



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

Changji Jianzi No. 01 2006



**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: March. 25, 2006

Environmental Protection Center of Ministry of Communications
Hunan Communication Research Institute

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APPENDIX 1 Sketch Map of the Locations of Environmental Monitoring Sensitive Sites

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. 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.

ChangJi Expressway about 223 km long, constructed on the two-way and four-driveway standard, is planned to be finished and open to traffic by the end of 2007. The expressway winds from the Doumuhu to Jishou city, by way of Taoyuan, Guanzhuang, Yuanlin, Luxi, among which the section from starting point to Cha-anpu (62.10km) belongs to mini-downland area, with the designed driving speed 100km/h and embankment width 26m, while the section from Cha-anpu to end point (161.299km) belongs to hilly area, with the designed driving speed of 80km/h and embankment width of 24.5m. The entire expressway comprises 11 interchanges, 164 bridges added up to 37063.58m, 56 tunnels with the amount of 38642m, and stony embankment added up to 38.386 million m³, taking up 1470.86 hm² in land. Xiangxi section on ChangJi Expressway started construction in May, 2004. Changde and Huaihua sections funded by Asia Development Bank started in August, 2005. The locations of environmental monitoring sensitive sites are shown in appended fig.1.

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, at the same time, the environmental monitoring will provide basis for the environmental protection acceptance in the completion of works phase.

During the first quarter of 2006, major tasks of ChangJi Expressway consisted of cutting and protecting of slope, filling embankment, mixing and pouring concrete, welding steel bars,

casting bridge piles, excavating and supporting tunnels. Construction equipments included bulldozers, digging machines, graders, pavement rollers, air compressors, arc welders, hydraulic pumps, 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 at Yuanshui river and Wushui river, which is of related waterways to the construction, were conducted from 14th to 21st of March 2006. Opinions of residents along the construction sites were also collected, which form the foundation of the quarterly monitoring report.

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 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_{Aeq} (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^3

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 ₅	4
COD _{Mn}	6
Petroleum	0.05

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

Pollutant Name	SS concentration Criteria Limits
SS	150

2.3 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 Item

Equivalent continuous A Sound level

3.2 Monitoring Method

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

3.3 Monitoring Time and Frequency

Monitoring date is from 14 March to 21 March 2006. Noise monitorings were conducted at each sensitive site for 20 minutes with daytime from 6:00 to 22:00 and night from 22:00 to 6:00 each time.

3.4 Monitoring Instrument

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

3.5 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.

3.6 Monitoring Results

Monitoring result of noise at sensitive sites refer to table 6

Table 5 Noise Monitoring Sites

No	Stake	Monitoring Site	location	General Situation	Population	Industry Nearby	Landform	Vegetation	Main crop.
1	K42+977	No.7 Group of Zhenjiayi Village (residential area)	8m from left road	60 families with 300 peoples	concentration	None	Small hills	Thin	Vegetable
2	K42+977	No.7 Group of Zhenjiayi Village (school)	100m from right road	1000 more teachers and students	concentration	None	Small hills	Thick	Vegetable
3	K86+600	Gongjiwan Branch of The No.6 Middle School of Yuanling (Teaching Building)	20m from right road	800 more teachers and students	concentration	None	Small hills	Thin	Vegetable
4	K86+600	Gongjiwan Branch of The No.6 Middle School of Yuanling (Dormitory)	20m from right road	800 more teachers and students	concentration	None	Small hills	Thin	Vegetable
5	K93+300	Majiaping Branch of the No. 6 Middle School of Yuanling	32m from right road	300 more teachers and students	concentration	None	Small hills	Thin	Vegetable
6	K109+700	Namup Village Middle School	60m from right road	1200 more teachers and students	concentration	None	Small hills	Thin	Vegetable
7	K119+600	Wangjiawu Viaduct	40m from right road	30 families with 100 peoples	concentration	None	Small hills	Thick	Vegetable
8	K123+484	Hujiazu Baiwuping Village	49m from right road	100 families with 300 peoples	concentration	None	Small hills	Thick	Vegetable

9	K156+123	Jinshi Mining Limit Corporation	40m from right road	More than 1800 peoples	concentration	None	Small hills	Thick	Vegetable
10	K198+051	Central Elementary School of Tanxi Town	40m from right road	800 more teachers and students	concentration	None	Small hills	Thin	Vegetable
11	K216+200	Ana Village of Hexi Town	38m from right road	100 families with 500 peoples	concentration	None	Small hills	Thin	Vegetable
12	K221+400	Xiaozhuang Elementary School (residential area)	102m from right road	More than 700 peoples	concentration	None	Small hills	Thin	Vegetable
13	K221+400	Xiaozhuang Elementary School (school)	120m from right road	300 more teachers and students	concentration	None	Small hills	Thin	Vegetable

