



# Environmental Monitoring Report

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## People's Republic of China: Hunan Roads Development II

Prepared by Environmental Protection Center of Ministry of Communications, Hunan  
Communication Research Institute

For: Hunan Provincial Communications Department/Changji Expressway Construction and  
Development Company

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**Asian Development Bank**

# **Monitoring Report of Environmental Protection Center of Ministry of Communications**

**No. 01 2005**



**Environmental Protection Center of Ministry of Communications  
Hunan Communication Research Institute**

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Item: Hunan Changde-Jishou Expressway

Entrusting party: Hunan provincial Changde-Jishou Expressway  
Construction and Development Co.,Ltd.

Monitoring type: Entrusted monitoring

Report date: Dec. 24, 2005

Environmental Protection Center of Ministry of Communications  
Hunan Communication Research Institute

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## 1 Introduction

Changde-Jishou Expressway (abbr. to ChangJi Expressway in the rest of the report) is an important section of Changsha-Chongqing Highway, which is one of the eight important highways planned by the state as part of western China development efforts. It is also the backbone of Hunan provincial highway network, connecting the eastern, middle and western parts of the province. ChangJi Expressway plays an important role in Hunan provincial and national road network. Changsha-Jishou Expressway will develop the economy and exploit natural resources along the road, especially improve the tourism and ethnic groups integration in Xiangxi autonomous city. Xiangxi section started construction in May, 2004. Changde and Huaihua sections funded by Asia Development Bank started in August, 2005.

The purpose of this monitoring survey is to satisfy the environmental requirements of the system of *Simultaneous Design, Construction and Operation* and international finance corporation, as well as in observance of Changde-Jishou Expressway environmental impact report and written reply on environmental protection from the State Bureau of Environment. The final goal is to make ChangJi Express an expressway up to the standard of environmental and ecological requirements. The monitoring mission during construction period is to study the impact made by construction, the environmental quality along Changde-Jishou Expressway, as well as the implementation of environmental protection measures.

During the forth quarter of 2005, construction of Changde and Huaihua sections of ChangJi Expressway is in early stage. Major tasks included construction of the embankment, drilling holes of pile foundation, etc. Construction equipments included bulldozers, digging machines, cement mixers and trucks. In accordance with the construction trait and proceeding, surveys of noise level at construction field, air quality along sensitive sites, and water quality of related waterways to the construction were conducted from 1st. to 7th of December 2005. Opinions of residents along the construction sites were also collected.

## 2 Monitoring Basis, Monitoring Item, Assessment Standard and Monitoring Quality Control

### 2.1 Monitoring Basis

(1)*Environmental Protection Law of the People's Republic of China* (December 26, 1989);

(2)*Regulations on the Administration of Construction Project Environmental*

*Protection Nov. 29, 1998;*

(3)*Regulations Concerning National Environmental Monitoring Management* July 21, 1983;

(4)*Measures for Pollutant Source Monitoring Management* ( NEPA Document [1999] 246 );

(5)*Provisions Environmental Protection Management for Transportation Industry* (Environmental Protection Center of MOC [1993]1386 );

(6)*Measures of Environmental Protection Management for Transportation Construction Project* MOC Minister's Edict No.5 [2003] ;

(7)*Regulations on Environmental monitoring of Ministry of Communication.* Dec. 1982;

(8)*Detailed Rules of Regulations Concerning Environmental Monitoring of Ministry of Communication.* 1987;

(9) *Monitoring and Analyzing Method for Water and Liquid Waste (the forth edition) and HJ/T91-2002 Technique Guidelines for Monitoring of Surface Water and Sewerage;*

(10)*Monitoring and Analyzing Method for Air and Exhaust Gas* (the forth edition);

(11)*Technique criterion for Environmental Monitoring.* NEPA , 1986;

(12)*Changde-Jishou Expressway Environmental Impact Assessment statement*, Oct. 2002;

(13)*Work Outline on conservation of water and soil Monitoring of Changde-Jishou Expressway;*

(14)*Contract of Technology Service of Environmental Monitoring during Changde-Jishou Construction Period Signed by Hunan Provincial Changde-Jishou Expressway Construction and Development Co., Ltd. and Hunan Transportation Environmental Protection Monitoring Center.*

## **2.2 Monitoring Item**

### **2.2.1 Noise Monitoring**

Monitoring of equivalent continuous A Sound level was conducted during the construction period through TSP sampling. At each sensitive site, two or three monitoring for 1 day each during 6:00 to 22:00 daytime and 22:00 to 6:00 nighttime.

## 2.2.2 Air Ambient Monitoring

TSP concentration is the main monitoring item. The sampling was taken during construction period. Two or three samplings were conducted at each sensitive sites during a 24 hour period in the morning and afternoon. Each sampling was at least 1.5h.

## 2.2.3 Water Environmental Monitoring

The monitoring items are pH、BOD<sub>5</sub>、COD<sub>Mn</sub>、SS、Petroleum.

Monitoring period is 1 day. Two sampling section that are 100m from upper reaches and 200m from lower reaches separately were chosen at each bridge. Sampled twice at am. and Pm., then deposited after mixed. The specific monitoring sites are determined with the width and depth of the river.

## 2.3 Assessment Standard

(1)The GB3096-93 Urban Area Ambient Noise Standard was used for the resident buildings and the first row of buildings near the road side; and school apply 60dB in daytime, 50dB at night. See Table 1.

