SFG1301 REV

World Bank Loan

Hebei Clean Heating Project

Environmental Management Plan

Prepared by

Foreign Debt Management Center of Hebei Provincial Government

For the World Bank

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Content

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Appendix A Environmental Protection Management Regulations on Heating Exchange Station and Pipeline Laying Construction

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Environmental Management Plan

1. Overview

1.1 Background of the Project

Hebei province is located in the North China Plain, which is one of the three provinces and cities in the Beijing-Tianjin-Hebei synergy development plan. The central heating construction in Hebei province started from 1970s. And since the early 1990s, Hebei has been accelerating the central heating construction to promote the economic growth, advance the urbanization process and expand the coverage of central heating in the region. Thus the heating-supply mode has been initially formed in which cogeneration heating supply is major and boiler-room heating supply in large-scale areas is auxiliary and other clean energy is complementary (such as the fuel gas, ground source heat pump and terrestrial heat).

The development targets of the heating industry in Hebei: strive to develop the heating mode in which cogeneration heating supply is major and boiler-room heating supply in large-scale areas is auxiliary to improve the urban environment and further improve the comfort level of residents. During the heating period, the heating supply can comply with national standard requirements. The rate of reaching the standard of heating temperature can be higher than 95%. The urgent repair of pipeline network can be in time in any circumstances. The urban central heating penetration can be over 80% and the heat-metering charged areas can reach higher than 30%. Comprehensively promote the heat metering reform. The development focuses on the followings: 1) develop the urban heating system dominated by cogeneration and central heating. The distributed small coal-fired boilers in cities whose per-capacity is fewer than 10 tons an hour and those in county-level cities whose per-capacity is fewer than 4 tons an hour shall be stopped before 2017. 2) Take good advantage of the solar power, wind energy, terrestrial heat, biogas and other clean energy and establish new energy system. 3) Strive to develop the transformation of energy-saving technology of heating system to increase energy efficiency. 4) Implement the energy-saving transformation of existing buildings. The heating metering and energy-saving transformation of existing buildings reach over 50 million m^2 in 2015 and reach over 100 million m^2 in 2010. 5) Comprehensively promote heating metering reform. All newly-completed constructions, large-scale public constructions and constructions whose heat metering is transformed should not be charged by area but by heat. County-level cities and counties with over 100 thousand population shall issue heat metering prices, charging measures and launch a pilot project charged by heat-metering, which covers more than 500 thousand m^2.

The project will carry out clean heating demonstration in 4 cities and counties of Hebei according to the plan. Carry out energy-saving transformation of the existing heating facilities through introducing advanced domestic and international heating concept and technologies. In the meantime, rebuild some heating facilities; reuse the industrial waste heat and shut down the backward heating sources (small heating boiler-rooms) to build clean heating system. Furthermore, it is planned to install heat-metering facilities for end-users in some cities and counties and carry out the capacity building of clean heating system.

The project is composed of four subprojects, namely Chengde City subproject, Pingshan County

subproject (Pingshan is subordinate to Shijiazhuang City), Xingtai subproject and Zhangjiakou subproject, which are distributed in four cities and counties. The main project construction contents are in the following: the clean heating facilities construction, including heating pipeline construction, heat exchange station construction, the heating pipe network construction and transformation. Besides, 'project management and the capacity building of clean heating' are included. The four subprojects contain the above construction contents.

The project executing agency is the World Bank funded project management office (PMO) in Hebei (Foreign Debt Management Center of Hebei Provincial Government). The project leading groups and administrative offices are set up in relevant project cities and offices, which will take charge of the project management work. In the meantime, a local heating company is appointed as project implementing unit (PIU) in each of four cities and counties, namely, Chengde Heating Group Co, Ltd. Pingshan Chengzhen Heating Co, Ltd. Xingtai Xuyang Anneng Heating Co, Ltd. Zhangjiakou Dongyuan Heating Co, Ltd. The project PMOs and PIUs will complete the relevant work during the preparation and implementation stages under the center leadership of Foreign Debt Management Center in Hebei province.

Table 1-1 Brief Characteristics of the Project

	Chengde Subproject	**Pingshan Subproject**	**Xingtai Subproject**	**Zhangjiakou Subproject**
PIU	Chengde Heating Group Co, Ltd.	Pingshan Chengzhen Heating Co, Ltd.	Xingtai Xuyang Anneng Heating Co, Ltd.	Zhangjiakou Dongyuan Heating Co, Ltd.
Principal of PIU	Ji Wei	Zhang Jianming	Yin Yongwei	Wang Zhigang
Main project contents	1. Build new conventional heat exchanger stations, building heat exchanger stations and some one-time heating pipeline networks 2. Carry out energy-saving transformation of outmoded one-time heating pipeline networks, two-times heating pipeline networks and facilities.	1. Build some new one-time heating pipeline networks, conventional heat exchanger stations and building heat exchanger stations. 2. Carry out scale transformation of heat exchanger stations. 3. Carry out the transformation of some one-time heating pipeline networks. 4. Install household heat metering tables; transform the automatic monitoring and control system of pipe network system; build new automatic monitoring command centers.	1. Transform the heat source equipment in the factories; build new circulating water pipes and steam pipes to the origin station. 2. Build facilities of the origin heat exchanger stations. 3. Build some new one-time heating pipeline networks. 4. Build some new conventional heat exchanger stations and building heat exchanger stations.	1. Build new interval pressure heat exchanger stations, one-time heating pipeline networks and hot-water pipeline networks. 2. Build and transform building heat exchanger stations. 3. Build new heating command centers. 4. Install household heat metering tables. 5.Carry out the gas transformation of coal-fired boilers.
Total planned investment	CNY 21.234 million	CNY 15.436 million	CNY 66.854 billion	CNY 45.409 million
Planned World Bank loan	20 million US dollars	12 million US dollars	33.50 million US dollars	33.50 million US dollars
Construction cycle	Three years	Four years	Five years	Three years

1.2 Project Targets

The project targets are as follows: 1) improve the heating supply capacity of cities and counties to increase the heating coverage. Expand the local central heating areas. 2) Improve the efficiency of renewable energy like the industrial waste heat; abandon small-scale coal-fired boilers and reduce the emission of atmospheric pollutants. 3) Improve the automaticity of pipeline networks and heat exchanging stations to reduce the waste of energy. 4) Solve the aging problem of pipeline networks to reduce heat loss, save energy and improve the safety of heating operation. 5) Introduce the building heat exchanging stations of low investment with high energy efficiency to increase the heating utilization efficiency. 6) Install heat metering equipments for end-users' convenience to save energy. 7) Improve the operational efficiency and management ability of heating companies to increase the heating stability of relevant cities, counties and the thermal comfort degree. 8) Achieve the targets and requirements of the local urban heating special planning.

The effects of the project upon the regional atmospheric environment and the urban infrastructure constructions are in the following: A) improve the living quality of urban residents. B) Improve the energy efficiency of heating service in relevant cities and counties; optimize the urban heating methods. C) Improve the environmental performance and reliability. D) Make a contribution to achieve the reduction of pollutant emissions in the *Air Pollution Prevention and Control Action Plan in Beijing-Tianjin-Hebei Region and the Surrounding Regions*. E) Make a contribution to achieve the national targets of *The Air Pollution Prevention and Control Action Plan*.

1.3 Target and Purpose of Environmental Management Plan

The purpose of making the environmental management plans (EMP) is to control the unavoidable adverse effects of the project upon the environment and it is necessary to make environmental impacts mitigation measures which are feasible in technology, continuous and operational in financial affairs and make monitoring plans. Also it is essential to make sure the responsibilities of executing agencies, PIUs, contractors, supervisors, operators and environmental management agencies during the construction and operation period, make sure the environmental management institutional frameworks, capacity building measures and arrangements to eliminate or make up to the adverse effects of the project upon society and environment as possible and reduce it to an acceptable level. The targets are as follows:

(1) Clear identify the environmental obligations of contractors and operators.

The environmental impacts mitigation measures in the EMP shall be brought into the engineering designs, bidding documents and contracts, which will serve as contractual obligations of constructional contractors and operators.

(2) Operational instructions of environmental management

The environmental monitoring plans during the construction and operation period in the EMPs can guarantee the effective implementation of environmental impacts mitigation measures, which will serve as the environmental protection texts that will be provided to the management units during the construction and operation period, environmental supervision units and other

relevant departments to help them to make sure the responsibilities and roles of relative departments and management institutions.

(3) Guarantee the expenditure of the environmental management

The expenditure of referred environmental management and measures, environmental supervision and ability construction will be calculated and recorded in the EMPs. Also the funding sources will be ensured to guarantee the implementation of environmental management actions.

EMP will help to avoid and control the environmental impacts during the construction and operation period. Also the relative impacts mitigation measures, monitoring measures, legal regulation means and the supporting measures of the above measures will be put forward according to the plans. What's more, the plans serve as the key bonds of connecting the environmental impacts, evaluations of the environmental impacts assessment, detailed descriptions of impacts mitigation measures and substitute measures.

1.4 Environmental Protection Targets during the Project Implementation

The environmental protection targets are divided into general environmental sensitive targets and special environmental sensitive targets. According to the site investigations, there are 189 general environmental sensitive targets and 61 special environmental sensitive targets in total. Special environmental sensitive targets include: hospitals, schools, important roads and intersections, penetration points of pipeline constructions of railways and roads, construction sites that will have great impacts upon municipal government and other pipelines, residential buildings that are near the construction sites. The detailed environmental protection targets list is illustrated by the **Table 1-2**.

Table 1-2-1 Summary of Environmental Protection Targets of the Subprojects

	Chengde subproject	Pingshan subproject	Xingtai Subproject	Zhangjiakou Subproject
Main environmental protection targets	There are 10 residential building areas, 2 schools, 1 hospital, 1 road in the surrounding of the construction site. Also 4 among them are special sensitive targets and 10 among them are general sensitive targets.	There are 20 residential buildings, 1 school, 2 hospitals, 14 administrative office units, commercial and research institutions, 8 general traffic intersections, 7 municipal pipelines, 1 railway crossing, 3 provincial highway crossings and excavations in the surrounding of the construction site. Also 4 among them are special environmental sensitive targets and 52 among them	There are 92 residential buildings, 10 hospitals, 8 schools, 14 roads, 9 important traffic intersections, 1 railway crossing, 1 provincial highway excavation in the surrounding of the construction site. Also 31 among them are special environmental sensitive targets and 104 among them are general environmental sensitive targets.	There are 30 residential building areas, 3 schools, 8 office institutions of any type, 4 important traffic intersections in the surrounding of the construction site. Also 22 among them are special environmental sensitive targets and 23 among them are general environmental sensitive targets.

Table 1-2-2 Environmental Protection Target List of Chengde Subproject

Environmental elements	Construction components	Environmental protection targets	Direction	The nearest distance (m)	Environmental quality standards (level)
A) Target of general environmental sensitivity					
Air and acoustic	New pipeline	Shuixiehuadu Community	SE	60	Class 2 standard in the

environment	networks establishment	Nanyuan Xiaonangou	SW	25	*Environmental Quality Standard for Noise* (GB3096—2008) Class 2 standard in the *Ambient Air Quality Standards* (GB3095—2012)
		Lijing Huating Community	W	50	
		Residential Building for Tap Water Factory	SW	30	
	Transform the old pipeline networks	Niuquan Zigou Community	N	36	
		Nanyuan Community	E	30	
	Heating exchanger stations	Shuixiehuadu Community	SE	11	
		Jinniu Shanzhuang Community	W	12	
		Xiandaicheng Community	N	10	
		Desheng Meidiwanjing Community	SE	10	
		Nanyuan Xiaonangou	SW	6	
		Lijing Huating Community	W	10	
		Residential Building for Tap Water Factory	SW	12	
		Baishunyuan Community	NE	10	
Air and sound environment	Removal of small boiler rooms	Minzu Middle School	SW	28	Class 2 standard in GB3095—2012 Class 2 standard in GB3096—2008
		Residential Building for Tap Water Factory	SW	12	
Ecological environment	Land-occupied areas	Vegetation and cultural landscape	/	/	Vegetation is properly protected and landscapes are harmonious.
B) Target of special environmental sensitivity					
Air and acoustic environment	New pipeline networks establishment	Minzu Middle School	SW	30	Class 2 standard in GB3095—2012 Class 2 standard in GB3096—2008
	New heat exchange stations construction	266 Hospital	SE	20	
		Puning Primary School	E	20	
		Minzu Middle School	SW	22	
Social environment	Construction work	Tourism	/	/	Impose no impacts upon the tourism industry of Chengde
		Traffic	/	/	Reduce the adverse impacts upon the normal traffic
		Note: In terms of the tourism and traffic impacts, pay much attention to the barrack sections of the west street.			

Table 1-2-3 Environmental Protection Target List of Pingshan Subproject

A) Target of general environmental sensitivity						
Environmental element	**Engineering**	**Environmental protection targets**		**Direction**	**The nearest distance (m)**	**Environmental quality standards (level)**
Sound, atmosphere	Build new pipeline networks	Longxing Mingdu Shops (under construction)	Gangcheng Road	W	21	Class 2 and 4a standards in the *Environmental Quality Standard for Noise* (GB3096—2008) Class 2 standard in the *Ambient Air Quality Standards* (GB3095—
		Runjing Garden Shops		W	21	
		Kangxin Home		E	42	
		Longhe Home		E	49	
		Xiangxielidu Community (under construction)	Zhongshan West Road	S	60	
		Binheyayuan		S	55	

		Community (under construction)				2012)
		Pingshan County Hospital		WN	58	
		Yuehe New City (under construction)	Xibaipo West Road	EN	70	
		Xibopo No.2 Middle School		EN	70	
		Huibinglou Hotel		N	30	
		Longcheng Garden		S	80	
		Longcheng Garden	Hexi Street	W	41	
		Yehe Mingzhu		W	25	
		Mingzhu Park		E	23	
		Zizhuyuan Community	Dongchuan Street	E	20	
		Gaocun Village		N	20	
		Feicheng International Community	Power plant and Feicheng International Building	EN	25	
Social environment		Intersections of Wanshou Road	Gangcheng Road	/	/	
		Water pipes along the pipelines, sewage pipes, geographical cables, optical fibers, traffic signal lines, gas pipelines and so on.		/	/	
		Water pipes along the pipelines, sewage pipes, geographical cables, optical fibers, traffic signal lines, gas pipelines and so on.	Zhongshan West Road	/	/	
		Intersection of West Zhongshan Road	Hexi Street	/	/	
		Water pipes along the pipelines, sewage pipes, geographical cables, optical fibers, traffic signal lines, gas pipelines and so on.		/	/	
Sound and air	Transformation and expansion of the pipeline networks	Pingshan Sub-branch of ICBC	Jianshe North Street	E	35	
		Workers' Hospital of Pingshan County		W	6	
		Pingshan Sub-branch of China Bank		E	35	
		Yujing International		W	40	
		Justice Bureau		W	6	
		Food Bureau		W	6	
		Price Bureau of Pingshan County		E	35	
		Jianan Community	Xibaipo West Road	N	10	
		Anju Community		N	10	
		Post Office of Pingshan County		N	15	

		Finance Bureau of Pingshan County		N	15	
		Industrial and Commercial Bureau of Pingshan County		N	15	
		Rongchang Hotel		S	40	
		Jingye Hotel		S	40	
		Zhonghang Anquan Community		S	40	
		Vocational Education Center	Xianbiao North Street	E	60	
		Xingshang Building		W	10	
		Jinxiu Garden Community	Hongqi South Street	W	10	
		Shidaicheng Community		W	18	
		Beijie Village		E	45	
Social environment		Intersections of Wanshou Road	The construction north street	/	/	Class 2 and 4a standards in the *Environmental Quality Standard for Noise* (GB3096－2008) Class 2 standard in the *Ambient Air Quality Standards* (GB3095－2012)
		Intersections of Jingye Road		/	/	
		Water pipes along the pipelines, sewage pipes, geographical cables, optical fibers, traffic signal lines, gas pipelines and so on.		/	/	
		Intersections of Dongchuan Street	Xibaipo East Road	/	/	
		Intersections of Andong Street		/	/	
		Intersections of North Hongqi Street		/	/	
		Water pipes along the pipelines, sewage pipes, geographical cables, optical fibers, traffic signal lines, gas pipelines and so on.		/	/	
		Water pipes along the pipelines, sewage pipes, geographical cables, optical fibers, traffic signal lines, gas pipelines and so on.	North Xianbiao Street	/	/	
		Intersections of Pingnan Road	South street of Hongqi Road	/	/	
		Water pipes along the pipelines, sewage pipes, geographical cables, optical fibers, traffic signal lines, gas pipelines and so on.		/	/	

B) Target of special environmental sensitivity

Environmental element	Construction contents	Environmental protection targets	Main impacts contents	Environmental quality standards
Social	Build new	Gangcheng Road: Suhuang	Traverse through the reserved	Reduce the adverse

environment	pipeline networks	Railway	heat pipes under the bridge of railways	impacts upon the normal traffic to the least.
		Power plant and Feicheng International Building: Dianchang Road (urban section of S301 Provincial Road)	Traverse through the under pipe-jacking of provincial highway s301.	
		Intersection of Hexi Street and West Xibopo Road	Traverse through open channels	
	Transform and expand the pipeline networks	Intersection of North Xianbiao Street and East Xibopo Road	Traverse through open channels	

Table 1-2-4 Environmental Protection Target List of Xingtai Subproject

A)General environmental protection targets					
Environmental element	**Engineering**	**Environmental protection targets**	**Direction**	**The nearest distance (m)**	**Environmental quality standards (level)**
Atmospheric and acoustic environment	Heating pipeline construction	73 residential areas, 8 schools, 9 hospitals	/	Beyond 50 m	Class 2 and 4a standards in the *Environmental Quality Standard for Noise* (GB3096－2008) Class 2 standard in the *Ambient Air Quality Standards* (GB3095－2012)
Social environment		The shops facing the street	/	/	To minimize the negative effects
Traffic effects		Xingzhou Avene, Jinquan Street, Renmin Street, Kaiyuan North Road, Kaiyuan Road, North Spring Street, South Spring Street , Tuanjie Avenue, Xinhua Road, Xingda Road, Yejing Road, Gangtie Road, Taihang Road, Lianchi Street	/	/	To minimize the negative effects on normal traffic
B)Particular environmental sensitive targets					
Environmental element	**Engineering**	**Environmental protection targets**	**Direction**	**The nearest distance (m)**	**Environmental quality standards (level)**
Atmospheric and acoustic environment	Heating pipeline and heat exchange station construction	Yihai Garden	W	30	Class 2 standard in GB3095－2012 GB3096-2008 – Class 2 standard
		Fengchao Garden	W	30	
		Quandu City	N	50	
		Tianhe Renjia Residential zone	W	20	
		Dexin Court	N	30	
		Century Mingdu	N	50	
		Zhaicun Community	S	50	
		Community Health Centers	N	50	
		Natural City	N	50	
		Longqiang Gaozhu Building	S	40	
		Xueyuan Apartment	S	50	
		Yijin Garden	N	30	
		Hongsheng Garden	S	50	
		Hexie Garden	NS	30	
		Paper Mill Relatives Court	N	30	
		Yinfa Community	N	40	
		Yongkang City Garden	S	30	
		Guangming Community	S	40	
		Transformer Factory Relatives Building	S	30	

		Car Frame factory Relatives Building	S	30	
Traffic effects	Heating pipeline construction	S221 Provincial Road	The main impacts: the pipe network construction along the line		To avoid the negative effects on normal traffic
		Beijing-Kowloon Line	The main impacts: the pipelines under the railway cross the construction(pipe jacking)		To avoid the adverse effects of construction
		Intersections: Xingzhou Avene - Xiangdu Road, Xingzhou Avene - Kaiyuan Road, Xingzhou Avene - 107 National Highway, Yejin Road - North Spring Street, Renmin Street - Yurang Bridge Road, Xingda Road - Lianchi Avenue, Kaiyuan Road - North Spring Street, Kaiyuan Road - South Springs Street, Xiangdu Road - Dongguan Street	The main impacts: the effects of the pipe network construction along the line to the original water supply and discharge pipelines, electricity pipelines, telecom pipelines and gas pipeline, etc.		To avoid the adverse effects of construction

Table 1-2-5 Environmental Protection Target List of Zhangjiakou Subproject

Environmental element	Engineering	Environmental protection targets	Direction	The nearest distance (m)	Environmental quality standards (level)
A) General environmental protection targets					
Atmospheric and acoustic environment	Heating pipeline construction	22 residential areas, 1 school	/	Beyond 50 m	Class 2 and 4a standards in the *Environmental Quality Standard for Noise* (GB3096－2008) Class 2 standard in the *Ambient Air Quality Standard* (GB3095－2012)
B) Targets of particular environment sensitivity					
Atmospheric and acoustic environment	Compartment pressure and heat exchange station	China Unicom Relatives Building 3	N	10	Class 2 domain of acoustic environment performs the level 2 standard of *Environmental Quality Standard for Noise* (GB3096－2008). Class 2 domain of ambient air performs the level 2 standard of *Ambient Air Quality Standard* (GB3095－2012).
		Residential Building of 251 Hospital	W	6	
	Heating pipeline construction	High-tech Zone Miaomiao Nursery School	E	40	Class 2 domain of acoustic environment performs the level 2 standard of *Environmental Quality Standard for Noise* (GB3096－2008). The first row beyond the red lines on the two sides of the city main roads including Wuyi Street, Middle Shengli Road, North Shengli Road, Jianguo Road and Dongxing Street focuses on buildings taller than 3 floors. The region facing the roads is Class 4 domain of noise
		Zhangjiakou Qiaodong District Bureau of Municipal and Rural Construction	E	30	
		Zhangjiakou Qiaodong District Construction and Environmental Protection Agency	E	30	
		Zhangjiakou Bureau of Land and Resources Qiaodong Sub-bureau	W	26	
		Hebei Zhangjiakou Radio Administration Bureau	E	40	
		Gongrencun South Community Traffic Police Community	E	30	
		Zhangyuan New Town	E	50	

		City Industrial and Commercial Bureau Residential Building	W	25	and it performs the level 4a standard of *Environmental Quality Standard for Noise* (GB3096－2008). Class 2 domain of ambient air performs the level 2 standard of *Ambient Air Quality Standards* (GB3095－2012).
		People's Government of Zhangjiakou Qiaodong District	W	45	
		Rongchen Garden	W	50	
		Meihuixian Community	E	40	
		Weihua Elementary School	E	27	
		Education Bureau of Zhangjiakou Qiaodong District	E	27	
		Zhangjiakou Employment Service Agency	W	35	
		Victoria Square Community	N	43	
		Chahaer Martyr's Cemetery	E	15	
Traffic effects	Heating pipeline construction	Intersection of Middle Shengli Road and West Shenghua Street	Have major impacts on the pipe network construction along the line		To avoid the negative effects of construction on normal traffic
		Intersection of North Shengli Road and Jianguo Road, South Hongqi Road			
		Intersection of North Shengli Road and East Jianshe Road			
		Intersection of North Shengli Road and Wuyi Street			
		Weihua Elementary School			
Social effects	Heating pipeline construction	The intersection of Middle Shengli Road and West Shenghua Street	Have major impacts on the effects of the pipe network construction along the line to the original water supply and discharge pipelines, electricity pipelines, telecom pipelines and gas pipeline, etc.		To avoid the adverse effects of construction
		Intersection of North Shengli Road and Jianguo Road, South Hongqi Road			
		Intersection of North Shengli Road and East Jianshe Road			
		Intersection of North Shengli Road and Wuyi Street			
Related project: the gas pipeline under planning	Gas pipeline construction	Yanghe	Have major impacts on the crossing or stepping over of pipeline laying		To avoid the adverse effects of construction on the normal operation of roads and railways and the river water quality
		Beijing-Baotou Railway Huanhua Part			
		Hachaer Street			
		Beijing-Tibet Expressway			

1.5. Summary of Environment Management and Planning

EMP is the guidance document of environmental management in the project implementation process. Main contents are included as follows:

(1) Environmental management system: to determine the involved relevant agencies and their specific duties during the construction and operation stages of the project.