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

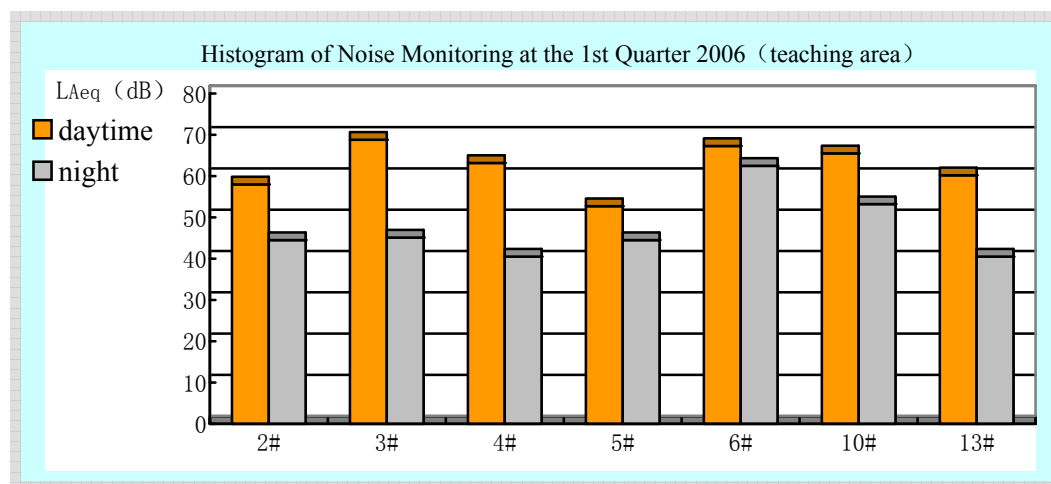
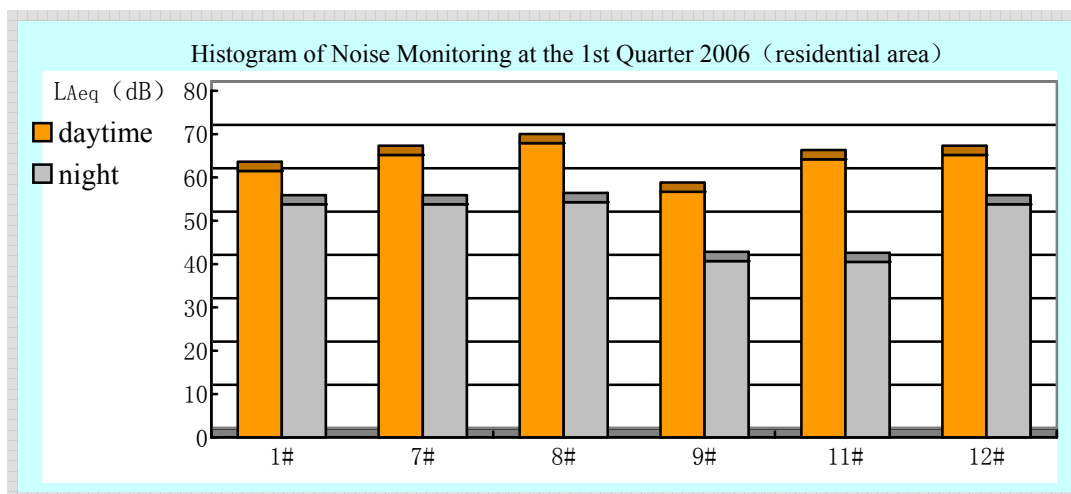
Table 6 Monitoring Result of Noise of Sensitive Sites**Unit: L_{Aeq} (dB)**