**Table 1 Urban Area Ambient Noise Standard ( GB3096-93 ) Unit: L<sub>Aeq</sub> ( dB )**

Area	Class	Daytime	Night
Resident Area ( both sides of the artery )	IV	70	55
Teaching Area of School	II	60	50

(2)Class II criteria limits of GB3095-1996 *Ambient Air Quality assessment Standard* is applied. Daily average concentration limits of TSP are shown in table 2

**Table 2 Ambient Air Quality Standard (GB3095-1996) Unit: mg/m<sup>3</sup>**

Monitoring Item	Daily Average Concentration Limits
TSP	0.30

(3)Apply class III criteria limits of GB3838-2002 Surface Water Quality Standard, criteria limits are shown in table 3. criteria limits of GB5084-92 *Agricultural Irrigation Water Quality Standard* is applied for SS concentration assessment, see table 4.

**Table 3 Surface Water Standard Limits ( GB3838-2002 ) Unit: mg/L**

Monitoring Items	Class III Criteria Limits
pH	6 ~ 9



BOD <sub>5</sub>	4
COD <sub>Mn</sub>	6
Petroleum	0.05

**Table 4 Agricultural Irrigation Water Standard ( GB5084-92 )** Unit: mg/L

Pollutant Name	Class III Criteria Limits
SS	150

## 2.4 Monitoring Quality Control

The whole monitoring process was carried out according to *Environmental Monitoring Technical Standard* issued by National Environmental Protection Agency (NEPA) and *Environment Quality Handbook* issued by Environmental Protection Central of Ministry of Transportation, In order to ensure the survey accuracy and credibility, monitoring staff conducted the survey strictly under various rules, including collecting and preserving samples, equipment set-ups and monitoring, etc.

## 3 Noise Monitoring

### 3.1 Monitoring Project and Implementation

#### 3.1.1 Monitoring Project

It is arranged that the data of TSP at 11 sensitive sites on Changde-Jishou Expressway should be taken, the original samples should be recorded seriously, moreover, surveys on the effect of air quality on residents along the road should be conducted.

#### 3.1.2 Monitoring Item

Equivalent continuous A Sound level

#### 3.1.3 Monitoring Method

Monitoring according to *Measure method of noise environment in urban district* ( GB/T14623-93 )

### **3.1.4 Monitoring Time and Frequency**

Monitoring date is From 1 December to 7 December 2005. Continuously monitor for 1 day with daytime from 6:00 to 22:00 and night from 22:00 to 6:00 each time.

### **3.1.5 Monitoring Instrument**

AWA6218B noise statistical analysis instrument which made by Hangzhou Aihua instrument limited company is applied and calibrated with regulator before monitoring.

### **3.1.6 Monitoring Site**

Environment around monitoring sensitive site that is 1m from the front of the window of the first raw of buildings and 1.2m from the ground are shown in table 5.

## **3.2 Monitoring Results**

Monitoring result of noise at construction field refer to table 6

**Table 5 Noise Monitoring Sites**

No	Stake	Monitoring Site	Monitoring Site	General Situation	Population	Industry Nearby	Landform	Vegetation	Main crop.
1	K42+977	No.7 Group of Zhenjiayi Village	20m from left road	60 families with 300 peoples	concentration	None	Small hills	Thin	Vegetable
2	K88+535	Gongjiwan Branch of Yuanling of the No. 6 Middle School	20m from left road	800 more teachers and students	concentration	None	hills	Thin	Vegetable
3	K93+300	Majiaping Branch of Yuanling of the No. 6 Middle School	30m from right road	300 more teachers and students	concentration	None	hills	Thin	Vegetable
4	K109+700	Namup Village Middle School	30m from right road	1200 more teachers and students	concentration	None	hills	Thin	Vegetable
5	K123+484	Hujiazu Baiwuping Village	20m from right road	100 more families with 300 peoples	concentration	None	Flat	Thick	Vegetable

6	K137+025	Zhoujiazu, Wangjia Village of Liangshuijin Town	40m from right road	25 families with 300 peoples	Relative concentration	None	Small hills	Thick	Vegetable
7	K156+123	Jinshi Mining Limit Corporation	30m from right road	More than 1800 peoples	concentration	None	Hills	Thick	Vegetable
8	K177+050	Luxi Exchange	20m from right road	200 more peoples in Pharmacy factory and transformer substation	concentration	None	Hills	Thin	Vegetable
9	K198+051	Central Elementary School of Tanxi Town	30m from right road	800 more teachers and students	concentration	None	Hills	Thin	Vegetable
10	K216+200	Ana Village of Hexi Town	50m from right road	100 families with 500 peoples	concentration	None	Hills	Thin	Vegetable
11	K221+400	Xiaozhuang Elementary School	40m from left road	More than 1000 teachers, students and residents	concentration	None	Hills	Thin	Vegetable

