

1. Foreword

1.1 Project Origin

Changtai Paper Industry (Wuhan) Co., Ltd. is a wholly-owned subsidiary of Guochang Tianyu Group, and also a paper-making production base arranged by the Group in Central China. The Group, engaged in paper-making industry for years, currently owns three production enterprises: Tangshan Guotai Paper Industry Co., Ltd., Hebei Changtai Paper Industry Co., Ltd., Changtai Paper Industry (Guangshui, Hubei) Co., Ltd., with annual packaging paper and paperboard production capacity of 1.5 million tons; in addition Guotai Paper Industry (Caofeidian, Tangshan) Co., Ltd. is under construction, in which the packaging paper production capacity of Phase I is 1.4 million tons, and it has been completed for production in 2015.

Changtai Paper Industry (Wuhan) Co., Ltd. proposes to build 2.20Mt/a High-grade Packaging Board Project in Gong'an County Qingji Industrial Park, Hubei Province, and the paper-making project plans to invest CNY 7.5 billion; based on raw materials of commercial wood pulp and waste paper, 8 packaging paperboard production lines and sewage treatment plants, CHP facilities will be built in the park, and all will be completed for production in 2019. Then, the project can achieve an annual sales revenue of CNY 7.93 billion, annual profit and tax of CNY 1.2 billion and profit of CNY 0.72 billion.

The existing industrial heat users in the central city of Gong'an County are mainly concentrated in Qingji Industrial Park, and a small amount of users are distributed in Chanling Industrial Park; since the central city of Gong'an County has no unified planning on centralized heat supply, the heat demand of settled enterprises cannot be solved in a centralized manner, as a result, the settled enterprises build internal boilers on their own to solve respective heat supply problems. According to investigation, the capacity of the existing boiler in Gong'an County is 0.3~35t/h, while the actual load of the enterprise in short term is only 30%~40% of the installed capacity, thus the energy, equipment utilization rates are low, the initial cost is high, and the environmental pollution is very serious.

With increment of government's investment promotion, the enterprises newly settled in the central city of Gong'an County are increasing, and the head load is gradually increasing; there is no centralized heat supply source in the central city of Gong'an County, so these enterprises continuously put pressure on relevant departments or are transferred to other industrial parks with better infrastructure, and meanwhile, heat use enterprises face more and more environmental protection pressure, and the enterprises with self-built boiler rooms face the problems on turning coal into gas or increment of boiler emission treatment facilities; it certainly will increase the heat cost and burden of the enterprises, therefore the imbalance between supply and demand on gas for enterprises will also become increasingly prominent.

To meet the needs of construction of central city and county economic development in Gong'an County, perfect construction of infrastructure, improve ecological environment, reduce atmospheric pollution and meanwhile to attract more industrial users to settle, it is badly in need of centralized heat supply in the industrial park with more centralized heat demand. Therefore, it is proposed to build high-temperature high-voltage coal-fired power generator units with capacity of 5x410t/hCFB+4xCB60MW (one of boilers is standby for the whole plant) in Qingji Industrial Park, and synchronously build flue gas desulfurization, denitration device. To this end, People's Government of Gong'an County is specialized to put forward to shut down the small boilers of nine organizations, such as Shine Star (Hubei) Biological Engineering Co., Ltd., Qinchu Paper Industry Co., Ltd. (see the list in the annex) by batch to Provincial Development and Reform Commission by way of *Letter of the People's Government of Gong'an County on Reporting the Scheme of Shutting Down Small Boilers of the Enterprise in Qingji Industrial Park of Hubei Gong'an Economic Development Zone by Gong'an County* (People's Government of Gong'an County, July 8, 2015), and totally 11 small boilers are shut down (total evaporation capacity: 206.5t/h), in order to vacate some ambient air capacity for the Project.

The EIA report of the production line project with annual production of 2.20Mt/a High-grade

Packaging Board Project has obtained the approval from Jingzhou Environmental Protection Bureau (see the annex) at present, and the paper making project is at the preliminary design stage. To complete CHP Project as soon as possible, the Employer entrusted Central Southern China Electric Power Design Institute (CSEPTI) of China Power Engineering Consulting Group Corporation to complete *General Feasibility Study Report of Yangjiachang Town Industrial Park CHP Project in Gong'an County* in February 2015, an EIA report shall be prepared for the Project according to the requirements in *Regulations on the Administration of Construction Project Environmental Protection* (No. 253 by the State Council), *Law of the People's Republic of China on Environmental Impact Assessment* and other relevant regulations. The Employer entrusted Hubei Academy of Environmental Sciences to prepare the EIA report for the Project on March 13, 2015 (see Annex 1).

1.2 Overview

The site of the Project is located in Paper Making Cycle Industrial Park of Yangjiachang Industrial Park under planning, the southwest corner of the project planning red line range of Changtai Paper Industry, and the Project covers an area of 209,333.33m² (including 37,666.67m² land for Comprehensive Solid Wastes Utilization Project); the north-south length of the land is 648m, and the east-west width is about 323m. Jingzhou, where the site is, is beyond the planning range of the 12th Five-Year Plan on Air Pollution Prevention and Control in Key Regions, belonging to one of 113 key environmental protection cities determined in *National Eleventh Five-Year Plan for Environmental Protection*.

It is proposed to build high-temperature high-voltage coal-fired power generator units with capacity of 4x410t/hCFB+4xCB60MW (one of boilers is standby for the whole plant) in the power plant, 4x410t/hCFB+2xCB60MW for Phase I, build one 410t/h standby boiler, and synchronously build flue gas desulfurization, denitration device. The coal source of the power plant is transported from the coal yard at Gong'an Station of Jingzhou-Yueyang Railway to the coal yard of the power station via motor highway; the water source of the power plant is from Changtai Paper Industry Water Center relying on the coal transportation passage of Western Inner Mongolia-Central China Railway; the outgoing line is 110kV outgoing line. The Project was preliminarily planned to commence in September 2015, and two units were put into power generation in September and December 2017.

1.3 Project History

At present, the Project is at the feasibility study stage. According to *Environmental Protection Law of the People's Republic of China*, *Law of the People's Republic of China on Environmental Impact Assessment* and *Regulation on the Administration of Construction Project Environmental Protection* and other laws and regulations, an EIA report shall be prepared for the Project; the Employer formally entrusted Hubei Academy of Environmental Sciences to carry out environmental impact assessment for the Project on March 13, 2015, and prepare *EIA report of Yangjiachang Town Industrial Park CHP Project in Gong'an County*.

Upon acceptance of engagement, we organized relevant professional technicians for site survey, collecting relevant information and knowing the natural and social environmental profiles near the Project. We has further analyzed the environmental characteristics and the engineering characteristics, and identified and screened the environmental impact factors and assessment factors. According to the environmental impact assessment procedures, based on the project application report and relevant technical data provided by the Employer, we have successively completed the first on-line information announcement of the project, monitored and assessed the surrounding environmental status, analyzed the Project, predicted environmental impact assessment, put forward pollution control measures and estimated the environmental protection investment, carried out the second on-line announcement, issued and recycled the public participation questionnaires, etc. The *EIA report on the Yangjiachang Town Industrial Park CHP Project in Gong'an County (Draft for Approval)* was completed at the end of May 2015. The technology assessment meeting for EIA report was carried out in Gong'an County from June 18 to June 19, 2015. After the meeting, the Project Team carefully modified the report according to experts' opinions, and

the modified *EIA report on the Yangjiachang Town Industrial Park CHP Project in Gong'an County (Draft for Approval)* was hereby submitted to the Employer and reported to Environmental Protection Department of Hubei Province for approval.

In the process of preparing Report, significant support and help were obtained from Environmental Protection Department of Hubei Province, Jingzhou Environmental Protection Bureau, Jingzhou Environmental Monitor Station, Gong'an County Environmental Protection Bureau, the Employer Changtai Paper Industry (Wuhan) Co., Ltd. and other departments and units, thank all of you!

1.4 Environmental Issues to be Concerned

The Project is CHP Project. According to the industrial characteristics, unorganized waste gas will be generated during raw material storage and transportation, and SO₂, NO_x, smoke, and other pollutants; the denitration process involves storage of hazardous wastes such as ammonia. Environmental issues to be concerned in the Project:

- (1) Unorganized emission of temporary ash and slag silo in raw material storage yard and plant area.
- (2) Collection and treatment of industrial wastewater of the Project and the flushing sewage of the site, influence of the treated wastewater on local receiving water.
- (3) Treatment, standard emission and total amount control of SO₂, NO_x, smoke generated by boilers.
- (4) Collection and disposal of boiler ash and slag, and storage and risk of denitration ammonia.
- (5) Control measures for atmospheric pollution and feasibility of flue gas desulfurization, denitration schemes.
- (6) Analysis for regional environmental carrying capacity and project construction compatibility.

1.5 Main Conclusions of Environmental Impact Assessment

What are mainly concerned in the process of preparing *EIA report on the Yangjiachang Town Industrial Park CHP Project in Gong'an County* include raw material storage yard, collection and disposal of ash and slag, control of boiler waste gas, planning and industrial policy conformity, feasibility of drainage scheme, standard emission feasibility of waste gas treatment, rationality of health protection distance, total amount index source of pollutant and public participation. Upon comprehensive demonstration of the above factors, the main conclusions of the *EIA report on the Yangjiachang Town Industrial Park CHP Project in Gong'an County* are as follows:

The Yangjiachang Town Industrial Park CHP Project in Gong'an County of Gong'an Changtai Paper Industry (Wuhan) Co., Ltd. conforms to *Directory Catalogue on Readjustment of Industrial Structure (2011) (Revised in 2013)*, and meets the land layout requirements of Qingji Industrial Park and Yangjiachang Industrial Park. The engineering environmental protection investment is CNY 57.60 million, and "standard emission" can be achieved on basis of comprehensively carrying out various pollution control measures determined in the report; after land pre-review, drain outlet demonstration licensing, implementation of environmental impact assessment planned in Yangjiachang Town Industrial Park, synchronous completion of ash and slag yard supporting the Project and emission of pollutants reaching the requirements for the total amount control, the normally discharged pollutants have smaller impact on the surrounding and environmental protection objectives; based on guaranteeing completion of settlement within the environmental protection distance, the impact of the construction project on the surrounding is within the acceptable range. In terms of environmental protection, the construction of the Project has environmental feasibility.

2. General

2.1 Preparation Basis

2.1.1 Laws

- (1) *Environmental Protection Law of the People's Republic of China* (edited and revised in 2014, enforced from January 1, 2015);
- (2) *Environmental Impact Assessment Law of the People's Republic of China* (enforced from September 1, 2003);
- (3) *Air Pollution Control Law of the People's Republic of China* (enforced from September 1, 2000);
- (4) *Water Pollution Control Law of the People's Republic of China* (enforced from June 1, 2008);
- (5) *Environmental Noise Pollution Control Law of the People's Republic of China* (enforced from March 1, 1997);
- (6) *Solid Waste Pollution Control Law of the People's Republic of China* (enforced from April 1, 2005);
- (7) *Law of the People's Republic of China on Promotion of Cleaner Production* (enforced from April 1, 2008);
- (8) *Energy Conservation Law of the People's Republic of China* (enforced from July 1, 2012);
- (9) *Soil and Water Conservation Law of the People's Republic of China* (March 1, 2011)
- (10) *Circular Economy Promotion Law of the People's Republic of China* (January 2009)
- (11) *Land Administration Law of the People's Republic of China* (enforced from January 1, 1999);
- (12) *Urban and Rural Planning Law of the People's Republic of China* (enforced from January 1, 2008);
- (13) *Water Law of the People's Republic of China* (enforced from October 1, 2002);

2.1.2 Regulations

- (1) *Regulations on the Protection of Basic Farmland* promulgated by the State Council (November 29, 1998)
- (2) *Environmental Protection Management Regulations of Construction Projects* (Decree No. 253 of the State Council of the People's Republic of China, December 1998);
- (3) *Decision of the State Council on Several Issues Concerning Environmental Protection* (GF[1996] Decree No. 31);
- (4) *Regulation on the Safety Management of Hazardous Chemicals*, November 1, 2011 (Decree No.591 of the State Council of the People's Republic of China)
- (5) *Decision of the State Council on Implementing Scientific Viewpoint of Development and Strengthening Environmental Protection* (GF[2005] No. 39);
- (6) *Notice on Printing and Issuing the Comprehensive Work Program for Energy Conservation and Emission Reduction* (GF[2007] No. 15);
- (7) *Official Reply of the State Council to Acid Rain and Sulfur Dioxide Pollution Control Areas* (GH[1998] No. 5);
- (8) *Circular of the State Council on Forwarding the Guiding Ideas of Ministry of Environmental Protection and Other Departments about Promoting Joint Prevention and Control Work of Atmospheric Pollution to Improve the Regional Air Quality* (GBF[2010] No. 33);
- (9) *Circular of the State Council on Printing and Distributing Action Plan for Air Pollution Prevention and Control* (GF[2013] No. 37);

(10) *Circular of the State Council on Endorsing the Working Opinion about Further Strengthening Treatment of Municipal Solid Waste by the Ministry of Housing and Urban-Rural Development and Other Departments* (GF[2011] No. 9);

(11) *Circular of the General Office of the State Council on Printing and Issuing the Construction Planning for Harmless Treatment Facilities of National Municipal Solid Waste during the "12th Five-Year Plan"* (GBF[2012] No. 23);