(2) Environmental impacts and the mitigation measures: engineering measures and management measures taken to prevent or mitigate the adverse environmental effects during the construction and operation stages of the project.

(3) Environmental monitoring plan: to determine the monitoring plan during the construction and operation stages.

(4) Capacity building plan: to determine the training arrangement of environmental management during the construction and operation stages.

(5) The budget of environmental management.

(6) Continuous public participation.

(7) The reporting requirements for implementing the environmental management.

2. Policies and Legal Framework

2.1 National laws and Regulations

The project construction involves the national laws and regulations such as the Notification on Action Plan for Air Pollution Prevention and Control issued and delivered by the State Council, Detailed Rules for the Implementation of the Air Pollution Prevention and Control Action Plan in Beijing-Tianjin-Hebei Region and the Surrounding Regions and so on. The project complies with the requirements of local regulations and normative documents such as The Air Pollution Prevention and Control Action Plan.

The environmental impact assessment of this project follows Technical Guidelines for Environmental Impact Assessment, national environmental quality standards and pollutant discharge control standard, the requirement of the World Bank Safeguard Policy are also followed simultaneously.

The World Bank Safeguard Policy related to this project mainly include the environmental impact assessment (OP4.01), involuntary resettlement (OP 4.12), Environment, Health and Safety Guide (General EHS Guide), Guidelines for the Environment, Health and Safety of Thermal Power Plant (Thermal Power Plant EHS Guide); the safety of dam is also relate to the source of water for heating source enterprises in Xingtai (OP4.37).

2.2. Main Standards List

1) EIA Technical Guidelines (HJ2.1-2011) General

2) EIA Technical Guidelines (HJ2.2-2008) Air Environment

3) EIA Technical Guidelines (HJ/T2.3-93) Surface Water

4) EIA Technical Guidelines (HJ610-2011) Groundwater

5) EIA Technical Guidelines (HJ2.4-2009) Noise

6) EIA Technical Guidelines (HJ19 -2011) Biological Impact

7) Environmental Risk Assessment Technical Guidelines for Construction Projects (HJ/T169-2004)

8) Technical Guidelines for Water and Soil Conservation Rehabilitation (T16453.1-6-96)

9) Guidelines for Identification of Hazardous Solid Waste (Pilot) SEPA Document [2006]No.11

10) *Noise Environmental Quality Standard* (GB3096－2008)

11) *Ambient Air Quality Standard* (GB3095－2012)

12) *Surface Water Quality Standard* (GB3838-2002)

13) *Ground Water Quality Standard* (GB/T14848-93)

14) *Integrated Emission Standard of Air pollutants* (GB16297-1996)

15) *Emission Standard of Air Pollutants* (GB13223-2011)

16) Air Pollutant Emission Standard for Boiler (GB13271-2014)

17) *Emission Standard of Environment Noise for Boundary of Construction Site* (GB12523-2011)

18) *Emission Standard of Noise at Boundary of Industrial Enterprises* (GB12348-2008)

19) *Code for Design of Sound Insulation of Civil Buildings* (GB50118-2010)

20) *Standard for Pollution Control on the Storage and Disposal Site for General Industrial Solid Wastes* (GB18599-2001)

21) Design Codes for Treatment of Industrial Circulating Cooling Water (GB50050-2007)

22) *Wastewater Quality Standards for Discharge to Municipal Sewers* (CJ343-2010)

23) Technical Specifications for Continuous Monitoring of Thermal Power Plant Fume Emission (HJ/T 75-2001)

24) Standard for Pollution Control of General Industrial Solid Waste Storage and Disposal Sites (GB18599-2001)

3. Environmental Management System In accordance with the relevant provisions and the actual needs of the implementation of the project, the environmental protection department will fulfill regulatory functions according to the law. In addition, the project is to appoint specially-assigned persons from each level of the PMO to be in charge of environment management, and to establish construction stage and operation stage environmental management system including supervision agency, implementing agency and consultation services agency.

3.1. Environmental Management System at Construction Stage

The institutions involved at the construction stage environmental management system include the environmental protection agencies (management based on law), PMO of all levels (overall supervision), the project implementing unit (daily management), the contractor (the specific implementation of mitigation measures), and the monitoring unit (field monitoring and submit monitoring report). Please find the specific responsibilities of the division of labor in **Table 3-1**.

Table 3-1 environmental management system during the construction period

Nature of project agency		Name of project agency	Main responsibility
External management	Supervision agency	Environmental protection bureau	Environmental management supervision
		World Bank	Supervise and review the implementation of EMP

Internal management	Management agency	Provincial, city/county PMO	Overall supervision and management
		Construction unit	Responsible for overseeing and manage the implementation of environmental protection measures, take responsibility for environmental management
	Measures implementing unit	Contractor	Implementation of environmental protection measures during construction period
	Consulting service	Environmental supervising unit	Strict supervision of Environmental engineering quality and contractors for implementing environmental protection measures.
		EIA institute	Provide consulting service arise along the project implementation
		Environmental monitoring unit	To conduct on-site environmental monitoring based on the requirements in the EMP and provide monitoring report on time

3.2 Environmental Management System at Operation Stage

The institutions involved in the operation stage environmental management system include: environmental protection department (management according to law), PMO of all levels (overall supervision), the implementation agency (daily management), the operation unit (the specific implementation of mitigation measures), the monitoring unit (field monitoring and submit monitoring report) and heat source unit (personnel emission monitoring and provide monitoring results). Please find the specific responsibilities of the division of labor in **Table 3-2**.

Table 3-2 environmental management system during the operation period

Nature of project agency		Name of project agency	Main responsibility
External management	Supervision agency	Environmental protection bureau	Environmental management supervision
		World Bank	Supervise and review the implementation of EMP
Internal management	Management agency	Provincial, city/county PMO	Overall supervision and management
	Measures implementing unit	Construction unit	Implementation of environmental protection measures and entrusted monitoring, Collect heat source unit emissions monitoring report (Data)
	Consulting service	Environmental monitoring unit	To conduct on-site environmental monitoring based on the requirements in the EMP and provide monitoring result
	Associated project agency	Heating unit	Implement environmental protection measures and requirement during the project implementation period. To provide pollution emission monitoring report to construction unit

4. Environmental Management Agency

The environmental management institutional structure of the project includes the project management agency, the supervision agency, the construction and the implementing agency, the consulting service provider, and the monitoring agency.

4.1. Supervisory Agency

Environmental supervisory agencies of the project implementation period include the World Bank and environmental protection agencies at all levels.

Responsibilities of the World Bank cover:

-Review the progress report of the project and the separate semi-annual and annual environmental report. Check the implementation of the EMP;

- Send the annual review mission to carry out on-site inspection of the project;

- Review the environmental impact of the main changes in the project and related mitigation measures.

The environmental protection agencies at all levels are responsible for the supervision and administration of the whole process of this project, including the approval of the project environmental impact assessment report (including the environmental assessment of sub projects), environmental supervision and monitoring during the construction and operation stage.

4.2. Executing Agency

For the project environment management, the executing agency includes the provincial PMO and the county PMOs.

Provincial PMO is responsible for communicating with the World Bank to carry out the overall supervision and management.

County PMOs are responsible to:

1) Report to the competent government department and coordinate with other relevant departments to solve environmental problems;

2) Supervise the implementation of environmental protection measures required by the environment assessment;

3) Organize and implement the project environmental management training program;

4) Coordinate with the environmental inspection work (including the inspection of the World Bank).

4.3. Implementing Unit

Project implementing unit refers to project construction unit of each sub project (owners), its specific responsibilities include as follows:

1) Ensure the implementation of environmental protection measures in the tender documents and civil contracts.

2) Ensure that the environmental protection measures of the EMP are in the construction contract of the project;

3) Hire, supervise and coordinate environmental supervisor (qualification, responsibility and management);

4) Employ environmental external monitoring unit to carry out environmental monitoring during construction and operation stages;

5) Report the implementation of the EMP to all levels of the PMOs;

6) Record and collect the complaints during the project construction and operation process; report it to all levels of the PMOs; publish the results to the public; and to solve public complaints.

4.4. Supervision Agency

The construction supervision unit employed by the project implementation unit shall be in charge of the environmental supervision work, and shall be responsible for the implementation of environmental mitigation measures in the construction site. The specific duties of the supervision agency include:

1) Be responsible for the completion of environmental supervision, inspection of the environment report, the implementation of the environmental impact of the construction stage to slow down;

2) Supervise and inspect the construction area of the living sewage treatment, construction waste water treatment, soil erosion prevention measures, waste gas, dust, noise control measures, production, living garbage, sanitation and epidemic prevention, etc.;

3) Propose solutions to the problems of environmental protection in the construction activities;

4) Ensure that the contractors prepare and submit monthly environment;

5) Prepare and submit the construction supervision report.

4.5. Monitoring Agency

In accordance with the requirements of the world bank policy, the project implementation unit shall authorize a qualified environmental monitoring unit to monitor the noise and the raise dust and due diligence during construction and operation stages, including small boiler removal and heat source emissions according to the requirements of environmental monitoring plan, the location, monitoring parameters and monitoring frequency determined by the monitoring plan, and provide monitoring report.

4.6. Implementation Unit

The environmental management unit includes the project contractor and operating unit, its specific responsibilities include:

1) Implement all the environmental protection measures;

2) Cooperate with the implementation of on-site environmental monitoring;

3) Accept the engineering supervisor, the World Bank and the environmental protection departments' levels supervision and inspection of environmental protection;

4) Report on the implementation of environmental protection measures.

Please find the management structural representation during the construction and operation stages in **Figure 4-1** and **Figure 4-2.**

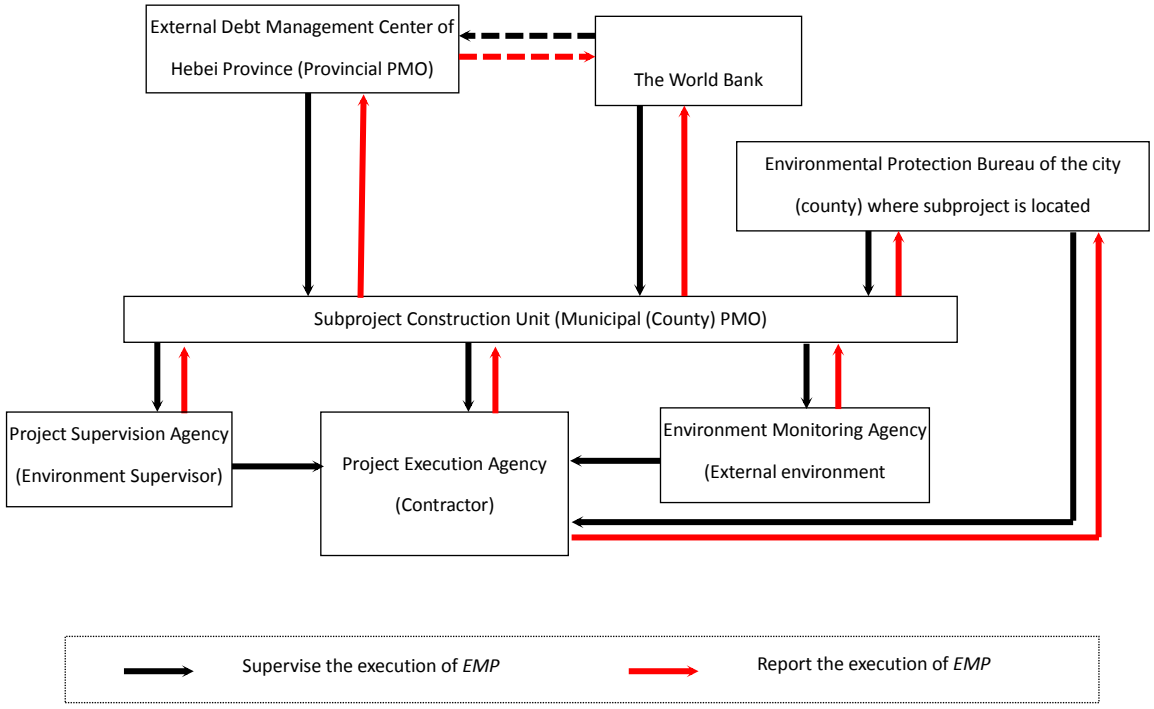

Figure 4-1 Institutional Diagram of Environmental Management Agency during the Construction Period

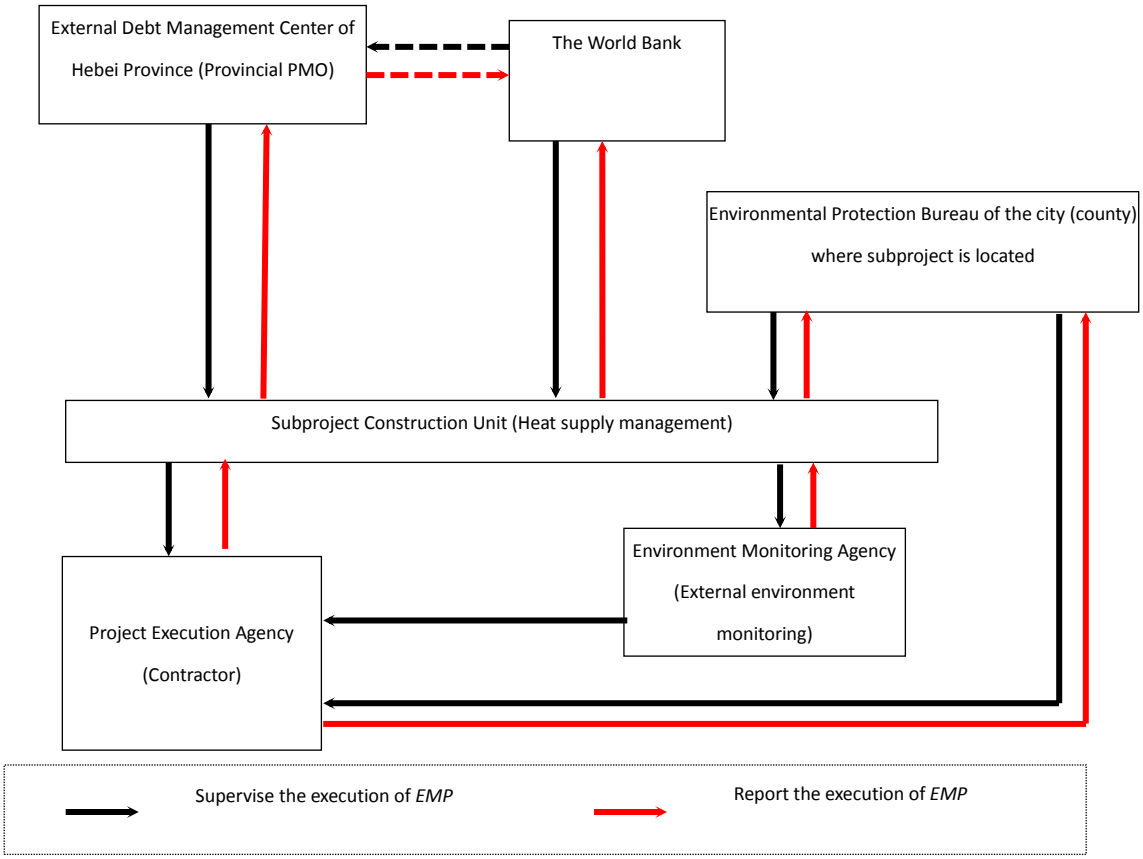

Figure 4-2 Schematic Diagram of Management Agency for Operation Period

5. Environmental Management and Impact Mitigation Measures

5.1. Design Phase

According to the experience of similar projects, in the design phase of this project, some environmental impact and risk mitigation measures have been taken into consideration. The purpose is to use the heat source rationally; to reduce pollution emissions; to improve the management effect and level of central heating; and to prevent environmental problems and other adverse effects during the construction and operation stages. Details are illustrated in **Table 5-1**.

5.2. Environmental Management Regulations and Impact Mitigation Measures during Construction stage

The environmental impact of the project is mainly concentrated in the construction stage. The main environmental impacts of construction stage include: (1) heat exchanging station and heating pipe network construction's impact on the acoustic environment and atmospheric environment; (2) the impact from the solid wastes of the heat exchanging station and heating pipe network; (3) the influence to the local traffic and the residents during the construction stage; (4) the impact from the solid wastes of small boiler removal and the influences on the workers' health and safety.

In view of the potential environmental impact of the construction stage, a comprehensive mitigation measures have been developed, including the environmental protection measures for the special sensitive target. To strictly control the construction activity and to ensure it will be in accordance with the requirements of the EMP, "Environmental Management Rules for Heat Exchanging Station and Pipeline Laying Construction Activities" have been edited. You can find the detailed plan in **Appendix A**. The removal of small boilers in Chengde, Xingtai and Zhangjiakouzi will be conducted the same time with the project. To the potential influences of dust, noise, and solid waste disposal, we have compiled a separate "Small Boiler Removal EMP". Details are illustrated in **Appendix B**.

In addition, 1) the result of field investigation confirms that there is no protected material and cultural resources within the construction scope of all the sub projects. 2) the prevention and mitigation measures of due diligence, small boiler removal, environmental and risk assessment, and social assessment are incorporated into the environmental impact mitigation measures in accordance with the impact category.

The general construction stage environmental impact mitigation measures of each sub project are summarized in **Table 5-2**, the special environmental impact mitigation measures are summarized in **Table 5-3**.

5.3. Operation stage Impact Mitigation Measures

Impacts during the operation of the project mainly include: (1) heat exchanging station's impact on the acoustic environment; (2) environment and risk impact of the heat exchanging station and heating pipe network.

The general and specific potential adverse environmental impact of each sub project during operation stage and the corresponding mitigation measures are shown in **Table 5-4** and **Table 5-5**.

5.4. Follow-up Actions by Heating Facilities

In order to improve pollution control performance of heating facilities, some follow-up actions will be taken by Pingshan and Xingtai subproject heating sources in parallel with implementation of the Project to ensure compliance with applicable pollution control standards. Detailed follow-up actions to be taken by the heating facilities are given in Table 5-6.

Table 5-1 Environmental Impact and Risk Mitigation Measures in Design Stage

Element	Mitigating Measures	Implementing Organization	Supervisory Organization	Expenses (ten thousand yuan)
Reasonably utilize heat source and reduce pollutant discharge	① Achieve combined heat and power generation with local existing heat source and finally achieve large-region centralized heat supply through optimizing heat supply pipeline network; ② Since heat is sourced from those heat source plants determined in heat supply planning, construction of combined heat and power generation conforms to local heat supply planning. In addition, construction of heat supply network by local heat supply department is concurrent with the project construction, avoiding repeated construction of thermoelectric project or unmatched construction duration between heat supply network and the project; ③ Gradually achieve fuel cleaning to reduce pollutant discharge; ④ Take heat balance stability in pipeline system into consideration during project design.	Designing institute	Construction unit (subproject office)	Included in design fee
Reduce environmental and other adverse impact in construction stage	① Take a full consideration in site selection for heat exchange station to minimize adverse environmental impact on sensitive targets; ② Enhance exploration and investigation in design stage to avoid excavation in construction interfering or destroying underground utilities for municipal facilities, communication, electricity and gas; ③ Formulate reasonable construction plan to avoid pipeline tied-up, cross construction, outside destroy or other abnormalities; ④ Take possible impact on social activities, urban traffic and material cultural resources into consideration in project construction design to avoid or reduce adverse impact; ⑤ Arrange sufficient public consultation activities in project preparation stage to facilitate formulation of sound construction plan, assuring smooth construction; ⑥ Bring expenses for environmental mitigation measures and environment monitoring into formulation of engineering cost estimate. It is also required that these estimation expenses shall be listed in construction contract for construction unit to specify duties and work content of each organization.			
Reduce environmental impact in operation stage and avoid environmental problems	① In design and preparation stage, formulate operation requirements for project operation stage, requiring to periodically inspect and tour heat supply pipeline, prefabricate signal line for monitoring in insulating layer of pipeline for real time monitoring of pipeline for having leakage timely found and repaired; ② The in and out pipeline of pump should be vibration absorber throat pump. The foundation of pump should adopt vibration reducing measures. Acoustic shield should be added and reduce noise. ③ Choose environmental protection equipment with low noise, and keep maintenance and repair regularly. ④ Heat exchange station is equipped with sound proof doors and double-layer closed sound proof windows; adopt sound proof structure when constructing heat exchange station; newly built equipments for heating station should be in reasonable layout; ⑤ It is required to enhance safety awareness to avoid chaos in or delay of emergency response in project construction and operation stages, in order to avoid safety risk caused by external factors.			

Reduce possibility of environmental risks in construction and operation stages	① Design buildings and structures according to requirements specified in national earthquake resistance code, with earthquake fortification reaching level 7. ② Make sure fire protection rating of buildings and structures which also should be equipped with effective fire extinguishing system; ③ Buildings and structures shall be equipped with water supply, drainage and heating systems to ensure domestic drinking water quality and drainage standards are met; ④ Make sure buildings and structures in well natural lighting and ventilation condition to create healthy and hygienic working environment; ⑤ Security margin of electric equipments in different voltage classes should not be less than the minimum margin required by relevant codes; damage blocking device should be configured between disconnecting switch and earthing knife-switch of corresponding breaker to improve security; all electrical equipments should be equipped with leakage protectors and safely grounded; ⑥ All places needing illumination in buildings and structures should be equipped with fluorescent lamps, waterproof lamps, corrosion-proof lamps and emergency lighting fittings; ⑦ Equipments in heat exchange station and pipeline of external surface temperature ≥50℃ should be configured with heat preservation layer to save energy and protect people being scalded or suffering heat radiation; ⑧ Valve inspection well of heat supply network should be designed according to requirements of *Design code for city heating network* (CJJ34—2010); ⑨ Zhangjiakou gas-fired boiler DCS system shall be designed to meet the requirements in *Code for furnace safeguard supervisory system in fossil fuel power plant* (DL/T1091-2008) and other relevant codes; ⑩ Zhangjiakou gas-fired boiler shall be equipped with ultra-low nitrogen combustor and exhaust purification system to have concentration of NOx in the exhaust lower than standard limit; ⑪ Doors of equipment rooms should open outwards. Hot water station building of length larger than 12m should be configured with 2 exits. Safety valves on hot water pipeline and equipment should be equipped with drain-pipe connected to safety place which should also be equipped with enough section area and anti-freezing measures for smooth drainage. Drain-pipe should not be configured with valve.			

