying with standards	Jan. ~ Jun. 2010	The whole route (K104+800~K114+911.654)	No.7
	Impact of high-speed transport	Reducing the speed	Yes: ✓	No: ✗	Fairly good	Jan. ~ Jun. 2010	The whole route (K104+800~K114+911.654)	No.7

Table 13-9 Implementation of Environmental Management (NO.8 Contract Section)

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes: ✓	No: ✗				
Impacts	Slurry generated in drilling and pier construction	Yes: ✓	No: ✗	Fairly good	Jan. ~ Jun. 2010	K114+700~K116+600	NO. 8

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes: ✓	No:				
on surface water quality	Waste generated during drilling being settled in settling tanks	Yes: ✓	No:				
	Oil leakage of equipment and ships	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K123+700~ K123+700	NO. 8
	Checking the maintenance of construction equipment	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K114+700~ K123+700	NO. 8
	Retaining the wastewater and divert it into temporary settling tanks	Yes: ✓	No:	No	Jan. ~ Jun. 2010		
	Setting SS separation system	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K114+700 K123+700	NO. 8
	Treating with tertiary septic tanks	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K114+700 K123+700	NO. 8
	Optimizing alignment	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K114+700 K123+700	NO. 8
	Utilizing low-noise-level equipment	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010		
	Locating the stations from sensitive points	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K114+700 K123+700	NO. 8
	Optimizing construction period. Construction from 22:00 to 06:00 is prohibited.	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K114+700 K123+700	NO. 8
Impacts of construction at night to sensitive points							
Noise impact	Impacts of concrete mixing stations to sensitive points	Yes: ✓	No:				
	Impacts of construction near sensitive points	Yes: ✓	No:				

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes: ✓	No:				
Impacts on ambient air	Impacts of blasting	Informing residents living within 500m to the sites in advance	Yes: ✓	No:	Jan. ~ Jun. 2010	K114+700 K123+700	NO. 8
	Impacts of quarries, mixing stations and asphalt station to sensitive points	Setting the spots beyond 300m in leeway direction to the residential areas nearby	Yes: ✓	No:	Jan. ~ Jun. 2010	K114+700 K123+700	NO. 8
	Impact of fugitive dust generated from cement and aggregate centralized treatment spots	Installing dust removal equipment	Yes: ✓	No:	Jan. ~ Jun. 2010	K114+700 K123+700	NO. 8
	Impacts of transport routes near sensitive points to those points	Water spraying	Yes: ✓	No:	Jan. ~ Jun. 2010	K114+700 K123+700	NO. 8
	Fugitive dust generated by transport vehicles	Covering with water-proofing clothes	Yes: ✓	No:	Jan. ~ Jun. 2010	K114+700 K123+700	NO. 8
	Impact of high-speed transport	Reducing the speed	Yes: ✓	No:	Jan. ~ Jun. 2010	K114+700~ K123+700	NO. 8

Table 13-10 Implementation of Environmental Management (NO. 9 Contract Section)

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes: ✓	No:				
Impacts on surface water	Recycling utilization of slurry	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K125+302 Leli River Bridge in Liangba K126+265 Liangba Reservoir Bridge	No.9
	Waste generated during drilling being settled in settling tanks	Yes: ✓	No:				

Environmental Impacts/problems		Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
quality	Oil leakage of equipment and ships	Checking the maintenance of construction equipment	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K123+700 K123+000	No9
	Waste water discharged from bridge construction sites (prefabrication site)	Retaining the wastewater and divert it into temporary settling tanks	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K125+700 Prefabrication site K126+265 Liangba Reservoir Bridge	No9
	Wastewater containing sediments and pollutants generated during tunnel construction	Setting SS separation system	Yes:	No: ✓	No	Jan. ~ Jun. 2010		
	Domestic wastewater discharged from construction campsites	Treating tertiary septic tanks	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K123+700-K133+000	No9
	Impacts of transport route	Optimizing alignment	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K125+300 Leli River Bridge in Liangba	No9
Noise impact	Impacts of construction near sensitive points	Utilizing low-noise-level equipment	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K126+265 Liangba Reservoir Bridge	No9
	Impacts of concrete mixing stations to sensitive points	Locating the stations far from sensitive points	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K125+000 mixing station K127+000 mixing station	No9
	Impacts of construction at night to sensitive points	Optimizing construction period. Construction from 22:00 to 06:00 is prohibited.	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K126+265 Liangba Reservoir Bridge K129+000-K130+000	No9

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes: ✓	No:				
Impacts on ambient air	Impacts of blasting	Informing residents living within 500m to the sites in advance	Yes: ✓	No:	Fairly good	K123+700-K133+000	No9
	Impacts of quarries, mixing stations and asphalt station to sensitive points	Setting the spots beyond 300m in leeway direction to the residential areas nearby	Yes: ✓	No:	Fairly good	K125+000quarry K126+215 quarry K127+000 quarry	No9
	Impact of fugitive dust generated from cement and aggregate centralized treatment spots	Installing dust removal equipment	Yes: ✓	No:	Fairly good	K123+700-K133+000	No9
	Impacts of transport routes near sensitive points to those points	Water spraying	Yes: ✓	No:	Fairly good	K123+700-K133+000	No9
	Fugitive dust generated by transport vehicles	Covering with water-proofing clothes	Yes:	No: ✓	Fairly good		
	Impact of high-speed transport	Reducing the speed	Yes: ✓	No:	Fairly good	K125+302-K133+000	No9

Table 13-11 Implementation of Environmental Management (NO. 10 Contract Section)

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes: ✓	No:				
Impacts on surface	Slurry generated in drilling and pier construction	Recycling utilization of slurry	Yes: ✓	No:	Greatly reducing pollution to surrounding rivers and ditches. Surrounding residents all have good comments to the project and no complaint was received	All bridges in the route	10
		Waste generated during drilling being settled in settling tanks	Yes: ✓	No:			