(12) *Opinions of the State Council on Strengthening Major Environmental Protection Work* (GF[2011] No. 35);

2.1.3 Government rules and normative documents

(1) *Temporary Measures of the Public Participation in Environmental Impact Assessment* (HF [2006] No. 28), promulgated by State Environmental Protection Administration;

(2) *Circular on Accelerating Structural Adjustment of Electric Power Industry and Promoting Healthy and Orderly Development* (FGNY [2006] No. 661) promulgated by National Development and Reform Commission;

(3) *Guiding Opinions of the State Environmental Protection Administration on Promoting Development of Circular Economy* (HF [2005] No. 114) promulgated by the original State Environmental Protection Administration;

(4) *Circular on Simplifying the Approval Procedures for Environmental Impact Assessment of Construction Projects* (HB [2004] No. 65) promulgated by the General Office of the State Environmental Protection Administration;

(5) *Circular on Carrying out Standardization Treatment Work of Discharge Outlet*; (HF [1999] No. 24) promulgated by the State Environmental Protection Administration;

(6) *Circular on printing and issuing 12th Five-Year Plan on Air Pollution Prevention and Control in Key Regions* (HF [2012] No. 130);

(7) *The Guideline Catalogue for Industrial Restructuring* (2011) (revised in 2013) promulgated by the National Development and Reform Commission;

(8) *Notice on Enhancing Environmental Impact Assessment Management in Prevention of Environmental Risks* (HF [2005] No. 152) promulgated by the original State Environmental Protection Administration;

(9) *Circular on Further Strengthening Information Disclosure of Environmental Protection* (HB [2012] No. 34) promulgated by the Ministry of Environmental Protection;

(10) *Administrative Measures for the Comprehensive Utilization of Coal Ash* (No. 9 Decree) promulgated by 10 ministries and commissions, such as National Development and Reform Commission, Ministry of Science and Technology, Ministry of Industry and Information Technology, Ministry of Finance, Ministry of Land and Resources, Ministry of Environmental Protection, Ministry of Housing and Urban-Rural Development, Ministry of Transport, State Administration of Taxation;

(11) *Announcement on Publishing EIA report of Thermal Power Project for Acceptance* ([2006] No. 39) announced by the original State Environmental Protection Administration;

(12) *Circular on Printing and Issuing Guiding Idea for Distribution Index of Total Sulfur Dioxide* ([2006] No. 182) announced by the original State Environmental Protection Administration;

(13) *Circular on Strengthening Environmental Protection Approval and Strictly Controlling Newly-Commenced Projects* (HB [2006] No.394) promulgated by the original State Environmental Protection Administration;

(14) *Circular on Accelerating Structural Adjustment of Electric Power Industry and Promoting Healthy and Orderly Development* (FGNY [2006] No. 661) promulgated by National Development and Reform Commission, Ministry of Land and Resources, original Ministry of Railways, original Ministry of Communications, Ministry of Water Resources,

original State Environmental Protection Administration, China Banking Regulatory Commission, State Electricity Regulatory Commission;

(15) *Cleaner Production Assessment Index System of Electricity (Coal-fired Power Plants)* ([2015] No. 9) (April 15, 2015) promulgated by National Development and Reform Commission, Ministry of Environmental Protection, Ministry of Industry and Information Technology;

(16) *Circular on Printing and Issuing Rules for Checking the Total Emission Reduction of Main Pollutants* (HF [2007] No. 183) promulgated by the original State Environmental Protection Administration;

(17) *Notice on Practically Strengthening Risk Prevention and Strict Management for Environmental Impact* (HF [2012] No. 98) promulgated by Ministry of Environmental Protection;

(18) *Circular on Printing and Issuing 12th Five-Year Plan on Air Pollution Prevention and Control in Key Regions* (HF [2012] No. 130) promulgated by Ministry of Environmental Protection;

(19) *Announcement on Applying the Special Emission Limits of Air Pollutants* ([2013] No. 14) promulgated by Ministry of Environmental Protection;

(20) *Decision of the National Development and Reform Commission on Modifying Relevant Articles of the Directory Catalogue on Readjustment of Industrial Structure* (2011) (Decree No. 21 of the National Development and Reform Commission);

(21) *Construction Project Catalogue for Ministry of Environmental Protection to Approve Environmental Impact Assessment Files* (2015) promulgated by the Ministry of Environmental Protection.

2.1.4 Local normative documents

(1) *Circular on Forwarding the Approval Procedures of the State Environmental Protection Administration for Environmental Impact Assessment of Construction Projects* (EHB [2004] No. 65 office document) promulgated by the Environmental Protection Department of Hubei Province;

(2) *Notice of the Provincial Environmental Protection Bureau on Further Strengthening of the Environmental Management of the Construction Projects in the Province* (EHF [2008] No. 56) promulgated by the Environmental Protection Department of Hubei Province;

(3) *Circular of the General Office of the Provincial People's Government on Printing and Issuing the Classification Scheme of Centralized Drinking Water Conservation Zones of Above County Level in Hubei Province* (EZBF [2011] No. 130);

(4) *Notice of the Provincial People's Government on Issuing the Major Functional Zoning Plan of Hubei Province* (EZF [2012] No. 106);

(5) *Implementation Suggestions of the Provincial People's Government on Carrying out the Action Plan of the State Council for Air Pollution Prevention and Control* (EZF [2014] No. 6);

(6) *Notice of the General Office of the Provincial People's Government on Forwarding Functional Categories of Surface Water Environment in Hubei Province by Environmental Protection Bureau* (EZBF [2000] No. 10);

(7) *Decision of Hubei Provincial People's Government on Modifying Implementation Measures of Hubei Province on Administration of Urban Water Supply*;

(8) *Regulations of Hubei Province on the Prevention and Control of Water Pollution* (adopted by the second meeting of the 12th People's Congress of Hubei Province on January 22, 2014);

(9) *Circular of Environmental Protection Department of Hubei Province on Further Adjusting and Delegating the Approval Authority of Environmental Impact Assessment*

Documents in Construction Projects (EHH [2014] No. 51) published on January 26, 2014;

(10) *Urban Overall Planning of Gong'an County* (2003-2020);

2.1.5 Engineering data and relevant approval documents

(1) *Application Report of Yangjiachang Town Industrial Park CHP Project in Gong'an County* (Central Southern China Electric Power Design Institute (CSEPD) of China Power Engineering Consulting Group Corporation, January 2015);

(2) *Controlling Project Planning of Qingji Industrial Park in Gong'an Economic Development Zone* (2010-2020);

(3) *Opinions on Review of Environmental Impact Assessment for Planning (2013~2030) in Gong'an County Qingji Industrial Park* (Environmental Protection Department of Hubei Province);

(4) *Environmental Impact Assessment Report on Planning (2013~2030) of Yangjiachang Industrial Park in Gong'an County (Draft for Review)* (Jingzhou Environmental Protection Technology Co., Ltd.);

(5) *"12th Five-Year" Plan for National Economy and Social Development in Gong'an County* (2011-2020);

(6) *12th Five-Year" Environmental Protection Plan in Gong'an County* (2011-2015);

(6) Review Opinions of Provincial Water Resources Bureau on the Demonstration Report of Drain Outlet Setting for the 2.20Mt/a High-grade Packaging Board Project of Changtai Paper Industry (Wuhan) Co., Ltd. and Yangjiachang Town Industrial Park CHP Project in Gong'an County (ESXK [2015] No. 152, Hubei Provincial Department of Water Resources, July 30, 2015)

(7) Review Opinions of Provincial Water Resources Bureau on the Water Resource Demonstration Report for 2.20Mt/a High-grade Packaging Board Project of Changtai Paper Industry (Wuhan) Co., Ltd. and Yangjiachang Town Industrial Park CHP Project in Gong'an County (ESXK [2015] No. 151, Hubei Provincial Department of Water Resources, July 30, 2015);

(8) Technical Review Opinions on *Flood Impact Assessment Report of Urban and Rural Master Plan in Gong'an County (2013-2030)*

(9) Land Preview Comments (Land and Resources Bureau)

(10) Official Reply to Planning Environmental Impact Assessment of Yangjiachang Town Industrial Park

(11) *Official Reply to Environmental Impact Assessment Report of 2.20Mt/a High-grade Packaging Board Project of Changtai Paper Industry (Wuhan) Co., Ltd.* (JHBSW [2015] No. 18, Jingzhou Environmental Protection Bureau, February 15, 2015);

(12) *Water Resource Demonstration Report of the 2.20Mt/a High-grade Packaging Board Project of Changtai Paper Industry (Wuhan) Co., Ltd. and Yangjiachang Town Industrial Park CHP Project in Gong'an County* (draft for review, Hubei Provincial Water Resources and Hydropower Planning Survey and Design Institute, May 2015);

(13) *Drain Outlet Setting Demonstration Report of 2.20Mt/a High-grade Packaging Board Project of Changtai Paper Industry (Wuhan) Co., Ltd. and Yangjiachang Town Industrial Park CHP Project in Gong'an County* (draft for review, Hubei Provincial Water Resources and Hydropower Planning Survey and Design Institute, May 2015);

(14) *Report on Water and Soil Conservation Scheme of CHP Project in Clean Industrial Park of Gong'an County* (Hubei Provincial Water Resources and Hydropower Planning Survey and Design Institute, May 2015);

(15) *Flood Impact Assessment Report of Urban and Rural Master Plan (2013-2030) in Gong'an County* (first draft, Changjiang Survey, Planning, Design and Research Co., Ltd., April 2015).

2.1.6 Guidelines and technical specifications

- (1) *Technical Guidelines for Environmental Impact Assessment - General Programme* (HJ2.1-2011);
- (2) *Technical Guidelines for Environmental Impact Assessment - Atmospheric Environment* (HJ2.2-2008);
- (3) *Technical Guidelines for Environmental Impact Assessment - Surface Water Environment* (HJ/T2.3-93);
- (4) *Technical Guidelines for Noise Impact Assessment* (HJ2.4-2009);
- (5) *Technical Guidelines for Environmental Risk Assessment on Projects* (HJ/T169-2004);
- (6) *Technical Principles and Methods for Making Local Emission Standards of Air Pollutants* (GB/T13201-91);
- (7) *Technical Guidelines for Environment Impact Assessment – Ecological Impacts* (HJ19-2011);
- (8) *Technical Guidelines for Environmental Impact Assessment - Groundwater Environment* (HJ610-2011);
- (9) *Technical guidelines for Environmental Noise and Vibration Control Engineering* (HJ2034-2013);
- (10) *Technical Guidelines for Solid Waste Treatment & Disposition Engineering* (HJ2035-2013);
- (11) *The Prepared Specifications of Thermal Power Plant Construction Project EIA report* (HJ/T13-1996);
- (12) *Guide for Water Saving of Thermal Power Plant* (JB142-2010);
- (13) *Identification of Major Hazard Installations for Hazardous Chemicals* (GB18218-2009).

2.1.7 Commitment document

Undertaking Letter of Environmental Impact Assessment, Changtai Paper Industry (Wuhan) Co., Ltd., March 13, 2015.

2.2 Assessment Objective and Design of Assessment Thought

2.2.1 Objective of Evaluation

- (1) The environmental quality status of the construction area is mastered through investigating the current environment of the construction area. Collect environmental protection planning, district heat supply planning, environmental function division, etc. discuss whether the construction of the Project conforms to the overall regional planning and environmental protection planning, expound the main environmental issues in the region, and demonstrate the feasibility of project site selection.
- (2) Screen to determine the main factors of the Project endangering the environment, and analyze the rationality, feasibility and reliability of pollution control measures taken in engineering design. Demonstrate the rationality of the overall scheme of the proposed works from the view of environmental protection, and put forward practical and feasible pollution control measures and suggestions.
- (3) Analyze the features of discharging “three wastes” in the Project through engineering analysis, analogical investigation and material balance (pollutant type, quantity, discharge way and control measures taken, etc.).
- (4) Analyze the influence on the surrounding during operation upon project completion through environmental impact prediction for atmosphere, water body, noise and other environmental factors, and demonstrate the environmental feasibility of building the proposed

works from the view of environmental protection.

(5) Demonstrate the accessibility and source of total amount control of pollutants in the Project, propose total amount control scheme for the pollutants after the Project is put into production, and analyze the variation and investigation of the total discharge of regional pollutants.

(6) Analyze the project pollution control measures and cleaner production process according to the technical policies of the industry and the best practical technical level of national environmental protection, and put forward practical and feasible pollution control countermeasures and measures.

(7) Carry out environmental risk assessment according to potential environmental risk accidents, and propose risk pollution prevention measures. In short, demonstrate the feasibility of building the Project from the view of environmental protection through environmental impact assessment of the Project, in order to provide basis for optimal design of environmental protection facilities, enterprise environmental supervision and management and comprehensive decision of government environmental protection departments.

2.2.2 General assessment design

(1) Insist on high starting point and strict requirement in assessment, strictly follow relevant regulations of Law of the People's Republic of China on Environmental Impact Assessment, fully carry out national environmental protection policies of "cleaner production", "standard emission of pollutant", "total amount control", etc. in assessment.

(2) Analyze and check the pollutant emission of the proposed works according to the characteristics of the production process device in the proposed project, and propose specific and feasible pollutant control measures.

(3) Based on feasibly proposing measures and demonstrating measures, in combination with satisfiability of each demonstration index, draw a conclusion whether the environmental impact of the Project is feasible.