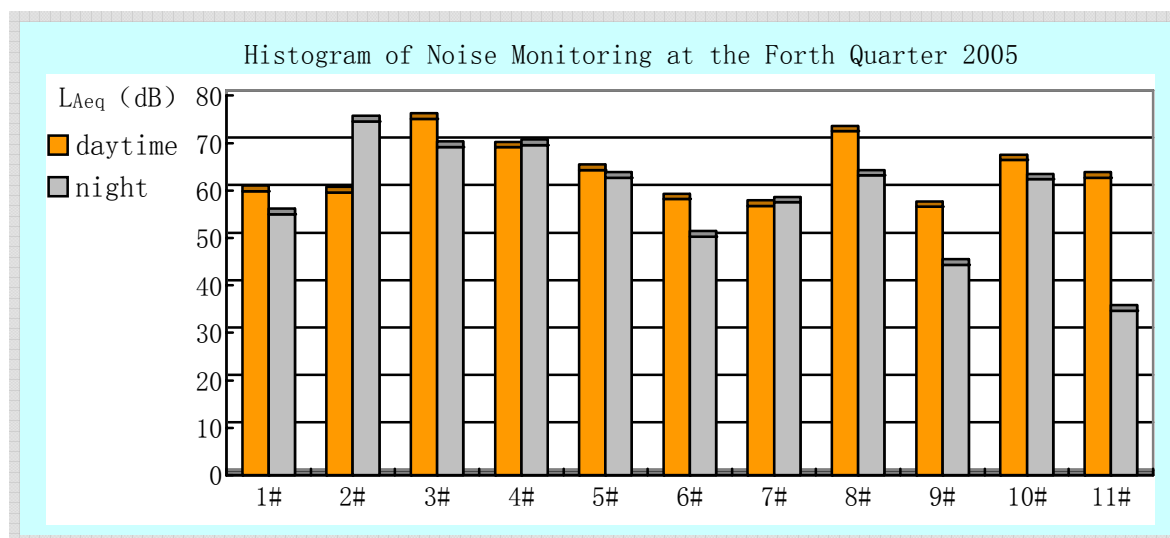
note: The left and right is determined by the direction from Changde to Jishou.

**Table 6 Monitoring Result of Noise of Sensitive Sites****Unit:  $L_{Aeq}$  (dB)**

No	Stake	Monitoring Site	Monitoring Value		Standard Value		Exceeded Standard		Main Noise Source
			Daytime	Night	Daytime	Night	Daytime	Night	
1	K42+977	No.7 Group of Zhenjiayi Village	59.9	55.0	70	55	–	–	Drilling machine at mixing field
2	K88+535	Gongjiwan Branch of The No.6 Middle School of Yuanling	59.6	74.6	60	50	–	Surpass the standard by 24.6	Construction on certain spots at daytime Construction with Generator and compactor at night.
3	K93+300	Majiaping Branch of the No. 6 Middle School of Yuanling	75.1	69.2	60	50	Surpass the standard by 15.1	Surpass the standard by 9.2	Construction with compactor, grab and pug mill
4	K109+700	Namup Village Middle School	69.1	69.6	60	50	Surpass the standard by 9.1	Surpass the standard by 19.6	Generator, drill, flatting machine and constructing vehicles carried muck, vehicles passing by national road 319
5	K123+484	Hujiazuo Baiwuping Village	64.3	62.7	70	55	–	Surpass the standard by 7.7	Grab and noise of thumping reinforcing steel bar, vehicles passing by national road 319

6	K137+025	Zhoujiazu, Wangjialing of Liangshuijin Town	58.2	50.3	70	55	–	–	Noise of drilling machine
7	K156+123	Jinshi Mining Limit Corporation	56.8	57.5	70	55	–	Surpass the standard by 2.5	Drilling machine, pug mill, vibrator and truck
8	K177+050	Luxi Exchange	72.5	63.2	70	55	Surpass the standard by 2.5	Surpass the standard by 8.2	Trucks, construction of retaining wall as well as bulldozer and forklift.
9	K198+051	Central Elementary School of Tanxi town	56.6	44.4	60	50	–	–	Construction on certain spots at daytime, reading from students. No construction at night.
10	K216+200	Ana Village of Hexi Town	66.4	62.4	70	55	–	Surpass the standard by 7.4	Construction on certain spots, noise of hammering at stones and bark
11	K221+400	Xiaozhuang Elementary School	62.7	34.7	60	50	Surpass the standard by 2.7	–	Vehicles carried muck , bulldozer and trucks . No construction at night

### 3.3 Monitoring Results Analyses And Conclusions



It is shown in the noise monitoring data (table 6) and noise histogram that among the eleven monitoring sites, the daytime noise levels in Majiaping branch of Yuanling of the No. 6 Middle School, Nanmupuxiang middle school, Luxi exchange and Xiaozhuang elementary school were above class IV criteria limits in *Urban Environmental Noise Standards* (GB3096-93), while the levels at the other seven sites were under the standards; At night, except the Seventh Group in Zhenjiayi village, Zhoujiazu, Wangjialing village, central elemental school of Tanxi town and Xiaozhuang elemental school, noise levels at other seven monitoring sites were beyond class IV criteria limits in *Urban Environmental Noise Standards* (GB3096-93). In summary, noise levels at 50% monitoring sites exceed. Noise level in the daytime goes beyond the standards by 15.1dB at maximum at MaJiaPing branch of the No.6 Yuanling Middle School. Noise level exceeds at night by 24.6dB at maximum on GongJiaWang Campus of the No 6 Yuanling Middle School.

Noise levels at MaJiaPing branch of the No.6 Middle School, NanMuPu Middle School, LuXi Exchange were all above the standard levels both in the day time and at night: by 15.1 dB、9.1 dB、2.5 dB in the day and by 9.2 dB、19.6 dB、8.2 dB at nights. It can be concluded that results at monitoring sites were mostly affected by construction and traffic.

The reason for noise level surpass in daytime is mostly because the construction was at its early stages of paving the foundation for the expressway. Lots of big equipments such as compactor, diggers, cement mixers and drillers were deployed continuously. Two of the

monitoring sites were near No 319 National Highway and prone to traffic noise interference. Near Luxi exchange and Xiao Zhuan Elementary School, a lot of bulldozers were in full operations.