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes:	No:				
water quality	Oil leakage of equipment and ships	Checking the maintenance of construction equipment	Yes:	No:	Jan. ~ Jun. 2010		
	Waste water discharged from bridge construction sites (prefabrication site)	Retaining the wastewater and divert it into temporary settling tanks	Yes: ✓	No:	Jan. ~ Jun. 2010	All bridges in the route, No. 1, 2, 3 prefabrication sites	10
	Wastewater containing sediments and pollutants generated during tunnel construction	Setting SS separation system	Yes:	No:	Jan. ~ Jun. 2010		
	Domestic wastewater discharged from construction campsites	Treating with tertiary septic tanks	Yes:	No: ✓	Jan. ~ Jun. 2010		10
	Impacts of transport route	Optimizing alignment	Yes: ✓	No:	Jan. ~ Jun. 2010	All access roads	10
	Impacts of construction near sensitive points	Utilizing low-noise-level equipment	Yes: ✓	No:	Jan. ~ Jun. 2010	quarry	10
	Impacts of concrete mixing stations to sensitive points	Locating the stations far from sensitive points	Yes: ✓	No:	Jan. ~ Jun. 2010	No. 1, 2, 3 prefabrication site	10
	Impacts of construction at night to sensitive points	Optimizing construction period. Construction from 22: 00 to 06: 00 is prohibited.	Yes: ✓	No:	Jan. ~ Jun. 2010	quarry	10
	Impacts of blasting	Informing residents living within 500m to the sites in advance	Yes: ✓	No:	Jan. ~ Jun. 2010	All the route	10
	Noise impact						

Impacts on ambient air	Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
			Yes: ✓	No:				
Impacts on ambient air	Impacts of quarries, mixing stations and asphalt station to sensitive points	Setting the spots beyond 300m in leeway direction to the residential areas nearby	Yes: ✓	No:	Good comments coming from surrounding residents	Jan. ~ Jun. 2010	Quarry	10
	Impact of fugitive dust generated from cement and aggregate centralized treatment spots	Installing dust removal equipment	Yes: ✓	No:	Significantly reducing emission of fugitive dust	Jan. ~ Jun. 2010	quarry	10
	Impacts of transport routes near sensitive points to those points	Water spraying	Yes: ✓	No:	Reducing emission of fugitive dust to sensitive areas	Jan. ~ Jun. 2010	Access roads	10
	Fugitive dust generated by transport vehicles	Covering with water-proofing clothes	Yes:	No: ✓	Generating little fugitive dust	Jan. ~ Jun. 2010	All the route	10
	Impact of high-speed transport	Reducing the speed	Yes: ✓	No:	Reducing emission of fugitive dust	Jan. ~ Jun. 2010	All the route	10

Table 13-12 Implementation of Environmental Management (NO. 11 Contract Section)

Impacts on surface water quality	Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
			Yes: ✓	No:				
Impacts on surface water quality	Slurry generated in drilling and pier construction	Recycling utilization of slurry	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K145+800-K152+000	11
		Waste generated during drilling being settled in settling tanks	Yes: ✓	No:				
	Oil leakage of equipment and ships	Checking the maintenance of construction equipment	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K145+800-K152+000	11

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes: ✓	No:				
Noise impact	Waste water discharged from bridge construction sites (prefabrication site)	Retaining the wastewater and divert it into temporary settling tanks	Yes: ✓	No:	Fairly good	K145+800-K152+000	11
	Wastewater containing sediments and pollutants generated during tunnel construction	Setting SS separation system	是:	否:			
	Domestic wastewater discharged from construction campsites	Treating with tertiary septic tanks	Yes: ✓	No:	Fairly good	K145+800-K152+000	11
	Impacts of transport route	Optimizing alignment	Yes: ✓	No:	Fairly good	K143+800-K154+700	11
	Impacts of construction near sensitive points	Utilizing low-noise-level equipment	Yes: ✓	No:	Fairly good	K143+800-K154+700	11
	Impacts of concrete mixing stations to sensitive points	Locating the stations far from sensitive points	Yes: ✓	No:	Fairly good	K143+800-K154+700	11
	Impacts of construction at night to sensitive points	Optimizing construction period. Construction from 22:00 to 06:00 is prohibited.	Yes: ✓	No:	Fairly good	K143+800-K154+700	11
	Impacts of blasting	Informing residents living within 500m to the sites in advance	Yes:	No:			

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section	
		Yes: ✓	No:					
Impacts on ambient air	Impacts of quarries, mixing stations and asphalt station to sensitive points	Setting the spots beyond 300m in leeway direction to the residential areas nearby	Yes: ✓	No:	Fairly good	K143+800-K154+700	11	
	Impact of fugitive dust generated from cement and aggregate centralized treatment spots	Installing dust removal equipment	Yes:	No:	Jan. ~ Jun. 2010			
	Impacts of transport routes near sensitive points to those points	Water spraying	Yes: ✓	No:	Fairly good	K143+800-K154+700	11	
	Fugitive dust generated by transport vehicles	Covering with water-proofing clothes	Yes:	No:	Jan. ~ Jun. 2010			
	Impact of high-speed transport	Reducing the speed	Yes: ✓	No:	Fairly good	K143+800-K154+700	11	
	Impact on Chengbi Lake Nature Reserve	Slurry generated in drilling and pier construction	Recycling utilization of slurry	Yes: ✓	No:			
			Waste generated during drilling being settled in settling tanks	Yes: ✓	No:	Fairly good	K145+800-K152+000	11
		Oil leakage of equipment and ships	Checking the maintenance of construction equipment	Yes: ✓	No:	Fairly good	K145+800-K152+000	11
			Retaining the wastewater and divert it into temporary settling tanks	Yes: ✓	No:	Fairly good	K145+800-K152+000	11

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes: ✓	No:				
Impacts of emergency accidents	Working out leakage prevention scheme for emergency accidents	Yes: ✓	No:	No	Jan. ~ Jun. 2010	K145+800-K152+000	11
Impacts of construction campsites at the road section	Prohibiting setting of campsites at the section	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K145+800-K152+000	11

Table 13-13 Implementation of Environmental Management (NO. 12 Contract Section)