2.3 Environmental Function Division and Assessment Standard

2.3.1 Environmental function division

According to *Official Reply to Executive Standards on Environmental Impact Assessment for CHP Project in Qingji Industrial Park of Gong'an County* (EZBF [2000] No. 10 and GHH [2015] No. 5 of Gong'an County Environmental Protection Bureau), the environmental function divisions in the assessment area are as follows:

Ambient air: execute Class II ambient air functional area of GB3095-2012;

Surface water: Gong'an section of the Yangtze River executes Class III water quality standards;

Ground water: execute Class III standards in *Quality Standard for Ground Water* (GB/T14848-93);

Noise: Class 3 at boundary, Class 4a along traffic artery;

Soil: execute the second level standard in *Environmental Quality Standard for Soils* (GB15618-1995).

2.3.2 Evaluation criterion

2.3.2.1 Environmental quality standards

The environmental quality standard and pollutant emission standard are as shown in Table 2.3-1 and Table 2.3-2.

Table 2.3-1 List of Assessment Quality Standard Systems

Standard type	Standard number	Standard title	Assessment objective	Class (category)
Quality	GB3095-2012	Ambient air quality standard	Atmospheric	Second level

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standard			environment of assessment area (after January 1, 2016)	
	GB3838-2002	Environmental Quality Standards for Surface Water	Gong'an section of the Yangtze River	Class III
	GB3096-2008	Environmental Quality Standard for Noise	Around the plant site	Class 3
			Existing settlement around	Class 2
	GB/T14848-93	Quality Standard for Ground Water	Area of plant site	Class III
	GB15618-1995	Environmental Quality Standard for Soils	Area of plant site	Second level
Discharge standard	GB16297-1996	Integrated Emission Standard of Air Pollutants	Waste gas during construction	Second level
	GB13223-2011	Emission Standard of Air Pollutants for Thermal Power Plants	Boiler flue gas standard	Table 1
	GB8978-1996	Integrated Wastewater Discharge Standard	Waste water	Level 1
	GB12348-2008	Emission Standard for Industrial Enterprises Noise at Boundary	Noise at the plant boundary	Class 3, Class 4a
	GB12523-2011	Emission Standard of Environment Noise for Boundary of Construction Site	Noise for boundary of construction site	-
	GB18599-2001	Standards for Pollution Control on the Storage and Disposal Site for General Industrial Solid Wastes	Temporary storage of ash and slag	-

Table 2.3-2 List of Ambient Air Quality Standards Unit: mg/Nm³

Item	Annual average	Daily mean	Hour average	Remarks
TSP	200	300	-	GB3095-2012
PM ₁₀	70	150	-	GB3095-2012
PM _{2.5}	35	75		GB3095-2012
SO ₂	60	150	500	GB3095-2012
NO ₂	40	80	200	GB3095-2012
Hg			0.0003	TJ36-79

Table 2.3-3 List of Quality Standards for Surface Water Unit: mg/L, except for pH

Standard number	Standard title	Assessment factors	standard	Assessment objective
GB3838-2002	Environmental Quality Standards for Surface Water (Class III)	pH	6~9	Gong'an section of the Yangtze River
		COD	≤20	
		NH ₃ -N	≤1.0	
		BOD ₅	≤4	
		DO	≥5	
		Hexavalent chromium	≤0.05	

		Arsenic	≤0.05	
		Mercury	≤0.0001	
		Petroleum	≤0.05	
		Total phosphorus	≤0.2	
		Volatile phenol	≤0.005	
		F-	≤1.0	

Table 2.3-4 Environmental Quality Standard for Soils (Second Level) (mg/kg)

Item	pH	Copper	Nickel	Zinc	Plum bum	Mercury	Arsenic	Chromium	Cadmium
Standard (second level)	<6.5	50 farmland	40	200	250	0.30	40 dry land	150 dry land	0.30

6.5-7.5	100 farmland	50	250	300	0.50	30 dry land	200 dry land	0.30
>7.5	100 farmland	60	300	350	1.0	25 dry land	250 dry land	0.60

Table 2.3-5 Quality Standard for Ground Water (Class III)

SN	Item	Standard Value
1	pH	6.5-8.5
2	Ammonia nitrogen (mg/L)	0.2
3	Chloride (mg/L)	250
4	Sulfate content (mg/L)	250
5	CODMn(mg/L)	3.0
6	Hexavalent chromium (Cr ⁶⁺) (mg/L)	0.05
7	Volatile phenol (mg/L)	0.002
8	Arsenic (mg/L)	0.05
9	Lead (mg/L)	0.05
10	Cadmium (mg/L)	0.01
11	Mercury (mg/L)	0.001
12	Total coliforms (Nr./L)	3.0
13	Total bacteria (Nr./mL)	100

2.3.2.2 Pollutant discharge standards

The *Integrated Emission Standard of Air Pollutants* (GB16297-1996) is executed during construction; flue gas emission executes the emission standard of the *Emission Standard of Air Pollutants for Thermal Power Plants* (GB13223-2011); the emission of boundary odor pollutants executes the second level standard of the new expansion project in the odor pollutant factory boundary standard values of the *Emission Standards for Odor Pollutants* (GB14554-93). See Table 2.3-8 for details.

Table 2.3-6 List of Waste Gas Pollutant Discharge Standards Unit: mg/Nm³

Standard number	Discharge standard	Pollution factor	Control item	Emission limit	Source of Pollution
GB16297-1996	Integrated Emission Standard of Air Pollutants	Dust	Emission concentration	120	Construction period
			Boundary concentration in unorganized emission	1.0	Operation period
GB13223-2011	Emission Standard of Air Pollutants for Thermal Power Plants	SO ₂	Allowable emission concentration	100	Operation period
		NO _x	Allowable emission concentration	100	
		Soot	Allowable emission concentration	30	
		Hg and its compounds	Average determination	0.03	

Table 2.3-10 List of Regional Environmental Noise Standards Unit: dB(A)

Standard number	Standard title	Assessment factors	Day time	Night	Assessment objective
GB3096-2008	Environmental Quality Standard for Noise	Equivalent sound level L _{Aeq}	60	50	Residential area, Class 2

The production wastewater during project operation is sent to the wastewater treatment station of the paper making project for treat via pretreatment (mainly sedimentation of wastewater for flushing the site), and then discharged to Yangtze River by pipelines after meeting the standards in Table 3 Comprehensive Waste Water of Discharge Standard of Water Pollutants for Pulp and Paper Industry (GB3544-2008) and the standards of the paper making joint production enterprises; the household sewage enters the pipe network of the

park after treatment by septic-tank. Execution of specific standards is as shown in Table 2.3-11.

Table 2.3-11 List of Wastewater Pollutant Discharge Standards

Standard number	Discharge standard	Pollution factor		Emission value	Source of Pollution
GB8978-1996	Integrated Wastewater Discharge Standard (Class III)	SS	Emission concentration (mg/L)	≤400	Domestic sewage
		BOD ₅	Emission concentration (mg/L)	≤300	
		COD	Emission concentration (mg/L)	≤500	
		NH ₃ -N	Emission concentration (mg/L)	-	
		pH		6-9	
(GB3544-2008)	Comprehensive Waste Water (Table 3) in Discharge Standard of Water Pollutants for Pulp and Paper Industry and Paper Making Joint Production Enterprises	pH		6-9	Industrial wastewater
		SS	Emission concentration (mg/L)	≤10	
		COD	Emission concentration (mg/L)	≤60	
		BOD ₅	Emission concentration (mg/L)	≤10	
		Ammonia nitrogen	Emission concentration (mg/L)	≤5	
		Total phosphorus	Emission concentration (mg/L)	≤0.5	

Table 2.3-12 List of Noise Pollution Control Standard Values Unit: [dB(A)]

Standard number	Control standard	Control object	Day time	Night	Control level
GB12523-2011	Emission Standard of Environment Noise for Boundary of Construction Site	Noise for construction site	70	55	—
GB12348-2008	Emission Standard for Industrial Enterprises Noise at Boundary	Residential area (before removal)	60	50	Class 2
		Boundary and surrounding	65	55	Class 3
	Discharge standard	Along traffic artery	70	55	Class 4

In addition, the temporary ash and slag storage place of the Project executes relevant requirements in *Standards for Pollution Control on the Storage and Disposal Site for General Industrial Solid Wastes* (GB18599-2001). However, this assessment excludes temporary ash yard part of the Project, and the Employer will separately assess the environmental impact for the temporary ash yard, and commit to synchronously complete for operation with the Project; this environmental impact assessment will also incorporate synchronous operation of the temporary ash yard into the acceptance content of “three simultaneities”.

2.4 Environmental Impact Identification and Assessment Factor

The environmental impact factor identification matrix is as shown in Table 2.4-1 and the main assessment factors are as shown in Table 2.4-2.

Table 2.4-1 Environmental Impact Factor Identification Matrix

Item	Environmental factor	Construction period					Operation period						
		Waste gas	Waste water	Waste residues	Noise	Transport	Resettlement	Waste gas	Waste water	Waste residues	Noise	Transport	Employment
Natural environment	SO ₂							*					
	NO ₂							*					
	PM ₁₀					▲		▲		▲		▲	
	TSP	▲		▲		▲		▲		▲		▲	
	Surface water		▲						▲				

	Groundwater									▲				
	Noise				▲	▲						▲	▲	
	Ecologic environment			▲										
Social environment	Regional economy											△	☆	
	Travel allowance													
	Health of population				▲				▲					△
	Electromagnetic influence								▲					
	Living standard											△	☆	

Remarks: △ slight positive effect ☆ long-term or medium-term positive effect ▲ short term or slight adverse effect ☆ long-term or medium-term adverse effect

Table 2.4-2 List of Assessment Factor Determination Results

Environment element		Assessment factors
Ambient air	Current situation assessment	SO ₂ , NO ₂ , PM ₁₀ , TSP, Hg and its compounds
	Forecast	SO ₂ , NO ₂ , PM ₁₀
Surface water	Current situation assessment	pH, DO, COD _{Cr} , BOD ₅ , As, Hg, Cr ⁶⁺ , total phosphorus, ammonia nitrogen, petroleum, volatile phenol, fluoride
Groundwater	Current situation assessment	pH, ammonia nitrogen, chloride, sulfate, permanganate index, Cr ⁶⁺ , volatile phenol, lead, mercury, arsenic, cadmium
Noise	Current situation assessment	L _{eq} dB(A)
	Forecast	L _{eq} dB(A)
Soil	Current situation assessment	pH, copper, nickel, zinc, lead, mercury, arsenic, chromium, cadmium

2.5 Assessment focus

According to the pollution characteristics of the proposed works, comprehensively analyze the current status of the regional environment and relevant environmental protection policies, and determine the main points of this environmental impact assessment as follows:

- (1) Analyze the pollutant output and discharge of the proposed works;
- (2) Discharge the wastewater arising from the proposed works into the wastewater treatment station in the packaging paperboard engineering plant area, and finally discharge into Gong'an section of the Yangtze River by special pipelines; predict the wastewater pollution influence range and extent after the Project is put into production through environmental impact assessment, and quantitatively assess the influence range and extent of wastewater on Gong'an section of the Yangtze River; assess the feasibility for wastewater in the Project to enter into the wastewater treatment station of the plant area for treatment;
- (3) Assess the feasibility of standard boiler flue gas treatment measures, predict the influence range, extent of waste gas on the air environment quality and technical and economical rationality of control measures; calculate the health protection distance.
- (4) Analyze the total amount control and cleaner production level of the enterprise, and propose total amount control measures;
- (5) Analyze the feasibility of environmental risk prevention measure.

2.6 Rating, Scope and Period of Assessment

2.6.1 Rating of assessment

- (1) Ambient air

According to the provisions of Guidelines for *Environmental Impact Assessment - Atmospheric Environment* (HJ2.2-2008), the standard ratio Pi (the subscript i represents the Hubei Academy of Environmental Sciences

i(th) pollutant) of the maximum ground concentration of each atmospheric pollutant is calculated by the following formula:

$$P_i = C_i / C_{oi} \bullet 100\%$$

where: P_i - standard ratio of the maximum ground concentration of the i(th) pollutant, %;

C_i - the maximum ground concentration of the i(th) pollutant calculation by the estimation model, mg/m^3 ;

C_{oi} - ambient air quality standard of the i(th) pollutant, mg/m^3 . Rating of assessment is classified in Table 2.6-1.

Table 2.6-1 Classification Criteria of Atmospheric Environmental Impact Assessment

Rating of assessment	Classification criteria of assessment
Level 1	$P_{\text{max}} \geq 80\%$, and $D10\% \geq 5\text{km}$
Second level	Others
Class III	$P_{\text{max}} < 10\%$ or $D10\% <$ minimum distance from the pollution source to the boundary

According to the pollutant discharge of the proposed project, the maximum ground concentration is calculated by estimation model, $D10\%$, and the main parameters of waste gas emission are set as shown in Table 2.6-2.