Table 5-2 General Environmental Impact and Mitigation Measures in Construction Period

Project	Environmental Elements		Mitigation (Prevention) Measures	Implementing unit	Supervisory Agency	Monitoring Agency	Monitoring Program	Expenses (CNY 0'000)
Construction of heat exchange station and	Natural Environment	Acoustic Environment Noise from	① To select low-noise equipment; set up sound insulation hoarding sheet around construction site in case of relatively long-time construction with high frequency noise; ② Achieve rational layout on construction site to avoid local excessive sound level.	Contractor	Project Supervision, Construction Unit, county	Third-party Monitoring	L_{Aeq}	**541**

pipeline network, including coal-to-gas reconstruction of initial heating station, pressure isolation substation and boiler, and demolition of small boiler		construction of coal-to-gas reconstruction of initial heating station, pressure isolation substation and boiler	Place some equipments with high noise centralized, make fixed noise generating source away from sensitive targets and operate equipments with high noise in shelter as much as possible to minimize noise in construction stage; ③ Periodically maintain and repair machinery equipments to assure their normal and stable operation and avoid equipment in poor operation causing noise pollution; ④ Develop scientific construction plan to avoid concurrent operation of high-noise equipments and strictly control operation duration of high-noise machinery. Restrict equipment operation from regulated time duration (12:00-14:00 pm, 22:00 pm - 6:00 am in the next day); ⑤ Purchase commercial concrete rather than installing concrete mixer on construction site; ⑥ Vehicles for materials, earthwork and stonework and construction muck delivery should be kept in a rountine and away from residential concentrated area and transportation time beyond sensitive duration (22:00 pm - 6:00 am in the next day). Transportation vehicles should slow down and no horn-blowing when entering and exiting construction site. Construction unit shall keep transportation vehicles in good technical performance with tightened structure and no screaming in braking; ⑦ Set up barrier around buildings and structures when handling earthwork and stonework and construction structures to mitigate the impact; ⑧ Build boundary fence with height of 2.2m before start construction; ⑨ Adopt stationary or movable acoustic enclosure or noise barrier for local obstruction when operating electric generator or other high-noise equipments; ⑩ Reduce human-made noise as much as possible when disassembling baffle or holder, and loading and unloading materials or muck. ⑪ Immediately shut down idle equipments; ⑫ Enhance environmental supervision in construction period. Construction unit should dispatch special personnel in charge of construction machinery maintenance, and organize on-site workers in periodical training to avoid burst noise from fault equipment; ⑬ Construction unit should report to administration for environmental protection of the People's Government to obtain approval 15 days before commencement of project in accordance with provisions of *Law of the People's Republic of China on Prevention and Control of Pollution from Environmental Noise*. Reporting content		PMO, Local Environmental Protection Bureau			

			should cover project name, construction place and duration, possible environmental noise value and environmental noise pollution prevention and control measures to be taken.					
		Atmospheric environment Construction dust, including dust from coal-to-gas reconstruction of initial heating station, pressure isolation substation and boiler	The following measures should be taken during construction of pipeline network and heat exchange station: ① Construction area must be isolated with enclosure and taken watering measures to reduce dusting. The barrier on construction site should be stable and tidy. Clear the generated waste every day. Prohibit open earthwork excavation or long-time piling up waste; ② Building materials and earthwork prone to raising dust during construction should be covered with tarpaulin; ③ In case of earthwork excavation or backfill in dry weather easy to raise dust, it is necessary to conduct water sprayting for dedust and shorten dust causing activity duration. In case of windy weather higher than level 4 or air quality warning issued by government, stop on-site transporting materials prone to raising dust, stop dusting operation such as earthwork excavation or refill, and cover building materials with dustcloth; ④ Take covering measure for such building materials that is prone to raise dust including earthwork and stonework, cement and lime to avoid scattering along the transportation; prohibit from dispersing aloft or careless loading & unloading; make sure materials not scattered or leaked; ⑤ Entrance and exit of construction site should be cleaned periodically and set vehicle washing facilities to avoid sand being carried outside the construction site; ⑥ Welding should be conducted within on-site enclosure, increase and heighten the enclosure if necessary; ⑦ Prohibit on-site concrete mixing; use pre-mixed mortar; prohibit from on-site pitch mixing or heating; ⑧ Concentrate, classify and pile up construction waste and residue muck in construction area for daily clearing up waste generated; waste should be transported with closed vehicle or covered with tarpaulin, to avoid waste scattering along the transportation; prohibit waste being piling up for a long time; ⑨ Transportation vehicles and other construction machinery should be equipped with completed exhaust purification device to make exhaust meet emission	Contractor	Project Supervision, Construction Unit, county PMO, Local Environmental Protection Bureau	Third-party Monitoring	Total suspended particulates (TSP)	**343**

			standard. Fixed equipment exhaust blowdown stack should be arranged away from residential area and in sufficient height for diffusion; ⑩ Adopt construction machinery in conformity with requirements of relevant pollutant control standards and periodically maintain them to always make sure them in normal and smooth operation condition; ⑪ Construction unit should arrange special personnel in charge of environmental protection in construction period, provide corresponding training for operators and strictly execute various measures for preventing and controlling dust; ⑫ When pipeline network completed, construction unit should dismantle enclosure, safety protection facilities and other temporary facilities set on construction site within 2 days; clean the construction site and surrounding places. When heat exchange station completed, construction unit should dismantle enclosure, safety protection facilities and other temporary facilities set on construction site within one week; clean the construction site and surrounding places. For construction of first heating station and pressure isolation substation, besides the above mentioned measures, the following measures should be taken: (1) Main roads and working place on construction site should be paved, and barren place and that for piling up earthwork should be covered with tarpaulin, solidified, greened or handled with other measures; (2) Place for storing building materials must be flat and solid; those building materials prone to raising dust such as earthwork and stonework, cement and lime must be stored in closed space or covered with tarpaulin; sand should be piled into rectangular shape and stone piled into rectangular shape according to different grain diameters, with both covered with tarpaulin to avoid dust raising; (3) Water the area and roads prone to dust raising in regular time every day; (4) Entrance and exit of construction site should be configured with vehicle washing area to clean wheels of incoming and outgoing vehicles.					

		Water environment Small	① Public toilets (facilities) is encouraged to be used in the work field during construction. Temporary mobile toilets are supposed to be set up if there is no public sanitation nearby. Indiscriminate discharge is strictly prohibited on the spot.	Contractor	Project Supervision, Construction Unit, county	/	/	**135.7**

		amount of waste water produced during construction	② Sedimentation tank should be set, muddy water used in the construction should be clarified in the sedimentation and then be reused; ③ a special drainage channels are set at the construction location, which make small quantity of sewage discharge into the sewage pipe network instead of the surface of the earth; ④ sand, cement and other materials should be protected from rain when being stacked in the construction site, which can prevent surface runoff from the rain to pollute nearby natural waters.		PMO, Local Environmental Protection Bureau			
		solid waste and a small amount of solid waste generated during the construction period: construction waste and scraps and materials	Measures for solid waste generated by construction of heat transfer station and pipe network are: ① construction wastes should be transported to some location designated by urban administration agency; construction waste can not be dumped randomly and dumping sites for construction waste are not allowed to be set randomly, construction wastes are also not allowed to be sold and accepted. ② All spoil should be used for backfill. ③ temporary soil pileup come from sectional construction of the pipeline should be within the construction red line. Straw bag with soil bags are stacked around the construction site, Water should be sprayed to construction site to .water should be sprayed regularly to reduce dust impact based on weather condition like windy day or rainfall; ④ Vehicles for transporting construction waste shall follow arranged route, schedule and location, and should be properly loaded. Closure, packing and covering measures should be taken to prevent leakage and spillage ⑤ Waste metal parts, equipment spare parts and insulation material should be transported to designated disposal site in accordance with general industrial waste disposal requirements. Measures for solid waste generated by the demolition of small boilers are: ① construction waste, waste slag and ash and waste insulation materials are centralized to store and shipped to Chengde city construction waste landfill site for concentrated disposal; ② abandoned boiler equipment and associated equipment shall be sold to scrap purchasing station;	Contractor	Project Supervision, Construction Unit, county PMO, Local Environmental Protection Bureau	/	/	**91.5**

			③ after the closure of the old boiler, incomplete ground for original boiler installation should be back filled to keep the floor clean.					
	Ecological environment		① Make full use of natural topography in the region, to reduce temporary excavation area as much as possible, to mitigate the destruction to vegetation; to reduce the occupation of road greening land; to reduce the amount of excavation and fill, to try to make the balance of the earthwork of project; in order to protect the surface soil, stratified excavation, backfill measures; to excavate earth and back fill layer by layer in order to protect the mellow soil on the surface; ② During the construction period of pipeline, the way that a section should be recovered after its construction completion should be taken, the earth should be backfilled and vegetation should be recovered timely; ③ to reduce mixing construction materials in the site to mitigate the possible influence to the soil; ④ temporary soil pileup come from construction should be held back by straw bags with soil and measures of covering should be taken ⑤ vehicles used for construction are not allowed to make ways at random; ⑥ to restore the green and original function of the land as soon as possible when the construction of the project completed; ⑦ to build ecological environment construction supervision system of the construction period to ensure the implementation of measures.	Contractor	Project Supervision, Construction Unit, county PMO, Local Environmental Protection Bureau	/	/	**161.6**
	Conservation of water and soil		① Spoiled soil should be disposed properly and utilized comprehensively to prevent soil and water loss ② Strictly comply with design requirements, to take measures of blocking for nearby area where soil and water are easy to lost to narrow the range of influence; ③ Spoiled soil excavated during the construction should be pilled up in a central area. To try to excavate and back fill at the same time, to try to reduce the spoiled soil as much as possible to mitigate the soil and water loss ④ Temporary soil pileup should be held back by straw bags and covering measures should be taken.			/	/	**180.7**
	Social environment	Residents living, transportation,	① Careful preparation should be done before construction. Construction program should be confirmed with relevant agencies and emergency-response program should be in place to ensure the normal circumstance of surrounding residents' daily life;	Contractor	Project Supervision, Construction Unit, county	Social Assessment Monitorin	Contents of social activity plan	**235.6**

		commercial and cultural relics and etc.	② Relevant power agencies should be consulted in advance to confirm power use plan. In area with insufficient power capacity, expansion should be done in advance to prevent temporary power failure and disturb daily life of the residents and business along the pipeline; ③ Appropriate people should be assigned to contact with the communities, schools, hospitals and other agencies in the construction area and when it is necessary, they are asked to assist to solve the problems generated in the construction so that the normal work will not be disturbed. ④ Transport scheme during construction should be disclosed to the public through television, newspapers, radio and other media. Notice of bus route or station changing should be posted in the bus and at bus station. At the same time the bus company should set up a hotline for public consultation; ⑤ Billboards should be placed at the construction site indicating main contents of the project, construction time and contact person and hotline should be provided to obtain public understanding of the inconvenience caused by construction activities, ⑥ Height and direction of the construction lamp shall be considered not to affect residents during night; ⑦ Warning signs and traffic guiding signs should be posted in affected area in accordance with relevant requirements;		PMO, Local Environmental Protection Bureau	g Institute of the Third Party		
		Other	Properly resettle the boiler workers' training and reemployment from the closed small boilers. They will mainly hired as workers working the heat transfer station for maintaining or some similar posts with the original heating company.	Local heating company	Construction unit, local	/	Re employment rate	**0.2**
Construction period	Environment and security risk	Pipeline construction risk	A) To select qualified thermal insulation materials and to conduct anti-corrosion appropriately; to select qualified pipeline accessories like valve, compensators and etc. The steam pipe should be high enough to be across the walkway, the road and the height limit sign should be there on the road. B） Determine burial depth of pipelines according to requirements and make stability checking. The type selection of compensator is determined by calculation and all kinds of adverse conditions should be taken into account . To select qualified piping accessories, and to detect the attachment of the welding seam 100%. Fixed bracket thrust is determined by calculation and all kinds of	Contractor	Construction Unit, local Environmental Protection Bureau, Safety Supervision Bureau, Construction Management	/	/	20

			adverse conditions should be taken into account . Consider the local seismic intensity when handling foundation and laying pipelines. C） Determine burial depth of pipelines according to code requirements and make stability checking. Arrange dust cushion and conduct punning when the pipeline foundation construction starts. Consider the local seismic intensity when handling foundation and laying pipelines. D） To strengthen exhaust device settings of the pipe and equipment, to reduce the remained the air in the pipeline and circulating water pump. It is better to install an exhaust valve on the high point of the pipeline. The pipeline should be injected with water and exhausted before the pump starts and the remain air in the pipe is exhausted after the pump starts. To select the pump with stable quality and strengthen the maintenance of equipment. The outlet valve and cut-off valve must operate smoothly and maintained regularly. To strengthen the adjustment of pipe network load and extreme temperature changes should be avoided. Time curve of the on-off of the pump butterfly valve should be in line with the design requirements and can be adjusted, and it should be protected from water hammer caused by hydrophobic in the pipe from rapid opening of the pipeline. The pipe should be fully warmed before starting. E） Based on the reconnaissance results, the project pipeline network will not be crossed with other municipal pipelines; during the project preparation and desigh period, the site investigation still need to be strengthened. An instant investigation and report must be undertaken once an unknown pipeline is found, which can prevent damages to the municipal pipe network. Where there is a lot of other pipeline parallel or cross with the heat pipe, there must make careful measuring and line planning before construction and relative position should be clearly indicated. When the distance is short, mechanical excavation should be replaced by manual excavation. When construction activities are carried out near important lines like gas, water, important fiber and etc., relevant agencies should be informed to the scene and preparatory work should be made in case of emergency preparedness. F） Relevant agencies referring to planning, municipal, communications, electricity, gas and etc. should be informed about the pipeline route, buried depth, the pipeline location maps of the road where heating pipeline pass by managed by other agencies should be provided.		Authority			

		Mechanical (vehicle) damage, electricity safety risk	A） Machinery with good quality, safety and qualified electrical protection device should be selected. B） Due to large transportation and busy traffic during the construction period, contractor should take the transportation influence on the construction schedule and safety, the safety signal must be set and working time and task should be arranged properly. C） The construction lamp and related facility should be installed on the construction site in the night or somewhere with unfavorable light; D） Various machinery, electric safety equipment should be inspected regularly and some safety problems should be solved promptly. E） Various safeguard devices(including power safety devices)of the machinery should be ensured to be sensitive and effective; F） The firefight working on the spot should be noticed and necessary firefight equipment should be there. G） Machinery should be operated in accordance with the operation rules; H） Operations must apply with various construction and safety regulations, non-standard operation is strictly banned. I） three-dimensional cross operation.should be reduced as much as possible in the construction.					
		Acetylene gas explosion risk	A） To carefully watch the logo of the spherical portion of the cylinder shoulder. "Next pressure testing time" should be focused in particularly. Regular technical inspection of the cylinder should be undertaken in the use in accordance with the requirements. Gas cylinders shall not be used for more than a period of time. B） External inspection should be made firstly before use it. The key points are bottle valve, take over the thread, pressure reducer and etc.. If there is leakage, slider, ineffective hand movement or "climbing", it should be repaired promptly and any random treatment must be banned. Belt tightening valve stem is prohibited and the pad material must not be adjust . Soap water is supposed to be used to check the leakage and fire must be avoided. When the cylinder and electric welding are used in the same place, the bottom of the bottle should be insulated to prevent the cylinder charging. The piping and equipment that are in contact with the gas cylinder shall have a grounding device to prevent the combustion or explosion caused by static electricity. When the gas cylinder is used in winter, the cylinder					

			valve or regulator may frost, then it should be thawed with hot water or steam instead of fire baking or knocking the bottle valve with iron, and adjusting jerk screw of the regulator can not be twisted to avoid gas out which may cause the accident. C） Violent vibration and impact should be avoided in the process of cylinder use and storage. light loading and unloading in the transportation and special frame or cart must be used and wire rope must be banned to directly lift cylinder. Railing or bracket must be used to fix the cylinder to prevent dumping. D） cylinders should be kept away from high temperature, fire and molten metal splash (distance beyond 10 m). It must not be under the sunshine in summer. E） Open the cylinder valve slowly or regulator to prevent the collision heat of jet high-speed airflow in the electrostatic spark discharge, solid particles and reduce chafe, gas by sudden compression release heat (adiabatic compression) which will cause the cylinders and pressure reducer explode and catch fire. F) Qualified special acetylene pressure reducer and the tempering should be used. G）The temperature of the surface of bottle can not exceed 4O°C. When used, the bottle wall should be often touched and if the temperature is more than 40°C (some hot) , the bottle must be stopped using. After water cooling and it should be sent to the inflation agency for checking. H）Acetylene bottle can only be erected when it is stored and used. It must not be laid in horizon direction in case of outflow of acetone combustion causing the explosion. After silent period of fifteen minutes of the bottle upright standing, it can be install on the regulator for application. It is generally to open acetylene bottle valve by 3/4 circle and do not exceed a lap and a half at most. I） ventilation should pay attention to Indoors for storing acetylene bottles and to avoid stagnation of of acetylene leakage. J） The distance between the acetylene bottle and the oxygen bottle is no less than 5.0m.					
		Risk management of safety production	A) To strictly implement principle of "safety first, prevention first, comprehensive management" ; B） construction personnel must strictly abide by three disciplines: to wear safety helmet on the construction site, to fasten the safety belt above the ground and to avoid high-altitude litter;					

			C） To implement the responsibility for production safety, to perfect production management agency; D） To strengthen construction supervision and check on of the contractor qualification; E） To strengthen safety training and education to construction personnel, esp. especially for fresh workers, migrant workers who never work on the construction; mutual cooperation and information exchange between different construction units should be emphasized and focus on safety together. F） To strengthen design and review management of the construction agency, and safety management on the trial operation phase as well G） During the project construction period, construction units, site reconnaissance units, design units, construction units, project supervision units and other units related to projects construction safety must comply with production safety laws and regulations, ensure the safety of construction projects and take their own responsibility of safe production.					

Table 5-3 Environmental Impacts and Mitigation Measures of Construction stage Characteristics (Special)

Impact factor	Pollution source (and/or sensitive spot)	Special environmental impact	Mitigation Measures	Budget (CNY 10,000)	Implementer	Supervisor
Acoustic Environment	Construction noises in terms of sensitive receptors of the four subproject cities/counties like schools, hospitals, as well as residential buildings and office space, including various types of machinery and equipment noise (list of the sensitive receptors	Increasing the noise level of the construction area and its surroundings; affecting human auditory senses	① Set up higher fences for sound insulation,which should not be less than 3 m. When necessary, the practice of fenced construction would be employed in the operation area; ② Reduce human-made noise as much as possible when disassembling baffle or holder, and loading and unloading materials or muck. ③ In terms of construction around schools, the contractor shall consult with the school, reasonably arranging the construction work off school time, and trying to schedule high-noise construction during weekends or after school, at the same time, speeding up the construction progress and shortening the construction duration. Any construction work shall be prohibited during school exams. ④ Prior to the construction work around residential buildings with sensitive receptors, the contractor shall communicate with the relevant committees, and also notify the residents about construction schedule via committees. A public notice shall be posted at the	**18**	Contractor	Project Supervision, Construction Unit, county PMO, Local Environmental Protection Bureau

	are given in Table 1-2)		entrance and exit to bring up the attention. ⑤ During construction, qualified institute shall be authorized by the contractor to monitor the quality of acoustic environment on site; activities shall be stopped when noise level cannot meet applicable standard. The construction cannot be resumed until recheck results reaching the standard after reducing construction intensity and adjusting the operating methods. ⑥ For special road section that requires continuous construction, consultation with nearby communittee shall be done and approval shall be obtained, public notice shall also be made prior to construction;			
Atmospheric environment	Dust suspension in terms of sensitive receptors in four subproject cities/counties like schools, hospitals, as well as residential buildings and office space (list of the sensitive receptors are given in Table 1-2)	Mainly affecting the quality of ambient air within the extent of construction, and also influencing the residents along the road construction (personnel, including the construction personnel), institutions, etc.	For sensitive receptors at residential and office buildings, as well as commercial shops etc., the following measures shall also be taken: ① Increase watering frequencies (2-3 times per day), reduce dust as much as possible ② Set up high enclosure around the boundary of construction site (no lower than 2.5 m); set up dust-proof net when necessary. ③ Forbid throwing muck in the air. ④ Reasonably arranging construction operation time, prohibiting from working at night or windy time; ⑤ The dump site shall be away from sensitive points; ⑥ All temporary mounds of earth should be covered. ⑦ Transport vehicles should travel at low speed when coming in and going out to reduce dust and ensure exhaust gas emission to reach the standards. The following measures shall also be taken for sensitive receptors at schools, hospitals, etc.: ① Increase watering frequencies (2-3 times per day), reduce fugitive dust as much as possible ② Set up high enclosure around the edge of construction site (no lower than 2.5 m); set up dust screen when necessary. ③ Forbid throwing muck in the air. ④ Reasonably arranging the construction work off school time. Prohibiting from constructing at night, exam, and windy time; trying to shorten the time limit of construction around schools and hospitals. ⑤ The dump site shall be away from schools and hospitals; ⑥ All temporary mounds of dirt should be covered. ⑦ Transport vehicles should travel at low speed when coming in and going out to reduce	**23**	Contractor	Project Supervision, Construction Unit, county PMO, Local Environmental Protection Bureau