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes: ✓	No:				
Impacts on surface water quality	Slurry generated in drilling and pier construction	Yes: ✓	No:	Remarkable effects	Jan. ~ Jun. 2010	K157+042	12
	Oil leakage of equipment and ships	Yes:	No:				
	Waste water discharged from bridge construction sites (prefabrication site)	Yes: ✓	No:	Remarkable effects	Jan. ~ Jun. 2010	No. 1, 2, 3, 4 prefabrication	12
	Wastewater containing sediments and pollutants generated during tunnel construction	Yes:	No:				

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes: ✓	No:				
Domestic wastewater discharged from construction campsites	Treating with tertiary septic tanks	Yes: ✓	No:	Remarkable effects	Jan. ~ Jun. 2010	Construction campsites (K157+900, K161+800, K163+400)	12
Impacts of transport route	Optimizing alignment	Yes: ✓	No:	Reducing transport time and increasing efficiency	Jan. ~ Jun. 2010		12
Impacts of construction near sensitive points	Utilizing low-noise-level equipment	Yes: ✓	No:	Reducing noise	Jan. ~ Jun. 2010		12
Impacts of concrete mixing stations to sensitive points	Locating the stations far from sensitive points	Yes: ✓	No:	Remarkable effects	Jan. ~ Jun. 2010		12
Impacts of construction at night to sensitive points	Optimizing construction period. Construction from 22:00 to 06:00 is prohibited.	Yes: ✓	No:	Remarkable effects	Jan. ~ Jun. 2010		12
Impacts of blasting	Informing residents living within 500m to the sites in advance	Yes: ✓	No:	Remarkable effects	Jan. ~ Jun. 2010	K162+800	12
Impacts on ambient	Setting the spots beyond 300m in leeway direction to the residential areas nearby	Yes: ✓	No:	Remarkable effects	Jan. ~ Jun. 2010	K161+800, K163+400	12

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes: ✓	No:				
air	Impact of fugitive dust generated from cement and aggregate centralized treatment spots	Installing dust removal equipment	Yes: ✓	No:	Jan. ~ Jun. 2010		12
	Impacts of transport routes near sensitive points to those points	Water spraying	Yes: ✓	No:	Jan. ~ Jun. 2010	AK0+000~+300, K158+000~+400	12
	Fugitive dust generated by transport vehicles	Covering with water-proofing clothes	Yes: ✓	No:	Jan. ~ Jun. 2010		12
	Impact of high-speed transport	Reducing the speed	Yes: ✓	No:	Jan. ~ Jun. 2010		12
Impact on Chengbi Lake Nature Reserve	Slurry generated in drilling and pier construction	Recycling utilization of slurry	Yes: ✓	No:	Jan. ~ Jun. 2010	K157+042	12
	Oil leakage of equipment and ships	Waste generated during drilling being settled in settling tanks	Yes: ✓	No:	Jan. ~ Jun. 2010		
		Checking the maintenance of construction equipment	Yes:	No:	Jan. ~ Jun. 2010		
		Retaining the wastewater and divert it into temporary settling tanks	Yes: ✓	No:	Jan. ~ Jun. 2010	No. 1, 2, 3, 4 prefabrication	12
		Working out leakage prevention scheme for emergency accidents	Yes: ✓	No:	Jan. ~ Jun. 2010		12
		Prohibiting setting of campsites at the section	Yes: ✓	No:	Jan. ~ Jun. 2010		12

Table 13-14 Implementation of Environmental Management (NO. 13 Contract Section)

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section	
		Yes:	No: ✓					
Impacts on surface water quality	Slurry generated in drilling and pier construction	Yes:	No: ✓		Jan. ~ Jun. 2010		No13	
	Oil leakage of equipment and ships	Yes:	No: ✓		Jan. ~ Jun. 2010		No13	
	Waste water discharged from bridge construction sites (prefabrication site)	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K170+500	No13	
	Wastewater containing sediments and pollutants generated during tunnel construction	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K167+850	No13	
	Domestic wastewater discharged from construction campsites	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K168+200	No13	
	Impacts of transport route	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010		No13	
	Impacts of construction near sensitive points	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K173+200	No13	
	Impacts of concrete mixing stations to sensitive points	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K170+500	No13	
	Impacts of construction at night to sensitive points	Optimizing construction period. Construction from 22: 00 to 06: 00 is prohibited.	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010	K173+300、K171+100	No13

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section	
		Yes: ✓	No:					
Impacts on ambient air	Impacts of blasting	Informing residents within 500m to the sites in advance	Yes: ✓	No:	Fairly good	K173+300、K171+100	No.13	
	Impacts of quarries, mixing stations and asphalt station to sensitive points	Setting the spots beyond 300m in leeway direction to the residential areas nearby	Yes: ✓	No:	Fairly good	K170+500、K168+100	No.13	
	Impact of fugitive dust generated from cement and aggregate centralized treatment spots	Installing dust removal equipment	Yes: ✓	No:	Fairly good	K168+100、K170+500、K177+100 quarry	No.13	
	Impacts of transport routes near sensitive points to those points	Water spraying	Yes: ✓	No:	Fairly good	Access road	No.13	
	Fugitive dust generated by transport vehicles	Covering with water-proofing clothes	Yes: ✓	No:	Fairly good	Access road	No.13	
	Impact of high-speed transport	Reducing the speed	Yes: ✓	No:	Fairly good	Access road	No.13	
	Impact on Chengbi Lake Nature Reserve	Slurry generated in drilling and pier construction	Recycling utilization of slurry	Yes:	No: ✓			No.13
		Oil leakage of equipment and ships	Waste generated during drilling being settled in settling tanks	Yes:	No: ✓			No.13
		Waste water discharged from bridge construction sites (prefabrication site)	Checking the maintenance of construction equipment	Yes:	No: ✓			No.13
		Impacts of emergency accidents	Retaining the wastewater and divert it into temporary settling tanks	Yes: ✓	No:	Fairly good	K170+500、K168+300、K176+200 prefabrication sites	No.13
		Working out leakage prevention scheme for emergency accidents	Yes: ✓	No:	Fairly good		No.13	

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes: ✓	No:				
Impacts of construction campsites at the road section	Prohibiting setting of campsites at the section	Yes: ✓	No:	Fairly good	Jan. ~ Jun. 2010		No.13