Table 2.6-2 List of Calculation Results by Engineering Estimation Model

Name of pollution source		SO ₂	NO ₂	Hg	PM ₁₀	PM _{2.5}
		Standard ratio, %				
Boiler exhaust funnel	Phase I	16.7	28.32	0.84	2.61	2.51
	Phase II	16.7	28.32	0.84	2.61	2.51
1# transfer station	Phase I	-	-	-	1.08	-
	Phase II	-	-	-	1.08	-
2# transfer station	Phase I	-	-	-	1.08	-
	Phase II	-	-	-	1.08	-
Crusher room	Phase I	-	-	-	4.33	-
	Phase II	-	-	-	4.33	-
Coal bunker	Phase I	-	-	-	1.08	-
	Phase II	-	-	-	1.08	-
Slag silo	Phase I	-	-	-	0.69	-
	Phase II	-	-	-	0.69	-
Dry coal shed	Phase I	-	-	-	30.18	-
	Phase II	-	-	-	30.18	-
Ash bin 1 (Phase I)		-	-	-	2.04	-
Ash bin 2 (Phase I)		-	-	-	2.04	-
Ash bin 3 (Phase II)		-	-	-	2.04	-

The maximum standard ratio in the pollutants is 30.18% (generated from the pollutant H₂S discharged by unorganized discharge at the percolate treatment station), and the farthest distance $D10\%$ at the standard ratio of 10% is 1,832m, less than 5,000m, and the rating of ambient air impact assessment in the Project is determined as Class II according to HJ2.2-2008.

(2) Surface water environment

The production wastewater and household wastewater of the proposed project are subject to centralized treatment at the wastewater treatment station of the high-grade packaging paperboard works of Changtai Company for reaching standards, and directly discharged into

Yangtze River via the pipelines at the wastewater treatment station; the main pollutants include COD, BOD₅, SS, ammonia nitrogen, etc. The total wastewater discharge volume of the proposed project is about 55.36m³/d, which is small.

According to the rating classification base of environmental impact assessment for surface water in *Technical Guidelines for Environmental Impact Assessment Surface Water Environment* (HJ/T2.3-93), wastewater is discharged to Gong'an section of the Yangtze River after reaching standards by treatment at the wastewater treatment station of the packaging paperboard works. Therefore, the environmental impact assessment rating for surface water is determined as Class III, and the feasibility of the wastewater from the Project to reach the standards through treatment at the wastewater treatment station of the packaging paperboard works and the contribution influence of the wastewater on the Gong'an section of the Yangtze River are mainly analyzed.

(3) Acoustic environment

According to the principles of grading in *Technical Guidelines for Noise Impact Assessment* (HJ2.4-2009), the boundary of the proposed works executes Class 3 standards stipulated in *Environmental Quality Standard for Noise* (GB3096-2008). After the proposed works is put into production, the noise level at the boundary and surrounding is increased, and a health protection distance of 400m (set for odor in wastewater treatment station and sorting workshop of solid wastes) is provided for the Project, thus the noise impact assessment is determined as Class II.

(4) Environment risks

2×500m³ steel diesel oil tanks (including boiler ignition oil for Comprehensive Solid Wastes Utilization Project), are set up for the project with the storing capacity of 900t, and the volume of the ammonia tank for the project is 100m³ with the storing capacity of 90t. In combination with the provisions of Table 2 in *Identification of Major Hazard Installations for Dangerous Chemicals* (GB18218-2009), diesel oil is flammable liquid with the flashing point of ≥55°C and critical quantity of 5,000t, and is not major hazard source; the ammonia (with concentration of 20%) belongs to non-major hazard source, and its toxicity is lower than that of general toxic hazardous substances. And the site selection of the Project is located in a non-sensitive area.

According to the assessment rating classification table in the *Technical Guidelines for Environmental Risk Assessment on Projects* (HJ/T169-2004), the risk assessment rating is mainly classified according to the hazard of the risk factor, size of hazard source, environmental sensitivity level in the assessment project (See Table 2.6-4). The risk assessment rating is determined as the Class 2.

Table 2.6-4 Environmental Risk Assessment Rating Classification

Item	Highly toxic hazardous substance	General Toxic Hazardous Substance	Combustible and Inflammable Hazardous Substance	Explosive Hazardous substance
Major hazard source	I.	2.	I.	I.
Non-major hazard source	2.	2.	2.	2.
Environmentally sensitive areas	I.	I.	I.	I.

(5) Groundwater environment

The project type is classified according to *Technical Guidelines for Environmental Impact Assessment - Groundwater Environment* (HJ610-2011), and the Project may cause pollution to the groundwater during stacking at the ash yard in the production process, belonging to Class I construction project. Ash yard is excluded in this assessment, and the ash yard is not in the assessment range; there are only ash bins and slag bins in the plant area of the Project, and the ash yards are subject to separate environmental impact assessment by the Employer, but it must be incorporated into the acceptance content of "three simultaneities" in the assessment.

The Project is within the plant site of the 2.20Mt/a High-grade Packaging Board Project assessed by the Employer, and the groundwater assessment rating is Class III according to the approved *Environmental Impact Assessment Report of Changtai Paper Industry (Wuhan) Co., Ltd.* on the 2.20Mt/a High-grade Packaging Board Project; the assessment conclusion of this report is used in this assessment. The groundwater assessment rating in the project area is determined as Class III.

(6) Ecologic environment

The Project covers an area of about 209,333.33m² (including land for CHP Project and comprehensive solid wastes utilization project), and this plot was farmland before, belonging to general area; according to Table 2.6-5 in *Technical Guideline for Environmental Impact Assessment Ecological Impact* (HJ19-2011), the ecological environmental impact assessment rating is Class III.

Table 2.6-5 List of Classification Criteria of Ecological Environmental Impact Assessment

Ecological sensitivity of affected regions	Land occupation range of the Project		
	Area≥20km ²	Area 2~20km ²	Area ≤2km ²
Special ecological sensitive region	Level 1	Level 1	Level 1
Important ecological sensitive region	Level 1	Second level	Class III
General region	Second level	Class III	Class III

2.6.2 Assessment range

See Table 2.6-6 for the assessment range.

Table 2.6-6 List of Assessment Range

Assessment factors	Assessment range
Ambient air	Rectangular region with a radius of 5km×5km, centered by the exhaust funnel (chimney)
Water environment	Gong'an section of the Yangtze River (including 500m upstream to 10km downstream of the wastewater treatment plant of the packaging paperboard works)
Acoustic environment	200m beyond the boundary
Ecology	Plant area of the Project and 2.5km around

2.7 Targets of environmental protection

According to the natural environment conditions around the Project, relevant environmental protection objectives and distribution of environmental sensitive points, the wastewater from the Project is discharged after standard treatment at the wastewater treatment plant of the packaging paperboard works, and the drain outlet is proposed to locate at the right stake No. 646+500 of Ejiang. The surrounding environmental sensitive points and environmental protection objectives at the site of the Project are listed in Table 2.7-1.

Table 2.7-1 List of Main Environmental Sensitive Points around the Project and Environmental Protection Objectives

SN	Objective name		Relative orientation	Distance	Scale	Class of protection
1	Centralized drinking water intake within the assessment range	Drinking water intake in Douhudi Town	Right of the river at the upstream of the drain outlet	6900	Providing domestic water for about 60,000 people in Douhudi Town	Surface water: Class II
2		Majiangzhai drinking water intake in Jiangling County	Left of the river at the upstream of the drain outlet	2500	Intake scale 0.2 million m ³ /d, served for domestic water in the county city	Surface water: Class II

3		Water intake of Brewery in Yangjiachang Town	Right of the river at the upstream of the drain outlet	500	Intake scale 10,000 m ³ /d, providing production water for this plant and domestic water for about 15,000 people in Yangjiachang Town	Surface water: Class II
4		Drinking water intake in Haoxue Town, Jiangling County	Left of the river at the downstream of the drain outlet	10200	Providing drinking water source for 81,000 people in Haoxue Town	Surface water: Class II
5	Yangtze River (Gong'an section)		N	2200	Great river	Surface water: Class III
6	Sensitive point	Group 5 of Lvhuo Village	SW	360~700	60 households	Ambient air: Level II Sound environment: Class 2
7		Group 4 of Lvhuo Village	S	840	42 persons	
8		Group 9 of Renhe Village	SW	750~1200	70 households	
9		Group 10 of Fuli Village	S	550~900	50 households	
10		Group 8 of Fuli Village	E	750~1500	54 households	
11		Resettlement Residential Area	NE	850~1100	140 households	
12		Group 3 of Fuli Village	N	770~1200	15 households	

3. Project Overview

3.1 Overview of the Project under Construction

The Project is mainly to serve the heat load and auxiliary power supply of "2.20Mt/a High-grade Packaging Board Project" approved to build by Jingzhou Environmental Protection Bureau, as well as other enterprise users in Qingji Industrial Park. Meanwhile, the "Comprehensive Solid Wastes Utilization Project in Yangjiachang Town Industrial Park of Gong'an County" built simultaneously with the Project is also at the environmental impact assessment stage, and brief introduction is given to the project under construction based on the contents in EIA reports of the two projects.

3.1.1 2.20Mt/a High-grade Packaging Board Project

3.1.1.1 Project Basic Information

2.20Mt/a High-grade Packaging Board Project of Changtai Paper Industry (Wuhan) Co., Ltd.

It is located in the southeast of Gong'an County Qingji Industrial Park, and the plant area covers an area of 1,523,340m², where the planned land for the Project is 1,324,700m², and the land reserved for thermal power station in the park is 209,333.33m² (including the Company's Comprehensive Solid Wastes Utilization Project); this plot crosses the approved Gong'an County Qingji Industrial Park and the planning Yangjiachang Town Industrial Park. The project investment is CNY 7,451.37 million.

The Project is built by phase, where the annual production of Phase I is 1.10 million tons, and the annual production of Phase II is also 1.10 million tons.

3.1.1.2 Product Production plan for the project

It is proposed to build the Project by two phases, and the products include five varieties; the project product plan and the capacity, speed, basis weight of each set are as shown in Table 3.1-1.

Table 3.1-1 List of Product Production Plan for Packaging Board Project

Engineering construction	No.	Product scheme	Production scale	Specification & basis weight	Reference basis weight	Working speed (m/min)	Breadth of paper machine
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stage			(10,000t/a)	(g/m ²)	(g/m ²)		(mm)
Phase I	PM15	kraft board paper	30	90~230	110	1000	5660
	PM16	Low basis weight recycled craft paper	30	60~140	110	1000	5660
	PM17	Low basis weight fluting paper	18	60~120	80	800	5660

Engineering construction stage	No.	Product scheme	Production scale (10,000t/a)	Specification & basis weight (g/m ²)	Reference basis weight (g/m ²)	Working speed (m/min)	Breadth of paper machine (mm)
	PM18	White-top craft paper	32	90~140	120	1000	5660
Phase II	PM19	Low basis weight recycled craft paper	30	80~160	110	1000	5660
	PM20	Low basis weight recycled craft paper	30	60~140	110	1000	5660
	PM21	Low basis weight fluting paper	18	60~120	80	800	5660
	PM22	Food wrapping paper	32	150~300	210	600	4880

3.1.1.3 Project description

The main construction contents of High-grade Packing Board 2.20Mt/a High-grade Packaging Board Project are as shown in Table 3.1-2.

Table 3.1-1 Contents of Packaging Board Project

Category	Project Composition	Construction contents	Remarks
Main works	PM15 kraft board paper production line, PM16 low basis weight recycled craft paper	1 crushing station, kraft board paper workshop (with production capacity of 300,000t/a) and low basis weight recycled craft paper workshop (with production capacity of 300,000t/a), totally one building	Phase I
	PM17 low basis weight fluting paper production line, PM18 white-top craft paper production line	1 crushing station, low basis weight fluting paper workshop (with production capacity of 180,000t/a) and white-top craft paper workshop (with production capacity of 320,000t/a), totally one building	Phase I
	PM19 low basis weight recycled craft paper production line, PM20 low basis weight recycled craft paper production line	1 crushing station, low basis weight recycled craft paper workshop (with production capacity of 300,000t/a) and low basis weight recycled craft paper workshop (with production capacity of 300,000t/a), totally one building	Phase II
	PM21 low basis weight fluting paper production line, one PM22 crushing station, low basis weight fluting paper workshop (with production capacity of 180,000t/a) and food wrapping paper workshop (with production capacity of 320,000t/a), totally one building	1 crushing station, low basis weight fluting paper workshop (with production capacity of 180,000t/a) and food wrapper workshop (with production capacity of 320,000t/a), totally one building	Phase II
Auxiliary works	Auxiliary production	1 mechanical repair shop, spare parts and hardware storage, power distribution station, wagon balance room, two waste paper sorting sheds	Phase I