			fugitive dust and ensure exhaust gas emission to reach the standards. The following measures shall also be taken at the important traffic crossing: ① Increase watering frequencies (2-3 times per day), reduce fugitive dust as much as possible ② Set up high enclosure around the edge of construction site (no lower than 2.5 m); set up dust screen when necessary. ③ All temporary mounds of dirt should be covered.			
Water environment	The removal of aged pipeline and pipeline network pressure test resulting in small amount of waste water discharging into surface water	Waste water discharging into surface water would increase the pollutant in the water	① Discharge pipeline residual water in the area containing municipal sewage pipes. Pipeline pressure test is, to drain pressure water in its interface with municipal sewage pipe. ② Special drainage channels are set up at construction site, allowing for small amount of waste water during construction discharging into sewage pipeline network nearby, instead of the surface.	**5**	Contractor	Project Supervision, Construction Unit, county PMO, Local Environmental Protection Bureau
Social Impact	The impact caused by excavation construction, the increase of transport vehicles to special sensitve receptors including important roads and special crossing, as well as the potential impact to various types of pipelines underground	The disruption in local traffic, the impact to school teaching, traffic congestion, and potential damage to various types of underground pipelines result in the interruption of social public services in any kind	① Prior to construction, the contractor shall communicate with the local Transport administrative agencies, work out traffic arrangements in the construction phase including the adjustment of vehicle routing, time arrangement, traffic control measures, etc.. Also informing the community in advance via television, radio, and newspapers etc. ② The contractor shall assign a dedicated person assisting traffic management at major roads and junctions during peak time, ensuring the traffic in order. ③ The color and appearance of the outer wall on the temporary dust and noise barriers at construction site shall be coordinated with local cultural relics, ensuring the integrity of urban landscape. ④ Construction activities shall be scheduled in summer holiday in the area near school and kindergarten, otherwise construction practice shall be optimized to reduce construction time at school entrance. Secure foot bridge or sidewalk shall be built for students with temporary use. ⑤ Construction material shall be placed in designated area far away from school and residential area; isolation zone shall be set up with warning signs. ⑥ Pipeline network contractors at total of 19 construction sites with important roads and crossings (1 in Chengde, 3 in Pingshan, 10 in Xingtai, and 5 in Zhangjiakou) shall have a clear understanding of the original pipeline drainage, electricity, gas, and communication	**14**	Contractor	Project supervision, contractors, county PMO, Local Environmental Protection Bureau, civil administration, Authorities in charge of Transportation, Railway Management Department

			in its layout at the construction site prior to construction, facilitating the cooperation with these business sectors to avoid any damage and interruption caused by the construction. ⑦ At total of 5 construction sites crossing highway and railway (4 in Pingshang, 1 in Xingtai), the contractor shall communicate with the highway and railway management agency prior to construction, ensuring secure construction methods. When needed, the contractor would invite these institutions to assist in solving the emerging problems and ensuring the completion of the construction work. ⑧ 6m away from ground surface for pipeline network crossing highways overhead; and 3m away from ground surface for pipeline network crossing highways geographically. In order to reduce the investment, the pipeline would be set up 1m away from road foundation.			
Cultural Resources	For construction at Chengde Guangren Street (West Street) Xiayingfang Section, inconsistency of the appearance of the outer wall at construction site with local landscape and cultural relics would cause uncomfortable sensory effect	The sensory effect of the local tourism culture	The construction section of the barracks in Chengde Guangren Street (West Street), shall: ① The contractor shall communicate with local Competent Authorities of Transport and Communications, as well as local Ministry of Tourism in constituting reasonable construction plan. Where possible, construction schedule shall avoid the Labor Day, the National Day, and peak summer time in July and August. When necessary, road guidance shall be supported. ② Construction material storage site, temporary roads, and the transportation of materials and equipments shall not be located in the area of cultural protection agency, and shall be set away from a side of it. ③ Construction personnel are not allowed to access to the protected area of cultural relics; behaviors that will damage cultural relics shall be banned ④ Dust and noise barriers set near cultural relics at construction site shall be heightened; ⑤ The color and appearance of the outer wall on the temporary dust and noise barriers at construction site shall be coordinated with local cultural relics, ensuring the integrity of urban landscape.	4	Contractor	Project Supervision, Construction Unit, county PMO, Local Environmental Protection Bureau

Table 5-4 General Environmental Impact and Mitigating Measures during Operation Period

Item	Environmental Elements		Mitigation Measures	Implementing unit	Supervisory Agency	Monitoring Agency	Monitoring Program	Expenses (CNY 10,000)
The operation	Natural Environm	Acoustic Environment	① Choose environmental protection equipment with low noise, and keep maintenance and repair regularly.	Operation Unit	Construction Unit, Local	Third-party Monitoring	L_{Aeq}	**74**

noise of water pump equipment etc during the operation period of heat exchange station	ent		② The in and out pipeline of pump should be vibration absorber throat pump. The foundation of pump should adopt vibration reducing measures. Acoustic shield should be added to reduce noise. ③ The doors and windows of heat exchange stations should be sound proof doors and double airtight sound proof windows. ④ The buildings of heat exchange stations should adopt sound proof structure. ⑤ The newly built heat exchange station equipment shall be in reasonable layout.		Environmental Protection Bureau			
Operation Period	Environment and security risk	Risk of pipeline network leakage accident	A) Conduct shockproof design by taking the earthquake in more than VII level as safety factor, make sure the pipeline could bear the menace of VII level earthquake. The laying of pipe network shall avoid unfavorable area such as soft soil area and earthquake fracture zone etc. B) Prohibit setting up mordant storage yards in the area where the pipeline is laid. C) Prohibit excavating and constructing building over the loan of pipe above and nearby the pipeline, prohibit engaging other production activities above and nearby the pipeline. D) Conduct timed checking to the heat supply pipeline, and timely repair the pipeline once breakdown occurred. E) Clean the pipeline regularly, exclude hydrops and dirt within the pipeline to relieve corrosion within the pipeline. F) Transact measurement for the wall thickness of pipeline in every three years, timely repair or exchange the seriously thickness-reduced pipeline to avoid the occurrence of pipe explosion accident. G) Examine the safety protection system of pipeline in half a year, add pressurization valve device etc. to make sure the pipeline can be safely disposed at the overpressure, which will reduce the influencing scope of harm to minimum; H) Prohibit constructing within the protection scope of pipeline; I) The signs in the crossing point of railway, road and river should be clear, explicit and the settings shall be clearly seen from different orientation and angle; J) Enlarge pipeline walking frequency, improve the effectiveness of pipeline walking;	Operating Enterprise	Construction Unit, local Environmental Protection Bureau, Safety Supervision Bureau, Construction Management Authority	/	/	**158.2**

			examine construction area of pipeline every day, check the situation of earth surface, and pay attention to the activities of staff in this area. Timely stop the influential behaviors for pipeline safety, adopt relevant measures and report it to superiors; K) Examine the pipeline passing through rivers, railways, roads and villages etc sensitive area once every day; L) Pay special attention to the safety of pipeline locating at river crossing section during flood period; M) Develop emergency plan for environmental risk and periodically exercise the plan.					
		Risk of boiler explosion accident	A) Keep the stability of boiler load, avoid abruptly lowering load that results in air pressure rising. B) Keep the sensitivity and reliability of safety valve, prevent malfunction of safety valve. Let off the safety valve by manual once at certain period and periodically make automatic vent test. Once the action is dull, timely restoration must be made. C) Periodically check the pressure meter to make sure the accurate indication of pressure meter. Once the indication is inaccurate or action is abnormal, the pressure meter must be replaced in time. D) Avoid water shortage. Control the normal water level, regularly flushing the water level, periodically maintain and examine water level alarm device or overtemperature alarm device. E) Avoid scale depositing. Correctly use water treatment equipment to ensure the water quality meeting standard. Carefully dispose the sewage and timely clear scale deposit and water dregs. F) Adopt effective water treatment and deoxygenation measures to ensure the qualification of water supply and water quality. Strengthen maintenance work of the boiler, timely clean ash, paint antirusting paint and keep internal drying of the boilder. G) Keep stable burning, prevent abrupt cold and hot of the boiler. Strengthen the checking for the stress concentrated part such as end socket and edge etc. Once crack or grooving is found, timely repair must be made. H) Adopt reasonable design, ensure the manufacturing and installation quality.					
		Inspection	A) Choose qualified heat insulating materials and do corrosion prevention work well.					

		defects risk of heat exchange station operation	Choose qualified valve and compensator etc. B) There are specially-assigned persons to guard and fence must be set up around the wellhead when indoor operation is operated. The workers shall pay attention to safety and do protective measures well to avoid the occurrence of falling accidents when they examining in the well. The workers in high altitude must be equipped with qualified protective products. C) The ground protection of electrical equipment must be done well to avoid electrification of shell. Examine the electrical equipment before transacting maintenance work. The workers must be equipped with necessary labor protective products, and the protective products are within qualified period of test.					
		Management Defect Risk of Natural Gas Use	A) Number main natural gas equipment, valve, bleeder and pipeline support etc., and the numbers shall be marked in obvious place. The management agency shall possess process flow diagram of gas, and the equipment No. and its accessory device No. shall be marked on the diagram; B) The reliable partition device must be set at the leading point (excluding hot boiler natural gas pipeline) of branch pipe of the main pipeline where the natural gas distributed; C) If the combustion apparatus adopts forced air supply burner, the natural gas branch pipe shall be installed with check device or automatical isolating valve. Set up explosion venting membrane in air conduit; D) Install low pressure alarm device to natural gas and air conduit; E) Set up bleeder at the terminal of air conduit, and the bleeder shall be extended to the outside of factory; F) Reliable isolating device shall be set up in normally maintained parts; G) Set up bleeder in the following positions: (1) The top of natural gas equipment and pipeline; (2) The terminal of natural gas pipeline and horizontal device; (3) The front parts of natural gas and pipeline as well as within 0.5 m from the natural gas main pipeline pipeline net isolating device to the front and behind branch pipe can not be set up with bleeder, however, if it is more than 0.5m, the air releasing head shall be set; H) The bleeder orifice shall be 4 m higher than natural gas pipeline, equipment and walking board and no less than 10 m from the ground. With respect to the pipe orifice of bleeder in natural gas pipeline and equipment within the factory or					

			within 20 m away from the factory shall be 4m higher than the roof. If the factory is very high and the bleed is infrequently used, the pipe orifice height can be lowered properly, but it shall 4m higher than the natural gas pipeline, equipment and walking board. Should not diffuse natural gas in the factory or to the factory; I) Bleeder orifice shall adopt rain-proof and anti-clogging measures; J) Weld stiffener at the root of bleeder and fixed with rope at the top; K) The bleeders of natural gas equipment shall not be jointly used, excluding the bleeders whose air diffusing is collectively disposed; L) The equipment and pipeline that need steam and nitrogen to displace natural gas or air at the time when stopping or delivering natural gas shall be installed with steam or nitrogen pipe orifice; M) The steam or nitrogen pipe orifice shall be installed at the top or side of natural gas pipeline, and cock or sluice valve shall be installed in pipe orifice. In order to avoid the natural gas entering into steam or nitrogen pipeline, the steam or nitrogen pipeline will be connected with natural gas pipeline only when steam or nitrogen is passing, and this connection shall be stopped or the blind plate shall be blocked when steam or nitrogen is stopped; N) The main natural gas pipeline within the factory shall be marked with obvious natural gas flow direction and types signs; O) All possible natural gas leaking parts shall be hung with reminding alarm signs; P) The natural gas regulator station shall be set in the open air or within independent factory, the open air regulator station shall have physical enclosing wall, and the distance between the enclosing wall and pipeline shall no less than 2m; Q) The operating room of regulator station shall be equipped with pressure meter, flow meter, high and low pressure alarm and telephone. The operating room shall be separated with regulator station, and two outward opening doors shall be set; R) The pressure regulation system shall have safety valve, and it shall meet current stipulations related to the management of pressure vessel.				
		Risk of Natural Gas Ignition	A) Once natural gas burning accident occurred, the natural gas protective station shall be immediately informed meanwhile the firefighting team shall be informed of on-site aid; B) If the natural gas pipeline with diameter more than 100 mm, the valve shall not be directly closed, and the pressure meter shall be installed. Gradually close the valve and lower pressure according to pressure, and inject a large amount of					

			steam or nitrogen into the natural gas pipeline to put out the fire. The natural gas pressure within natural gas pipeline shall no lower than 100 Pa at least; C) The fire extinguishment by high pressure water can be adopted. However, the abrupt water spray is forbidden when the equipment is burned red to avoid deformation and fracture of pipeline; D) If the interior of natural gas equipment is caught fire, firstly, confirm whether there are persons in the equipment, if there is no person, the inlet and bleeder shall be immediately closed, and put out the fire by injecting large amount of steam or nitrogen.					
		Risk of Natural Gas Explosion Accident	A) The boiler ignition work must be transacted according to operating procedure; B) Before ignition work, open the flue shutter, boiler door and wicket, dispose residual natural gas by adopting natural convection; C) The flue of newly built and rebuilt furnace kiln must possess certain suction, if the smell of smoke is not dry, the flue must be dried firstly; D) With respect to the ignition work, firstly ignite the fire and then deliver natural gas. The ignition of boiler generally adopts the mode of ignition tube. Under special circumstance, the natural gas ignition work can be delivered after set up firewood in the furnace kiln or ignite ignition objects; E) After the failure of first ignition, the air blower and flue shutter shall be opened to blow away the residual natural gas in boiler. Upon test, if it is qualified, the second ignition can be started; F) The ignition work must be transacted when the pressure of natural gas is stable; G) With respect to the forced-draft furnace kiln, the air blower and flue shutter shall be opened before the ignition work to blow away the residual natural gas in flue shutter. The ignition work shall be started after turning down the flue shutter. Gradually open the flue shutter and adjust air volume after all burner nozzles are totally ignited; H) The ignition work of all furnace kiln shall start from the terminal burner nozzle in orders. Once natural gas explosion accident occurs, the preferential disposal is as follows: A) Promptly cut off the source of natural gas, dispose the residual natural gas to avoid the extension of accident; B) If burning accident is produced by the explosion of natural gas, it shall be disposed					

			according to burning accident of natural gas; C) If natural gas poisoning accident is produced by the explosion of natural gas, it shall be disposed according to poisoning accident; D) The burnt personnel in the accident shall be immediately sent to hospital for burn for treatment, and washing and wipe are forbidden to avoid damaged skin or infection; E) Pay attention to the wounded whether they have trauma when fleeing from fire ground when rescuing the burnt personnel in natural gas explosion accident. Pay attention to the wounded to avoid aggravating injury once trauma occurred.					
		Precaution and Decrease of Natural Disaster Accident	A) The engineering will be transacted with earthquake proof preset according to the earthquake proof preset intensity and ground motion parameter stipulated in GB50011-2001, GB50032-2003. The periodic value of response spectrum characteristic of ground motion acceleration separately corresponded by different site shall be confirmed by periodic partition. B) Establish and perfect earthquake and disaster prevention system according to the principle of "Prevention First, comprehensive prevention". The planning, design and construction of all buildings and structures shall be conducted according to relevant earthquake resistant regulations and the earthquake ability of all buildings shall be improved. C) The layout of pipeline net shall avoid earthquake fault zone. Relevant engineering measures must be adopted if the construction is conducted in disadvantage area of building earthquake prevention, and the construction in earthquake prevention dangerous area is forbidden. D) Certain persons shall be left in heat source plant and heating station to evacuate shelter and meet the requirement of urgent evacuation of personnel by combining with city planning.					

Table 5-5 Environmental Impacts and Mitigation Measures For Runtime Characteristics (Special)

Impact factor	Pollution source (and/or sensitive point)	Special environmental impact	Mitigation Measures	Budget (CNY 10,000)	Implementer	Supervisor
Acousti	For the 201 sensitive receptors surrounding the	Increase surrounding	① Choose environmental protection equipment with low noise, and	6	Operation	Construction

c Environment	heat exchange substations including school, hospital, residential area and office building, mainly operating noise of pumps and other equipment	noise levels,and affect people's sense of hearing	keep maintenance and repair regularly. ② The in and out pipeline of pump should be vibration absorber throat pump. The foundation of pump should adopt vibration reducing measures. Acoustic shield should be added to reduce noise. ③ The doors and windows of heat exchange stations should be sound proof doors and double airtight sound proof windows. ④ The buildings of heat exchange stations should adopt sound proof structure. ⑤ Distribute equipment in the station rationally to make the high-noise devices away from the side of particularly sensitive targets; ⑥ Strengthen operational management and maintenance of facilities, and increase maintenance frequency of sound proof equipment to ensure stable operation of equipment and facilities		Unit	Unit, Local Environmental Protection Bureau
Risk Management	For the particularly sensitive noises surrounding Xingtai Primary Heat Station and Zhangjiakou pressure isolation substation, mainly to prevent the risk of explosion.	Explosions endanger the lives and property	Strengthen safety awareness and management, inspect regularly, and observe regulations and discipline	108	Operation Unit	Constructor, safety supervision bureau

Table 5-6 Follow-up Actions to Be Taken by Heating Sources

Environment Component	Pollution Source	Follow-up Actions	Budget CNY 10,000	Monitoring Parameter	Monitoring Frequency	Implementation	Supervision
Air	Pingshan subproject heating source – Xibaipo Power Plant coal-fired boiler Air impact of fume, SO_2 and NOx	① Renovation of desulfurization system of No.1-4 power generation units; ② Improvement of wet dust removers of No.1-4 power generation units; dust removing system renovation of No.5-6 power generation units; ③ Denitrificaiton system renovation of existing power generation units by adding standby catalyst layer and expanding treatment capacity.		Fume ≤ 5mg/m^3 SO_2 ≤ 35mg/m^3 NOx ≤ 50mg/m^3	Continuous online monitoring: once/hour; Monitoring by EPB: once/quarter	Heating facility: Xibaipo Power Plant	Pingshan County EPB, Subproject PMO

Air	Xingtai subproject heating source – China Coal Risun Company Air impact of fume, SO2 NOx and dust	Construction/renovation to be finished by the end of 2015: Waste gas capture and treatment facility: ① Construction of 2 sets of coke oven fume heat boilers (6t/h) ② One enclosed coal storage structure ③ Construction of acid-washing + water-washing system for treatment of waste gas from desulfurization regeneration tower, foam tank and ammonia sulfate process; ④ Upgrading of existing 9 dust removing equipment to 6 sets of bag-type dust removing towers	6285	Fume ≤ 30mg/m^3 SO2 ≤ 100mg/m^3 NOx ≤ 500mg/m^3 Dust ≤ 50 mg/m3 (new standard, 2015)	Self-monitoring: once/day; Monitoring by EPB: once/quarter	Heating facility: China Coal Risun Company	Xingtai City EPB, Subproject PMO
		Construction of new facilities to be completed by the end of 2015: ① Upgrading of existing conventional wet quenching coke system of No.1-3 coking ovens to innovative 150t/h quenching coke system (innovative low-moisture quenching coke system); ② Construction of 1 set of 170t/h dry quenching coke equipment, one 91 t/h residual heat utilization boiler, and 1 set of 25 MW extraction power generator; and ③ Construction of 1 set of 150 m^3/h "ultrafiltration + nanofiltration" wastewater treatment equipment.	25630				

6. Environmental Monitoring Plan

6.1. Purpose, Requirement and Specification of Environmental Monitoring

Making and implementing a necessary environmental monitoring plan which is an important part of environmental management can effectively check the situation and effect of implementation of environmental mitigation measures made for the project and ensure that the environmental effects are acceptable. The regular environmental monitoring and interpretation of result can check whether the adverse environmental effects predicted in the period of project preparation is reduced efficiently or not. The mitigation measures shall be adjusted and improved to ensure the implementation of environmental protection measures and reduce the adverse effects to the least, especially the effect of sensitive targets of environment as necessary.

The environmental monitoring plan comprises the monitoring of construction stage and operation stage of the project. According to the requirement, 1) the environmental monitoring in the construction stage and operation stage of this project is in the charge of the development organization of each subproject and implemented by contractor and Heating Operation Company. 2) The supervisory agency of environmental monitoring is the local environmental protection bureau. 3) The environmental monitoring should be undertaken by a monitoring company with high qualification, and the company shall monitor the project in accordance with the monitoring plan and provide with the formal environmental monitoring report.

6.2. Environmental Monitoring Plan

The four subprojects include the environmental monitoring plan in the construction stage and operation stage, as shown in Table 6-1 to Table 6-4. The cost of monitoring is estimated in these plans.

Table 6-1 Environmental monitoring plan for Chengde Subproject

Stage	Monitoring object	Monitoring item	Monitoring place	Monitoring frequency	Cost estimate(10 thousand RMB)	Monitoring organization	Responsible agency	Supervisory organization	Applied standard
Construction stage	Noise	LEQ	Boundary of construction site (14 places including Minzu Middle School, 266 Hospital, Puning Primary School, a section of Xiayingfang Xidajie Road and so on)	Once in construction stage	**5.0**	The monitoring organization authorized with qualification	Chengde Thermal Power Group	Chengde Environmental Protection Bureau	Class B standard in *Environmental Quality Standard for Noise* (GB3096-2008) Day time≤60, Night time ≤50 [Unit: dB (A)]
	Atmosphere	TSP	Boundary of construction site(14 places including Minzu Middle School, 266 Hospital, Puning Primary School, a section of Xidajie Xiayingfang Road and so on)	Once in construction stage	**10.0**				Class B standard in *Ambient Air Quality Standard* (GB3096-2008) Average in a year≤200, average in 24 hours≤300 (microgram/cubic meter)
Operation stage	Noise	LEQ	Except the heat exchange stations in Minzu Middle School, 266 Hosiptal, Puning Primary School and so on.	Once in heating period	**/**				Standard for the Class 3 function area in *The Standard for the Environmental Noise of Boundary of Industrial Enterprise* (GB12348-2008)
Operation stage	Smoke and dust, SO2, NOx		Boilers and chimneys in heat source and electric power plant.	Continuous online monitoring, once/hour; External monitoring by local EPB: once/quarter	**/**		Heat source enterprise		*Emission Standard of Air Pollutants for Thermal Power Plants (*GB13223-2011) Smoke and dust ≤30, SO2≤200, NOX≤100 (Unit: mg/m3)

Note: (a) 50% of general environmental sensitive ojbects and all the special sensitive receptors can be selected for noise monitoring of heating substations during operation; and (b) Technical Specifications for Continuous Monitoring of Thermal Power Plant Fume Emission (HT/T 75-2001) will be followed for heating source monitoring.