During the monitoring period, excessive noise for the sensitive sites at nighttime mostly results from generator, drilling machine and bulldozer and traffic vehicles.

### 3.4 Suggestions

The excessive noise suffered by the residents and schools along Changde-Jishou Expressway is noticeable. Overall noise levels at 50% monitoring sites exceed *Urban Environmental Noise Standards*( GB3096-93 ), among which Majiaping branch of Yuanling No. 6 Middle School, Nanmupuxiang Middle School and Luxi Exchange were affected by noise mostly. So we suggest that construction company take measures to mitigate and control environmental noise such as employing low-noise equipment and putting; distance the major noise equipment relatively far from residential and school areas, adjust the direction of the noise equipment to low its noise volume or stop major noise equipment at night.

## 4 Ambient Air Monitor

### 4.1 Monitoring Project and Implementation

#### 4.1.1 Monitoring Project

TSP of 11 sensitive sites of Changde-Jishou Expressway were monitored and the original record table was detail made out for the ambient air TSP and conduct surveys on the effect of air quality on residents along the road.

#### 4.1.2 Monitoring Item

TSP

#### 4.1.3 Monitoring Method

Monitoring process applies national standard of *Ambient air TSP weighing method*



( GB/T15432-1995 )

#### 4.1.4 Monitoring Time and Frequency

TSP concentration sampling was taken during construction period. Samplings were conducted at each sensitive sites during a 24 hour period in the morning and afternoon. Each sampling was at least 1.5h.

#### 4.1.5 Sampling Instrument

Monitoring Item	Instrument	Factory	Remark
TSP	2030B intellectualized middle flux sampling instrument for 203 Intellectualized great flux sampling instrument for TSP	Laoshan Applied Technique Research Institute of Qindao	
Atmosphere Pressure	DYM3 air pressure apparatus	Jiangshan glass apparatus factory of Ji county, Ningbo	
Wind Direction And Wind Speed	DHM6 three cup wind direction and speed apparatus	Weather apparatus factory of Tianjin	

#### 4.1.6 Monitoring Site

Air quality monitoring sites were the same ones as noise monitoring. See table 7 for details.

### 4.2 Monitoring Results

We monitored TSP and recorded weather and construction condition at the same time. see table 7. Table 8 is the monitoring result of TSP in sensitive site.

**Table7 Weather and Construction Condition during Monitoring Period**

Monitoring Site	Time	temperature ( °C )	Air pressure ( kPa )	Wind direction	Wind speed ( m/s )	weather	Constructed in full
No.7 Group of Zhenjiayi Village	Am. Dec. 2, 12	12.0	102.3	S	0.3	Cloudy	Constructed in full
	Pm. Dec. 2, 12	13.0	102.3	S	0.3	Cloudy	Constructed in full
Gongjiwan Branch of Yuanling of the No. 6 Middle School	Am. Dec. 7,12	3.0	100.9		0	Sunny	Construct on a certain spot
	Pm. Dec. 7,12	3.0	100.9		0	Sunny	Construct on a certain spot
Majiaping Branch of Yuanling of the No. 6 Middle School	Am. Dec. 7,12	2.0	101.3	N	0.2	Sunny	Constructed in full
	Pm. Dec. 7,12	4.0	101.3	N	0.2	Sunny	Constructed in full
Namup Village Middle School	Am.Dec. 2, 12	13.0	100.3	NE	0.3	Cloudy	Constructed in full
	Pm. Dec. 2,12	10.0	100.3	NE	0.3	Cloudy	Constructed in full
Hujiazu Baiwuping Village	Am. Dec. 3,12	8.0	99.0	EN	0.4	Cloudy	No construction
	Pm. Dec. 3,12	7.0	99.0	EN	0.4	Cloudy	No construction
	Am. Dec. 3,12	9.0	101.4	EN	0.9	Cloudy	Construct on a certain spot

Zhoujiazu

Wangjialing of Liangshuijin Town	Pm. Dec. 3,12	9.0	101.4	EN	1.5	Cloudy	Construct on a certain spot
Jinshi Mining Limit Corporation	Am. Dec. 4,12	8.0	101.6	NE	1.2	Cloudy	Construct on a certain spot
	Pm. Dec. 4,12	9.0	101.6	NE	0.7	Cloudy	Construct on a certain spot
Luxi Exchange	Am. Dec. 4,12	10.0	101.1	NE	1.0	Sunny	Constructed in full
	Pm. Dec. 4,12	11.0	100.7	NE	1.0	Sunny	Constructed in full
Central Elementary School of Tanxi twon	Am. Dec. 5,12	6.0	101.8	N	1.5	flurry	Construct on a certain spot
	Pm. Dec. 5,12	6.0	101.8	N	1.4	Cloudy	Construct on a certain spot
Ana Village of Hexi Town	Am. Dec. 5,12	5.0	101.7	NW	0.1	flurry	Construct on a certain spot
	Pm. Dec. 5, 12	9.0	101.7	NW	0.1	Sunny	Construct on a certain spot
Xiaozhuang Elementary School	Am. Dec. 6,12	8.0	101.3	N	0.2	Sunny	Constructed in full
	Pm. Dec. 6, 12	8.0	101.3	N	0.2	Sunny	Constructed in full