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	workshop	1 waste paper sorting shed, starch preparation workshop, end socket paper core production workshop, packaging material processing workshop	Phase II
	Production Management	1 production dispatching center, 1 fire control building	Phase I
	Office and living quarter	1 office building, staff canteen, 2 management staff dormitories, 4 shift-change dormitories	Phase I
1 management staff dormitory, 4 shift-change dormitories		Phase II	
Public works	Water supply	The project intakes water from the pump room along the river side and have Yangtze River water as production water. The planned water intake capacity is 70,000m ³ /d, 35,000m ³ /d for Phase I and Phase II, respectively;	Phase II relying
	Drainage	Effluent segregation, rain and sewage diversion systems are provided; production and domestic wastewater is pumped into Yangtze River through lifting pump after standard treatment.	Phase II relying
	Heat supply	Steam required for production is pipelined by the supporting power station in the park, and the condensed water is sent to thermal power station by the supporting pipe network.	Phase II relying
	Power supply	The construction power is mainly supplied by thermal power station in the park, and the engineering power system is provided by 11kv substation in the park with dedicated double-loop overhead lines; one step-down station is built.	Phase II relying
	Compressed air station	The compressed air stations are all set individually in paper making workshop during each stage, which are responsible for the air supply for the corresponding project production and instruments.	
	Heating and ventilation	The pulping workshop is provided with a mechanical ventilation system; the wet part of the pulping workshop (under the net, head box, former, broken paper pond, etc.) is provided with mechanical exhaust; the drying part is provided...	
	Greening	Both sides of the main road are planted with arbor, shrub and herbaceous plant to form a green belt, and the greening area is 228,756.97m ²	
Environmental protection works	Waste gas control	The main structures are provided with closed odor collection systems, sent to the scrubbing tower for treatment after collected by fan, discharged by 15m exhaust funnel, in order to strengthen greening around the wastewater treatment station	
	Wastewater treatment	Domestic wastewater is subject to "grille + primary sedimentation tank + anaerobic reactor + aeration tank + secondary sedimentation tank + Fenton reaction tank + third sedimentation tank + filter tank" together with production wastewater after treatment by septic-tank	Phase II relying
	Noise treatment	Adopt equipment with low noise, sound insulation of power house, foundation vibration reduction, greening...	
	Solid wastes governance	General comprehensive industrial solid wastes utilization, qualified units are entrusted to treat hazardous solid wastes, and the household garbage is uniformly collected by environmental sanitation.	
Risk prevention works	Accident tank	1 emergency pool will be built, with effective volume of 20,000m ³	Phase II relying
	Fire cistern	2 clean water ponds, with volumes of 8,000m ³ , including indoor and outdoor fire-fighting and automatic spray water storage of 2,600m ³	Phase II relying
Storage and transportation engineering	Raw material storage	3 waste paper sheds	Phase I
		2 waste paper sheds, 1 pulp board storage	Phase II
	Finished product storage	5 finished product warehouses	Phase I
		5 finished product warehouses	Phase II
Other warehouses	3 chemical product warehouses	Phase I	
		1 packaging material and starch warehouse	Phase II

3.1.1.4 Main public works

(1) Heat supply project

The heat supply load balance of the Project is as shown in Table 3.1-3.

Table 3.1-3 Heat Load of Packing Board Project

Product line	Product type	Production capacity (t/a)	Steam consumption	Steam use	Maximum steam use
			t/t	t/h	t/h
Phase I project					

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PM15	kraft board paper	300000	1.6	58.82	64.70
PM16	Low basis weight recycled craft paper	300000	1.6	58.82	64.70
PM17	Low basis weight fluting paper	180000	1.5	33.09	36.40
PM18	White-top craft paper	320000	1.6	62.75	69.03
Phase II Project					
PM19	Low basis weight recycled craft paper	300000	1.6	58.82	64.70
PM20	Low basis weight recycled craft paper	300000	1.6	58.82	64.70
PM21	Low basis weight fluting paper	180000	1.5	33.09	36.40
PM22	Food wrapping paper	320000	1.6	62.75	69.03
Total				430.96	469.66

Steam is mainly 6bar saturated steam; since there is no reliable heat source which can be supplied with steam to the Company around the High-grade Packaging Paper Project, the Employer has synchronously built Yangjiachang Town Industrial Park CHP Project in Gong'an County to meet the steam use demands of Packaging Paper Project, and it can gradually replace small boilers of other steam users in the park.

(2) Power supply work

When the Project works normally, its electricity is provided mainly by thermal power station in the park.

The supporting thermal power station will be intensively built in Qingji Industrial Park, to provide steam and electricity for the setting-in enterprises in the park. This power station is separated from the Project by a wall to supply power and steam required for normal production of the Project, and the wastewater sludge, production waste residue generated in the Project are sent to the power station for incineration. The supporting general step-down station of the Project will be arranged in thermal power station.

110kV substation is planned in the park, about 1km from the Project; the rod line of its transmission line passes by the land for the Project, and the power source of the power system in the Project is proposed to be provided by this substation with dedicated double-loop overhead lines.

(3) Water Supply Works

There are four water supply systems in the whole plant (including CHP Project and Comprehensive Solid Wastes Utilization Project): domestic water supply system, production water supply system, fire-fighting water supply system and production circulating water supply system.

The total water consumption for the first stage and the second stage of the Project is 56,400m³/d, 28,200m³/d for each of the stages. The feedwater treatment station is planned with the daily treatment capacity of 65,000m³/d, and water after treatment is sent to each workshop by the water supply pump room. The feedwater treatment station is planned for once and constructed in steps, including a construction scale of 32,500m³/d respectively at the first stage and second stage.

The production water in the Project sources from the Gong'an Section of Yangtze River. This Yangtze River section is Category III water, with abundant water, water quality generally not contaminated, and good exploitation and utilization conditions. The project intakes water from the pump room along the river side and have Yangtze River water as production water. The planned water intake capacity is 70,000m³/d, where the design water intake capacity of the first stage is one 35,000m³/d DN800mm gravity flow water intake pipe, about 250m long; one 35,000m³/d DN800mm gravity flow water intake pipe is increased at the second stage. The Yangtze River water flows into the sump in front of the water intake pump house via the gravity flow raw water intake pipes, and is lifted by the raw water pump. For the sake of water

supply safety, water is transported to the feedwater treatment station in the plant by two DN700mm water pipes (about 2,000m in length) which are provided with metering device for purpose of water conservation.

The source of domestic water in the plant in the Project is municipal water.

(4) Drainage Works

Drainage of the plant area in the Project is divided into production wastewater drainage system and rain drainage system. The domestic sewage is discharged into the wastewater treatment station together with other production wastewater through pipeline gravity flow after anaerobic digestion treatment by the septic-tank, then flows into the discharge pool after standard treatment, lifted by sewage pump, is discharged into the Yangtze River section in Gong'an County Qingji Industrial Park by one about 2,500m long DN800mm special steel pipe in way of diffused duck-billed discharge. Discharge points after being treated are at the downstream of the whole park.

The rainwater in the plant area is collected by open ditches or pipelines, is discharged into the channel, and finally enters into Xuzhang Canal.

Sewage from workshops is treated and discharged based on the principle of separation of clean water and sewage in the Project,

1 wastewater treatment station is built for High-grade Packaging Paper Project, and the production wastewater, domestic wastewater, etc. at the first stage are mixed for anaerobic treatment, secondary biochemical treatment and tertiary advanced treatment (advanced chemical oxidation with FENTON reagent). The production wastewater of the second stage is subject to anaerobic treatment, secondary biochemical treatment and tertiary advanced treatment (advanced chemical oxidation with FENTON reagent). The planned design scale of the wastewater treatment station is considered as per $Q=55,000\text{m}^3/\text{d}$ and implemented in stages, $27,500\text{m}^3/\text{d}$ respectively considered for the anaerobic, aerobic and advanced treatment at the first and second stages. The wastewater treatment scale includes CHP Project and Comprehensive Solid Wastes Utilization Project.

3.1.1.5 Main environmental protection measures

(1) Waste water treatment measures

The wastewater from the Project is mainly composed of domestic wastewater from staff in the park, process wastewater from paper making and pulping workshops, sent to the wastewater treatment station for standard discharge, and the process of the wastewater treatment station is "grille + primary sedimentation tank + anaerobic reactor + aeration tank + secondary sedimentation tank + Fenton reaction tank + third sedimentation tank + filter tank". The wastewater treatment scales of Phase I and Phase II of the wastewater treatment station are planned to be designed as $27,500\text{m}^3/\text{d}$, and the total wastewater treatment scale of two phases is $55,000\text{m}^3/\text{d}$.

The back flushing water of the water station and outer drainage from the sludge concentration basin, dehydration machine room, condensed water from the compressor of air compression station and frozen desiccant, belonging to clean sewers after simple treatment, are discharged into the rain drainage system in the plant.

The fire-fighting wastewater in the plant area is collected into the emergency pool of the plant area, and then discharged into the wastewater treatment station for treatment.

(2) Waste gas treatment measures

The waste gas from the Project is mainly composed of malodorous gas and acid mist gas generated by the wastewater treatment station and cooking fume from the canteen, motor vehicle exhaust and dust generated by transportation.

The odor from the wastewater treatment station is controlled through the following measures:

- 1) Odor is collected by fan and then sent to the biological scrubbing tower for treatment;
- 2) Unorganized odor emission has a health protection distance;

- 3) Some facilities are covered, and regularly subject to odor removal by spraying odor inhibitor;
- 4) The greening tree species capable of absorbing malodorous gas are planted, and greenbelts are provided;
- 5) Operation management is strengthened.

The acid mist gas generated by the wastewater treatment station is discharged after treatment of the acid mist absorption tower. The cooking fume from the canteen is discharged after it reaches the standard limit in *Emission Standard of Cooking Fume* through treatment by the cooking fume purification unit. For the vehicle exhaust generated by transportation, air around the plant area is purified through strengthening greening on both sides of the road, and road dust is reduced through hardening roads in the plant area and regularly spraying water to inhibit dust.

(3) Noise treatment measures

Noise in the Project is mainly from operation of production equipment, and the noise value is about 73~116dB(A), reduced mainly through the following measures:

- 1) Adopt low noise equipment.
- 2) Provide acoustic shield for high noise equipment, set soundproof room, and install silencer for the fan equipment.
- 3) Strengthen daily maintenance and servicing for equipment, keep good lubrication condition and reduce extraordinary noise.
- 4) Strengthen greening of plant area, plant tall arbors, and strengthen staff labor safety and health protection.
- 5) Strengthen traffic management of transport vehicle, and reduce the influence of traffic noise on the surrounding residents.

(4) Solid wastes governance measures

- 1) The pulp slags generated in the pulping and paper making process is sent to the boiler of thermal power station in the park for incineration.
- 2) Waste iron wires, plastic sheets, sandstone and other impurities generated in the pulp preparation process are sold for comprehensive utilization.
- 3) The silt generated by the reaction sedimentation basin in the feedwater station is transported out for comprehensive utilization.
- 4) The residual sludge generated in the wastewater treatment station is filter-pressed as mud cakes and then sent to thermal power station in the park for burning with coal.
- 5) The adsorbent generated by the refrigerated dryer is recycled.
- 6) The environmental sanitation department is entrusted to uniformly clear and transport the staff household garbage.
- 7) The qualified units are entrusted to treat and dispose the waste engine oil, waste empty filter cell generated by mechanical repair. All solid wastes generated in the Project are not discharged out after proper treatment and disposal.

3.1.2 Comprehensive Solid Wastes Utilization Project

3.1.2.1 Project Basic Information

The Comprehensive Solid Wastes Utilization Project in Yangjiachang Town Industrial Park of Gong'an County is located in Paper Making Industrial Park planned in Gong'an County Qingji Industrial Park, the southwest corner of the project planning red line range of Changtai Paper Industry, and the Project covers an area of 209,333.33m² (including land for CHP Project, where the land for the Project is about 37,666.67m²); the north-south length of the land is 648m, and the east-west width is about 323m.

Comprehensive Solid Wastes Utilization Project is built with the High-grade Packaging Board Project by stages, and it is proposed to build one 90t/h incinerator and one 15MW extraction condensing steam turbine generator unit for Phase I project; and build another one 90t/h incinerator and one 15MW extraction condensing steam turbine generator unit for Phase II project.

The sludge quantity required to treat is 145,800t/a (water content: 74%) for Phase I, 291,600t/a (water content: 74%) for the final phase; the paper making waste slag quantity is 107,300t/a (water content: 59%) for Phase I, and 214,600t/a (water content: 59%) for the final phase. The sludge quantity after treatment is 84,200t/a (water content: 55%) for Phase I, 168,300t/a (water content: 55%) for the final phase; the paper making waste slag quantity is 80,000t/a (water content: 45%) for Phase I, and 160,000t/a (water content: 45%) for the final phase. In addition, some fired coal is doped, and the weight ratio of fired coal doped is lower than 20%. The steam and electricity generated are incorporated into CHP Project (the environmental impact assessment project).

3.1.2.2 Main construction contents of the Project

Main construction contents of the Comprehensive Solid Wastes Utilization Project are as shown in Table 3.1-4.