Table 6-2 Environmental Monitoring Plan For Pingshan Subproject

Time Interval	Monitoring Object	Monitoring point location	Monitoring Program	Monitoring frequency	Cost Estimate (ten thousand yuan)	Monitoring Organization	Responsible Organization	Supervisory Organization	Executive standards and norms
Construction stage	Noise	Individual heat exchange stations, typical pipeline area and near settlements, hospitals, schools.50 locations in total	Equivalent A-weighted sound level	8: 00~10: 00, 14: 00~16: 00, 20: 00~22: 00 Mnitor once a month for two continuous days at peak construction stage daily monitoring period 8:00 to 10: 00,14: 00 ~ 16: 00,20: 00 ~ 22:00	**10.0**	Entrusted and qualified supervision organization	Pingshan heating company	Enviroment Protection Agency, Pingshan County	Acoustic *Environmental Quality Standards* (GB3096-2008) Category-2 standards, ≤ 60 in daytime, ≤ 50 at night [unit: dB (A)]
Operation stage	Power Plant	Each chimney	SO2, NOx, smoke	Continuous online monitoring, once/hour; External monitoring by local EPB: once/quarter	**/**		Xibaipo Power Plant		*Emission Standard of Air Pollutants in Thermal Power Plant* GB13223-2011
	Wastewater	Drainage Plant	PH	Heating period，monitor once	**/**		Xibaipo Power Plant		*Quality Standards For Sewage Discharged into the City Sewer*(CJ343-2010)Class B pH6.5-9.5, COD≤500, Total Dissolved Solids≤2000, Ammonia≤45(mg/l)
			COD		**/**				
			Total Dissolved Solids		**/**				
			Ammonia nitrogen		**/**				
	Noise	36 heat exchange stations	Equivalent A-weighted sound level	Heating period，monitor once in daytime and another in night	**7.2**		Pingshan heating company		*Sound Environmental Quality Standards*(GB3096-2008)Class B

Note: (a) 10-20% of general environmental sensitive objects and all the special sensitive receptors can be selected for noise monitoring of heating substations during operation; and (b) Technical Specifications for Continuous Monitoring of Thermal Power Plant Fume Emission (HT/T 75-2001) will be followed for heating source monitoring.

Table 6-3 Environmental Monitoring Plan For Xingtai Subproject

Time Interval	Monitoring Object		Monitoring Program	Monitoring point location	Monitoring frequency	Cost Estimate (ten thousand yuan)	Monitoring Organization	Responsible Organization	Supervisory Organization	Executive standards and norms
Construction stage	Atmosphere		TSP	Boundary of the construction site (20 special sensitive points such as Yihai Garden, Fengchao Garden, Quandu City)	At least one supervision during construction for each sensitive point	**3**	Entrusted and qualified supervision organization	Xingtai Xuyang Anneng Heating Power Co., Ltd.	Enviroment Protection Agency, Xingtai City and Enviroment Protection Agency, Xingtai County	*Ambient Air Quality Standards* (GB3095-2012)Class 2 Standard(TSP annual average standard is 200μg/m3，average in 24 hours is 300μg/m3)
	Noise		Equivalent continuous A-weighted sound level	Boundary of the construction site (20 special sensitive points such as Yihai Garden, Fengchao Garden, Quandu City)	At least one supervision during construction for each sensitive point	**4**				*Emission Standard of Environment Noise for Boundary of Construction Site*(GB12523-2011)(Daytime standard value is 70dB(A)，night standard value is 55dB(A))
	Diligent enterprise supervision	Zhongmei Xuyang	SO_2, NOx, smoke, dust	Coke oven, dirt catcher at ground station, tube furnace, dirt catcher for coke transport and screen, broken exit	Self-monitoring, once/day; External monitoring by local EPB: once/quarter	**/**		Heat source enterprise		Standard limiting value in the *Pollution Discharge Standards for Coking Chemical Industry* (GB16171-2012) Table-5
		Xingtai Xuyang Chemical Engineering	CO, SO2, non-methane, total hydrocarbons and particulate matters	Exhaust funnel thief hatch and 10 meters away from the factory boundary		**/**				*The Integrated Emission Standards of Air Pollutants* (GB16297-1996) Table-2 secondary standard, *The Emission Standards of Stationary Pollution Source Carbon Monoxide* (DB13/487-2002) Table-2 secondary standard
Operating period	Noise		Equivalent continuous A-weighted sound level	Facility site boundary (144 thermal stations and one Primary Heat Station)	At least one supervision in the heating period (one day and one night)	**29**		Xingtai Xuyang Anneng Heating Power Co., Ltd.		*Emission Standard for Industrial Enterprises Noise* (GB12348-2008) Class 3 functional areas corresponding standard(Daytime standard value is 65dB(A)，night standard value is 55dB(A))
	Diligent enterprise	Zhongmei Xuyang	SO_2, NOx, smoke, dust	Coke oven, dirt catcher at ground station, tube furnace, dirt catcher for	Self-monitoring, once/day; External monitoring by local EPB: once/quarter	**/**		Heat source enterprise		Standard limiting value in the *Pollution Discharge Standards for Coking Chemical Industry* (GB16171-2012) Table-5

	supervision			coke transport and screen, broken exit						
		Xingtai Xuyang Chemical Engineering	Phthalic anhydride condensation exhaust and pollutant concentrations around the factory	Exhaust funnel thief hatch and 10 meters away from the factory boundary		/				*The Integrated Emission Standards of Air Pollutants* (GB16297-1996) Table-2 secondary standard, *The Emission Standards of Stationary Pollution Source Carbon Monoxide* (DB13/487-2002) Table-2 secondary standard

Note: 10 percent of the quantity of general environmental sensitive targets and 20 percent of quantity of special environmental sensitive targets are selected as the representatives for the noise monitoring of heat exchange station in the operation stage.

Table 6-4 Environmental Monitoring Plan for Zhangjiakou Subproject

Stage	Monitoring object	Monitoring item	Point location of monitoring	Monitoring frequency	Cost estimate (RMB 10 thousand)	Monitoring organization	Responsible agency	Supervisory agency	Applied standard and specification
Construction stage	Atmosphere	TSP	Boundary of construction site (see appendix for Point location of monitoring list)	Every sensitive spot should be monitored at least once (one day) in the construction stage.	**9**	The monitoring organization authorized with qualification	Dongyuan Thermal Power Company in Zhangjiakou	Zhangjiakou Environmental Protection Bureau	level 2 standard in *Ambient Air Quality Standard* TSP≤300(μg/m3)
	Noise	LEQ	Boundary of construction site (see appendix for	Every sensitive spot should be monitored at least once (a day and night) in the	**11.5**				*Noise Limits for Construction Site* GB12523-90 [Unit: dB(A)] Earthwork stage: day -time≤75, night - time≤55; Piling stage: day – time ≤85, Construction is stop at night; Instructure stage: day - time≤70, night -time≤55; Decoration stage: day - time≤65, night -

			point location of monitoring list)	construction stage.					time≤55
	Monitoring of the enterprise with due diligence	SO2, NOx, Smoke and dust	Chimneys of coal fired boiler	Continuous online monitoring, once/hour; External monitoring by local EPB: once/quarter	**/**		Heat source enterprise		*Emission Standard of Air Pollutants for Thermal Power Plants* (GB13223-2011) The standard limit value in Table 1 NOx≤200, SO2≤200, Smoke and dust≤30 (Unit: mg/m3)
Operation stage	Noise	LEQ	Boundary of construction site (see appendix for Point location of monitoring list)	The monitoring should be carried out at least once (a day and night)in heating period	**4**		Dongyuan Thermal Power Company in Zhangjiakou		*The Standard for the Environmental Noise of Boundary of Industrial Enterprise* (GB12348-2008) Day –time ≤60, night - time≤50
	Atmosphere	SO2, Smoke and dust	Chimneys of gas fired boilers in Dongyuan Heat Power Plant	The monitoring should be carried out at least once (a day and night)in heating period	**2**		The heat source plant of Dongyuan Thermal Power Company in Zhangjiakou		The relevant standard limit value of gas fired boilers in *Emission Standard of Air Pollutants for Thermal Power Plants* SO2≤35mg/m3 Smoke and dust≤5mg/m3
	Sewage	PH value, suspended matter, total dissolved solids	Drainage of softened water system in heat exchange station	The monitoring should be carried out at least once (a day and night) in heating period	**3**				The standard limit value of Class B in *Wastewater Quality Standard for Discharge to Municipal Sewers*(CJ343-2010) PH value: 6.5~9.5, suspended matter≤400, total dissolved solids≤2000 (Unit: mg/L)
	Monitoring	SO2, NOx,	Chimneys of	Continuous online	**/**		Heat source		*Standard of Air Pollutants for Thermal Power Plants*(GB13223-2011)

	of the enterprise with due diligence	Smoke and dust	coal fired boilers	monitoring, once/hour; External monitoring by local EPB: once/quarter			enterprise		The standard limit value in Table 1 NOx≤200, SO2≤200, Smoke and dust≤30 (Unit: mg/m3)
Appendix: The residential area includes: NO.3 staff building of Unicom Company, staff building of 251 Hospital, the residential community for traffic police located at south of Gongren Village, Zhangyuan Xincheng Community, residential building of Municipal Industrial and Commercial Bureau, Rongchen Zhuangyuan Community, Yanhuixian Community, Vitoria Guangchang Community, Pengyuelongcheng Community, Yianjiayuan Community, Aolinxincheng Community, the staff building of tobacco monopoly administration, staff building of Telecommunication Office, Zhongshengzhicheng Community, Lihauyuan Community, No. 16 yard in Shengli road, staff building of Coal Mining Machine Plant, Guojin Times Community, No. 43 and No. 49 residential buildings in Shenglizhong road, Shengshihuating Community, NO. 4, 14, 18, 28 and 32 residential buildings in Shenglibei road, Huayuan Residence Community, Fuanqu Community and staff building of Road Transport Bureau; The hospitals include: Miaomiao Kindergarten and Weihua Primary School in New and High-tech Zone; Institutions include: Bureau of Municipal and Rural Construction at Qiaodong district, Zhangjiakou city, Construction Environmental Protection Bureau at Qiaodong district, Zhangjiakou city, Zhangjiakou Bureau of Land and Resources (Qiaodong Substation), Zhangjiakou Radio Administration Bureau of Hebei Province, the People's Government in Qiaodong district, Zhangjiakou city, The Education Bureau in Qiaodong district, Zhangjiakou, Zhangjiakou Employment Service Center and Chahar Cemetery of Martyrs								

Note: (a) 20 percent of the quantity of general environmental sensitive targets and special environmental sensitive targets are selected as the representatives for the noise monitoring of heat exchange station in the operation stage. (b) Technical Specifications for Continuous Monitoring of Thermal Power Plant Fume Emission (HT/T 75-2001) will be followed for heating source monitoring.

7. Training for Environmental Management

7.1. Training Purpose

The purposes of training for environmental management are to ensure the smooth and effective implementation of work of environmental management, ensure each managerial staff and the specific person in charge are familiar with the content and procedure of this environmental management, improve the environmental administrative capacity of environmental managers and guarantee effective implementation of each environmental protection measure, monitoring plan and report.

7.2. Training Object

The Project Office and related agencies of the subprojects shall clearly understand the security policy and environmental management requirement and the specific practices and procedures, so a specialized training should be carried out to improve their administrative capacity after the implementation of this project. Besides this specialized training, the staff of these agencies should attend other training with more wide content to improve their ability for this project. The training objects of this environmental management include: development organization of each subproject, subproject office, environmental supervision personnel, contractor and so on.

7.3. Training Content

The training contents of the environmental management include:

① The mastery and application of environmental policy and domestic environmental protection laws, regulations and environmental criteria;

② Environmental management mode of item of loan and loan agreement, environmental clause of project agreement;

③ Implementation and management of EMP and monitoring plan of each subproject.

④ obligation of environmental managers;

⑤ Pollution control technology in the construction stage and operation stage;

⑥ Safety protection and practice for the removal of small boiler (such as the practice when meet harmful heat insulating material;

⑦ The preparation of environmental management report or information, including monthly report of environmental monitoring, quarterly report and annual report of development organization.

7.4. Training Plan

See **Table 7-1** for the specific training plan and the related cost estimated.

Table 7 Environmental management training program and cost estimation

No.	Training Content	Participants	Chengde		Pingshan		Xingtai		ZhangJiakou	
			Days of training	Expenses (CNY 10,000)	Days of training	Expenses (CNY 10,000)	Days of training	Expenses (CNY 10,000)	Days of training	Expenses (CNY 10,000)
1	World Bank environmental policies and domestic environmental regulations and standards	PMO at different levels, project construction unit, environmental supervisor, contractor	3	3	2	2	3	8	1	1
2	A) World Bank environmental management, model, environmental provisions in loan agreement and project agreement; B) Implementation and management of EMPs and monitoring plans C) Responsibilities of environmental management staff	PMO at different levels, project construction unit, environmental supervisor, contractor	1	1	2	2	4	10	1	1
3	Pollution control technology during construction and operation safety protection and practices for the removal of small boiler	PMOs at all levels, project construction unit	3	3	1	1	3	13	1	1
4	Environmental reporting and data preparation	PMO at different levels, project construction unit,	2	2	1	1	3	10	3	3

		environmental supervisor, contractor								
Subtotal：			**9**	**9**	**6**	**6**	**13**	**41**	**6**	**6**
Total：			**Days for training: 34; Total estimated cost: CNY 620,000**							

8. Budget for Measures on the Environmental Protection Management

Measures on environmental management include the implementation and management of environmental impact mitigation and security administration in the operation stage and construction stage of the project, training for the environmental management, construction monitoring and so on, among which, see chapter 6 for the budget of environmental monitoring; see chapter 7 for the budget of environmental management training; see **Table 8-1** for the budget of environmental impact mitigation and security administration. All the costs have been included in the total investment estimated.

Table 8-1 Environmental impact mitigation and environmental safety management measures Estimate Table

Project Stages	Parameters	Investment for subproject（CNY 10,000）				Subtotal (CNY 10,000)
		Chengde Subproject	Pingshan Subproject	Xingtai Subproject	Zhangjiakou Subprojcet	
Construction period	Construction Noise	**180**	**3**	**201**	**175**	**559**
	Construction Dust	**135.2**	**5.8**	**126**	**99**	**366**
	Construction Waste	**48.7**	**1**	**40**	**46**	**135.7**
	Solid Waste	**28.5**	**1**	**30**	**32**	**91.5**
	Ecological environment	**38.6**	**45**	**31**	**47**	**161.6**
	Water and soil conservation	**74.7**	**0**	**46**	**60**	**180.7**
	Social Impact: Living and social activities	**78.6**	**0**	**80**	**77**	**235.6**
	Transportation, commercial activities	**5**	**3**	**71**	**54**	**133**
	Cultural relics	**34**	**0**	**0**	**0**	**34**
	Environmental Risk Management	**0.2**	**0**	**20**	**0**	**20.2**
Operation period	Heat exchange station noise	**10**	**17**	**46**	**7**	**80**
	Environmental risks and operational safety risk management	**27.8**	**11**	**75**	**58**	**171.8**
	Occupational Health	**13.4**	**3**	**201**	**13**	**26.4**
Subtotal (CNY 10,000)		**674.7**	**86.8**	**766**	**668**	
Total (CNY 10,000)		**2195.5**				

9. Public Participation Plan

9.1. Continuous Public Participation

Public participation should be in each stage of the project, including preparation period, construction stage and operation stage. A annual meeting for the on – site investigation of work should be held in the area with more environmental sensitive targets within 2 years after the construction stage and operation stage to listen to the public opinion, and the environmental mitigation measures shall be improved as necessary.

During the construction stage, the form of on – site announcement should be used to inform the public: construction stage, operation time, and measures adopted to reduce the environmental effects; names of development organization, construction organization and environment protection bureau, name and contact number of contacts and so on. The public should get feedback timely for their opinion proposed in the construction stage, and the construction activity should be coordinated to reduce the environmental effects to the least.

The forms of interviews or formal discussion activities should be used in the operation stage of the project to collect the opinions or suggestions of residents and all walks of life in the society affected by this project, and further mitigation measures should be adopted as necessary.

9.2. Public Participation Plan

Table 9-1 illustrates the continuous public participation plan in the construction stage and operation stage of the project.

Table 9-1 Continuous Public Consultation Plan

Agency	Form	Frequency	Content	Participant
A. Project construction period				
Local PMO, PIU, contractor	Public consultation in seminars and site visits	At least once a year	Implementation and effectiveness of mitigation measures, if necessary, update the mitigation plan; construction impacts; suggestions and recommendations	Residents' representatives from project service community and society
Local PMO, PIU, contractor	Expert forum and press conference	According to needs of public participation	Mitigation measures and the observations and recommendations of implementation; public opinion.	Experts and medias in all fields
B. Project operation period				
Local PMO, PIU, operation unit	Public consultation and site	Once a year at first two years	The effect of mitigation measures; operational impacts; suggestions and	Residents' representatives from project service

	visits		recommendations	community and society
Local PMO, PIU, operation unit	Expert forum and press conference	According to needs of public participation	Comments and suggestions for run impacts; public opinion.	Experts and medias in all fields

9.3. Information Diffusion and Suggestion Feedback (Complaint) Mechanisms

9.3.1 Information Diffusion

To ensure the people Affected by the project can get the information timely and the interests of them can be sufficiently considered in the process of construction and operation of the project, an effective information diffusion mechanism should be established. The following is the specific contents:

(1) Preparation stage

Many forms such as publicity of media, posting announcement, forum, interview and public participation questionnaire should be used by the development organization and environmental impact assessment bureau to spread the information. The requirement and feedback of people Affected by the project should be recorded truthfully.

(2) Construction stage

Construction party should publish the project information to the parties affected by the project (local government, enterprise and residents) by holding community meeting, posting announcement, setting hot line.

The project information should be posted prominently in each construction site, including but not limited to:

① Project overview;

② Construction plan;

③ Main construction activities;

④ Main environmental issues and mitigation measures;

⑤ Names and phone number of project manager, supervising engineer and environmental protection personnel.

The construction party and environmental supervision engineer should communicate with the main group affected by the project (such as the local residents, enterprises, and cultural protection office) regularly and hold symposiums to reduce the diverse effects; for the construction activities with significant impact, construction party should communicate with the parties which will be affected by the project possibly.

The construction party should post the related information of complaint channels at the entrance of construction site. There should be register of complaints in the construction office. All the complaints, issues and the related matters should be included in the feedback report and checked and approved by the environmental supervision engineer and development organization; the contents of complaint which are needed to be corrected or handled should be transmitted to the party concerned to ensure the satisfaction of the complainants.

The development organization should open telephone consultation hot line to timely know the issues concerned by the residents and departments which are affected by the project and answer these consultations. For the issues about environmental protection, the local environmental protection administrative department should be consulted and the issues should be solved properly.

(3) Operation stage

A mechanism to communicate with stakeholders should be established in the operation stage of the project. A hot line should be provided by the mechanism to monitor and evaluate the environmental effects of the operation of heating power pipe line and supporting facilities. The mechanism above is established to ensure the related institutions and the public can feed back the environment effects from the project.

The information of environmental monitoring and environmental management in the operation stage of the project should be shared fully by the stakeholders. An annual meeting for the parties related the interests should be held by the development organization, and the parties related the interests which are invited should include the representatives of the major government agencies, surrounding residents and groups. The requirement, discovery and suggestion should be conveyed to the relevant departments of government, and the necessary follow – up actions should be adopted to ensure the environmental quality can reach the standard.

The information above should be informed to the public with media, meeting or other ways to ensure the public can get the information released, at the same time, media tools shall be used to strength the propaganda and report. All aspects of the public comments and suggestions should be organized into clauses, which should be discussed and handled by the relevant agencies.

9.3.2 Grievance Readiness Mechanism

In the construction stage and operation stage, PMOs at all levels and construction organization should assign the special person to handle the complaints of people who effected by the project. The complaint call should be publicized, and the consultations and complaints of the public should be accepted.

Complaint Accepting office would accept the complaints within one week after the commencement of woks, and the private telephone for the complaints and complaints mailbox would be open at the same time.

Measures should be taken to ensure the complaints channels are transparent and effective:

① If residents in the project area are not satisfied with the EMP, or the operation and construction of the project affect the local environment quality, the verbal or written complaint can be proposed to the construction organization of the project or the local Project Office. The local office should make a decision to handle the complaints or solve the issues proposed in the complaints within 2 weeks.

② If the residents are not satisfied with the decision of PMO, according to *Administrative Procedure Law of the People's Republic of China*, they can appeal to the administrative departments with jurisdiction step by step to get administrative reconsideration and arbitration.

③ If the residents are not satisfied with the administrative reconsideration and arbitration, according to the civil procedure law, they can prosecute to the civil court.

④ The residents can propose appeal (prosecution) aimed at any aspects of the environmental management, including compensation standard and so on.

⑤ The appeal channels should be informed to the residents to ensure the residents can sufficiently know they own right of petition.

⑥ The institutions which accept the appeal of residents shall ensure there would be no fee are allowed to be charged from the residents, and the fees incurred from the appeal should be paid by the development organization.

GRM, including standardized record, track and periodic reporting system:

① Standardized record: the appeal record list comprises: the fundamental state of declarant, the fundamental state of the appeal matters, the fundamental state of reply, solution and effect achieved;

② Track: Paying a second visit to the declarant whether appeal is handled, whether the declarant is satisfied with effects of the treatments and so on.

③ Periodic report: The issues of appeal should be reported to the Office of Administration at higher level in writing form, which would be recorded into the plans for the next year to avoid the occurrence of similar incidents.

10. Environmental Reporting System

In the process of project implementation, the local PMO and PIUs should record the process of the project, the implementation of the project, the results of environmental quality monitoring and the compliance for the environmental clause in the loan documents, which should be report to the Provincial Project Office according to the set time.

The main contents of report include:

① Monthly report of project construction and supervision;

② Implementation, existing problems, corrective actions and effects of the mitigation measures;

③ Environmental monitoring report, which includes background monitoring before construction, monitoring in construction stage and monitoring in operation stage;

④ If the results of monitoring do not reach the standard, the explanation of reasons and corrective actions of suggestions should be included;

⑤ Record for the environmental complains and solutions.

The frequency of report and project status report should be synchronized, which is quarterly or semi-annually base.

Appendix A

Environmental Protection Management Regulations on Heating Exchange Station and Pipeline Laying Construction

Annex A: Regulations on Environmental Protection of Heat Exchange Station and Pipeline Laying Construction

In accordance with the requirements of environmental screening and classification stipulated in the *Environmental Assessment of the World Bank Safeguard Policy* (OP4.01), the environment category has been classified as A based on the project type, location, sensitivity level, project scale and its characteristics, potential environmental impacts level. This *Regulation on Environmental Protection of Construction Works* has bee developed in order to standardize construction works and reduce as far as possible interference to sensitive and surrounding areas. This Regulation is applicable for construction of heat exchange station and heating pipelines.

I. Management system

1. Design of management system

In accordance with relevant regulations and actual engineering requirements and in order to better realize demonstration effect of the project, a special person shall be assigned in project management office (PMO) to be responsible for environmental management, and an environmental management system shall be established by relying mainly on external supervision of environmental protection authorities and assisted by internal supervision of project management agencies.