Table 13-15 Implementation of Environmental Management (NO. 14 Contract Section)

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes: ✓	No:				
Impacts on surface water quality	Slurry generated in drilling and pier construction	Yes: ✓	No:	Fairly good	Nov. 12, 2008 ~ Jan. 17, 2009	LK13+662	NO. 14
	Oil leakage of equipment and ships	Recycling utilization of slurry Waste generated during drilling being settled in settling tanks	Yes: ✓	No:	No construction of ships and pollution caused by construction vehicles to water and soil was controlled satisfactorily	LK0+000 LK23+960	NO. 14
	Waste water discharged from bridge construction sites (prefabrication site)	Checking the maintenance of construction equipment Retaining the wastewater and divert it into temporary settling tanks	Yes: ✓	No:	Perfect wastewater discharge system in prefabrication sites and mixing stations. All wastewater has been settled before being discharged.	Jan. 18, 2009 ~ May. 31, 2010	LK14+200 LK5+220

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section	
		Yes: ✓	No:					
Noise impact	Wastewater containing sediments and pollutants generated during tunnel construction	Setting SS separation system	Yes: ✓	No:	All wastewater has been settled before being discharged and screen has been set to separate SS.	LK0+345	NO. 14	
	Domestic wastewater discharged from construction campsites	Treating with tertiary septic tanks	Yes: ✓	No:	Domestic wastewater has been settled with septic tanks	LK12+300	NO. 14	
	Impacts of transport route	Optimizing alignment	Yes: ✓	No:	Transport route is reasonable	LK0+000 LK23+960	NO. 14	
	Impacts of construction near sensitive points	Utilizing low-noise-level equipment	Yes: ✓	No:	Being controlled satisfactorily	LK0+000 LK23+960	NO. 14	
	Impacts of concrete mixing stations to sensitive points	Locating the stations far from sensitive points	Yes: ✓	No:	Being controlled satisfactorily	LK0+000 LK23+960	NO. 14	
	Impacts of construction at night to sensitive points	Optimizing construction period. Construction from 22: 00 to 06: 00 is prohibited.	Yes: ✓	No:	Being controlled satisfactorily	LK0+000 LK23+960	NO. 14	
	Impacts of blasting	Informing residents living within 500m to the sites in advance	Yes: ✓	No:	Being controlled satisfactorily	LK0+000 LK23+960	NO. 14	
	Impacts ON	Impacts of quarries, mixing stations and asphalt station to sensitive points	Setting the spots beyond 300m in leeway direction to the residential areas nearby	Yes: ✓	No:	Being controlled satisfactorily	LK14+200 LK5+220	NO. 14

Environmental Impacts/problems	Mitigation measures	Implementation status		Effect	Implementation time	Location (pile No.)	Contract Section
		Yes: ✓	No:				
ambient air	Impact of fugitive dust generated from cement and aggregate centralized treatment spots	Installing dust removal equipment	Yes: ✓	No:	Being controlled satisfactorily	Apr. 12, 2008 ~ Oct. 31, 2010	LK14+200 LK5+220 NO. 14
	Impacts of transport routes near sensitive points to those points	Water spraying	Yes: ✓	No:	Water spraying has been made in the area generating large amount of fugitive dust	Apr. 12, 2008 ~ Oct. 31, 2010	LK0+000 LK23+960 NO. 14
	Fugitive dust generated by transport vehicles	Covering with water-proofing clothes	Yes: ✓	No:	Being controlled satisfactorily	Apr. 12, 2008 ~ Oct. 31, 2010	LK0+000 LK23+960 NO. 14
	Impact of high-speed transport	Reducing the speed	Yes: ✓	No:	Running speed has been controlled. Speed limit signs have been set.	Apr. 12, 2008 ~ Oct. 31, 2010	LK0+000 LK23+960 NO. 14

8. Assessment Results

8.1 Summary of Noise Monitoring

The monitoring results within the first half of the year show that the acoustic levels in daytime and at night in the sensitive points within 60m to the highway, including residential areas and schools complied with *Standard of Acoustic Environment of Urban Area* (National Standard GB3096-2008) except for Xianke Primary School in Liangba Village (K126+450), which was 0.2dB (A) higher than the standard at night. Thus, it is recommended to avoid construction at noon (12: 00~02: 00) and at night (10: 00~07: 00). Any construction activities required to be carried out at the special period should not start until permission license is issued by relevant environment protection agencies to the construction units.

8.2 Summary of Ambient Air Quality Monitoring

It is shown by the monitoring results that the values of TSP and CO in all monitoring points were all within the grade II standards of *Standard of Ambient Air Quality* (GB3095-1996) from Jan. to May. 2010. However, TSP in Nami and No. 9 concrete mixing station exceeded the standard by 55.8~59.3% and 25.4~28.8% respectively in June.

Thus, it is suggested to strengthen fugitive dust mitigation measures along the sections near sensitive points such as increasing frequency of water spraying so as to reduce the impact of fugitive dust to ambient air and ensure compliance with TSP standard. For the mixing station which exceeded the TSP standard, construction units should increase the frequency of water spraying within the station and adopt closed mixing manner as much as possible.

8.3 Summary of Surface Water Environment Quality Monitoring

It is observed from the monitoring results in the first half year of 2010 that all monitoring items at the sections 500m to the upper stream and downstream of Chengbi River Reservoir Bridge and those at the sections 500m to the right of Tangxing Reservoir Bridge could respectively meet grade II and III standards in *Standard of Surface Water Resource Quality*. From the results, it is also known that water quality at the sections varies slightly within the second half of year in construction period.

Besides, no random discharge of domestic and production wastewater into Chengbi River Reservoir and Tangxing Reservoir could be found in the same period. With the implementation of the project, it is suggested that the construction units conduct centralized treatment to

production and domestic wastewater and discharge of wastewater into Chengbi River Reservoir, source of potable water, be forbidden.

8.4 Complaints

During monitoring process, investigation has been conducted to the affected local residents about the project impacts in the form of interview and questionnaire. According to investigation results, complaints raised by residents about the environmental problems caused by highway construction mainly focus on fugitive dust. They all hoped that actions can be taken to reduce fugitive dust generated in the process in the second half of the year. Monitoring results show that project construction did cause certain impact to sensitive points. It is recommended that construction units increase frequency of water spraying along the section near villages so as to minimize the impact of construction to surrounding residents.