№	Stake	Monitoring Site	Daytime Value		Night Value		Above standard condition		Main Noise Source
			Standard	Monitoring	Standard	Monitoring	daytime	Night	
1	K42+977	No.7 Group of Zhenjiayi Village (Residential Area)	70	61.5	55	53.8	—	—	digging machines, falsework, pumping
2	K42+977	No.7 Group of Zhenjiayi Village (Teaching Area)	60	58	50	44.5	—	—	digging machines, falsework, pumping , reading aloud
3	K86+600	Gongjiwan Branch of The No.6 Middle School of Yuanling (on the 2 nd floor of Teaching Building)	60	68.8	50	45.1	Surpass the standard by 8.8	—	digging machines, arc welders, excavating slope, , reading aloud
		Gongjiwan Branch of The No.6 Middle School of Yuanling (on the 4th floor of Teaching Building)	60	76.2	50	47.1	Surpass the standard by 16.2	—	
4	K86+600	Gongjiwan Branch of The No.6 Middle School of Yuanling (Dormitory)	60	63.2	50	40.5	Surpass the standard by 3.2	—	
5	K93+300	Majiaping Branch of the No. 6 Middle School of Yuanling	60	52.7	50	44.5	—	—	construction of side ditch

6	K109+700	Namup Village Middle School	60	67.3	50	62.5	Surpass the standard by 7.3	Surpass the standard by 12.5	Generator, digging machines, graders and constructing vehicles carried muck, vehicles passing by national road 319, , reading aloud
7	K119+600	Wangjiawu Viaduct	70	65.2	55	53.8	—	—	cutting and bending of steel, hammering cage of reinforcement, electric welding
8	K123+484	Hujiazu Baiwuping Village	70	67.9	55	54.3	—	—	pumping, hammering cage of reinforcement, vehicles passing by national road 319
9	K156+123	Jinshi Mining Limit Corporation	70	56.7	55	40.7	—	—	Construction on certain spots at daytime, Vehicles carried muck , bulldozer and trucks .
10	K198+051	Central Elementary School of Tanxi Town	60	65.5	50	53.2	Surpass the standard by 5.5	Surpass the standard by 3.2	digging machines, graders, Vehicles and trucks , reading aloud.
11	K216+200	Ana Village of Hexi Town	70	64.2	55	40.5	—	—	cement mixers and trucks arc welders, Vehicles
12	K221+400	Xiaozhuang Elementary School (Residential Area)	70	65.2	55	53.8	—	—	bulldozers, digging machines, graders cement mixers and trucks
13	K221+400	Xiaozhuang Elementary School (Teaching Area)	60	60.2	50	40.5	Surpass the standard by 0.2	—	bulldozers, digging machines, graders cement mixers and trucks,reading aloud

3.7 Monitoring Results Analyses And Conclusions

Among the 13 sensitive sites under monitoring, 6 sites belong to residential area (see Histogram of Noise Monitoring at the 1st Quarter 2006 (residential area)), the others belong to teaching area (Histogram of Noise Monitoring at the 1st Quarter 2006 (teaching area)).



In table 6, sites marked as 1#、7#、8#、9#、11#、12# are in residential area, where class IV criteria limits in *Urban Environmental Noise Standards* (GB3096-93) are applied in the monitoring process with criteria limits of 70dB in daytime, 55dB at night. It is shown in the noise monitoring data (table 6) and histogram of noise monitoring at the 1st quarter 2006 (residential area), that the noise level in the daytime, presented by the orange bar, does not exceed the limit of 70dB, neither does the noise level at night, presented by the gray bar over 55dB. It comes to the conclusion that at all the sensitive sites in the six residential area,

i.e. 1# No.7 Group of Zhenjiayi Village (residential area) , 7# Wangjiawu Viaduct, 8# Hujiazu Baiwuping Village, 9# Jinshi Mining Limit Corporation, 11# Ana Village of Hexi Town, 12# Xiaozhuang elemental school (residential area) , were under the standards both in the daytime and at night.

In table 6, sites marked as 2#、3#、4#、5#、6#、10#、13# are in teaching area, where class II criteria limits in *Urban Environmental Noise Standards* (GB3096-93) are applied in the monitoring process with criteria limits of 60dB in daytime, 50dB at night. It is shown in the noise monitoring data (table 6) and histogram of noise monitoring at the 1st quarter 2006 (teaching area), that the noise levels at 3# Gongjiwan Branch of The No.6 Middle School of Yuanling (the 2nd floor of teaching building), 3# Gongjiwan Branch of The No.6 Middle School of Yuanling (the 4th floor of teaching building), 4# Gongjiwan Branch of The No.6 Middle School of Yuanling (dormitory), 6# Namup Village Middle School, 10# Central Elementary School of Tanxi town and 13# Xiaozhuang elemental school (teaching area) in the daytime go beyond the standards by 8.8dB, 16.2dB, 3.2dB, 7.3 dB, 5.5dB and 0.2dB respectively. It is also displayed that the noise levels at 6# Namup Village Middle School and 10# Central Elementary School of Tanxi town at night exceed the standards by 12.5dB and 3.2dB. It is noted that the noise levels all day long at 2# No.7 Group in Zhenjiayi village (teaching area) and 5# Majiaping Branch of the No. 6 Middle School of Yuanling are under standards.