2. Responsibilities and personnel allocation of each agency related environmental management system

The responsibilities of each agency in this project and personnel allocation can be referred in **Table A-1.**

Table A-1 Responsibilities of each agency in environmental management system

Name of the agency	Type of the agency	Personnel allocation	Responsibilities of the agency
①Municipal environmental protection bureau	Supervisory agency	1	[1] Conduct whole-process environmental supervision and management for the project according to law, which includes: approval of environmental impact assessment report of the project, environmental supervision and management during the period of project construction and operation;
②Provincial PMO	Regulatory agency	1	[1] Compile and supervise the implementation of *Regulations on Practice of Environmental Protection;* [2] Supervise and coordinate the compliance of domestic and the World Bank requirements of environmental management; [3] Submit relevant reports annually to the World Bank; [4] Review project environmental management work; [5] Coordinate with other relevant agencies to resolve major environmental issues; [6] Assign and recruit environmental expert team to conduct review of the project;
③Municipal/county PMO	Regulatory agency	1	[1] Compile and supervise the implementation of rules and regulations about the project environmental management; [2] Cause the engineering design to meet the requirements in environmental impact assessment; [3] Incorporate environmental protection measures in this environmental management plan into construction contracts; [4] Recruit, supervise and coordinate with Engineering Project Supervisor (qualifications, responsibilities and management); [5] Organize and implement environmental management training program; [6] Conduct special study or relevant research work; [7] Record and sort out complaints during the construction and operation period, release the results of complaint handling and

			resolve complaints; [8] Review environmental supervision and monitoring report; [9] Submit report (statement) to provincial PMO semiannually; [10] Sign off field check list submitted by construction and supervision units; verify environmental sensitive problems and keep them in the archives; [11] Accept inspection of environmental work (including the World Bank review mission)
④The World Bank	Supervisory agency	1	[1] The World Bank will assign review mission annually to be responsible for special inspection of engineering construction; [2] Check the implementation of project loan agreement and the Regulations on Practice of Environmental Protection;
⑤ Grade A unit with construction project environmental impact assessment qualification certificate	EIA institution	3	[1] Conduct site visit and evaluate its environment. [2] Being responsible for compiling parts of the Regulations on Practice of Environmental Protection Work;
⑥Environmental expert team hired by provincial PMO	Consulting service institution	1	[1] Assist provincial PMO to check project environmental protection work; [2] Conduct site inspection to the construction site and the contractor; Draft and report to provincial PMO; Propose suggestions and opinions on the Regulations on Practice of Environmental Protection Work.
⑦Engineering project supervisor(being responsible for environment supervision work)	Consulting service institution	1	[1] The Engineering Project Supervisor is assigned otherwise by provincial or local PMO; [2] Supervise and check treatment of domestic and industrial sewage, preventive measures of water loss and soil erosion, control measures of waste gas, dust and noise, treatment of production, domestic waste and sediments, health & epidemic prevention in the construction area; [3] Complete regularly each check list about environmental management attached to the Regulations on Practice of Environmental Protection; [4] The corrective measures shall be implemented as to relevant environmental protection problems encountered during the construction works of the construction unit and their progress of implementation shall be tracked all the time, including issue rectification notice and check list, examination of document filing; [5] Ensure that the construction unit will compile and submit weekly implementation status of the project to local PMO;
⑧Construction unit	Enforcement body	2	[1] Develop environmental protection measures during the construction period; [2] Accept supervision and inspection from engineering project supervisor, the World Bank and environmental protection agencies at all levels in terms of environmental protection; [3] Establish a feedback mechanism and complete correction within 3 working days since the notice of correction is received (corrections must be completed within 10 working days if coordination of regulatory agency is required); [4] Complete with the project supervisor construction site checklist before the construction and report it to regional PMO; [5] The construction unit shall report implementation status of the project to the project supervisor on a weekly basis.

3. Environmental management tasks at each project stage

The primary objective of the Environmental Codes of Practice is to ensure various environmental protection measures proposed to be implemented practically and effectively, including: ① Incorporate environmental protection measures in Regulations on the Environmental Codes of Practice into project design and construction contract; ② to check the implementation of environmental protection measures based on environmental supervision and construction unit during the project construction; ③ A mechanism for check, report and filing of Environmental

Codes of Practice shall be established. The effectiveness of the work is reflected through examination of daily work.

At different stages of the project implementation, different information is specified in the Environmental Codes of Practice, which is shown as **Figure A-1**:

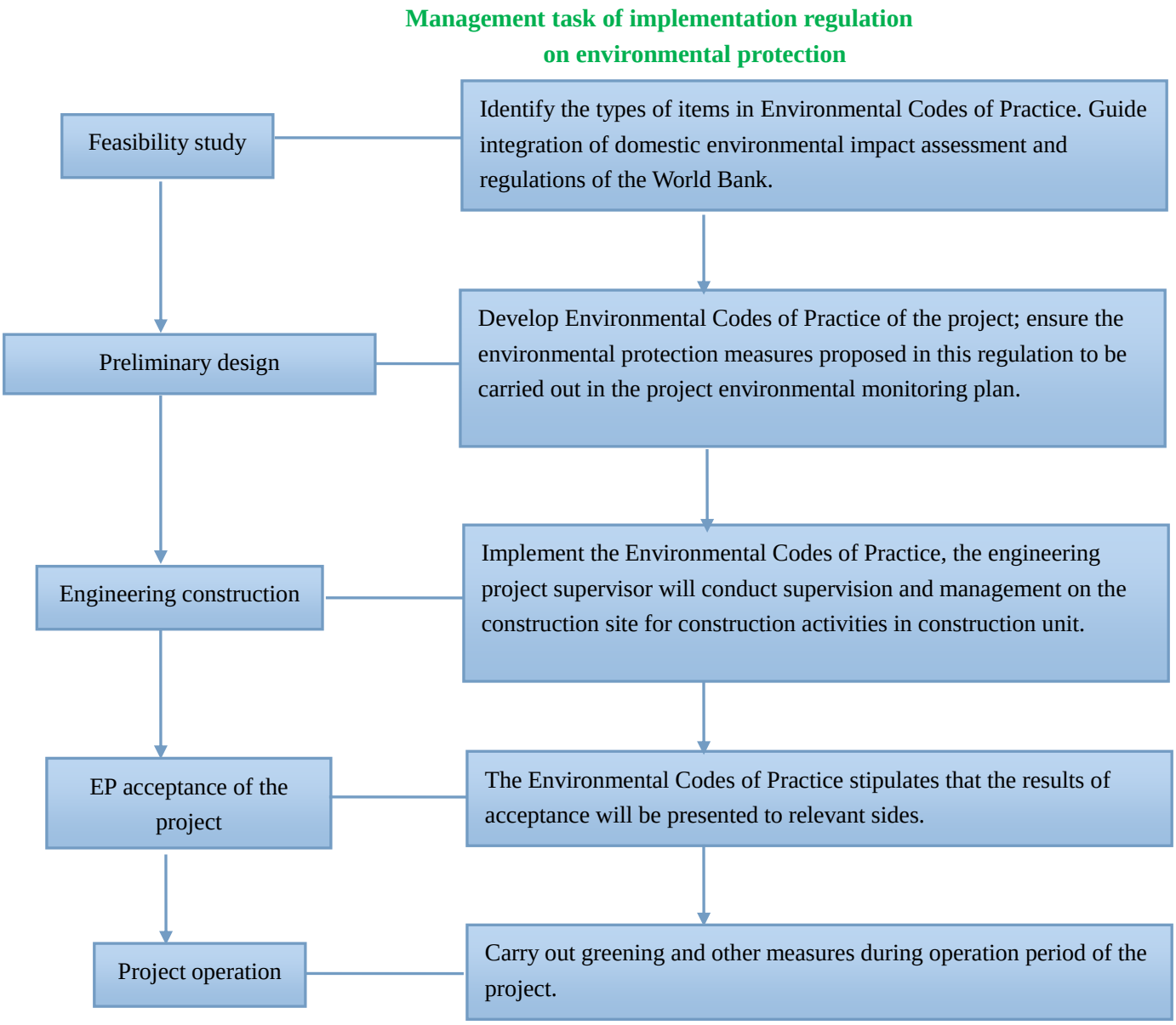

Figure A-1 Content of Environmental Codes of Practice at different stages during the project implementation

4. Working procedure of the agency performing the Environmental Codes of Practice during the construction period

Details can be referred in **Figure A-2**;

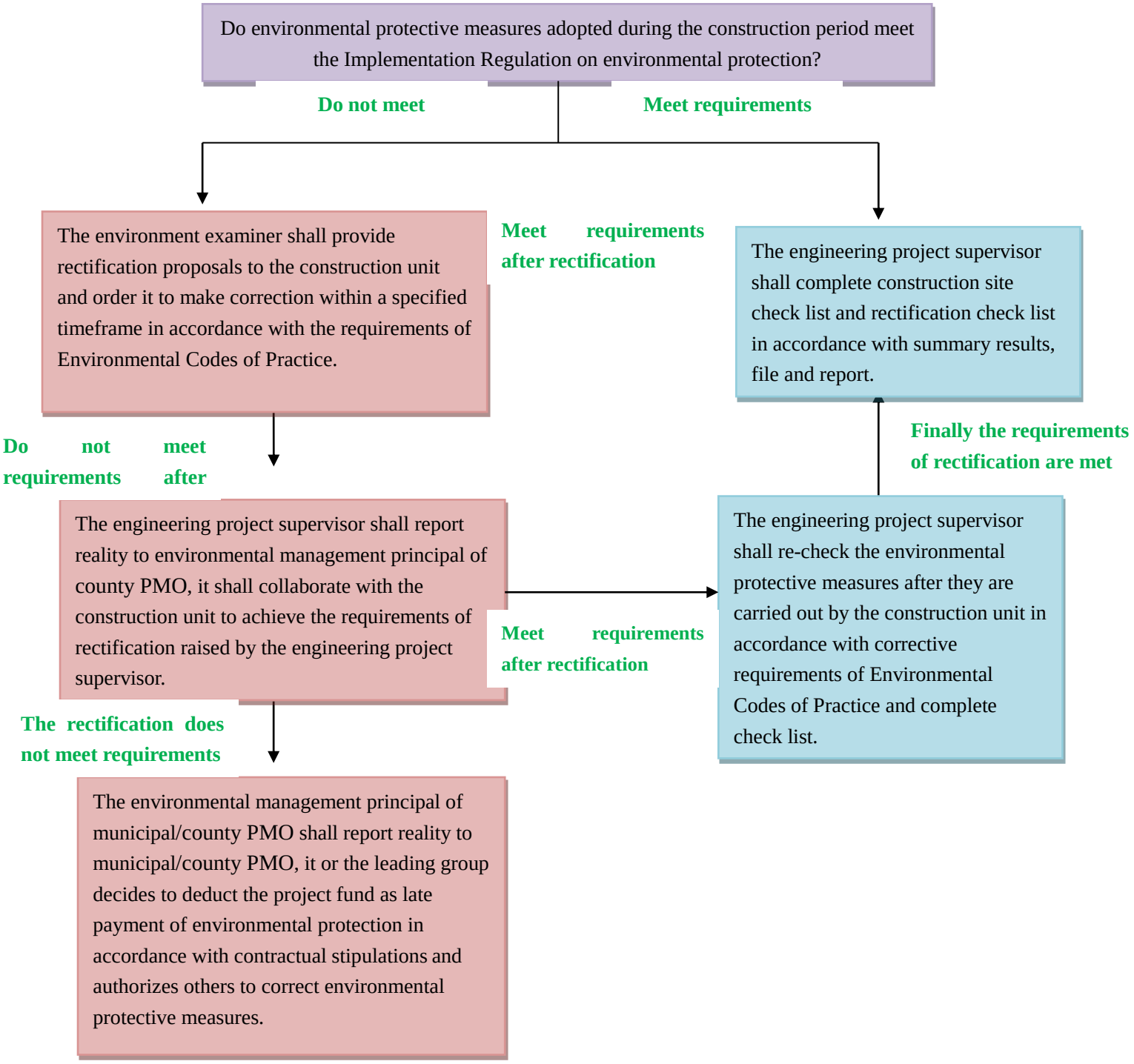

Figure A-2: Working procedure of the agency performing the Environmental Codes of Practice

4. Document management for Environmental Codes of Practice

During the implementation of Environmental Codes of Practice, the World Bank, the provincial project leading group and PMO, environmental impact assessment institute, engineering project supervisor and construction unit shall all be responsible for managing relevant documents, more details can be referred in the following **Table A-2**:

Table A-2: Requirements of document management at each agency

Name of the agency	Document management
①Construction unit	1. Record on a weekly basis the implementation of construction, file and report it to engineering project supervisor; 2. Complete the construction site check list with engineering project supervisor before the construction, file and report it to regional PMO; 3. In case of emergency, record specific implementation details, file and report them to the engineering project supervisor; 4. Upon receipt of the rectification notice, complete rectification within 3 working days (rectification shall be completed within 10 working days if coordination from regulatory agency is needed) and filing;
②Engineering project supervisor	1.Record on a weekly basis reports from the construction unit, file and report them to regional PMO; 2. Complete the construction site check list with the construction unit before the construction, file and report it to local PMO; 3. In case of emergency, record specific implementation details taken by the construction unit, file and report them to regional PMO; 4. The corrective measures shall be put forward as to relevant environmental protection problems encountered during the construction works of the construction unit and their progress of implementation shall be tracked all the time, including issuance of rectification notice and check list, examination of document filing;
③Grade A unit with construction project environmental impact assessment qualification certificate	1.Compile Environmental Codes of Practice and file respectively its first draft, draft for examination and draft for approval;
④Municipal/county PMO	1. Develop and implement rules and regulations on sub-project environmental management and file them; 2. Develop and apply for approval of domestic EIA documents, file them; 3. Develop and implement environmental management training plans, file them; 4. Organize special study or relevant research work, manage seminar and survey work documents and file them; 5. Record, sort out and file complaints during engineering construction and operation; 6. Record on a quarterly basis reports from engineering project supervisor, file and submit reports (statement) to provincial PMO; 7. Sign off construction site check list reported by the construction unit and engineering project supervisor; verify environment sensitive problems and keep them in the archives; 8.Manage and file reported rectification notices;
⑤Provincial project leading group and PMO	1. Develop, supervise and implement Environmental Codes of Practice, file it; 2. Record semiannually reports from each local project leading group and PMO and submit relevant reports to the World Bank, file them; 3.Coordinate with other relevant agencies to resolve major environmental problems, record detailed measures being adopted and file them;
⑥The World Bank	1.Record semiannually reports from provincial project leading group and PMO and file them;

II. General requirements of Environmental Codes of Practice

During the project construction, the contractor will play a key role in terms of environmental management, pollution control and implementation of preventive measures. In order to carry out Environmental Codes of Practice, this section lists some general requirements that are generally applied to each main agency during the construction. Thus, the construction unit can, under the coordination and internal/external supervision, management of provincial, municipal and county PMO and engineering project supervisor, carry out each environmental measure as stipulated in Environmental Codes of Practice.

1. Construction design drawings and implementation of environmental measures incorporate into bidding documents

Once the project is implemented, procurement will be carried out in accordance with procurement guidelines of the World Bank. The local PMO shall, under the coordination, guidance and supervision of provincial PMO, request tender compiling unit to compile this Environmental Codes of Practice and mitigation measures as to potential adverse environmental impacts in EIA of each sub-project into technical specification of the bidding documents and design drawings. The bidder is requested to incorporate all contents and requirements of this Environmental Codes of Practice into bidding documents and construction contract.

[1] The contractor is required to establish a supervision responsibility system for implementing environmental protection measures during the construction period, it shall be responsible for implementation of environmental protection measures throughout the construction period and ensure construction activities and its sub-contractors (if any) to meet each requirement of this Environmental Codes of Practice and necessary environmental protection measures have already been adopted during the construction process.

[2] The contractor shall communicate and negotiate with people in the area in which the project is located during the construction period, the bulletin board shall be established in each construction site to illustrate the concrete construction activities and working schedule. Meanwhile, the contact people and contact information of the construction unit shall be provided for the convenience of the people in complaining and suggesting.

[3] The contractor must comply with local rules related to safe and civilized construction;

[4] The construction unit and construction supervisor is required to receive training in terms of environmental protection and management. The provincial PMO authorizes external expert to train contractors and engineering project supervisor to identify various requirements of environmental protection related to this project.

[5] In case of any severe risk and accident caused by incompliance of environmental protection measures in Environmental Codes of Practice, the engineering project supervisor or the contractor must notify municipal/county PMO within 24 hours. The municipal/county PMO and environmental protection agencies at all levels shall order immediately the construction unit to adopt remedial measures, the contractor must guarantee that these remedial measures be implemented as effectively as possible to prevent recurrence of

similar risks. Meanwhile, the contractor must keep recording the implementation status of these measures and report on a regular basis to engineering project supervisor and the engineering project supervisor shall report it to municipal/county PMO and keep it in the archives.

[6] The contractor shall set aside part of the project cost as deposit for environmental management in accordance with annual budget, which shall account for about 3% of expenditure budget. If the construction unit takes inappropriate measures in environmental protection, the provincial PMO can impose a fine on the construction unit in accordance with the contract and deduct project fund for environmental protection, authorize others to adopt environmental protection measures.

2. Preparations before the construction

After the bid is awarded and before commencement of works, the municipal/county PMO shall provide results formed in environmental impact assessment of each sub-project, including EIA report and copy of EIA approval documents issued by local environmental protection agency, to the contractor under the coordination, guidance and supervision of provincial PMO. The contractor is required to conduct environmental survey on the construction site in order to verify and identify descriptions about surrounding area of the construction site in EIA assessment of sub-project and environmentally constraining factors in the project site.

The contents can be referred in Annex I of Environmental Codes of Practice, additionally appropriate environmental protection countermeasures shall be adopted for environment sensitive problems newly detected in environmental survey before commencement of works. Commencement of works is not permitted until approval of engineering supervisor and the construction activities at each stage shall be ensured to meet the requirements of Environmental Codes of Practice.

The environment sensitive problems survey before the commencement of works include:

[1] Check if there is electricity, water and gas supply, cable and telecommunication pipe laying in the section of pipeline construction;

[2]Check if there is sensitive point like school, hospital and residential area in the section of pipeline construction and at the construction site of heat exchange station;

[3] Check shade trees in the section of pipeline construction and if ancient and famous trees are needed to be transplanted;

[4] Whether or not the commencement of pipeline construction goes through relevant procedures at Planning Bureau and Bureau of Urban Utilities and Landscaping.

3. Approval of the authority and public consultations

The construction unit must collaborate closely with local governmental agencies and other agencies throughout the construction duration in order to ensure the government regulations are met fully. The construction unit shall notify in advance local residents and public in the neighborhood of the construction site of the site, including estimated duration of the construction. The public shall be provided with sufficient information, especially construction

activities that may possibly lead to public security, affairs that may do harm to public interests, sensitive area and temporary stowage area for the construction.

The construction unit must disclose open and transparent public participation mechanism and hotline telephone to receive consultations and advices from the public. The hotline telephone deals with various incoming calls concerning construction interference on the environment and records all incoming calls so as to reflect hot issues given so much attention by the caller. Meanwhile, a quick response mechanism shall be established to answer frequent questions raised by the public.

III. Site control during construction

As the main content of the *Environmental Codes of Practice*, this chapter puts forward the environment protection measurements and basic requirements of environmental management which instruct contractors to perform the engineering of heat exchange station and heating pipe network. It also summarizes requirements for construction site, which mainly include construction time, construction nameplate, construction hoarding, construction barricade, temporary access, construction encampments and accident risk prevention. Construction units must comply with the provisions of the local environmental protection agency and undergo regular inspections of environmental supervision.

1. Construction time

[1]. Construction time is from 6 am to 22 pm. Construction should be stopped during lunch breaking time, which is from 12 am to 14 pm. The working time for construction vehicles must comply with the requirements of the local government.

[2]. Construction at night should be limited. Construction units should announce to the residents if this cannot be avoided. Meanwhile, they also should go through relevant procedures and take measures to reduce the impacts to local residents.

2. Arrangement of construction nameplate

[1]. Construction units must indicate construction time, working schedule, service interruption, traffic detour routes, temporary bus lines and demolition on the construction nameplate.

[2]. Construction at night should be limited.

[3]. If necessary, construction units should control the constructing influence on the surrounding and announce to the committee in advance to make the public take the necessary measures.

[4]. Construction units must post notices to announce the public in the project sites, bus stations, affected residents and companies at least five days before service interruptions (including water, electric, gas and traffic lines)

3. Arrangement of construction hoarding

[1]. The hoardings should be set around boundaries of construction site to ensure enclosure in construction engineering whose period is more than 30 days. They shall be made of sheet

metal and hard materials. The height of the hoardings shall be equal to or larger than 2 meters in the general construction site and 2.5 m in the key construction site.

[2]. The hoardings shall be straight and upright, uniform and standardized, clean and good-looking and non-damaged. Their appearance shall along with the surrounding environment.

[3]. The hoardings occupying the road shall be set within the visible scope of 5 m away from the intersection of roads. Hoardings made of metal halftone which have the straight stiffness, are set so that the sight of drivers and pedestrians doesn't be sheltered, to ensure the traffic security. It is prohibited to pile up all sorts of things within the visible scope of 5 meters.

[4]. If the distance is equal to or less than 5 m between the hoardings and residence or 15 m between construction site and sensitive structures, such as residence, hospitals and schools, the noise abatement measures, which should conform with relevant specification and standard provisions, of heightening hoardings and setting noise barriers shall be taken. It should keep clean within 5 m outside of hoardings.

[5]. It is prohibited to pile up materials, such as tools, earth and rubble, within 1 m inside of hoarding.

[6]. It is prohibited to use hoarding as retaining walls or supports for other instruments and equipment.

[7]. Hoardings shall be set to ensure enclosure around boundaries of construction site in pipeline engineering in the key area.

4. Arrangement of construction barricade

[1]. Construction barricade shall be set around boundaries of construction site in pipeline engineering whose construction period is equal to or less than 30 days.

[2]. It is prohibited to use security isolation rope composed of red and white flags or other materials instead of construction barricade.

[3]. Construction barricades should linked continuously to be a closed enclosure. Barricades shall be tight and solid, uniform and standardized, clean and non-damaged.

[4]. Folding construction barricades shall be set around the boundaries of the work zone in which operations should be performed after opening or lifting blind manhole covers on the urban road where traffic keeps unobstructed.

[5]. The long sides of the base channels shall face the construction site in construction barricade setting. The width of construction access road, which needs to be set between construction barricades and construction site shall be equal to or larger than 0.6 m.

[6]. Construction unit's name shall be printed horizontally on the construction barricades. It is prohibited to set the construction barricades which are irrelevant to the organization's name in construction site.

[7]. Construction barricades shall be closed completely around the boundaries of work zone in which coating refresh or cleaning construction work would be performed on the surface of buildings. All sorts of mechanical equipment, tools and materials shall put within the scope of enclosure.

[8]. If temporary access road isn't adopted in road construction or the engineering hasn't been finished, it is prohibited to remove construction barricades.

[9]. In the key site, the construction method of "one excavation section, one laying section, one restoration section" shall be adopted in pipeline engineering. It is strictly prohibited to conduct all excavation work at the same time.

5. Arrangement of temporary access

[1]. To construct on the urban roads needs to comply with the relevant provisions of Public Security Traffic Administrative Department and Road Administration Management, go through relevant approval procedures, and set the temporary access.