**Table 8 Monitoring Result of TSP in Sensitive Site****Unit:** mg/m<sup>3</sup>

Stake	Monitoring site	Max. value	Minimum value	Average value	Above standard condition	Construction condition
K42+977	No.7 Group of Zhenjiayi Village	0.29	0.16	0.23	–	Digged peg
K88+535	Gongjiwan Branch of Yuanling of The No. 6 Middle School	0.43	0.22	0.34	Surpass the standard by	Constructed in full
K93+300	Majiaping Branch of Yuanling of The No. 6 Middle School	0.20	0.17	0.19	–	Constructed in full
K109+700	Namup Village Middle School	0.41	0.33	0.36	Surpass the standard by	Constructed in full
K123+484	Hujiazu Baiwuping Village	0.19	0.15	0.17	–	No construction
K137+025	Zhoujiazu, Wangjialing of Liangshuijin Town	0.23	0.14	0.19	–	Construct on a certain spot
K156+123	Jinshi Mining Limit Corporation	0.31	0.23	0.27	–	Construct on a certain spot
K177+050	Luxi Exchange	0.21	0.30	0.27	–	Construct on a certain spot
K198+051	Central Elementary School of Tanxi Town	0.26	0.17	0.21	–	Construct on a certain spot
K216+200	Ana Village of Hexi Town	0.20	0.13	0.17	–	Construct on a certain spot
K221+400	Xiaozhuang Elementary School	0.22	0.13	0.17	–	Construct on a certain spot

## 4.3 Monitoring Results Analyses And Conclusion

**Histogram of Concentration of TSP in the Forth Quarter of 2005**

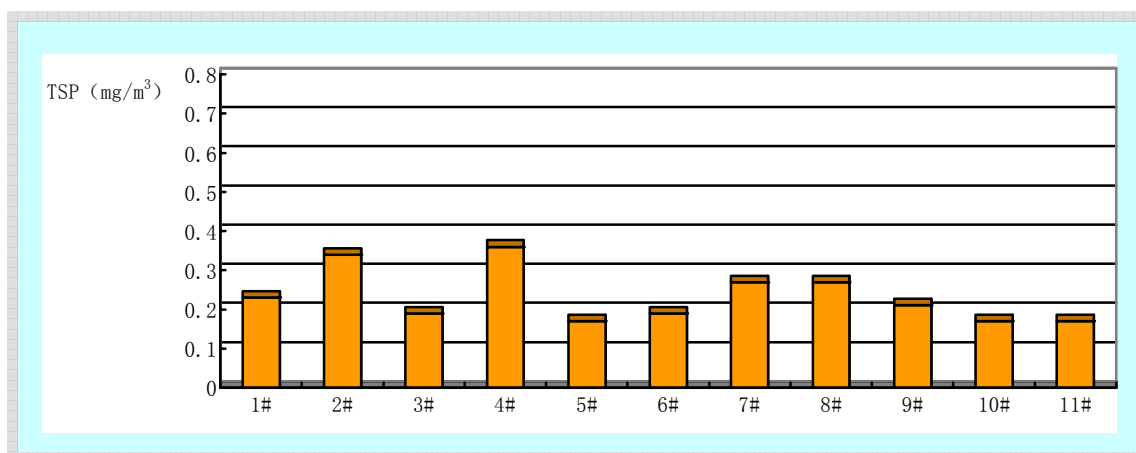


Table 8 and the above histogram reveal that TSP concentration in the seventh group, zhenjiayi village and Nanmupu middle school exceeded the standard, as a result of the blowing dust brought by construction work routes, digging and grading land with bulldozer and traffic vehicles on No 319 national highway respectively.

The standard rate of TSP over the whole road is only 18.2% with the max. of 0.43 mg/m<sup>3</sup> and minimum of 0.13 mg/m<sup>3</sup>.

In summary, the ambient air is good and TSP meets with the request of *Ambient air quality standards* GB3095-1996 in this quarter.

## 5 Water Environmental Monitoring

### 5.1 Monitoring Project and Implementation

#### 5.1.1 Monitoring Projects

Water Environments at Luxi bridges of Yuanshui, Tumazai Bridge of Wushui and Longziping of Wushui along Changde-Jishou Expressway should be monitored. Two sampling sections that are 100m from upper reaches and 200m from lower reaches separately were chosen at each bridge, where samples should be taken twice at am. and pm., then deposited after mixed in a one-day monitoring period.

## 5.1.2 Monitoring Items

pH、BOD、COD<sub>Mn</sub>、SS、Petroleum

## 5.1.3 Monitoring Methods

Monitoring Item	Analysis Method
pH	GB 6920-86 analysis with glass electrode
BOD	GB 7488-87 dilution and inoculation method
COD <sub>Mn</sub>	GB 11892-89 acid reaction method
SS	GB 11901-89 weighing and analytical method of suspended subject
Petroleum	GB /T 16488-96 infrared and prismatic luminosity monitoring for petroleum and oil of propagation in water

## 5.1.4 Monitoring Time and Frequency

Monitoring time is 5 December 2005. Two sampling section that are 100m from upper reaches and 200m from lower reaches separately were chosen at each bridge. Sampled twice at am. and Pm., then deposited after mixed. The specific monitoring sites are determined with the width and depth of the river.