Noise level in the daytime goes beyond the standards by 8.8dB at maximum at 3# Gongjiwan Branch of The No.6 Middle School of Yuanling (teaching building). Noise level exceeds at night by 12.5dB at maximum at 6# Namup Village Middle School. These illustrate that though some schools along Changde-Jishou Expressway are affected by the noise from the construction sites, the noise environment has been improved noticeably in contrast with the 4th quarter in 2005.

The reason for noise level over standard in daytime during the monitoring period is mostly because of the construction with use of big equipments such as generators, compactors, diggers, cement mixers, drillers and graders near 6# Namup Village Middle School, 10# Central Elementary School of Tanxi town and 12# Xiaozhuang elemental school. Besides, 6# Namup Village Middle School is located quite near No 319 National Highway, which also partly results in the abnormal noise level. The other reason resulting in the noise level over standard is the student's reading aloud.

During the monitoring period, excessive noise for the sensitive sites at nighttime

mostly results from generator, drilling machine and bulldozer and traffic vehicles.

3.8 Suggestions

It can be seen that the above monitoring results form a striking contrast to the results in 4th quarter in 2005, illuminating great improvement in the noise environment. However, some schools along Changde-Jishou Expressway, especially 6# Namup Village Middle School and 10# Central Elementary School of Tanxi town with excessive noise all day, are still affected by the noise from the construction sites, which implies further measurements should be taken by contractor to decrease the noise level, e.g. choosing types of machines with less noise; placing machines in the positions far from the residential and teaching areas; reasonably arranging the orientation of noise by facilities; switching off the equipments with heavy noise.

4 Ambient Air Monitor

4.1 Monitoring Item

TSP

4.2 Monitoring Method

Monitoring process applies national standard of *Ambient air TSP weighing method* (GB/T15432-1995)

4.3 Monitoring Time and Frequency

TSP concentration sampling was taken during construction period. The monitoring date is from 14 March to 20 March 2006. Monitorings were conducted at each sensitive site for three days, with each sampling lasting at least 12h.

4.4 Sampling Instrument

Monitoring Item	Instrument	Factory	Remark
TSP	2030B intellectualized middle flux sampling instrument for	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	

4.5 Monitoring Site

Air quality monitoring sites were Majiaping Branch of Yuanling of the No. 6 Middle School, Namup Village Middle School, Central Elementary School of Tanxi twon and Xiaozhuang Elementary School . See table 7 for details.

4.6 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 (℃)	Air pressure (kPa)	Wind direction	Wind speed (m/s)	weathe r	Construction condition
Majiaping Branch of Yuanling of the No. 6 Middle School	Mar.14	14.2	101.5	NE	1.4	Sunny	Constructed in full
	Mar.15	14	101.4	NE	1.6	Sunny	Constructed in full
	Mar.16	13.8	101.4	NE	1.5	Sunny	Constructed in full
Namup Village Middle School	Mar.14	14.2	101.3	NE	1.3	Sunny	Constructed in full
	Mar.15	14	101.4	NE	1.4	Sunny	Constructed in full
	Mar.16	13.8	101.3	NE	1.5	Sunny	Constructed in full
Central Elementary School of Tanxi twon	Mar.17	14	101.2	NE	1.5	Cloudy	Constructed in full
	Mar.18	14.2	101.3	NE	1.8	Sunny	Constructed in full
	Mar.20	11.3	101.2	NE	1.4	Cloudy	Constructed in full
Xiaozhuang Elementary School	Mar.17	14	101.2	NE	1	Cloudy	Constructed in full
	Mar.18	14.1	101.3	NE	0.8	Sunny	Constructed in full
	Mar.20	11.3	101.2	NE	1.1	Cloudy	Constructed in full