[2]. Construction units shall strictly comply with licensing provisions. It is strictly prohibited to occupy roads arbitrarily or construct beyond the prescribed time limit.

[3]. If organizations need to construct on the occupied urban roads and it influences the traffic of vehicles and pedestrians, they shall set the temporary access in accordance with provisions.

[4]. Organizations who occupy urban roads to construct shall set firm, even and continuous sidewalks enclosed securely near the edge to ensure the safe traffic of pedestrians on one side of access doors in the near markets, companies, office buildings and residences.

[5]. When organizations dig trenches or pipeline grooves on urban roads, if they can't finish it on that day and the road is still taken as a passing way, they shall take the steel covering and flatting method to construct continuously the next day.

[6]. Metal section shall be the supporting and strengthening material under the covering steel, when the width of trenches is equal to or larger than 0.8 m.

[7]. The supporting and strengthening measure shall go through the safety confirmation and be reported to construction unit for approval. The thickness of the steel plate covering the road shall be equal to or larger than 0.03 m. Sides of steel plate and metal slope frame shall be polished to ensure no sharp edges or burrs. Consequently, pedestrians and vehicles can pass safely.

6. Arrangement of construction encampments

[1]. Construction units should make use of surrounding existing facilities as much as possible and rent rooms to reduce the influence on the surrounding environment.

[2]. Organizations should arrange, store and deal with all the solid wastes produced in the construction site.

[3]. Natural wood can't be used as fuels when they process or prepare materials needed in

the engineering, cook or heat their rooms.

7. Accident risk prevention

[1]. Construction units should formulate the accident prevention measures in advance and name person in charge of emergency. Once an accident occurs, he can ask the relevant department for help.

IV. Air pollution control

1. A variety of construction activities may cause emissions of air pollutants during the construction and operation period.

2. The main air pollutants in this project are:

[1]. Dust emissions caused by stockpiling area, earth excavation for channel and transport activity.

[2]. Dust emissions caused in small boiler demolition process.

[3]. Dust emissions caused by material transportation on construction roads.

[4]. Waste gas produced in the process of road paving.

[5]. Automobile exhaust pollution produced by construction machinery and vehicles.

3. Environmental management should be strengthened to reduce the influence of construction on environment. The following measures are put forward.

[1]. The water spraying operations must be performed to reduce dust pollution in the construction site on dry days. Excavation, earth backfilling and other activities that may cause dust should be stopped if the wind level is equivalent and/or large than IV, and site should be covered and increasing water spraying frequency.

[2]. The efficient measures of dust controlling should be taken when materials go in or out of the cement silo and the mortar powder silo used in the construction site. It is forbidden to conduct cement mixing on site but pre-mixing should be adopted.

[3]. The measures of greening simply by sowing grass seeds, covering dust-proof gauze and consolidating in new type should be taken to deal with the muck retained in the site and the bare earth in the field.

[4]. Earth produced in the excavation of pipelines during the day should be cleaned after work.

[5]. The height of muck retained in the site is prohibited to exceed the height of the hoarding or barricades.

[6]. Vehicles which transport powders must be covered and cleaned before leaving the site.

[7]. Dusty materials must be wetted when being transported.

[8]. After stockpile is removed, any dusty materials must be wetted by water and cleaned from the road.

[9]. Hard-road or wetting measures must be taken on the dusty roads.

[10]. Organizations must ensure that the amount of water used to control dust emissions can't influence the surface flow or water use of the local community.

[11]. Covering or watering measures should be taken to reduce the dust in the piling site of dusty materials.

[12]. Bags of cement should be open in a sheltered site.

[13]. Construction must be performed in the regulated time to reduce the air pollution. Construction time is from 6 am to 22 pm. And construction should be stopped on lunch breaking time, which is from12 am to 14 pm.

[14]. The transported goods should be covered properly and tied tightly in the transportation. It needs to ensure that vehicles don't overload the earth, stone, waste soil and slag to prevent them from falling.

[15]. The choice of location of stockpile should consider the influence of wind direction to avoid dealing with dusty materials on the upwind location of sensitive receivers.

[16]. It should take measures of wind recovery and dust suppression to pile up the construction materials.

[17]. Organizations should ensure the proper route to transport the solid waste. They need choose the road as even as possible to avoid bumping and reduce the dust emissions.

[18]. The water spraying operations must be performed in the construction site in a demolition project.

[19]. The temporary enclosure must be set in the construction site.

[20]. Speed is limited on the roads along which vehicles enter into the construction site and construction roads. There should be a speed limit sign, with which construction vehicles must comply.

[21] Transport vehicles and other construction machinery should install exhaust gas purification equipment and exhaust emissions standards should meet. Fixed equipment exhaust chimney should be placed in a location away from residential areas, and maximize the use of highly conducive to the spread enough

V. Water pollution control

1. Waste water produced by construction activities can have a bad influence on the water quality.

2. The following activities shall influence on water quality when project is during the construction and operation period.

[1]. Waste water produced by construction equipment.

[2]. Uncontrolled surface runoff.

[3]. Soil erosion caused by the non-covering protection to the stockpile and the excavation

points in a bad weather conditions.

3. Environmental management should be strengthened to reduce the influence of construction on environment. The following measures are put forward.

[1]. The site in which the hoarding is set should be inside of access doors. One horizontal general drain tank should be set along the line out of doors. And it should be connected with the drainage system in the site.

[2]. Vehicles washing drain tank should be designed in accordance with the specific size of vehicles. Its surface should be plastered and evened by pre-mixed mortar. And its groove should be covered with metal halftone which has high load-carrying capacity.

[3]. Sedimentation tank with enough large capacity should be set in the construction site. And it needs to be cleaned regularly and dealt with by the solid waste disposal method.

[4]. Domestic sewage must go through tertiary treatment of sewage in the septic tank. After that, it can be discharged into the municipal pipe network and dealt with properly.

[5]. Construction must be performed in the regulated time to reduce the production of waste water.

[6]. Water discharged into the surface and waste water in the sewer line must conform with the laws and regulations of the water environment protection in China.

[7]. Construction units should send workers to clean deposits in the channel, winze and sedimentation tank. It is cleaned once per 10 days in the key area and once per month in the general area.

[8]. Organizations should maintain the waste water treatment (such as the sedimentation tank) in the construction site regularly.

[9]. It is prohibited to discharge the mud or slime water into the the city pipe network directly.

[10]. Vehicles and equipment should be cleaned before removing from the construction site.

[11]. The public roads and places, entrances and temporary hoardings revolving in the construction site should keep clean.

[12]. There must be enough area to store the wastewater treatment system.

[13]. Make clear the location of wastewater discharge point.

VI. Noise pollution control

1. A large number of equipment which produces noise shall be used in this project, such as back-acting shovels, bulldozers, cranes, trucks, generators, ground works, transportation and vehicular traffic.

2. Noise will be produced in the following activities:

[1]. The operation of construction equipment (such as mechanical equipment, bulldozers

and excavators).

[2]. Transporting vehicles deliver materials inside and outside of construction site.

3. Environmental management should be strengthened to reduce the influence of construction on environment. The following measures are put forward.

[1]. Organizations must comply with the relevant noise legislation during construction.

[2]. If not being examined and approved and put on records, organizations are prohibited to construct at night in the construction site.

[3]. Except for the special site in which pipeline construction is performed at night to avoid the influence on traffic during the day, it is strictly prohibited to construct at night.

[4]. If organizations construct at night in the special construction site, they should be submitted to the construction administrative department for filing. And they can't start and operate the mechanical equipment producing noise without authorization.

[5]. Except emergency and rush repair, construction units should arrange construction procedures properly and actively avoid implementing the pile foundation and foundation pit excavation in the construction site which is equal to or less than 100 meters from the residence and examination rooms during the college entrance examination and high-school entrance examination. And they shall comply with the provisions of terminating construction.

[6]. When the pipeline construction is implemented, the cladding method should be applied to the damaged roads and hard surfacing.

[7]. Various pavement damage device should be operated in the mobile operation site. Pavement damage machinery should take the noise abatement measures to control noise effectively.

[8]. Low noise equipment or noise-reducing devices (noise boards and barriers) should be operated in the construction.

[9]. Contractors need to maintain construction instruments regularly to control them under optimal operating condition and at the minimum noise level as far as possible.

[10]. The honking-prohibited signs should be set in the sensitive structures, such as the schools, hospitals and office buildings; the route of vehicles for transporting materials, earthwork should avoid concentrated area residents, try to avoid sensitive periods during transportation (22: 00 pm- 6:00 am the next day).

[11] Some noisy construction equipment is relatively centrally located, fixed noise sources should be located as far away from sensitive targets as possible, minimizing noise by adopt them inside during construction phase.

[12] Do not install concrete mixer on site, ready-mixed concrete should be purchased.

[13] Before commencement of construction, residential buildings surrounding the site are special sensitive targets, construction units should communicate with the relevant

committees, and inform the construction schedule by neighborhood committee. To the residents' access point, posting publicity Construction Notes.

[14] Before construction commencement nearby schools, construction units should be in consultation with the school, and reasonable construction work time schedule should be proposed avoid the disturbance of the class time, try to arrange the high noise level construction activities on weekends or after school, and also speed up the construction progress to shorten the construction period. Construction is prohibited during the examination period.

VII. Solid waste management

1. Solid waste generally includes any garbage. For instance, the household garbage, inert materials of construction and demolition waste produced in the construction site.

2. Solid waste is produced by the following activities:

[1]. Too much excavated earth need to be dealt with in the earthwork excavation.

[2]. The disposal of wood, steel, site hoardings, package materials, fuel tank, lubricant and paint used in the construction.

[3]. The household solid garbage produced by workers, kitchens and toilets.

[4]. The waste produced by on-site wastewater treatment facilities (sedimentation tank).

[5]. The solid waste produced by the small boiler demolition.

3. Environmental management should be strengthened to reduce the influence of construction on environment. The following measures are put forward.

[1]. It must choose the organization disposing the solid waste which has the business certificate.

[2]. The construction site must be clean (it can’t be disorganized).

[3]. Construction waste, reclaimable waste and general waste should be cleaned regularly and stored by category in the construction site.

[4]. If there is the oil spill, organizations must clean the polluted earth immediately during the construction.

[5]. Stoppers in the near drain or sewer should be cleaned regularly.

[6]. Mud sandy depositing in the flushing facilities should be cleaned regularly.

[7]. After finishing the project, organizations should clean all the rest waste in the construction site and dispose them properly.

[8]. Garbage of all the instruments should be collected and removed regularly. The household and construction garbage should be delivered to the designated garbage disposal place by the container with a cover or a truck. Construction waste removal vehicles should be routed, time and place of delivery, transport vehicles should be loaded in moderation,

and take sealed bandage, covering and other measures to prevent scattering, dusting and dripping;

[9]. There should be enough large area to store all the sorts of solid waste temporarily in the construction site.

[10]. If rock wool waste exists in the small boiler, it should be delivered to the designated place air tightly to be buried deeply in time.

[11]. The detailed lists of solid waste disposal should be prepared.

[12]. Transaction receipts of solid waste transportation should be kept.

VIII. Ecological environment protection

1. The construction of the project can have an impact upon the ecological environment. Thus the corresponding mitigation measures should be included in the environmental management plan of the project.

2. The ecological effects during the construction are associated with activities below:

[1]. The space clean-up and vegetation clearance will cause a loss to street plants and roadside vegetation.

[2]. The excavation will pose a threat to the soil.

[3]. The construction will pose a threat to the vegetation outside the construction site.

3. The environmental management should be strengthened to reduce the impact of construction on the environment and there are the following measures.

[1]. The quality and quantity of the construction guaranteed, the contractors should shorten the time of temporary land occupation as possible, control the construction time of the ground works, maintain the stability of excavation and filling and reduce the impact upon the area outside the construction land. Especially in the rainy season, they had better optimize construction land planning reasonably, try to reduce the range of construction activities. Also the construction materials should be transported when needed and the greening should be restored immediately when the construction is completed.

[2]. Try to protect the ancient and rare trees that aren't needed to be developed within the construction land.

[3]. The street trees should be re-planted the instant the construction of the temporary land occupation is completed and appropriate local species should be selected to plant and help to restore the greening.

[4]. No feeding of pets or animals of any type during the construction.

[5]. The exposed soil should be restored quickly and vegetation needs re-planting. The completed area should be restored back to the same to keep the stability of a slope and the completion of soil.

[6]. It is necessary to provide an educational training about ecological environment

protection to contractors and workers before the construction.

[7]. It is necessary to insure there is no natural reserve, ecological garden or cultural reserve near the construction site.

4. Prohibition

[1]. No any cutting of trees beyond the authorized construction site.

[2]. No interference to animals and plants beyond the construction site.

IX. Cultural relics

1. The construction of the project can have an effect on cultural ruins and cultural relics. And it is guaranteed in the environmental impact assessment report that the cultural ruins shall be emphasized in the environmental management plan.

2. Cultural ruins and cultural relics are associated with the following factors during the construction:

[1]. The cultural ruins may disappear or can be destroyed due to the project.

[2]. There exists the potential damage to the structure and stability of the cultural ruins during the construction and operation.

3. According to the related survey, there are no cultural relics within the construction site. If cultural relics are found or there are probably cultural monuments during the construction and excavation, the following measures shall be taken:

[1]. The construction shall be stopped wherever cultural relics are found and the scene protection should be strengthened.

[2]. Contractors shall report to the police immediately and the competent department of culture will give an identification.

[3]. The non-operating loss of contractors shall be compensated by the relevant state departments.

[4]. The protection domain shall be delimited the instant cultural relics are authenticated by experts.

[5]. Owing to the urgent construction or natural damage, the cultural relics should be rescued and excavated.

[6]. The rescue excavation of cultural relics shall be in the charge of professionals by professional facilities and contractors cannot excavate without authorization.

[7]. Whether the construction site should be changed will be discussed once it’s regarded as a finding of valuable cultural relics.

4. Prohibition

No interference to any architecture-relevant articles or ones with historical value.

5. Flow chart of emergency

The flow chart of emergency once cultural relics are found is illustrated by the Figure A-3.

X. Health and safety

1. Contractors are responsible to protect workers and properties from the emergency and conform to the national or local safety standards.

2. Some crucial risks relevant to the construction:

[1]. The risks of falling objects and unstable work-platform.

[2]. The risks of fires.

[3]. The risks of working on the unstable geology.

[4]. The traffic safety within the construction site.

[5]. Personal hygiene and the spread of epidemic diseases.

3. To reduce the effect upon the environment, the environmental management should be strengthened and there are following measures.

[1]. Keep traffic signs, road markings, the supply of guardrail products (including the oil paint, easels, marking materials and so on) and the safety of pedestrians during the construction.

[2]. Give a safety-training to workers before the construction.

[3]. Provide workers with personal protective equipment and clothing and force them to use.

[4]. All work should be stopped at the time of rainstorms and any emergencies.

[5]. Increase the prevention and treatment of AIDS and give an education to workers. Such as the implement of information communication strategy, the strengthening of consulting work face to face, the settling of systematic problems associated with personal behaviors and encouragement of personally-taken protection measures.

4. Prohibition

[1]. No using of open fire.

[2]. No using of unapproved poisonous materials, such as lead paint and asbestos.

[3]. Workers are prohibited from using alcohols.

Table A-3 Site Checklist Prior to the Construction

No.: Contract number and name:

The project name: Copy unit:

Current construction stage: Inspected by: Date:

Items	Implementation	Notes/

	Implemented	Unimplemented	Not applicable	suggestions
1. Natural habitats				
1.1 Whether the construction site is located in or close to national parks (existing or planning), natural reserves or areas of high-cultural value or not?				
1.2 Whether there exists the fragile or endangered species in the construction site or not (terrestrial or aquatic species)?				
1.3 Whether there exists a natural habitat in the construction site or not?				
1.4 Whether it is fragile, rare and range-limited or not if there exists a natural habitat?				
1.5 Whether there exists a wetland and an area with saturated soil or not (permanent or temporary)?				
1.6 Whether there exist archaeological, historical or other cultural heritages that have been known or not (graves, cemeteries and so on)?				
1.7 Others (please specify)				
2. Materials and cultural resources				
2.1 Whether the project will lead to permanent or temporary migration or the project will affect materials and cultural resources known or not?				
2.2 Whether the materials and cultural resources of the project make a difference to local residents or not (such as cemeteries)				
2.3Whether there exist archaeological, historical or other cultural heritages that have been known or not (graves, cemeteries and so on)?				
2.4 Others (please specify)				
3. Preparations before the construction.				
3.1 Whether the construction team has been hired or not?				
3.2 Whether the location of the storage area has been ensured or not?				
3.3 Whether seeds, native vegetation and topsoil have been collected and stored is essential to help to restore the site.				
3.4 Whether the construction road is cleared or not, including the clearance of roots and organic waste?				
3.5 Whether there exist buried pipelines of facilities like electric power, water delivery, fuel gas, optical cable and telecommunications on the pipeline construction sections or not?				

Items	Implementation			Notes/ suggestions
	Implemented	Unimplemented	Not applicable	
3.6 Whether there exist sensitive spots like schools, hospitals and mass houses on the pipeline construction sections or not?				
3.7 Whether there exist ancient and rare trees that need to be transplanted among the roadside plants on the pipeline construction section or not?				
3.8 Whether the operation of pipelines has procedures of relevant departments like planning department, municipal department of parks and woods or not and whether the construction is legitimate or not?				
3.9 Others (please specify)				
4. Surrounding environment and people				
4.1 Whether the project has infringed upon the interests of the surrounding people or not?				
4.2 Whether the construction of piping network has an impact upon the surrounding people or not?				
4.3 Whether the project is involved in the issue of the temporary land occupation or not				
4.4 Whether the project is involved in compensation issues or not?				
4.5 Whether the project has an impact upon the production facilities or not?				
4.6 Whether the project has an impact upon the service or resources channel or not?				
4.7 Whether the project has impeded the normal life or not?				
4.8 Others (please specify)				

Table A-4 Construction Management Checklist

No.: Contract number and name:

The project name: Copy unit:

Current construction stage: Inspected by: Date:

Item	Implementation			Notes/suggestions
	Implemented	Unimplemented	Unsuitable	
1. Air pollution control				
1.1 Whether watering is used to reduce the raised dust on the construction site or not?				
1.2 Whether vehicles loaded with powdery are covered or cleaned before leaving or not?				
1.3 Whether the road surface of dusty roads is hardened or watered to keep wet or not?				
1.4 Whether it's ensured that the amount of the water used to control raised dusts will make no difference to the surface flow or the water-use of local community or not				
1.5 Whether the lots stacked with powdery materials are covered or watered to reduce dusts or not and whether cement bags can be opened at somewhere shady or not?				
1.6 Whether there are facilities for regular checking, maintaining and cleaning of tires or not?				
1.7 Whether the transported cargo is properly covered or firmly tied or not?				
1.8 Whether the wind direction is taken into consideration at the time of choosing the location of material piles or not?				
1.9 Whether the wind dust-controlling measures are taken to protect the material piles or not?				
1.10 Whether a reasonable course of solid waste transportation is ensured to reduce the emission of dusts or not?				
1.11 Whether it is watered in the demolition engineering or not?				
1.12 Whether the places where raised dusts are produced (like the stirring of mud) are closed or not?				
1.13 Whether a temporary construction fence is built or not?				
1.14 Whether the speed is required or there are speed limit signs on the construction road or not?				
1.15 Whether the construction vehicles keep to the speed limit or not?				
1.16 Whether the construction time conforms to the stipulation to reduce the emission of dusts or not?				
1.17 Whether the powdery materials are moistened before being transported or not?				
1.18 Whether the remaining dusty materials are moistened and discharged from the road surface after the material piles are taken away or not?				
1.19 Whether dust control measures are taken when the presently-used cement silos and mortar powder silos are taken in and taken out or not?				

Item	Implementation			Notes/suggestions
	Implemented	Unimplemented	Unsuitable	
1.20 Whether the unearthing of the excavation of pipelines is dealt day by day or not?				
1.21 Others (please specify)				
2. Water pollution control				
2.1 Whether a horizontal and long sink is set up inside the in-out door and along the door on a construction site with fence or not?				
2.2 Whether the sink is connected with the drainage system of the construction site or not?				
2.3 Whether the washing sink of vehicles is designed according to the specific size of vehicles or not?				
2.4 Whether a big enough settling pond is set up inside the construction site of an area without the sewer or not?				
2.5 Whether the settling pond is regularly de-silted or not and whether it is dealt according to the handling of solid waste or not?				
2.6 Whether the sewage is exhausted into the sewer or not?				
2.7 Whether the sludge of the sink is disposed or not?				
2.8 Whether the construction time conforms to the stipulation to reduce the production of waste water or not?				
2.9 Whether the water discharged into the earth surface and the sewer conforms to Chinese laws and regulations about water environmental protection or not?				
2.10 Whether the wastewater treatment system of the construction site (like the settling pond) is normally used and maintained or not?				
2.11 Whether vehicles and equipment are cleaned before leaving the construction site or not?				
2.12 The maintenance situation of washing facilities. Whether the sediments are prevented from spilling over or being submerged or not?				
2.13 Whether the public roads and places surrounding the construction site, entrance and temporary fence are kept clean or stuck with muddy water or not?				
2.14 Whether there is an enough place to accommodate the wastewater treatment system or not?				
2.15 Whether the location of wastewater discharge point is clear or not?				
2.16 Others (please specify please)				
3. Noise pollution control				
3.1. Whether the construction conforms to the relevant noise regulations or not?				
3.2. Whether an effective noise permit is held during				

Item	Implementation			Notes/suggestions
	Implemented	Unimplemented	Unsuitable	
the period of noise-limitation or not?				
3.3 Whether mulch method is used in breaking and excavating the hard-surfaced road at the time of pipelines construction or not?				
3.4 Whether it is recorded at the same time by the construction administrative department when the working is on the special construction site at night or not?				
3.5 During college entrance examination and high-school entrance examination and in addition to urgent repairs, whether working procedures are reasonably arranged by the construction units to avoid the implementation of the pile foundation and excavation of foundation pit on the construction site which is equal to or less than 100 meters residence and examination rooms or not and whether the construction conforms to requirements of shut-downs or not?				
3.6 Whether all pavement crack devices are operated in the mobile operation rooms or not and whether the de-noise measures are taken in the operation of pavement crack machines to effectively control the noises or not?				
3.7 Whether low-noise devices are adopted during the construction or not?				
3.8 Whether the construction time conforms to the stipulation to reduce the noise pollution or not?				
3.9 Whether low-noise devices are adopted and de-noise measures are taken during the construction or not?				
3.10 Whether contractors have maintained the construction devices to keep them in a good condition and with the lowest noises or not?				
3.11 Whether there are honking-prohibited signs of vehicles on the sensitive spots like schools, hospitals, nursing homes and office buildings or not?				
3.12 Others (please specify)				
4. Solid waste management				
4.1. Whether the solid waste is disposed by work units with business licenses or not?				
4.2 Whether the construction site is clean and tidy or not? (whether the construction site is disorganized or not)				
4.3 Whether the construction waste, recycling waste and general waste are regularly disposed and classified and stored or not?				
4.4 Whether oil pollution is spilt during the construction and the polluted soil is cleared immediately or not?				
4.5 Whether the obstructions in the surrounding drain or sewer are disposed during the construction or not?				