Table 3.1-4 List of Construction Contents of the Proposed Works

Item		Comprehensive Solid Wastes Utilization Project in Yangjiachang Town Industrial Park of Gong'an County			
The Employer		Changtai Paper Industry (Wuhan) Co., Ltd.			
Scale, MW	Item	Unit capacity and quantity	Total capacity		
	Phase I project	1×15MW	15MW		
	Phase II Project	1×15MW	15MW		
	Master works	2×15MW (one standby)	30MW		
Main works	Solid wastes incineration system		2x90t/h incinerators (circulating fluidized bedboilers) are built, with the final sludge treatment capacity of M75,800t/a (oven dry); the paper making waste slag is 88,000t/a (oven dry); in addition, the biogas generated by the wastewater treatment plant is 14,606,400m ³ /a.	Construction by two phases	
		Solid wastes receiving	The paper making waste slag of the Project is from the sorting workshop of the paper plant, and the waste slag generated by the paper making workshop is directly delivered to the sorting workshop of the Project; the sludge is from the wastewater treatment station of the whole plant; the biogas is from the wastewater treatment station, and the fired coal doped is from the raw coal storage yard of CHP Project.		
	Solid wastes receiving, storage and delivery system		Temporary raw material storage facilities	The main raw materials of the Project are paper making waste slag and sludge of wastewater treatment station, all directly transported to the Project from the sorting workshop to the bin and the wastewater treatment station, and the fired coal doped is also directly transported from the coal shed of CHP Project to the stock bin (dump pit); there is no temporary storage facility for solid waste raw materials, and only the biogas generated in the wastewater treatment station is temporarily stored in 230m ³ biogas tank, and directly sent into the combustion system after pressurizing and filtering.	Construction by phase
		Feed mode	The paper making waste slag generated in the Project is first sorted, crushed and press-filtered in the sorting workshop, then fed into the front stock bin together with sludge after press-filtering, and conveyed into the fluidized bed incinerator by chain after mixing with fired coal; the biogas generated in the wastewater treatment station of the whole plant is fed into the biogas tank upon collection for pressurizing and filtering, and then conveyed into the incinerator by pressure pipelines for incineration.	Construction by phase	
		Collection and conveying system of solid wastes and	Sludge generated in the wastewater treatment station of the whole plant is directly conveyed from the sludge room to the front stock bin after press-filtering in the sludge room; the		

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		sludge leachate	paper making waste slag is conveyed from the sorting workshop to the sorting section of the Project, crushed, press-filtered by shortcut to the front stock bin after sorting, and loaded by grab bucket, conveyed by belt to the incinerator.	
	Combustion system	Ignition auxiliary fuel system	0# diesel oil is used for ignition to start up in the Project, and 2x500m ³ steel oil storage tanks and 3 fuel delivery pumps are built in the CHP Project; the oil for the ignition system of the Project is dependent on the CHP Project	
		Solid waste incinerator	Construction by two phases: 90t/h fluidized bed boiler is built for Phase I Project, and 90t/h fluidized bed boiler is built for Phase II Project.	
	Thermal system	Steam turbine generator	The extraction condensing steam turbine is built in Phase I, with the model of C15-3.43/1.1, rated power of 15MW, as well as steam turbine generator with the model of QFW-30-2A, rated power of 20MW, the same as Phase II.	
		Access system	The electricity and steam generated in the Project, together with those generated by CHP in the plant area supply power to the packaging board project, and meanwhile supply gas to the park; the isolated network operation way is adopted, without accessing to the local grid system.	
Auxiliary works		Fuel delivery system	Except that the fired coal doped in the Project is transported out of the plant area relying on off-site Western Inner Mongolia - Central China Railway, paper making waste slag, sludge and biogas are generated in the paper plant, and transferred in the plant area.	
		Water supply system	The industrial water supply system of the Project completely relies on the water supply system of High-grade Packaging Board Project, and the industrial water source is Gong'an section of the Yangtze River; this Yangtze River section is Category III water, and the whole plant intakes water from the pump room along the river side; the planned intake capacity is 70,000m ³ /d, 35,000m ³ /d for the design intake capacity in two phases respectively. Yangtze River water flows into the sump in front of the water intake pump house via the gravity flow raw water intake pipes, and is lifted by the raw water pump. For the sake of water supply safety, water is transported to the feedwater treatment station in the plant by two DN700mm water pipes (about 2,000m in length) which are provided with metering device for purpose of water conservation. The source of domestic water in the plant in the Project is municipal water.	
		Compressed air	One 12x30x7m(h) air compressor room, for common use of CHP and solid wastes incineration. One complete plant compressed air supply center is proposed to supply air for pneumatic ash removal and complete plant overhaul, instrument air, etc. It is proposed to provide five 43.7m ³ /min screw air compressors for the whole plant, 4 in operation and 1 spare; 5 sets of compressed air purification equipment are provided to remove water, dust, oil, etc. in the air. The pressure of the instrument compressed air source is 0.8MPa; the oil content is less than 8ppm; the dust particle diameter is not greater than 3µm; the dew point under working pressure is 10°C lower than the lowest work temperature.	
		Tank field	Oil pump room: 26mx7.5mx6m (height). For common use of CHP and Comprehensive Solid Wastes Utilization Project. Oil for boiler ignition and combustion supporting is 0# light diesel oil. The oil unloading, storage and supply facilities shall be newly built, and the system shall be provided with 2x500m ³ steel oil storage tanks and three oil supply pumps, to adapt to the flexible oil feeding way of the unit. Two unloading pumps with capacity of 100% and necessary sump oil purification devices. 2x100m ³ ammonia tanks with concentration of 20% (for the Project) and 1x50m ³ (for Comprehensive Solid Wastes Utilization Project), and acid-base tank of chemical water treatment workshop.	
		Demineralized water system	Unified planning by fired coal thermal power. The boiler feedwater treatment workshop of CHP Project is L-shaped building, and the water treatment equipment is arranged in the workshop: two 500m ³ clear water tanks, two 1,500m ³ demineralized water tanks, one 300m ³ middle water tank, acid-base storage equipment are arranged outdoors.	

	Cooling and circulating tower	The circulating water is 4,000m ³ /h for Phase I Project, and the circulating water of the whole Project is 8,000m ³ /h upon completion of Phase II Project. Each unit in the Project is provided with one circulating water pump, and the parameter of single water pump is: Q=1,250m ³ /h, H=20m; meanwhile, four units are provided with 2 contraflow mechanical draft cooling towers, and the cooling water volume of single tower is 2,500t/h. The plan view size of single tower is LxB=12.4x12.4m. The water supply static lift of the cooling tower is 9m. The cooling tower fan is variable-frequency, and the power of single fan is about 110kW. The circulating water supply and return mains is D1020x10 Q235B steel pipe.	
Environmental protection works	Flue gas cleaning	The combined cleaning process of "circulating fluidized bed boiler - SNCR denitration device - semi-dry desulfurization device - activated carbon jetting - bag-type deduster - stack emission" is used for flue gas in the Project, and the waste gas is discharged into atmosphere through the flue of the 180m high chimney with diameter of 3m in CHP Project after purification.	
	Odor removal	Air exhaust, odor removal by activated carbon, isolation curtain and other sealing measures	
	Wastewater treatment	The wastewater in the Project relies on the wastewater treatment station of the whole plant; one 55,000m ³ /d wastewater treatment station is built for the whole plant by two phases, with the treatment capacity of 27,500m ³ for each phase; the treatment process of pretreatment + anaerobic treatment + aerobic treatment + advanced treatment is used.	
	Flying ash treatment	One 400m ³ ash bin is provided for the Project, and the flying ash is first collected into the ash bin, outsourced to qualified units to dispose	
	Slag treatment	Slag is collected into the slag bin, and the Project is provided with one 300m ³ slag bin; all ash and slag generated is sold to local main building material units for comprehensive utilization	
	Noise control	Reasonable layout, installation of silencer, sound insulation, etc.	
	Accident tank	The wastewater from the Project relies on the wastewater treatment plant of the board project, and the High-grade Packaging Board Project is built with one 20,000m ³ emergency pool,	
Living facility	2.20M/a High-grade Packaging Board Project is agreed to build office building, dormitory and canteen for the whole plant; the office building is 6-storey high, 18,534m ² ; the dormitory is 6-storey, with building area of 57,408m ² ; the canteen is 3-storey, with building area of 14,024.4m ² . The office and living facilities of the Project rely on Board Project.		

3.1.2.3 Main public and auxiliary works

(1) Garbage pretreatment workshop

The treatment scheme of the garbage pretreatment workshop in the Project is as follows:

(1) The moisture content of the damp sludge is about 55% after dehydration in the wastewater treatment plant, and then the sludge is conveyed to the solid waste pond by truck; the waste paper residues are fed into the shredding machine, lifted by loaded and conveyed by conveyor; the waste paper residues after shredding is conveyed by belt.

(2) The waste paper residues shall be fed into the incineration system upon shredding, iron removal and dehydration;

(3) The waste paper residue percolate must be collected and conveyed to the wastewater treatment plant for treatment.

(2) Garbage stock bin room

The paper making waste residue (moisture content: 59%) is 214,600t/a and the dehydrated sludge (moisture content: 55%) is 168,300t/a, conveyed to the dump pit by belt conveyor. The dump pit is 1,369.8m² in area, 76.1m in length, 18m in width, capable of storing 5-day

mixed fuel consumption in the power plant.

(3) Temporary storage and delivery system of biogas

The biogas generated by the wastewater treatment plant is uniformly collected into the biogas pressure stabilization tank (volume: 230m³) for storage, pumped out by fan and delivered to the power plant by pipelines; the front pipeline of the power plant is provided with air relief valve, drain valve, main burning valve, blow-down valve, flow meter, pressure gage, spark arrestor, filter screen, etc. It is finally fed into the hearth for burning through biogas burners (one for each of the left and right sides of the hearth, provided with a flame checker and fire check protection); the pressure before the biogas is fed into the oven is 8~15KPA (provision of pressure protection); when the pressure is lower than 8KPA or higher than 15KPA, in case of protection action when exceeding the limit, close the main burning valve and cut off the steam source. The biogas control cabinet is locally provided, capable of achieving local remote operation; the control system is accessed to the main frame of boiler DCS, in order to achieve automatic control.

(4) Ash and slag handling system

1) The dry ash and slag are handled through separate sorting and storing by the ash and slag handling system. Slag handling in the plant is delivered mechanically and transferred to the slag bin; one 300m³ slag silo is provided; positive pressure pneumatic delivery, transfer of ash silo for storage is used for ash handling in the plant; one 400m³ ash silo is provided, and transported to comprehensive utilization plant or professional hazardous waste treatment plant by tanker.

2) The offsite ash, slag is transported by vehicle.

3) The ash and slag of the garbage incineration workshop can be used as the main admixture of the building materials such as cement, and the boiler ash is subject to comprehensive utilization, in order to save land resources, reduce environmental pollution and boost obvious economic benefits and environmental protection benefits.

Since the solid wastes incineration boiler in the Project burns the industrial solid wastes, the boiler ash and slag must be detected by relevant departments, and can all be comprehensively utilized after judged to be qualified. If it is unqualified, the corresponding treatment way must be determined according to detection results, and it shall be sent to the professional hazardous waste treatment plant for treatment.

4) Emergency ash and slag yard

In case of possible interruption in comprehensive utilization of ash, emergency ash and slag yard is considered. The emergency ash and slag yard is uniformly considered together with the fired coal CHP Project built by Changtai Paper Industry (Wuhan) Co., Ltd. and this environmental impact assessment is not incorporated into the construction content of this part.

(5) Water supply system

The water source and the water intake way are consistent with the High-grade Packaging Board Project, and the Comprehensive Solid Wastes Utilization Project only needs to dock the water pipe network interface of the Project with the whole plant.

1) Industrial water system

The industrial water supply pipe network of the Comprehensive Solid Wastes Utilization Project is from the industrial water pipe network of the High-grade Packaging Board Project in the plant area.

2) Circulating cooling water system

The cooling water required by the steam turbine of the Comprehensive Solid Wastes Utilization Project is about 2X4,000m³/h, and no circulating cooling tower is newly built for thermal power station; the circulating cooling water required for the Project is from the circulating cooling water of the fired coal thermal power plant.

(7) Wastewater treatment and drainage system

The wastewater in the Comprehensive Utilization from Comprehensive Solid Wastes Utilization Project is treated relying on the wastewater treatment station of the High-grade Packaging Board Project. The construction scale of the wastewater treatment station in the whole plant considers the wastewater treatment capacity of CHP and Comprehensive Solid Wastes Utilization Project.

Drainage of the plant area in the Comprehensive Solid Wastes Utilization Project is divided into production wastewater drainage system and rain drainage system. The domestic sewage is discharged into the wastewater treatment station together with other production wastewater through pipeline gravity flow after anaerobic digestion treatment by the septic-tank, then flows into the discharge pool after standard treatment, lifted by sewage pump, is discharged into the Yangtze River section in Gong'an County Qingji Industrial Park by one about 2,500m long DN800mm special steel pipe in way of diffused duck-billed discharge. Discharge points after being treated are at the downstream of the whole park.

(8) Chemical water system

Changtai Paper Industry (Wuhan) Co., Ltd. plans to build the Project and Comprehensive Solid Wastes Utilization Project, thus fluidized bed boiler is used, and it is necessary to synchronously build the required chemical water supply facilities.

The demineralized water of the chemical water station in the fired coal power plant is conveyed to this boiler by stainless steel pipe and rubber lined seamless steel pipe.

(9) Electric works

The Project is provided with one section generator 10kV bus, which is wired by single bus. The generating capacity of the generator is delivered to 35KV booster station of fired coal thermal power plant after deducting the auxiliary power. The neutral point of the generator is not grounded.

3.1.2.4 Main environmental protection measures

(1) Prevention and control measures for water pollution

All the production and domestic wastewater generated in the Project is treated relying on the wastewater treatment station proposed in "2.20Mt/a High-grade Packaging Board Project". The Comprehensive Solid Wastes Utilization Project must be only built with corresponding pipe network, collection and temporary storage system of percolate generated in solid wastes sorting, temporary storage (dump pit), boiler drainage collection pond and recycling system.

(2) Control measures for waste gas pollution

The main waste gas in the Project is from flue gas of the incinerator and odor generated by solid wastes.