## 5.1.5 Monitoring Instruments

Items		Instruments	Type	Remark
Sampling		Sampling bottle	1000mL	
Determination	pH	PH apparatus	PHS-3C	
	BOD	Case of constant temperature	ET99724A-6	
	COD	Setting of boiled water	CTL-BX3C	
	SS	METTLER TOLEDO electronic balance	AL204/01	
	Petroleum	Infrared instrument for monitoring oil	JDS-100 I	

## 5.1.6 Monitoring Sites

Water environmental monitoring sites refer to table 9

**Table 9 Monitoring Site of Water Environment**

Number	Stake	Name	Location and Frequency
1	K176+800	Luxi Bridge on Yuan Shui River	Observing sites were at 100m upstream to the bridges and 200m downstream. Observing periods were 24 hours. Random water samples were taken during the morning and afternoon.
2	K198+051	Ma Sai Bridge on Wu Shui River	
3	K198+893	Nong Zhi Ping Bridge on Wu Shui River	



**Construction Spot of Yuanshui Bridge  
of Luxi River**



**Construction Spot of Longziping Bridge  
of Wushui River**

## 5.2 Monitoring Results

Monitoring results of water environment are displayed in table 10.

**Table 10 Monitoring Results of Water Environment****Unit: mg/L**

River		pH	SS	COD <sub>Mn</sub>	BOD <sub>5</sub>	Petroleum
Luxi Yuanshui Bridge	Upper reach	6.95	15	5.72	1.00	0.054
	Lower reach	6.96	19	5.80	1.07	0.050
Wushui Tumazai Bridge	Upper reach	6.94	8	5.28	0.68	0.080
	Lower reach	6.92	11	5.34	0.70	0.086

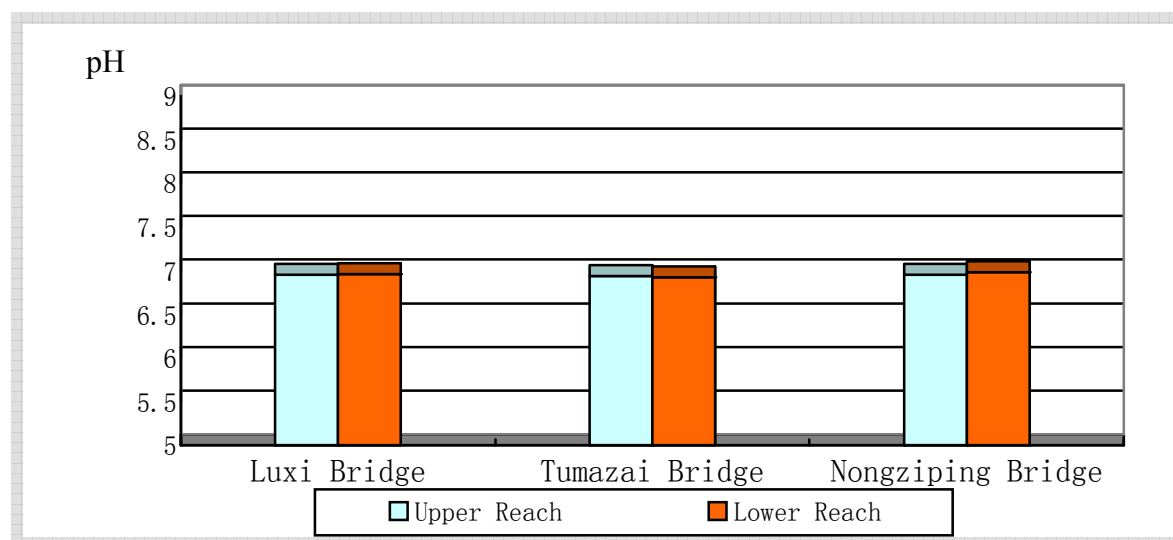
Wushui Nongziping Bridge	Upper reach	6.95	16	9.24	0.88	0.098
	Lower reach	6.98	18	9.18	0.90	0.098
Class III Criterion		6 ~ 9	$\leq 150$	$\leq 6$	$\leq 4$	$\leq 0.05$