Item	Implementation			Notes/suggestions
	Implemented	Unimplemented	Unsuitable	
4.6 Whether the precipitated clay sands on the washing facilities are disposed regularly or not?				
4.7 Whether the remaining waste on the construction site has been cleared and properly handled when the project is completed or not?				
4.8 Whether the waste of all facilities has been collected and disposed regularly or not? Whether the household garbage has been transported to the appointed waste-yard by containers with a cover or trucks or not?				
4.9 Whether the solid waste can be stored temporary at somewhere big enough on the construction site or not?				
4.10 Whether the transporting course of solid waste has been ensured or not?				
4.11 Whether the solid waste processing details list has been compiled or not?				
4.12 Whether the solid waste transport transaction documents have been kept or not?				
4.13 Others (please specify)				
5. Ecological environment management				
5.1 Whether measures are taken to restore the damaged street plants or not?				
5.2 Whether appropriate local species has been selected to plant and help to restore the greening or not?				
5.3 Whether there is any feeding of pets and animals on the construction site or not?				
5.4 Whether the ancient and rare trees that aren't needed to be developed are protected within the construction site or not?				
5.5 Whether the construction is carefully arranged to shorten the working time or not?				
5.6 Whether an educational training about ecological environment protection is provided to contractors and workers before construction or not?				
5.7 Others (please specify)				
6. Population Health and safety management				
6.1 Whether there are signs to keep the health and safety of workers on the construction site or not?				
6.2 Whether the construction units have provided protective equipment and have given a safety-training and education about AIDS to workers or not?				
6.3 Whether the campsite, the facilities and areas of the construction are equipped with fire-fighting equipment or not?				
6.4 Whether all machine operators and vehicle attendants possess the qualification certificate of operation or not?				

Item	Implementation			Notes/suggestions
	Implemented	Unimplemented	Unsuitable	
6.5 Whether there are enough fire-fighting equipment, fire-fighting water-pipes and fire hydrants on the construction campsite or not?				
6.6 Whether safe stadia is set within the construction site and campsite or not?				
6.7 Others (please specify)				
7. Cultural relics				
7.1 Whether the construction is stopped wherever the cultural relics are found and the scene protection is strengthened or not?				
7.2 Whether contractors report to the police immediately for the identification of competent department of culture or not?				
7.3 Whether the non-operating loss of contractors is compensated by the relevant state departments or not?				
7.4 Whether the protection domain is delimited the instant cultural relics are authenticated by experts or not?				
7.5 Whether the cultural relics are rescued and excavated because of the urgent construction or natural damage or not?				
7.6 Whether the rescue excavation of cultural relics is in the charge of professionals by professional devices or not?				
7.7 Whether the discussion is made that the construction site should be changed once it's regarded as a finding of valuable cultural relics or not?				
7.8 Others (please specify)				

Table A-5 Environmental Rectification Notice

No.: Contract No. and name:

Name of the subproject: Copy to:

Current construction stage: Date:

Problems existing in site inspection:
Analysis cause and improving measures:
Opinion from the rectification of environmental protection department (if necessary):
Environmental inspector: Date: Expiration date of rectification: Accepted by: Date:
Conclusion of review: Reviewed by: Date:

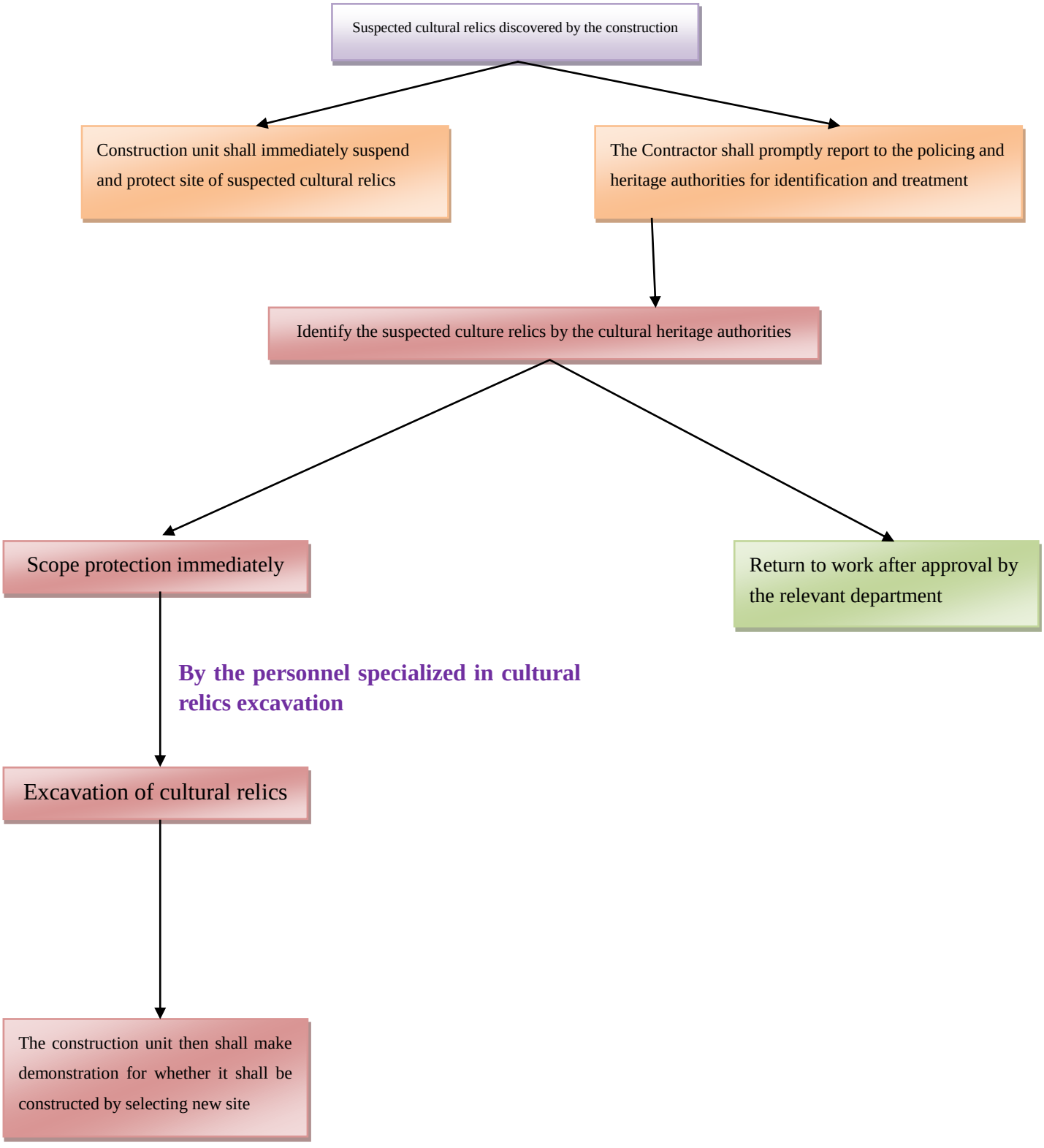

Figure A-3 Flow chart of emergency handling of cultural relics discovered

Appendix B

Environmental Management Plan for Small Boiler Dismantlement

Annex B Environmental Management Plan for Small Boiler Dismantlement

I. Overview

The subprojects in Chengde, Xingtai and Zhangjiakou involve the dismantlement of some existing small boilers during project implementation. In order to reduce the environmental and social impacts brought by the dismantlement work as much as possible. We hereby prepare a separate environmental management plan for small boilers dismantlement for decreasing its impacts on atmospheric environment and properly dealing with the solid waste especially hazardous waste from the dismantlement.

II. Content of Dismantlement

The scope of small boilers demolition in these three subprojects includes:

Table 1 The scope of small boilers demolition in each subproject

Subproject	Content
Chengde	To dismantle 4 independent small coal-fired boiler rooms in project area, with 6 small boilers involved.
Xingtai	To reconstruct 22 gas-fired boiler rooms, with 40 gas-fired boilers involved.
Zhangjiakou	To dismantle 158 coal-fired boilers within the project areas, with 99 small boiler rooms involved.

Table 2- List of dismantled small boilers in Chengde

No.	Location of boiler rooms	Qty.
1	Ethnic Middle School	2
2	Xinguanglian Network Company	1
3	Meteorological Bureau	2
4	Residential Buildings of Water Supply Company	1
	Total	6

Table 3- List of dismantled small boilers in Xingtai

No.	Location of boiler rooms	Qty.
1	North District of Fengchaoyuan	2
2	Fengchaoyuan	2
3	Yihai Garden	1
4	Gaojiatun Community	2
5	Yuzhuyuan	2
6	North Guozhuang	1
7	Quanbeiquan	1
8	Residential Buildings of No.3 Middle School in North Guozhuang	1
9	Residential Buildings of Xingtai Internal Revenue Service	1
10	Residential Buildings of Xingtai Health Bureau and Food and Drug Administration	1
11	North District of Fangyuan Life	1
12	Shui'an Lanting	2
13	West District of Fangyuan Life	1
14	Tuanjie Dongyuan	1
15	West District of Tuanjie Dongyuan	1

16	Yi'an Garden	5
17	Oriental Gran Via	4
18	The Second Phase of Natural City	2
19	Quandu City	1
20	Downing No. 10	2
21	Kongfu Garden	4
22	Xingtai Vocational and Technical College	2
	Total	40

Table 4- List of dismantled small boilers in Zhangjiakou

No.	Location of boiler rooms	Qty.
1	No. 1, 2, 3, 4 and New 5 Buildings on Backstreet of Wuyi Road	2
2	No. 10 Building	
3	Kaiheng Property (on South of No. 9 Building on Fu'an Street)	1
4	No. 17-31 Buildings of Garden Community	1
5	No. 1 and 2 Buildings on Fu'an South Street	1
6	No. 7 and 8 Buildings in Zhonghouli	1
7	No. 5 and 6 Buildings in Zhonghouli	1
8	No. 1 Building in Zhonghouli	1
9	Xiandai Property (between the No. 1 and 2 Buildings in Shiqingli)	1
10	Within Tiexie Primary School	1
11	Rescue Station	2
12	Cathedrol	1
13	Residential Buildings of Procuratorate	1
14	No. 1 Building of Railway (Built by Beijing Railway Bureau)	1
15	Kaiheng Property (Tuergou Community)	1
16	Kaiheng Property (Railway Cornered Street)	1
17	Behind No. 14 Building of Shengbei Garden	1
18	Behind No. 14 Building of Shengbei Garden	1
19	Within No. 90 Garden	1
20	Within the Municipal Bureau for Urban Planning	1
21	Urban Planning Institute	1
22	Beijing Railway Division (Lianchuang Mansion)	2
23	Near No. 8 Building of Junei Community	2
24	Zhangjiakou Chunyu Property Service Co., Ltd	2
25	Terminal Station of No. 9 Bus on No. 6 Lingyuan South Street	2
26	Residential Buildings of Post Office (Enabled)	1
27	Residential Buildings of Post Office on No. 2 Lingyuan South Street	1
28	The 577 Group on No. 8 Lianyuan Road	1
29	Paint Factory Yard on No. 4 Lingyuan North Street	8
30	Qiaodong Local Tax	1
31	The Business Hotel within Yijunge	1
32	Within No. 2 Railway Yard (Beijing Railway Bureau)	2
33	Kaiheng Property (within Dong'an Alley on Taiping Bridge)	1
34	Near 147 Billiard Room	1
35	Dong'an	2
36	Within the Residential Buildings of 251 Hospital	2
37	Within the Residential Buildings of 251 Hospital	1
38	Air Force Yard Community	3

39	Zhongbao Community	2
40	Residential Buildings of Development Bureau	1
41	The Seventh Construction Company of Zhangjiakou	1
42	Zhangjiakou Gas Company	1
43		1
44	Zhangjiakou Branch of China Unicom	
45	Residential Buildings of Agriculture Training College	1
46	Residential Buildings of Normal Training College	1
47	Residential Buildings of ICBC	1
48	The New No. 7 Middle School	1
49	Zhangjiakou Roads and Traffic Authority	1
50	Residential Buildings of Granary	1
51	Residential Buildings of Petroleum Company	1
52	Shengshi Huating, Wujiaohua Community	1
53	Jiahe Community	
54	Jinxia Community	
55	Residential Buildings of Fuel	
56	Railway Community, Coal Ash Line Community on No. 23 Shengnan Road	1
57	（(Beijing Railway Bureau)	
58	Residential Buildings of Post Office	2
59	Tianlun Jiayuan Community	1
60	Residential Buildings of ICBC on No. 15 51 Backstreet	1
61	No. 22 51 Backstreet (Residential Buildings of Qiaodong District Committee)	1
62	No. 8 Building on Dong'an Street, No. 69 Building on Shengli North Road	2
63	Residential Buildings of 251 Hospital	2
64	Residential Buildings of Water Conservancy Bureau and Animal Husbandry Bureau	1
65	No. 37 Jianguo Road (Residential Buildings of Unicom)	1
66	No. 38 Jianguo Road (Residential Buildings of Finance Bureau)	1
67	No. 77 Shengli North Road (Residential Buildings of Cadre's Sanitarium of Military Subarea)	1
68	Zhangjiakou Central Subbranch of People's Bank of China	1
69	No. 99 51 Street (Residential Buildings of PBC)	1
70	No. 97 51 Street (Residential Buildings of Trading Company)	1
71	No. 97 51 Street	1
72	Longteng Garden Community	1
73	Central Station of Earthquake	1
74	Residential Buildings on No. 7 Linyuan West Street	1
75	Zhangjiakou Water Supply Company	1
76	Zhangjiakou No. 10 Middle School	1
77	Martyrs Cemetery on No. 7 Linyuan Road	1
78	Linyuan Road Subbranch of Zhangjiakou Commercial Bank	3
79	(No. 9 Linyuan West Street)	
80	Zhangjiakou Dalishen Boiler Manufacturing Co., Ltd	1
81	Dongzheng Building Material & Parcel Factory	2
82	Mingchen Garden	1
83	Industrial Equipment Installing Company	1
84	No. 3, 4, 6 Buildings on Dong'an Street, No. 10 Building on Jiefang Street	1
85	Shangyuan Community	2
86	State-owned Assets Supervision and Administration Commission	1

87	Price Bureau	1
88	Zhangjiakou Hotel	1
89	Zhangjiakou General Union	1
90	Association of Suburbs	1
91	Century Supply and Marketing Cooperative	1
92	North Caiyuan 8#9#10#11#13#14#	1
93	Railway Buildings 1#2# (Beijing Railway Bureau)	2
94	Zhangjiakou Construction Bank/ Malu Street Kindergarten	2
95	No. 7#8# on First Line of Dong'an Street	1
96	No. 9 Building in Zhonghouli	1
97	No. 138 51 Street (Residential Buildings of Qiaodong Board of Education)	1
98	No. 2, 3, 4 Buildings in Zhonghouli	1
99	No. 1-5, 18#22# Buildings on Dama Road	1
100	No. 1-6 Buildings, Motor Corporation Building, Residential Buildings of Pharmaceutical Factory	1
101	Zhangjiakou Jianguo Hospital	1
102	China Unicom (Post & Telecom Hotel)	2
103	Residential Buildings of Xinhua Bookstore	1
104	Zhangjiakou Subbranch of ICBC	1
105	(Residential Buildings of ICBC)	
106	Zhangjiakou Zhongnan Construction Material Factory	1
107	No. 10 Building 51 Front Street (Residential Buildings of Zhangjiakou Technology Association)	1
108	Zhangjiakou People's Congress Administration and Registration Division	1
109	Hospital of Traditional Chinese Medicine and its Residential Buildings	1
110	Department Store	1
111	Dongsheng Grand Hotel	1
112	Zhangjiakou Hengtong City Hotel Co., Ltd	1
113	Residential Buildings of Trading Company	1
114	Fulihua Hotel	1
115	China Construction Bank Co., Ltd	1
116	Zhangjiakou Subbranch	
117	Residential Buildings of Recycling Company (the Old No. 5 and 6 Buildings on 51 Backstreet, No. 70-74 Buildings on Shengli North Road)	1
118	65 Military Compound	6
119	Zhangjiakou Internal Revenue Service	1
120	Residential Buildings of Municipal Party Committee (Enabled)	1
121	Departments of Internal Revenue Service and their Residential Buildings	1
122	65 Military Gas Station	3
123	Residential Buildings of 65 Military Chemical Defense Battalion Communication Regiment	2
124	Zhangjiakou Luxing Eco-corporation, Ltd.	1
125	Zhangjiakou Center Blood Bank	1
126	Residential Buildings of Traffic Departments	1
127	Residential Buildings of Public Utility Management Bureau	1
128	Residential Buildings of Pharmaceutical Company	1
129	Qiaodong No. 3 Kindergarten	1
130	Accessory Manufacturing Co., Ltd of Zhangjiakou Coal Mine Machinery Co., Ltd of China Coal	1
	Total	158

III. Assignment of Responsibility

Implementing Institutions: Related institutions of local government are responsible for organizing the dismantlement of small boilers.

Supervisory Institutions: The local environmental protection department is responsible for supervising the environmental impact brought by the removal work, as well as the implementation of related mitigation measures.

Monitoring Institutions: The related institutions who take charge of the removal work are responsible for monitoring PM10 at demolition sites.

IV. Impact Analysis & Management Measures

The impacts caused due to the small boilers dismantlement shall be the impact on the solid waste, the impact on surrounding atmospheric environment, and the health effect on workers. The specific impacts and its corresponding management measures are listed in **Table 5**.

As the field investigation which is done during the project preparation period shows, the boiler rooms that are planned to be closed without using asbestos materials for pipe insulation, so no impacts from asbestos fiber needs to be considered during the dismantlement.

Table 5 Environmental impact and management measures for small boilers

	Potential impact	**Management measures**
Solid Waste	Waste boilers and auxiliary equipment, heat insulation materials, slags, construction waste, cotton waste, lubricating oil and rock wool generated from the removal work.	- To store the construction waste and slags in a certain place, and then to transport them for landfills of construction waste in time. - To deal with waste boilers and auxiliary equipment, heat insulation materials, cotton waste and lubricating oil as general industrial waste. - To transport waste rock wool hermetically to waste landfills and bury them deeply as soon as possible.
Atmospheric Environment	The dust remained in the small boilers and pipes may influence the environment around the boiler rooms temporarily.	- To spray water at construction sites to reduce dust.
Wastewater	The original boilers and pipes will generate little and disperse wastewater.	- To discharge into sewers.
Health of Workers	The dust remained in the small boilers and pipes will influence workers' respiratory system.	- To spray water at construction sites to reduce dust. - To equip workers with dust masks and gloves to prevent dust and asbestos fiber.

V. Implementation Regulations

1. To make removing responsibilities clear and definite according to the principle of "the person who is in charge is responsible", and to make sure that the removal work of coal-fired boilers complete on time;

2. To confirm the removing objects and auxiliary pipes, and establish reasonable removing plans according to *Technical Supervision Regulation for Safety of Steam Boiler, Technical Specifications of Thermal Power Plant Construction and Acceptance (Chapter for Boiler Units)*, and design drawings of boilers, as well as the practical situations at sites;

3. To clear the sites before the removal work according to the characteristics at sites, removing all the constructions and barriers around which may obstruct the construction to ensure that the roads are unblocked and the equipment has enough place to store;

4. To cut off all connecting pipes as well as power lines and water pipes; to build safe and temporary water and power sources that the construction needs, and to set up temporary switchboards in the boiler rooms;

5. To discharge water in the boilers into municipal sewage pipelines, and to deal with the remaining coal or convert into money with deducting the removing costs;

6. To put boards at the allowable ranges of the construction and set up operators on duty at entrances to check each person for trespassing external person, and ensure the normal construction at sites and the safety of personnel;

7. The temporary support frames that are needed for removing large items must be secure and the hanging points must be firm to ensure the stability after incision;

8. To choose appropriate hoisting machines to hang and unload directly according to the weights and heights of boilers and headers, as well as the construction situations at sites;

9. To adopt wet-type construction during the removing processes to avoid the environmental pollution such as dust and noise, as well as to reduce the livelihood impact of surrounding residents;

10. To transport general solid waste and waste materials to the municipal waste yard. Waste materials (including boilers, grate gearboxes, air blowers, induced draft fans, flues, and waste old pipelines) will be treated by converting into money for deducting removing costs; the waste rock wool must be transported hermetically to waste landfills and be buried deeply as soon as possible;

11. To fill and level up the incomplete parts of the grounds where the boilers placed originally and clean up after the removal work;

12. The former sites of the boiler rooms should be arranged by the government or managed by heating companies;

13. To follow related procedures of cancelling boilers and get accepted by environmental protection departments.

VI. Safety Management System

1. Liability System of Safety Production

During the construction of removing boilers, we must strictly construct in a safe and civilized way. The labor protection laws and regulations shall be strictly conducted. The project manager is

generally responsible for the safety production and labor protections of the project; the technical director is responsible for the technical aspects of safety production and labor protections; the construction leader is specifically responsible for the safety production of the projects; all staff must obey the rules and regulations of safety production voluntarily.

2. Training System of Safety Production

All the managers, technicians, full-time safety officers and general workers should get corresponding training of safety production. Safety training on new workers and contract workers must be provided before construction, including safety technical knowledge and examines. Staff who pass the testes and get certifications can take up their positions.

3. Reporting System of Accidents Handling

If casualty accidents happen, lessons must be learnt from them seriously and completely eradicate the accident recurrence. The principles of “three no let off” needs to be followed when dealing with accidents; Criminal sanctions shall be taken if severe enough. After accidents, accident investigation reports need to be written with finding out reasons, summarizing lessons, establishing feasible preventive measures and providing written reports for related departments for investigation and reference.

4. Safety Management System for Site Construction

Relative operating instructions and construction technology shall be followed, and performances and operating provisions of construction machines need to be mastered to ensure safety work.

5. Safety Management System of Protective Equipment

Protective equipment for construction operators must handed out and exchanged in time according to the requirements of labor protection.

6. Civilized Construction System

Project note cards need to be used at the entrances of construction sites, with the contents including: the name of the project, construction organizations, date of commence, planned completion date, and the safety director of construction quality. We will also put up safety warnings and signs on all kinds of machines and equipment. Distribution facilities must be equipped with boxes, with doors, locks and rain-proof measures, and their ground protections must be safe and reliable.