The flue gas of the incinerator enters into the smoke purification system. The waste gas reaching the standard after treatment is discharged by the chimney of CHP Project, and the proposed height of the chimney is 180m; the inner diameter of the outlet is $\phi 3\text{m}$. The main pollutants in the flue gas of the incinerator are smoke, SO_2 , NO_x and a few dioxins, and various pollutants must be controlled. The pollutants in the proposed project are mainly discharged by the treatment process: circulating fluidized bedboiler \rightarrow SNCR denitration device \rightarrow semi-dry desulfurization device \rightarrow activated carbon jetting \rightarrow bag-type deduster \rightarrow chimney

The odor from the sorting workshop and the dump pit section of Comprehensive Solid Wastes Utilization Project in the Project escapes, and negative pressure closed type is used; the exhaust inlet of the fan is provided above the garbage pool so that the dump pit and the whole incineration system are in the negative pressure state, which cannot only effectively control odor escape, but also can introduce the malodorous gas as the combustion air into the incinerator; the malodorous gas is decomposed in the incinerator at high temperature, in

order to remove the malodorous odor.

(3) Measures for Prevention of Noise Pollution

The noise of the proposed project is mainly from continuous noise generated by boiler induced & forced draft fan, cooling tower, various pumps and air flue gas flow, and short-time high noise generated in boiler exhaust to the air, safety exhaust and noise generated by the garbage truck. The mechanical equipment with advanced process and small noise is mainly used, and the noise source is controlled. The main power house is reasonably arranged, and the noise source is relatively concentrated; the control room and operation room are of soundproof building structures. Noise control shall be strengthened, to minimize boiler steam exhaust and emptying in an emergency, and night work shall be avoided during boiler steam exhaust.

(4) Measures for Prevention of Solid Waste Pollution

1) Flying ash

The incineration of flying ash shall be subject to hazardous waste treatment according to the regulations in *Standard for Pollution Control on the Municipal Solid Waste Incineration* (GB18485-2014). The flying ash of the Project is mainly from the discharges of the reaction absorption tower and smoke collected by bag-type deduster, and the main ingredients are CaCl₂, CaSO₃, SiO₂, CaO, Al₂O₃, Fe₂O₃, etc. and a little amount of Hg, Pb, Cr, Ge, Mn, Zn, Mg and other heavy metals, as well as trace Dioxin and other toxic organic substances. The flying ash generated must be subject to harmless treatment such as chelating for comprehensive utilization, or directly delivered to qualified units for disposal.

2) Slag

Gong'an Jinsha Commerce Limited Liability Company, Gong'an Huifeng Energy Development Co., Ltd. and Gong'an Ruifeng New Wall Materials Co., Ltd. are entrusted to comprehensively utilize the slag generated by the proposed works.

3) Waste engine oil, activated carbon and woven bag

The qualified units are entrusted to dispose the replaced waste engine oil, waste activated carbon and woven bag as hazardous wastes. The Employer has signed intentional agreements with Yichang Hazardous Waste Disposal Management Center, and the hazardous wastes generated by the Project will be delivered to the responsible department for disposal.

4) Sludge and household garbage

The sludge generated in the wastewater treatment station of the whole plant (including High-grade Board Project, CHP Project and Comprehensive Solid Wastes Utilization Project) is directly incorporated into the incinerator of the Project for incineration. The household garbage shall be collected with consent of the local environmental sanitation department.

3.2 Profile of the Project to be constructed

3.2.1 Name, nature, location and the Employer

(1) Item

Yangjiachang Town Industrial Park CHP Project in Gong'an County.

(2) The Employer

Changtai Paper Industry (Wuhan) Co., Ltd.

(3) Project Type

Newly built.

(4) Construction site:

The site of the Project is located in Paper Making Industrial Park of Gong'an County Qingji Industrial Park, the southwest corner of the project planning red line range of Changtai Paper

Industry, and the Project covers an area of 209,333.33m² (including land for Comprehensive Thermal Power Solid Wastes Utilization Project); the north-south length of the land is 648m, and the east-west width is about 323m. See Attached Figure 1 for the geological location.

3.2.2 Construction scale and content

(1) Construction scale

The isolated network operation way is adopted by the Project (power not supplied outside, nor purchased online), and the power plant meets the electrical load demands of Changtai Paper Industry; a diesel generator is provided for use. The installed cable shall be subject to "heat and power balance", and the peak regulation and standby use of heat load shall be considered.

According to the statistics of the power load in the Project, as well as the Owner's requirements for the installed scale, four 60MW back-pressure steam turbines are newly built, and a diesel generator is provided to guarantee supply of power load. The boilers are five 410t/h high temperature and high pressure circulating fluidized bedboilers, one for hot spare, to guarantee stabilization of heat load and peak regulation. According to the construction phase of Taichang Paper Industry, 3 furnaces and 2 machines are adopted in Phase I of the Project, and 2 furnaces and 2 machines are adopted in Phase II, to form a common header system.

(2) Construction contents

The Project is CHP Project, and the Project mainly consists of main works and auxiliary works, public works, etc. including coal storage yard, burning system, thermal system, flue gas treatment system, flying ash treatment system and supporting facilities, etc. The composition of the main works is as shown in Table 3.2-1.

Table 3.2-1 List of Construction Contents (including phases) of the Proposed Works

I. Project Overview				
Item		Comprehensive Solid Wastes Incineration Utilization Project in Yangjiachang Town Industrial Park of Gong'an County		
The Employer		Changtai Paper Industry (Wuhan) Co., Ltd.		
Scale, MW	Total installed capacity		2x15 MW	
	Boiler		2x90 t/h	
II. Construction by phase				
Descrption	Project Content		Construction contents of Phase I Project	Construction contents of Phase II Project
Main works	Solid wastes incineration system		1x90t/h incinerator (circulating fluidized bedboiler) is built, with the final sludge treatment capacity of M75,800t/a (oven dry); the paper making waste slag M is 88,000t/a (oven dry); in addition, the biogas generated by the wastewater treatment plant is 14,606,400m ³ /a.	1x90t/h incinerator (circulating fluidized bedboiler) is built, and the sludge, paper making waste residue, biogas treatment capacity are half of those in the final phase.
	Solid wastes receiving, storage and delivery system	Solid wastes receiving	The paper making waste slag of the Project is from the sorting workshop of the paper plant, and the waste slag generated by the paper making workshop is directly delivered to the pretreatment workshop of the Project; the sludge is from the wastewater treatment station of the whole plant; the biogas is from the wastewater treatment station, and the fired coal doped is from the raw coal storage yard of CHP Project.	One complete pretreatment workshop is built for Phase I, but none for Phase II.
		Temporary raw material storage facilities	The main raw materials of the Project are paper making waste residue and sludge of the wastewater treatment station; the paper making waste residue is sent to the pretreatment workshop for sorting, and sludge is directly sent to the garbage pool for mixing with the paper making waste residue, then sent to the garbage bin through garbage crane, and then conveyed into the hearth via the chain scraper conveyor for burning; the fired coal doped is directly	The pretreatment workshop and garbage pool are built for Phase I, but none for Phase II.

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			delivered to the coal bin from the coal shed of CHP Project, and then conveyed into the hearth for burning through the feeder; the biogas generated by the wastewater treatment station is temporarily stored in 230m ³ biogas tank of the wastewater treatment station, and sent to the front biogas burner through administration via booster fan to enter into the incineration system.	
		Feed mode	The paper making waste residue generated by the Project is first sorted, crushed in the pretreatment workshop, then enters into the garbage pool together with the sludge after press-filtering with clear wastewater, grabbed to the garbage bin through garbage crane, then the fired coal doped is conveyed from the coal shed of CHP Project to the coal bunker, conveyed into the hearth for burning through feeder; the biogas generated by the wastewater treatment station of the whole plant is collected to enter into the biogas tank, and conveyed to the biogas burner of the incinerator for burning through pressure pipelines after boosting by fan and filtering.	The boiler of Phase II is necessarily built with relevant biogas pipelines and burners. Interfaces shall be reserved for Phase I.
		Collection and conveying system of solid wastes and sludge leachate	Sludge is generated from the wastewater treatment station of the whole plant, and then press-filtered in the clear wastewater sludge room, with the moisture controlled below 55%, then conveyed to the garbage pool from the sludge room; the moisture of the paper making waste residue shall be controlled below 45% in the paper pulping workshop via the wiper. It is sent to the pretreatment workshop, sorted and crushed to enter into the garbage pool, loaded to the garbage bin by grab bucket, and then conveyed to the incinerator via the chain scraper conveyor.	One complete penetration-filter pond is built for Phase I, but none for Phase II.
	Combustion system	Ignition auxiliary fuel system	0# diesel oil is used for ignition to start up in the Project, and 2×500m ³ steel oil storage tanks and 3 fuel delivery pumps are built in the CHP Project; the oil for the ignition system of the Project is dependent on the CHP Project	
		Solid waste incinerator	Construction by two phases: 90t/h fluidized bed boiler is built for Phase I Project, and 90t/h fluidized bed boiler is built for Phase II Project.	One 90t/h fluidized bed boiler is built for Phase II Project.
	Thermal system	Steam turbine generator	The extraction condensing steam turbine is built in Phase I, with the model of C15-3.43/1.1, maximum power of 15MW, as well as steam turbine generator with the model of QFW-30-2A, rated power of 20MW, the same as Phase II.	One C15-3.43/1.1 steam turbine generator is built for Phase II
		Access system	The electricity and steam generated in the Project, together with those generated by CHP in the plant area supply power and heat to the packaging board project, and meanwhile supply gas to the park; the isolated network operation way is adopted, without accessing to the local grid system.	The isolated network operation way is adopted, without accessing to the local grid
Auxiliary works	Fuel delivery system	Except that the fired coal doped in the Project is transported out of the plant area relying on off-site Western Inner Mongolia - Central China Railway, paper making waste slag, sludge and biogas are generated in the paper plant, and transferred in the plant area.		
	Water supply system	The industrial water supply system of the Project completely relies on the water supply system of High-grade Packaging Board Project, and the industrial water source is Gong'an section of the Yangtze River; this Yangtze River section is Category III water, and the whole plant intakes water from the pump room along the river side; the planned intake capacity is 70,000m ³ /d, 35,000m ³ /d for the design intake capacity in two phases respectively. Yangtze River water flows into the sump in front of the water intake pump house via the gravity flow raw water intake pipes, and is lifted by the raw water pump. For the sake of water supply safety, water is transported to the feedwater treatment station in the plant by two DN700mm water pipes (about 2,000m in length) which are provided	The water intake, supply system is completed for once in Phase I, but none for Phase II.	

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		with metering device for purpose of water conservation. The source of domestic water in the plant in the Project is municipal water.	
	Compressed air	One 12x30x7m(h) air compressor room, for common use of CHP and solid wastes incineration. One complete plant compressed air supply center is proposed to supply air for pneumatic ash removal and complete plant overhaul, instrument air, etc. It is proposed to provide five 43.7m ³ /min screw air compressors for the whole plant, 4 in operation and 1 spare; three 43.7m ³ /min screw air compressors are installed for Phase I, two in use and one for spare; in the meantime, 5 sets of compressed air purification equipment (3 sets for Phase I) are provided to remove water, dust, oil, etc. in the air. The pressure of the instrument compressed air source is 0.8MPa; the oil content is less than 8ppm; the dust particle diameter is not greater than 3μm; the dew point under working pressure is 10°C lower than the lowest work temperature.	Civil works is completed for once, and two 43.7m ³ /min screw air compressors are installed for Phase II. Two sets of compressed air purification treatment equipment are built for Phase II
	Tank field	Oil pump house: 26mx7.5mx6m (height). For common use of CHP and Solid Wastes Incineration Project. Oil for boiler ignition and combustion supporting is 0# light diesel oil. The oil unloading, storage and supply facilities shall be newly built, and the system of CHP Project shall be provided with 2x500m ³ steel oil storage tanks and three oil supply pumps, to adapt to the flexible oil feeding way of the unit. Two unloading pumps with capacity of 100% and necessary sump oil purification devices. 2x100m ³ ammonia tanks with concentration of 20% (for the Project) and 1x50m ³ (for Solid Wastes Incineration Project), and acid-base tank of chemical water treatment workshop.	1. No fuel tank, oil unloading and supply system will not be built. 2. The ammonia tank will not built in Phase II of the Project, and the Phase II of CHP Project will be built with 1*100m ³ ammonia tank. 3. No acid-base tank will not be built for the chemical water treatment workshop in Phase II.
	Demineralized water system	Unified planning by fired coal thermal power. The boiler feedwater treatment workshop of CHP Project is L-shaped building, and the water treatment equipment is arranged in the workshop; two 500m ³ clear water tanks, two 1,500m ³ demineralized water tanks, one 300m ³ middle water tank, acid-base storage equipment are arranged outdoors.	Clear water tank, demineralized water tank, middle water tank, acid-base storage equipment will not be built for Phase II.
	Cooling and circulating tower	The circulating water is 4,000m ³ /h for Phase I Project, and the circulating water of the whole Project is 8,000m ³ /h upon completion of Phase II Project. The hyperbolic cooling tower shall be built according to the scale of the final phase.	No cooling tower will be built in Phase II.
Environmental protection works	Flue gas cleaning	The combined cleaning process of "circulating fluidized bedboiler - SNCR denitration device - semi-dry desulfurization device - activated carbon jetting - bag-type deduster - stack emission" is used for flue gas in the Project, and the waste gas is discharged into atmosphere through the flue of the 180m high chimney with diameter of 3m in CHP Project after purification.	The chimney will not be built in Phase II, and the desulfurization, dust removal, denitration systems shall be separately built for the boiler in Phase II (no desulfurizer storage tank, denitrifying agent storage tank built)
	Odor removal	Air exhaust, odor removal by activated carbon, isolation curtain and other sealing measures	
	Wastewater treatment	The wastewater in the Project relies on the wastewater treatment station of the whole plant; one 55,000m ³ /d wastewater treatment station is built for the whole plant by two phases, with the treatment capacity of 27,500m ³ for each phase; the treatment process of	The official reply of the paper factory shall prevail.

		pretreatment + anaerobic treatment + aerobic treatment + advanced treatment is used.	
	Flying ash treatment	One 400m ³ ash bin is provided for the Project, and the flying ash is first collected into the ash bin, outsourced to qualified units to dispose	No ash bin will be built for Phase II.
	Slag treatment	Slag is collected into the slag bin, and the Project is provided with one 300m ³ slag bin; all ash and slag generated is sold to local main building material units for comprehensive utilization	No slag bin will be built in Phase II.
	Noise control	Reasonable layout, installation of silencer, sound insulation, etc.	
	Accident tank	The wastewater from the Project relies on the wastewater treatment plant of the board project, and the High-grade Packaging Board Project is built with one 20,000m ³ emergency pool,	There is no emergency pool built in the Project
	Living facility	2.20Mt/a High-grade Packaging Board Project is agreed to build office building, dormitory and canteen for the whole plant; the office building is 6-storey high, 5,000m ² ; the dormitory is 6-storey, with building area of 57,408m ² ; the canteen is 2-storey, with building area of 6,000m ² . The office and living facilities of the Project rely on Board Project.	