Table 8 Monitoring Result of TSP in Sensitive Site Unit: mg/m^3

Sampling Site	Sampling date	Filter Film Type	sampling time	Weight of Clean Filter Film	Weight of Dusty Filter Film	Difference	standard volume (m^3)	Concentration of TSP(mg/m^3)
Majiaping Branch of Yuanling of The No. 6 Middle School	Mar.14	4-8	12	406.2	411.8	5.6	65.503	0.085
	Mar.15	4-2	12	411.2	418.1	6.9	65.797	0.105
	Mar.16	4-1	12	414.9	422.0	7.1	64.920	0.11
Namup Village Middle School	Mar.14	8-1	12	411.6	422.2	10.6	65.959	0.16
	Mar.15	7-3	12	408.1	419.9	11.8	65.525	0.18
	Mar.16	7-2	12	408.2	418.1	9.9	66.071	0.15
Central Elementary School of Tanxi Town	Mar.17	1-3	12	409.0	418.3	9.3	66.447	0.14
	Mar.18	1-4	12	408.9	416.8	7.9	66.129	0.12
	Mar.20	2-3	12	413.3	420.5	7.2	65.833	0.11
Xiaozhuang Elementary School (residential area)	Mar.17	9-1	12	412.1	420.7	8.6	66.092	0.13
	Mar.18	8-3	12	412.7	419.9	7.2	65.816	0.11
	Mar.20	8-1	12	411.6	418.2	6.6	66.041	0.10

Table 9 the Analysis of Monitoring Result of TSP in Sensitive Site Unit: mg/m^3

Stake	Monitoring site	Max. value	Minimum value	Average value	Standard value	Above standard condition	Construction condition
K93+300	5# Majiaping Branch of Yuanling of The No. 6 Middle School	0.11	0.105	0.1	0.30	—	construction of side ditch
K109+700	6# Namup Village Middle School	0.18	0.15	0.163	0.30	—	Constructed in full
K198+051	10# Central Elementary School of Tanxi Town	0.14	0.12	0.123	0.30	—	Constructed in full
K221+400	12# Xiaozhuang Elementary School (residential area)	0.13	0.11	0.113	0.30	—	Constructed in full

4.7 Monitoring Results Analyses And Conclusion

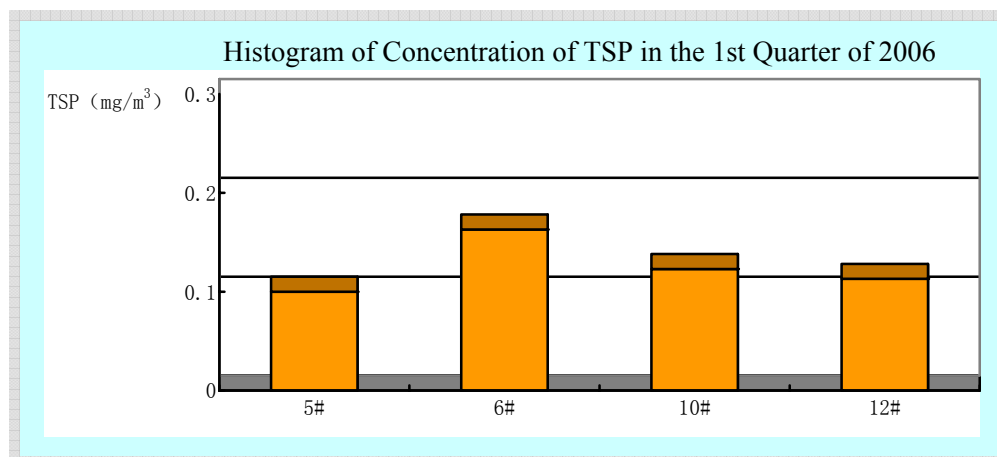


Table 8 and the above histogram reveal that TSP concentration at 5# Majiaping Branch of Yuanling of the No. 6 Middle School, 6# Namup Village Middle School, 10# Central Elementary School of Tanxi Town and 12# Xiaozhuang Elementary School (residential area) Nanmupu middle school are all under the standards. The maximum value of TSP concentration is 0.18 mg/m³, and the minimum one is 0.105mg/m³.

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

5 Water Environmental Monitoring

5.1 Monitoring Items

pH、BOD₅、COD_{Mn}、SS、Petroleum

5.2 Monitoring Methods

Monitoring Item	Analysis Method
pH	GB 6920-86 analysis with glass eletrode
BOD ₅	GB 7488-87 dilution and inoculation method
COD _{Mn}	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

5.3 Monitoring Time and Frequency

Monitoring time is 19 March 2006. Two sampling section that are 100m from upper reaches and 200m from lower reaches separately were chosen at Yuanshui river and Wushui river. Sampled twice at am. and Pm., then deposited after mixed. The specific monitoring sites are determined with the width and depth of the river.