In conclusion, it is found from the monitoring results of ambient air, acoustic environment and surface water environment that thanks to great attention paid by project owners and contractors to environmental protection, the impact of project during the construction period is still acceptable though the monitoring values of noise and air pollutants were higher than the detention limits at certain area and period, but still within acceptable levels. Construction units have taken countermeasures to mitigate most environmental impacts. It is hoped that construction units can insist in protecting environment while construction so as to minimize the environmental impacts of the project in future construction.

Chapter 2 Environmental Impact and Monitoring of Local Roads

According to collected information, it is found that Tianlin – Leye Highway and Jingxi – Napo Highway have been under construction. For the former highway, bidding for the section along Ceng Wanglao Mountain has been completed. For the latter highway, pavement engineering is in process. Construction headquarter for Tianyang to Dingye Highway has just been set up in Dec. 2009 and has completed the bidding of the subproject. As for De'er – Shali Highway, construction headquarter hasn't been established.

1. Implementation Progress and Environmental Impact of Tianlin – Leye Highway

1.1 Implementation Progress and Environmental Impact

Please refer to table 14 for implementation progress and environmental impact of No. 1 Contract Section of Tianlin-Leye Highway.

Table 14 Monthly Implementation Process of No. 1 Contract Section of Tianlin – Leye Highway in the First Half of 2010

Contract Section	Construction Content	Completion percentage	Environmental problems
No1	Excavation of subgrade, filling of subgrade; mortar rubble retaining walls; bridge construction; construction of graded broken stone bed course, cement stabilized macadam base course, seal course and asphalt pavement	Construction on the section has all been completed	No impact to surrounding environment
No2	Excavation of subgrade, filling of subgrade; mortar rubble retaining walls; construction of graded broken stone bed course, cement stabilized macadam base course, seal course and cement pavement	Excavation of subgrade: 75% completed, filling of subgrade: 78% completed; mortar rubble retaining walls: 82% completed	No impact to surrounding environment
No3	Excavation of subgrade, filling of subgrade; mortar rubble retaining walls; construction of graded broken stone bed course, cement stabilized macadam base course, seal course and cement pavement	Excavation of subgrade: 21mpleted, filling of subgrade: 18% completed;	No impact to surrounding environment
No4	construction of graded broken stone bed course, seal course and cement pavement	construction of graded broken stone bed course: 30% completed; construction of seal course: 10% completed	No impact to surrounding environment

No5	Excavation of subgrade, filling of subgrade; bridge construction; mortar rubble retaining walls; construction of graded broken stone bed course, cement stabilized macadam base course, seal course and cement pavement	Excavation of subgrade: 38% completed, filling of subgrade: 22% completed; mortar rubble retaining walls: 16% completed;	No impact to surrounding environment
No6	Excavation of subgrade, filling of subgrade; bridge construction; mortar rubble retaining walls; construction of graded broken stone bed course, cement stabilized macadam base course, seal course and cement pavement	Excavation of subgrade: 33% completed, filling of subgrade: 26% completed; mortar rubble retaining walls: 18% completed; bridge construction: 32% completed	No impact to surrounding environment
No7	Excavation of subgrade, filling of subgrade; bridge construction; mortar rubble retaining walls; construction of graded broken stone bed course, cement stabilized macadam base course, seal course and cement pavement	Excavation of subgrade: 30% completed, filling of subgrade: 28% completed; mortar rubble retaining walls: 35% completed;	No impact to surrounding environment

1.2 Bidding process for the road sections along Ceng Wanglao Mountain Nature Reserve

With total length of 29.79339km, the road section along Ceng Wanglao Mountain Nature Reserve starts from pile K23+100 and ends at pile K60+300. Targeting at paving on the existing route, the construction on the section mainly includes construction of graded broken stone bed course, seal course and cement pavement. According to the plan, the construction will be procured with only one contract (No. 4) and is expected to be completed within 18 months.

Post-qualification manner has been adopted in the bidding for the contract. The tendering company deliver the announcement of bidding on China Procurement & Bidding Web as well as the official web for Communication Department of Guangxi on Dec. 18, 2009 and the bid was opened in the meeting room on the 4th floor of Junyue Hotel on Jan. 19, 2010. Guinan Public Notary and supervision office of Highway Administration of Guangxi were invited to supervise the whole bidding process. With the method of reasonable low price adopted as evaluation basis, the evaluation of bid was carried out by an expert panel according to Tendering & Bidding Law of The People's Republic of China and other relevant Chinese laws and regulations as well as the bidding documents for civil work contract of section K10+800~K60+300 and section K77+741.138~K111+764.243. Finally, Xinli Highway & Bridge Engineering Co. Ltd of Guangxi was chosen as the candidate for tender while the second and the third potential candidates were Transport Construction Group of Fujian and

Transport Investment and Construction Co. Ltd of Guigang City. On Feb. 4, 2010, the bid was formally awarded to Xinli Highway & Bridge Engineering Co. Ltd of Guangxi and the bidding result was published on the official web for Communication Department of Guangxi for 7days.

2. Implementation Progress and Environmental Impact of Jingxi - Longbang Highway

2.1 Implementation Progress and Environmental Impact

Please refer to table 15-1~2 for implementation progress and environmental impact of No. 1 ~5 Contract Section of Jingxi – Longbang Highway in the first half of 2010.