### 5.3 Conclusions

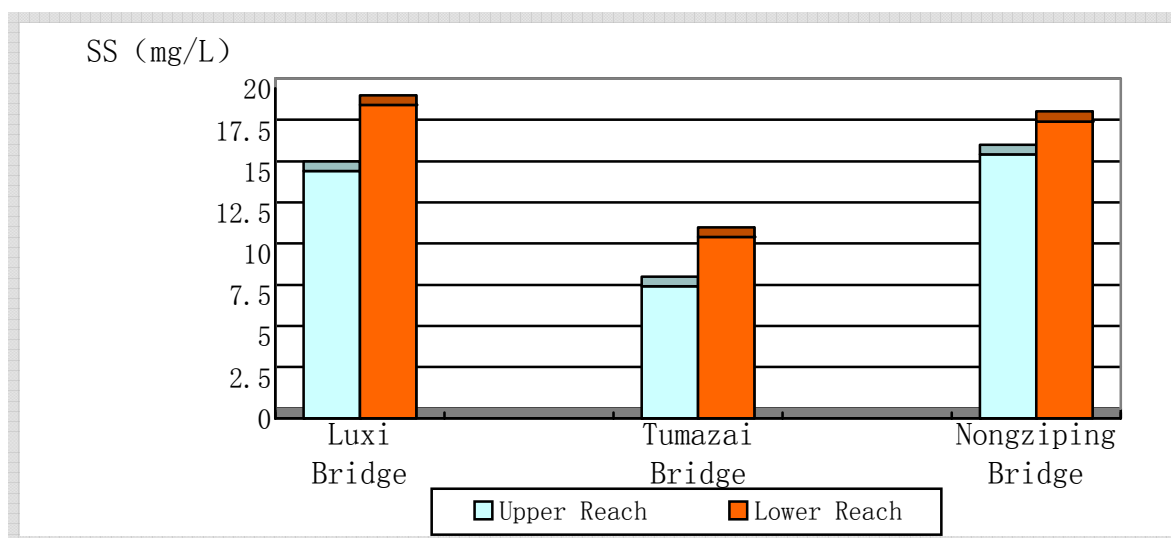
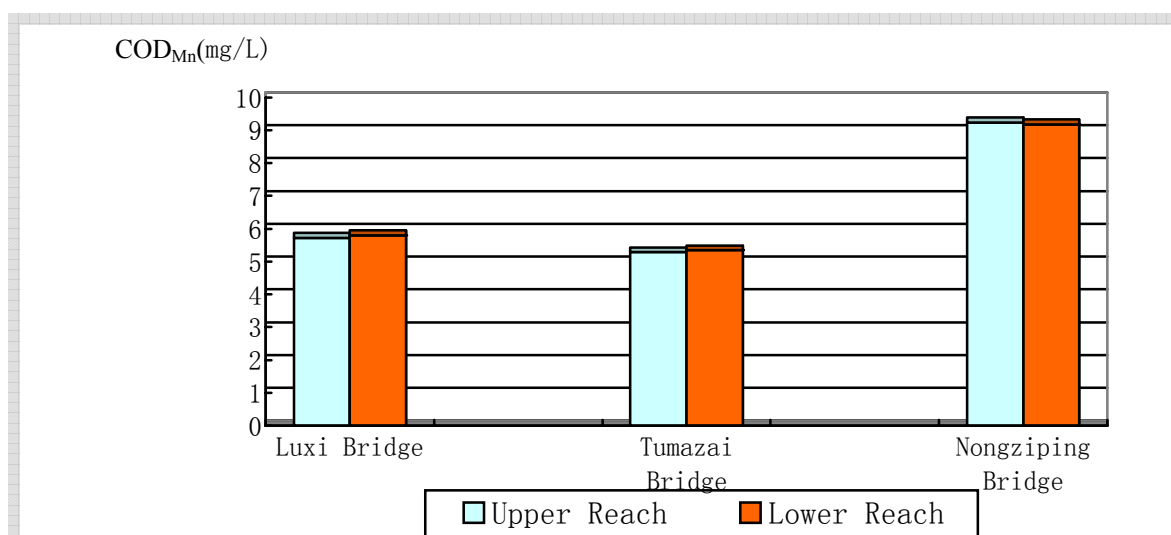
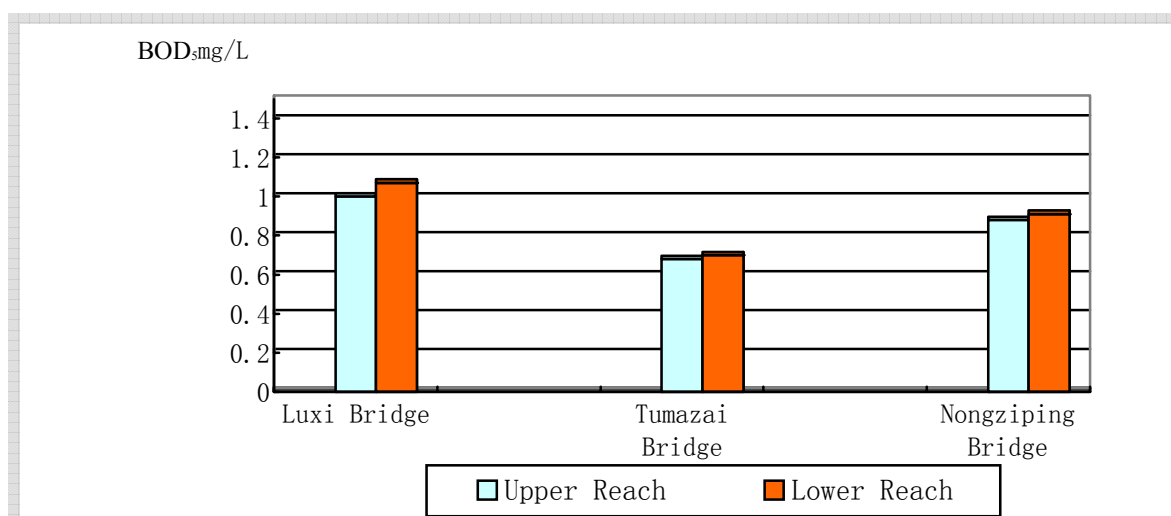
The surface water environments of constructed reaches conform to class III of *surface water environmental quality standards* basically except for the contents of petroleum at the reach of wushui masai bridge, petroleum and COD<sub>Mn</sub> at the reach of wushui Nongziping bridge. But based on the contrasts between results of monitoring section of upper reaches and lower reaches, it is indicated that there's little alteration of concentration of pH、BOD、COD<sub>Mn</sub> and petroleum except concentration of SS at lower reaches is higher than that of upper reaches by ( 2 – 4mg/L ) . To be summarized, the construction of bridge has little influence on water quality.

Contrasting results of concentration of monitoring factor at upper reaches and lower reaches concerning the constructed bridges illustrate in the following histograms.