5.4 Monitoring Instruments

Items		Instruments	Type	Remark
Sampling		Sampling bottle	1000mL	
Determination	pH	PH apparatus	PHS-3C	
	BOD ₅	Case of constant temperature	ET99724A-6	
	CODMn	CODMn Index analyse instrument	JAWA-1002C	
	SS	METTLER TOLEDO electronic balance	AL204/01	
	Petroleum	Infrared instrument for monitoring oil	JDS-100 I	

5.5 Monitoring Sites

Water environmental monitoring sites refer to table 10.

Table 10 Monitoring Sites 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	Upper reach of Wu Shui River	
3	K198+893	Lower reach of Wu Shui River	



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



**Water Sampling from Luxi Yuanshui
River**

5.6 Monitoring Results

Monitoring results of water environment are displayed in table 11.

Table 11 Monitoring Results of Water Environment

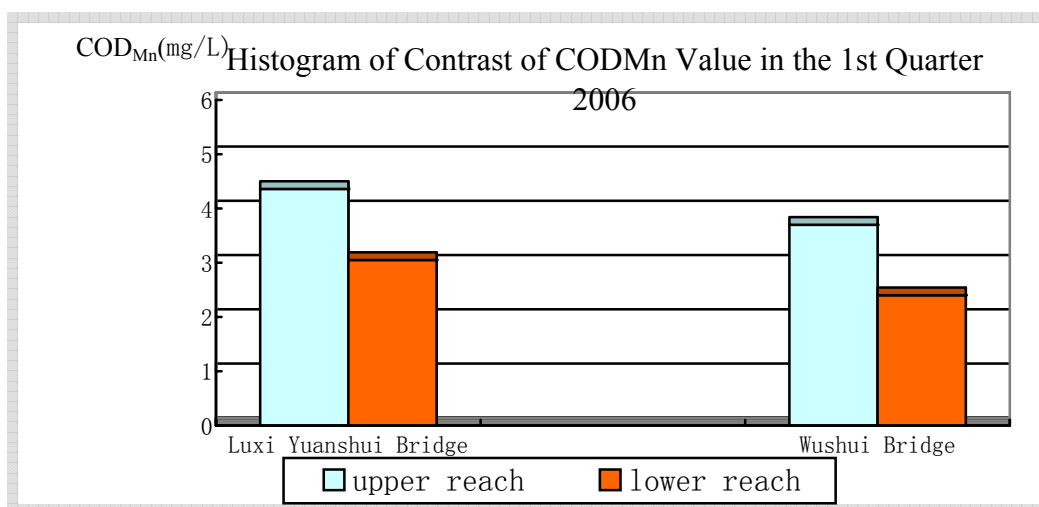
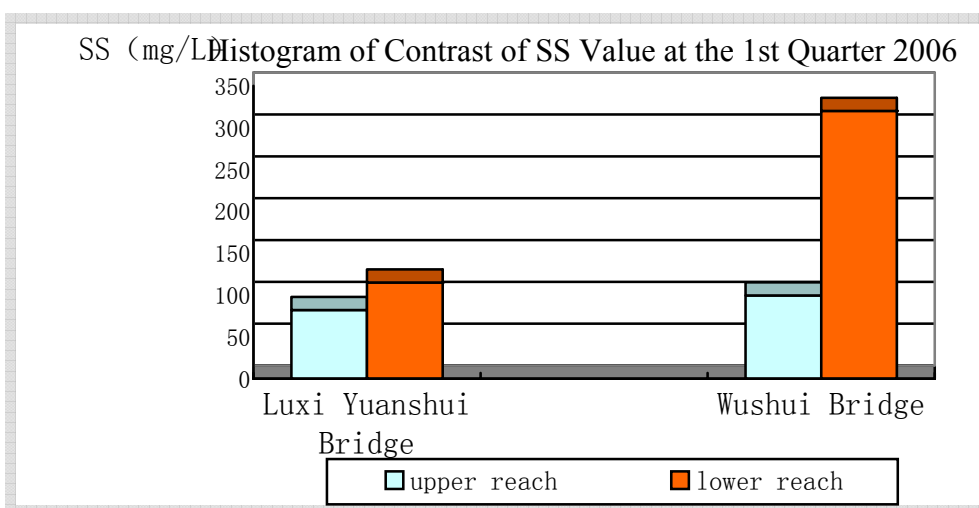
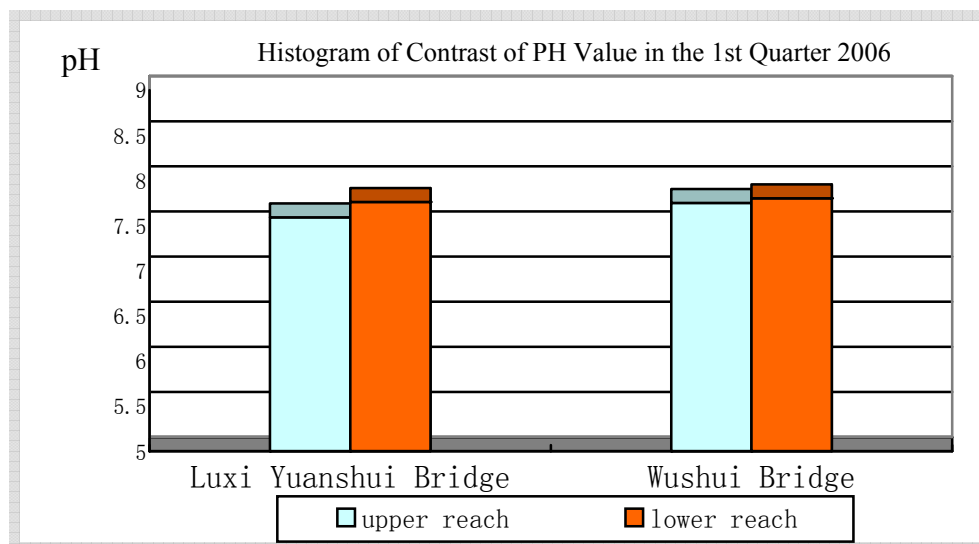
Unit: mg/L