Table 15-1 · Monthly Implementation Process of Jingxi -- Longbang Highway in the First Half of 2010

Contract section	Construction period	Construction content	Environmental problems
No 1-1	Jun. 1st, 2010	Subgrade, pavement, bridge and culverts, pavement, safety facilities and highway greening preparation	No complaint
No 1-2	Aug. 5, 2010	Subgrade, pavement, bridge and culverts, pavement, safety facilities and highway greening preparation	No complaint
No 1-3	Dec. 1 st , 2010	Subgrade, pavement, bridge and culverts, pavement, safety facilities and highway greening preparation	No complaint
No 1-4	Dec. 1 st , 2010	Subgrade, pavement, bridge and culverts, pavement, safety facilities and highway greening preparation	No complaint
No 1-5	Dec. 1 st , 2010	Subgrade, pavement, bridge and culverts, pavement, safety facilities and highway greening preparation	No complaint
No 6	May 5 th , 2010	Subgrade, pavement, bridge and culverts	No complaint
No 7	May 5 th , 2010	Subgrade, pavement, bridge and culverts	No complaint
No 8	Construction hasn't started since pending of land acquisition		

No9	May 5 th , 2010	Subgrade, pavement, bridge and culverts	No complaint
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3. Implementation Status and Environmental Issues for Tianlin – Dingye Highway

Construction office of Tianlin – Dingye Highway was established in Dec. 2009 and bidding for the subproject was completed in the first half of 2010. However, construction has not started in the period and hasn't brought environmental impact to surrounding areas.

4. Summary

Based on field reconnaissance and monitoring results provided by local environmental management departments, no violation of various environmental rules and regulations have been found during construction of the above 2 highways. Construction units have taken some environmental protection measures according to EIA, such as water spraying, treatment of construction wastewater, optimization of construction period. Furthermore, no complaints has been received during the process of interview to local residents.

Chapter 3 Environmental Impact of Bus Stations

Data provided by Baise City Highway Administration shows that the environmental impact of the construction of the 50 bus stations is limited. Less fugitive dust will be generated from the small earthwork. Fairly slight impact will be brought to the water body by little construction wastewater. Besides, construction period are mainly concentrated in day time. No impact will be caused to the villagers at night. Please find table 16 for implementation progress of village bus stations.

Development Project (III) Table16 Bus Station Summary Sheet

序号	车站名称 (乡镇)	车站名称 (乡镇)	县(区)	县(区)	服务 Village 庄(个)	服务人口 (人)	新建 N/扩 建E	完成后 等级	施工 年份	合同包 号码	合同 总额 (万元)	亚行支 付金额 (万元)	新增 占地 面积 (亩)	其中: 耕地 面积 (亩)	占地 补偿 金额 (万元)	拆迁房屋 面积 (m ²)	搬迁户 数 (户)	拆迁补偿 金额 (万元)	是否需要 环境 评价	开工日 期	完工日 期	完成 率 %	分配 比重	按比 重进 度 %
No	Station (Township)	Station (Township)	County	County	Num ber of Ben efici ary Villa ges	Benefici ary Populat ion	New /Exp ansi on	Achi eved Clas s	Cons tructi on Year	Contra ct Packa ge Numb er	Cont ract Amo unt (CN Y10, 000)	ADB financi ng (CN Y10, 0,000)	Land Acq uisiti on (mu)	of whic h: farmk and (mu)	Land com pens ation fund (CN Y10, 000)	House dem oliti on (m ²)	Reloc ated house holds (H H)	Dem oliti on com pens ation ** (CN Y10, 000)	EIA Req uire ment (Yes /no)	Work Start	Wok compl ete	Com plete %	Assi gne d Wei ght	Wei ghte d prog ress %
1	泮水乡泮水客运站	泮水镇泮水客运站	右江区	右江区	9	12474	N	V	2007	百农客-1	24.1	19.28	5.4	0	3	0	0	0	no	2007.5.12	2008.6.2	100	1.7	1.7
2	祥周镇祥周客运站	祥周镇祥周客运站	田东	田东	21	49200	N	V				0	30	0	0				no				1.7	
3	江城镇江城客运站	江城镇江城客运站	田东	田东	8	22348	N	V				0	4	0	0				no				1.7	
4	作登乡作登客运站	作登乡作登客运站	田东	田东	21	37888	N	V				0	5.4	0	0				no				1.7	
5	林逢镇林逢客运站	林逢镇林逢客运站	田东	田东	21	50825	N	V	2009	百农客-5	23.83	19.06	2.5	0	17	0	0	0	no	2009.2.18	2009.6.18	100	1.7	1.7

6	风梧乡风梧客运站	Fengwu Bus Station	平果	Pingguo	18	36026	N	V	2007	百乘客-6	35.18	28.15	2.69	0	9.16	0	0	0	0	0	no	2007.8	2008.5	100	1.7	1.7%
7	太平镇太平客运站	Taiping Bus Station	平果	Pingguo	20	71000	N	III	2009	百乘客-7	110	88	5	0	21	0	0	0	0	0	no	2009.3.8		20	10.0	
8	黎明乡黎明客运站	Liming Bus Station***	平果	Pingguo	10	21680	N	V	2009	百乘客-8	42	33.6	0.76	0	0	0	0	0	0	0	no	2009.11.8		10	1.7	
9	同老镇同老客运站	Tonglao Bus Station	平果	Pingguo	9	15650	N	V	2009	百乘客-9	32	25.6	2.23	0	10.93	0	0	0	0	0	no	2009.3.9	2009.5.30	100	1.7	1.7%
10	巴头乡巴头客运站	Batou Bus Station***	德保	Debao	14	22798	N	V	2007	百乘客-10	25	20	3.14	3.14	3.15	0	0	0	0	0	no	2007.06.18	2007.08.30	100	1.7	1.7%
11	东凌乡东凌客运站	Dongling Bus Station	德保	Debao	19	39484	N	V	2008	百乘客-11	30	24	2.77	1.05	9.55	11.46	1	6	0	0	no	2008.04.20	2008.08.12	100	1.7	1.7%
12	燕峒乡燕峒客运站	Yandong Bus Station	德保	Debao	19	33669	N	V					3.89	3.89	19.45	0	0	0	0	0	no				1.7	
13	足荣乡足荣客运站	Zurong Bus Station	德保	Debao	10	22609	N	V					3.96	3.96	28.8	0	0	0	0	0	no				1.7	
14	荣华乡荣华客运站	Ronghua Bus Station	德保	Debao	10	19677	N	V	2009	百乘客-14	23.1	18.48	3.21	3.21	4.7	76.45	3	0.4	0	0	no	2009.01.01	2009.06.30	100	1.7	1.7%
15	龙邦镇龙邦客运站	Longban Bus Station	靖西	Jingxi	21	36821	N	III	2009	百乘客-15			6.66	0	30	0	0	0	0	0	no	2009.9		80	10	
16	渠阳乡渠洋客运站	Quyang Bus Station***	靖西	Jingxi	18	31391	N	V	2009	百乘客-16			5.16	0	16.44	0	0	0	0	0	no	2009.8		20	1.7	
17	化峒乡化峒客运站	Huadong Bus Station	靖西	Jingxi	15	21020	N	V	2009	百乘客-17	21	16.8	7.2	0	18.26	0	0	0	0	0	no	2009.3	2009.1	100	1.7	1.7%
18	龙临镇龙临客运站	Longlin Bus Station	靖西	Jingxi	27	50799	N	V	2006	百乘客-18	21.25	17	7.4	0	15.77	0	0	0	0	0	no	2006.1	2007.1	100	1.7	1.7%