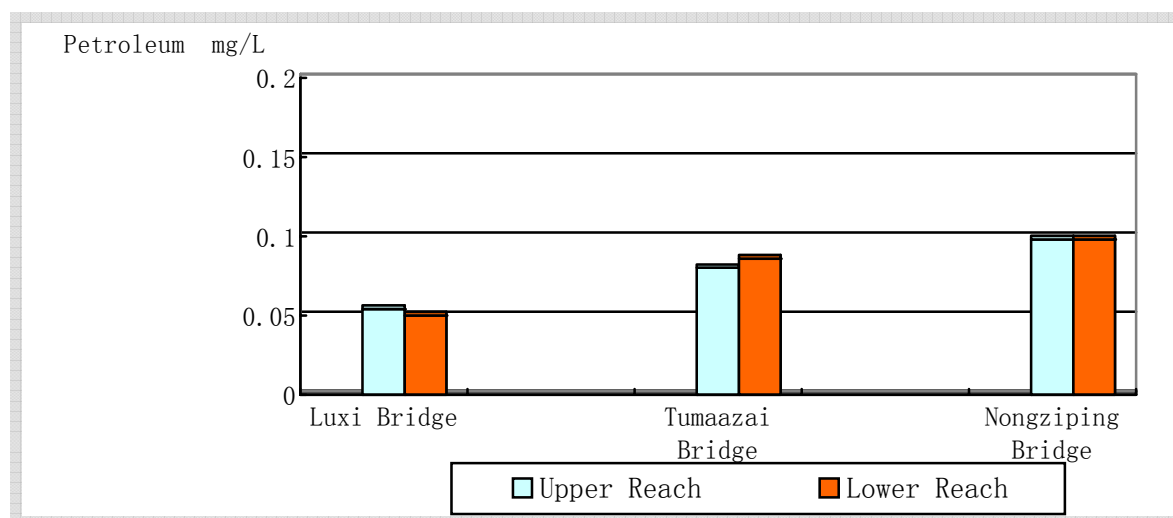
**Histogram of Contrast of PH Value at the Forth Quarter 2005**





**Histogram of Contrast of SS Value at the Forth Quarter 2005****Histogram of Contrast of COD<sub>Mn</sub> Value in the Forth Quarter 2005****Histogram of Contrast of BOD<sub>5</sub> Value at the Forth Quarter 2005**

### Histogram of Contrast of Petroleum Value at the Forth Quarter 2005



## 6. Ecology Effects And Public Opinion Survey

It is an ecologically good area, which relies mainly on agricultural ecology along the road. Agricultural vegetation that give first place to paddy and orange and complex forest vegetation are in their integrities. There's no scarce propagation with good groundwater and lower noise and better ambient air quality.



**K93+250 Embankment under construction**



**K98+000 Building Shortcut Across the River**



**K93+300 drinking water source for local residents**



**K123+480 newly-built drinking water source**



**K123+480 water in newly-built drinking water source**



**K82+000 drainage out of control in construction of bridge pile foundation**

The project is now in the stage of excavating earth and constructing embankment. The excavation in the body of the mountain will harm the local ecological environment. The contractor attaches great importance to the local environment protection and the conservation of soil and water , by building retaining walls, drains and catchworks. So far there are no evidences of soil erosion by vegetation damage.

Resulted from proper measures taken by contractor in colleting and clearing up construction and everyday life rubbish, no signs of pollution, e.g. turbidity or flotage, have been found. However, some local residents complain about the pollution of rivulet by the build of the expressway, the depth of drinking well, the low quality of the water and inconvenience of the facilities

On some section of the road, e.g. ANa Village of Kexi Town (K216+200), dust exerts unfavorable effect on the growth of local crops. For example, the leaves of mandarin orange trees planted by local residents are covered with dust, which may result in income losses of local residents by a decline in quality of mandarin oranges, furthermore, death of mandarin orange trees.



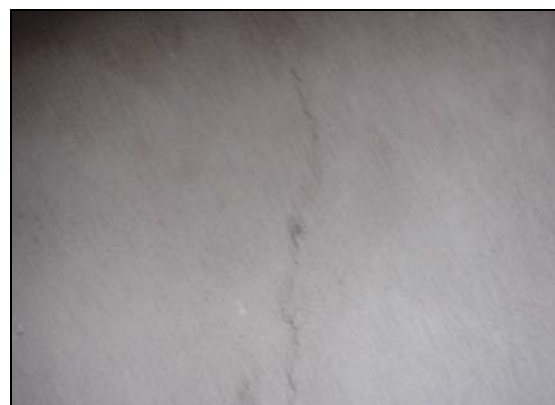




Noise and dust have impact on the people around the constructed road to a certain degree. Especially, the quarter areas of Majiaping branch of the No.6 middle school of Yuanling village (K93+300) and Nanmupu middle school (K109+700) near the road, the construction noise at night affected the rest of teachers and students. Over ten families reported that their houses cracked for the vibration of rollers. In a word, the road construction affects the living environments of local residents to some degree.



**K109+700 Nanmupu Middle School**



**K123+484 Crack of Wall of House**

## 7. General Conclusions and Suggestions

According to environmental monitoring survey along the whole routes and at all sensitive sites, we know that the construction activities in this project have little effect on water environment. Surface water quality is good generally at the constructed reaches; noise and dust made by construction produced impact on the living of local residents and school to some degree, and there is a superscale in noise and TSP at a few sensitive sites. It is suggested that contractor should study this environment monitoring report and take various measures at those noise and dust surpass sites, such as stop using big equipments during night, spraying the sites with water, etc. All the measures were aimed to reduce the environment impact to the least extent. In addition, suggestions were made for the construction company to make efforts to protect the water and soil at soil digging and dumping sites, especially near or over rivers. Waste soil levees, retaining walls and other measures need to be taken in order to prevent soil erosion.

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Monitoring personnel:

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Report compiler:

Examiner:

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Technology supervisor:

Signer authorized:

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