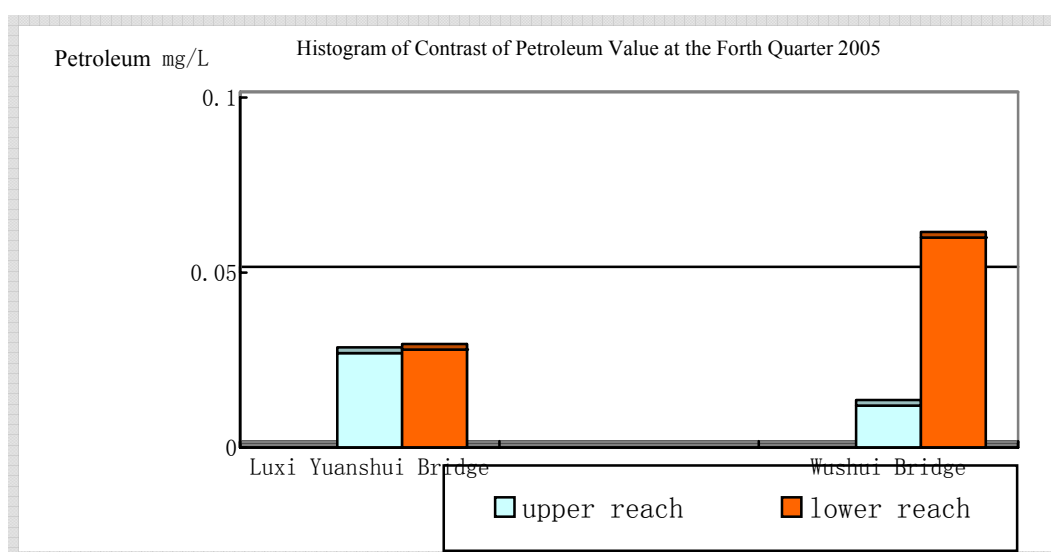
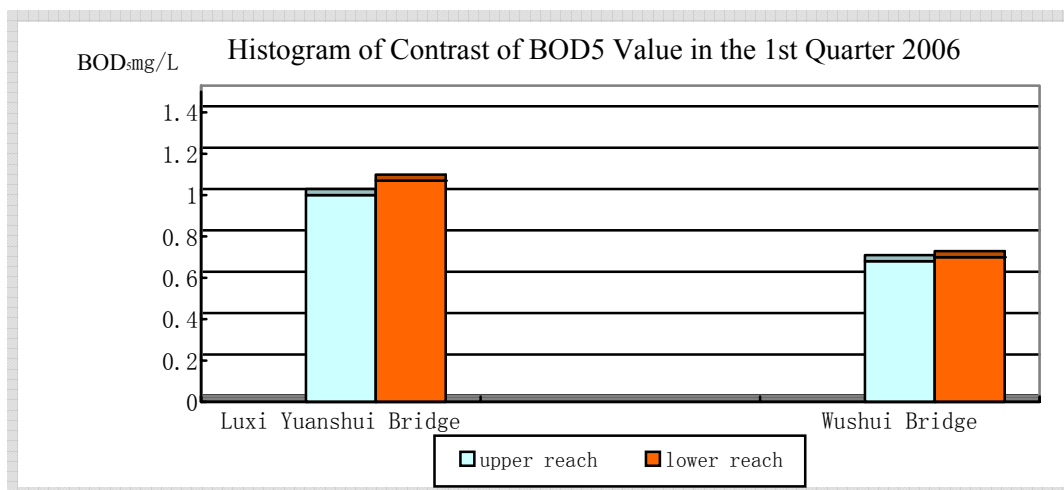
River		pH	SS	COD _{Mn}	BOD ₅	Petroleum
Luxi Yuanshui Bridge	Upper reach	7.59	82	4.36	0.30	0.027
	Lower reach	7.76	115	3.05	0.40	0.028
Wushui	Upper reach	7.75	99.5	3.70	0.49	0.012
	Lower reach	7.80	320	2.40	0.59	0.060
Class III Criterion		6 ~ 9	≤ 150	≤ 6	≤ 4	≤ 0.05