19	六隆乡六隆客运站	田林	Tianlin	18	16864	N	V	2007	百农客-20	25	20	2.06	0	9	0	0	0	0	no	2007.5	2008.3	100	1.7	1.7%
20	利周乡利周客运站	田林	Tianlin	9	16235	N	V															1.7		
21	旧州乡旧州客运站	田林	Tianlin	15	20045	N	V	2009	百农客-21	19	15.2	1.82	0	2.61	0	0	0	0	no	2009.8		90	1.7	
22	那比乡那比客运站	田林	Tianlin	5	10000	N	V	2009	百农客-22	35.5	28.4	4	0	6	0	0	0	0	no	2009.4.29	2009.7.29	100	1.7	1.7%
23	隆或乡隆或客运站	隆林	Longlin	15	27830	N	V	2006	百农客-23	32	25.6	3.82	3.82	6.2	0	0	0	0	no	2006.12.08	2007.04.07	100	1.7	1.7%
24	德峨乡德峨客运站	隆林	Longlin	15	33507	N	V	2007	百农客-24	27	21.6	2.5	2.5	3.84	0	0	0	0	no	2007.11.10	2008.05.10	100	1.7	1.7%
25	克长乡克长客运站	隆林	Longlin	13	26189	N	V	2007	百农客-25	27	21.6	2.5	2.5	4	0	0	0	0	no	2007.11.10	2008.05.10	100	1.7	1.7%
26	者保乡者保客运站	隆林	Longlin	13	28609	N	V	2008	百农客-26	26.45	21.16	2.5	2.5	4.4	0	0	0	0	no	2008.10.15	2009.10.14	100	1.7	1.7%
27	蛇场乡蛇场客运站	隆林	Longlin	8	16642	N	V	2008	百农客-27	24.51	19.61	2.5	2.5	6.29	0	0	0	0	no	2008.09.15	2009.04.08	100	1.7	1.7%
28	金钟山乡金钟山客运站	隆林	Longlin	6	13200	N	V	2008	百农客-28	19.35	15.48	2	2	3.38	0	0	0	0	no	2008.10.15	2009.10.14	100	1.7	1.7%
29	沙梨乡沙梨客运站	隆林	Longlin	7	15749	N	V	2008	百农客-29	35.88	28.70	2.5	2.5	4	0	0	0	0	no	2008.10.20	2009.06.25	100	1.7	1.7%
30	介廷乡介廷客运站	隆林	Longlin	8	13910	N	V	2009	百农客-30	23.47	18.77	2.5	2.5	6	0	0	0	0	no	2009.08.28	2009.12.03	100	1.7	1.7%

Chapter 4 Environmental Impact of Village Roads

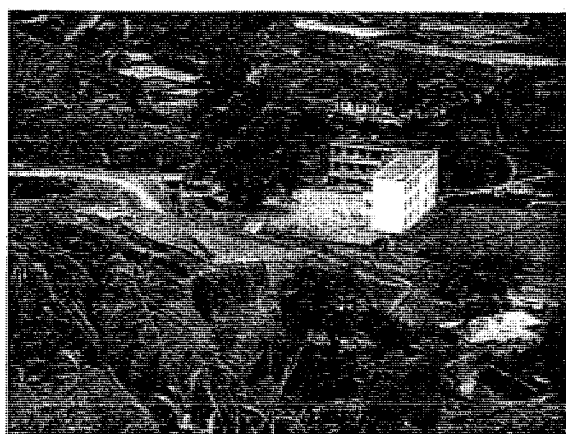
Assessment to village roads can not be provided in the report since Communication Department of Guangxi Zhuang Autonomous Region hasn't identified the specific components of the village road project by the end of Jun. 2010.

Annex 1 Photos for monitoring points

Monitoring Points in Jan.



Lawei Village K5+200



Weile Primary School K6+300



Pingman Village



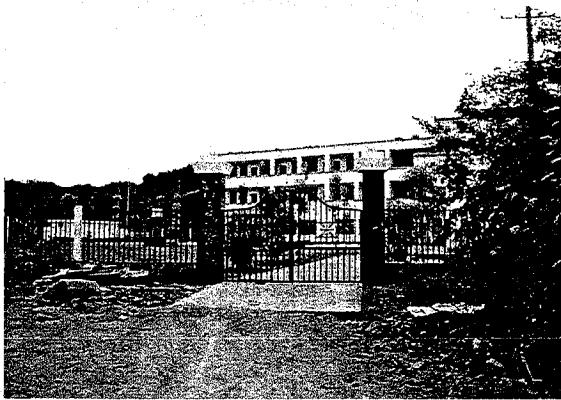
Bantao Village K62+120



Nashe Village K65+800



Pingji Village K76+000



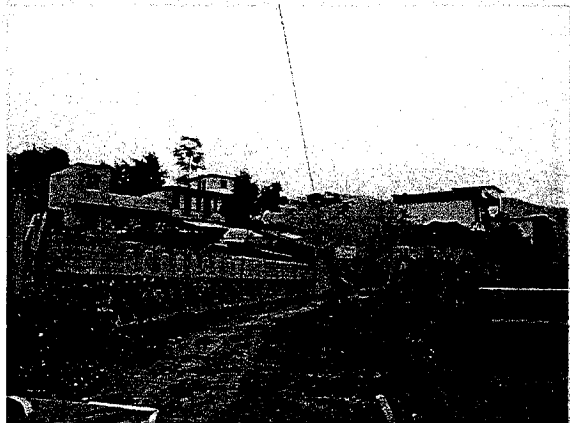
Xianke Primary School in Liangba Village K126+450