5.7 Conclusions

According to class III of *surface water environmental quality standards*, the monitoring results of water environment at Luxi Yuanshui Bridge are under the standards, which indicated that the construction of Luxi Yuanshui Bridge has little influence on the water quality. At the lower reach of Wushui, concentrations of SS and petroleum are higher than the standards, which illuminated that the construction of Wushui Nongziping bridge, wushui Tumasai bridge has affected water quality of Wushui River to some extent.

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





6. Ecology Effects And Public Opinion Survey

It is an ecologically good area, which relays 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.

The project is now at the stage of excavating earth and constructing embankment. , most of the surfaces of the slopes in Changde and Huaihua sections are bare because of the excavation in the mountains. Some slidings of slopes in local area come into being due to the excavation and heavy rain, which will have adverse effect on the conservation of soil and water and the recovery of vegetation. The highway slope protection in Jishou section has finished mostly and the restoration of slope vegetation is well..



Excavating Slope at K90



Crack of Slope at K108



K112+020 Landslide



K111 Slope Reinforce with Anchor Cable



Concrete Framework to Slope Protection at K216



Slope Protection with Vegetation at K214



Slope Protection with Vegetation at K215



Slope Protection with Vegetation at K215



Zhangmuxi Slope Protection with Vegetation at K213

Along changji Expressway, the subgrade filling material mainly comes from the mountain digging. The excavation and transportation of the fillings are executed within the area of subgrade to large extent, thus this process has limited effect on the circumjacent environment. Dumping ground is generally located at filled road area. By means of in-situ investigation, large-scale dust emission and soil erosion are not detected, ecology environment is satisfactory.



Borrow Pit, 50m from the Right Side of K111+760



Dumping Place at K210



Dumping Place near the Inlet of Bimaxi Tunnel

Due to the heavy rain, the water of yuanshui river and wushui river is turbid in the 1st quarter of 2006. The monitoring results of water environment at Luxi Yuanshui Bridge are under the standards, while the results of Wushui river are higher than the standards, which may result from the heavy rain. The monitoring results of water environment from the sections of construction of bridges don't exceed the standards, indicating that the construction of bridge has little influence on water quality.

The growth of local crops was good. However, some local residents ascribed the damage of farmland water conservancy works to the build of the expressway.



The Water Body near K219+300 Qifang Brige



the Water Body at K216+200 Dong Shui River



Yuanshui Bridge at K176+800



Yuanshui Bridge at K176+800, Swelling due to the Heavy Rain

**Farmland near K216+200 the Ana Exchange****K88+450 Gongjiwan Branch of Yuanling**

Though the residents of Hujiazuo Baiwuping Village at the site of K123+484 complain that drinking water source has not restored, and the phenomena of houses cracking by the vibration of rollers remain, The environmental monitoring results are better than the one of the last quarter to a certain degree by taking effective measures. TSP concentration at sensitive sites are all under the standards, and the ambient air quality is good. The noise monitoring results meet with the request of class IV criteria limits in *Urban Environmental Noise Standards* (GB3096-93.

**K123+484 Newly-built Drinking Water Source****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; the

ambient air quality is good and TSP meets with the request of the secondary standard; and there is a superscale in noise at a few sensitive sites, noise made by construction produced impact on local school to some degree.

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.

Monitoring personnel:

Report compiler:

Examiner:

Technology supervisor:

Signer authorized:

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