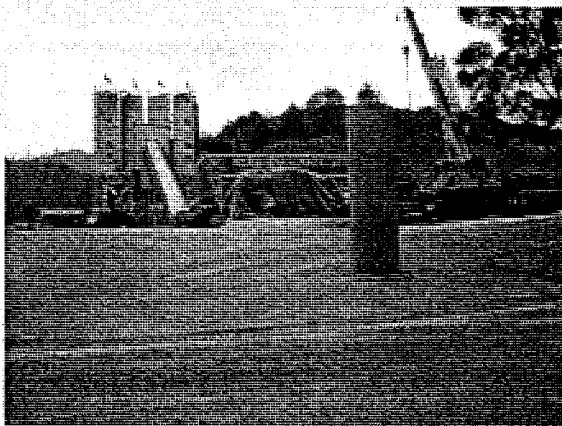
Nami K128+800



Wanyu Village K149+500



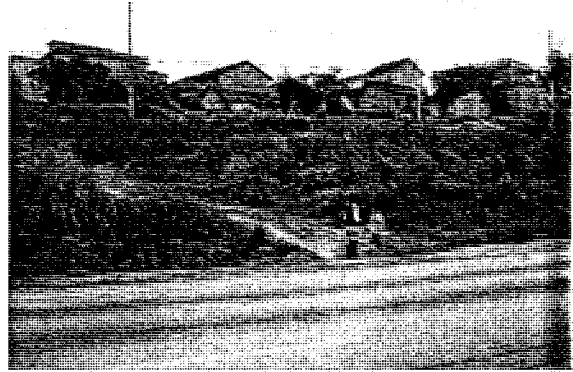
Xinzhai Village LK15+200



9# mixing station (K148+000)



Nami K128+800



Wanyu Village K149+500

Monitoring Points in Apr.



Weile Village K6+200



Zhenian Village K27+700



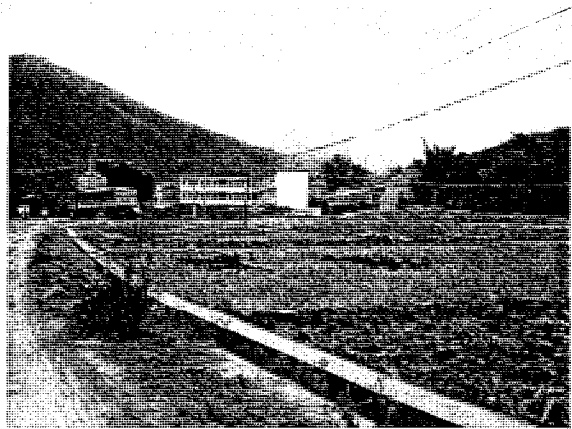
Pingman Village K44+300



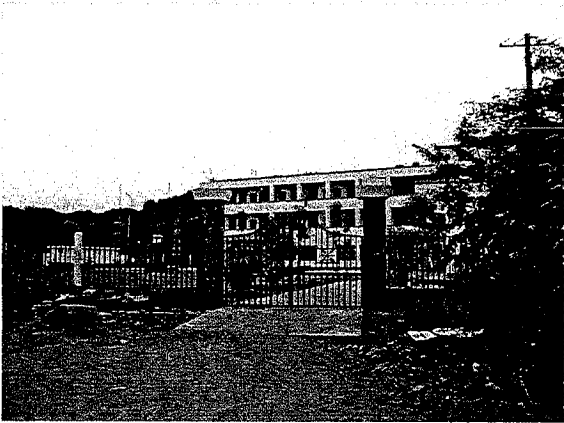
Zheshu Village K49+900



Xinning Village K95+700



Changzhai Village K115+850



Xianke Primary School in Liangba Village K126+450



Xiatang Village K144+000

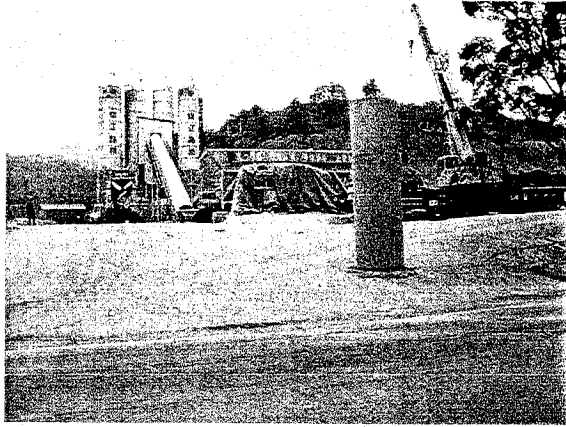
Monitoring Points in Jun.



Bangba Village



Weile Village



9# mixing station (K148+000)

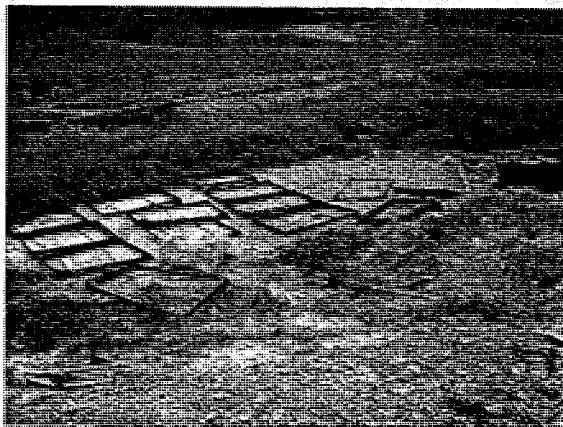
Photos for Water Quality Monitoring Points



Where Chengbi Reservoir Bridge Crossing the River



Tangxing Reservoir



Settling tank for pile foundation of Chengbi Reservoir Bridge (1)_____ (2)