3.2.3 Model, parameter and main technical specification of the main engine

3.2.3.1 Boiler

Type: high temperature and high pressure, natural circulation, non-reheat, solid residue discharge, outdoor arrangement, all steel suspension structure, single drum circulating fluidized bed boiler.

Qty.: 5 sets (1 for hot spare), including 3 sets for Phase I (1 for hot spare)

The boiler is CFB boiler, and the relatively lower furnace temperature can effectively reduce the production of NO_x; the emission concentration of NO_x under various combustion conditions or loads is not more than 200mg/Nm³ (standard state, dry flue gas, oxygen content 6%, calculated as per NO₂); the flue gas denitration device is provided synchronously, and the NO_x emission at the outlet of the denitration device is not more than 100mg/Nm³ (standard state, dry flue gas, oxygen content 6%, calculated as per NO₂).

The main technical parameters of the boiler are as shown in Table 3.2-2 below:

Table 3.2-2 Main Technical Parameters of the Boiler

Indexes	Unit	BMCR (Boiler Maximum Continuous Rating)
Boiler Maximum Continuous Rating	t/h	410
Superheated steam pressure	MPa(g)	9.81
Superheated steam temperature	°C	540
Feedwater temperature	°C	240
Exhaust gas temperature	°C	136
Boiler guarantee heat efficiency	%	91

3.2.3.3 Steam turbines

Type: high temperature and high pressure, non-reheat, single-spindle, two-stage regenerative, extraction back-pressure type steam turbine.

Qty.: 4 sets

The main parameters of the steam turbine are as shown in Table 3.2-3 below.

Table 3.2-3 Main Parameters of Steam Turbine

SN	Item	Unit	Parameters of steam turbine
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			Rated condition	Maximum condition
1	Steam inflow	t/h	393	410
2	Steam inlet pressure	MPa	8.83	8.83
3	Steam inlet temperature	°C	535	535
4	Steam extraction volume	t/h	50	/
5	Steam extraction pressure	MPa	1.778	/
6	Steam extraction temperature	°C	327	/
7	Steam exhaust volume	t/h	261	318
8	Steam exhaust pressure	MPa	0.9807	0.9
9	Steam exhaust temperature	°C	257	241
10	Rated power	MW	55	60

3.2.3.4 Electric generator

Quantity	4 sets (2 sets for each phase)
Rated Power	60MW
Rated speed	3000r/min
Frequency	50Hz
Rated power factor	0.8 (hysteresis)
Noise (at 1m from the shell)	≤85dB(A)
Cooling method:	air cooling
Mode of excitation:	brushless excitation system

3.2.4 Thermal system

The thermal system of the Project is uniformly considered by two-phase project, and the configuration of thermal system strives to be economic, applicable, simple in system; under the premise of guaranteeing unit safety, reliability, economy and efficient operation, thermal system is optimized, to reasonably reduce standby equipment and standby capacity, simplify the technological process, reduce the system resistance and medium-loss, and reduce energy consumption. The thermal system of the Project is a common header system.

3.2.4.1 Main steam system

The common header system is used for the main steam system. The main high pressure steam pipeline is led out from the outlet of the high temperature superheater header to form mains, whose branching pipes are connected to the main steam valve inlet of each back-pressure type steam turbine.

An electric isolating valve is provided from the boiler header outlet to the main steam pipe, and electric isolating valves are provided on both ends from the main steam pipe to the main steam valve of the steam turbine.

Long-neck nozzle flow measuring devices are provided from the boiler header outlet to the main steam pipe, main steam pipe to the main steam pipeline of the main steam valve of the steam turbine.

Two-way temperature and pressure reducer is provided on the main steam pipe, respectively connected to medium pressure heat supply steam pipe and low pressure steam pipe after temperature and pressure reduction.

3.2.4.2 High pressure water supply system

The high pressure feedwater system is a common header system, provided with five electrically driven feed pumps with capacity of 100%, four in use and one for spare in normal operation. 3 sets are installed for Phase I, and 2 sets are installed for Phase II. In normal

operation, the boiler feedwater regulation mainly relies on the regulating valve of the main feedwater pipeline. The bypass is used for the high pressure heater, and the high pressure heater system will be uncoupled in case of failure of any one high pressure heater.

In normal operation, the feedwater enters into the boiler economizer via the high pressure feedwater console from the deaerator feedwater tank, low pressure feedwater mains, feedwater pump, high pressure feedwater cold mains, No. 2 high pressure heater, No. 1 high pressure heater to the high pressure feedwater hot mains. The desuperheating water system is from the high pressure feedwater cold mains.

3.2.4.3 Steam extraction system

The steam turbine include two-stage steam extraction, and the first section and second section of steam extraction are for two high pressure heaters; the second section of steam extraction is concurrently medium pressure heat supply steam source. Each section of steam extraction pipeline is provided with pneumatic extraction check valve and electric isolation valve, turbine overspeed protection and protection against water intrusion.

Safety valve, fast valve and electric isolation valve are provided on the heat supply extraction pipeline.

3.2.4.4 Heater drain and vent system

The heater drain water flows automatically step by step, and the final step high pressure heater drain water automatically flow to the deaerator. Each heater is also provided with emergency drain pipeline; in case of an accident and low load, open the accident drain valve of the relevant heater, and directly discharge the drain water into the emergency drain flash chamber.

3.2.4.5 Water replenishing and heat supply backwater system

After unit heat supply backwater is tested, it is delivered to the main power house via chemical water replenishing pump upon professional chemical treatment, and the backwater is directly conveyed to the deaerator.

The unit water replenishing is from demineralized water mains, one for replenishing into the deaerator and one connected to the drain tank.

3.2.4.6 Circulating cooling water system

The circulating cooling water in the main power house is from the circulating water supply pipe out of the main power house, in order to provide cooling water for the oil cooler of the turbine generator unit in the steam engine room, generator air cooler and other equipment with higher water consumption.

3.2.4.7 Industrial cooling water system

The industrial cooling water system is mainly to provide cooling water for the equipment in the boiler room, such as high-pressure fluidized blower bearing, sealing fan bearing, primary fan bearing, secondary fan bearing, induced draft fan bearing, etc.

3.2.4.8 Heat supply system

The steam of the medium pressure heat supply pipeline and low pressure heat supply pipeline is from steam extraction in the second section of the steam turbine and back pressure exhaust steam. Two-way temperature and pressure reducer is provided on the main steam pipe, and connected to two heat supply steam pipe after temperature and pressure reduction, as standby heat supply steam.

3.2.5 Combustion system

3.2.5.1 Startup and ignition system

The Project is circulating fluidized bedboiler, using oil gun ignition under and on the material bed.

The ignition startup flow chart is:

oil tank → oil supply pump → oil gun under the bed (oil gun on the bed) → oil tank.

The ignition fuel oil is ordinary 0# light diesel oil, with sulfur content of less than 0.2%, and the flue gas volume and time in ignition are different with different quantities of oil guns and startup states; the duration of each ignition is 6~8h, and the oil consumption at the most oil guns is about 11.0t/h; the oil consumption of single ignition is 15t/time, and the total ignition time is 3 times/year. The total flue gas volume is about 67,000Nm³/h, and the flue gas in ignition is subject to dust removal and desulfurization by the dust remover and wet desulphurization unit.

3.2.5.2 Primary air system

The primary air system is mainly to provide fluidizing agent for the circulating fluidized bedboiler so as to make the coal realize the fluidized state in the boiler furnace as the conveying medium of the fuel feeding system.

When the boiler is in normal operation, the hot primary air from the air preheater is divided into two ways, one of which makes the material bed fluidize through the wind cap arranged on the air distributor upon entering the chamber at the bottom of the hearth, and forms upward gas-solid two-phase flows; the other one conveys the fuel spreading air with the pressure reaching the requirements through six coal feeding legs in the front of the furnace through coal spreading booster fan.

One way led from the outlet of the primary fan is used as the sealing air required for the weighing type coal belt feeder.

Each boiler is provided with two 50% centrifugal primary fans (20% margin is considered for the air volume and air pressure of each primary fan); the fan inlet is provided silencer, and the air volume and the air pressure are regulated by inlet guide blade.

3.2.5.3 Secondary air system

The hot secondary air from the air preheater provides air required for burning of the upper and lower secondary circular air bellows of the circulating fluidized bedboiler.

Each boiler is provided with two 50% centrifugal secondary fans (20% margin is considered for the air volume and air pressure of each secondary fan); the fan inlet is provided silencer, and the air volume and the air pressure are regulated by inlet guide blade.

3.2.5.4 Flue gas system

The high temperature flue gas generated by boiler combustion is first separated by high-efficiency cyclone separator, and big flying ash particles in the flue gas are separated to return to the hearth, while the flue gas with small flying ash particles flows via the heating surface at the tail of the boiler, collected by electric bag deduster, and then discharged to the atmosphere by the induced draft fan.

According to the limit requirements for the emission concentration, the Employer must treat the boiler flue gas, and the main treatment ways include limestone desulfurization, and denitration by electric bag and SNCR:

(1) The main reactant used for desulfurization is limestone, generally limestone powder, the annual consumption of each boiler is 14,000t, and the annual consumption of 4 units is 56,000t. The physical and chemical properties are: CaCO₃ content>90%, particle size<20mm. The limestone-gypsum wet desulfurization process is used, and the main equipment includes absorption tower, circulating pump, oxidation air blower, gypsum cyclone, vacuum belt filter.

(2) The reducer used for denitration is 20% ammonia. The ammonia has strong pungent smell, strong basicity, strong causticity, and has explosion risk within a certain concentration range. The main equipment includes ammonia storage tank, ammonia delivery pump, ammonia mixer and ammonia spray gun.

(3) Dust removal is efficient electric bag dust removal with the dust removal efficiency of more than 95%, and the final emission concentration is lower than 30mg/m³.

According to the requirements for environmental emission, the efficient electric bag deduster is temporarily used for boiler flue gas dust removal at the current stage, and the other dust removal efficiency and flue gas desulfurization (wet) are considered together, so that the outlet smoke emission concentration of the chimney is not more than $30\text{mg}/\text{Nm}^3$. The three-tube sleeve-type chimneys are used for five boilers: two of three boilers in Phase I share one chimney with inner diameter of $\Phi 4\text{m}$ at the outlet and height of 180m, and another one adopts a chimney with inner diameter of $\Phi 3\text{m}$ at the outlet and height of 180m; two boilers in Phase II share one chimney with inner diameter of $\Phi 4\text{m}$ at the outlet and height of 180m. The final height of the chimney and the collection efficiency shall be based on the approval comments of national environment protection authority. The tail full-flue gas desulfurization system is used in the Project, and the original flue gas is led out from the outlet flue of the induced draft fan, and the purified flue gas is accessed from the chimney inlet; the desulfurization system is not provided with desulfurization flue gas bypass flue. The configuration of the desulfurization system and details are as shown in relevant chapter of this report.

Each boiler is provided with two 50% centrifugal induced draft fans (20% margin is considered for the air volume and air pressure of each induced draft fan); the air volume and the air pressure are regulated by inlet guide blade. A contact flue is provided at the outlet of the deduster.

3.2.5.5 Internal material circulating combustion system

The internal material circulating combustion system is to send the hot particles collected by the efficient cyclone separator back to the hearth, in order to circulate combustion of materials and improve the combustion efficiency of boiler. The system consists of two insulated cyclone separators, two material return devices, two high pressure fluidized blowers, etc.

The solid particles separated by the efficient cyclone separator enter into the material return device replying on gravity, and the material return device can send the solid particles back to the hearth in one way by forming different fluidization states with help of high pressure wind. The material level of the solid particle in the cyclone separator stand pipe can prevent flue gas and fluidizing air in the furnace from running to the cyclone separator. The high pressure fluidized blower is used for providing the high pressure fluidizing air and aeration air required for the material return device, and meanwhile providing flowing air for the boiler scum pipe. At the boiler ignition startup stage, the high pressure fluidized blower provides necessary cooling air for the flue igniter, and in addition, a little redundant high pressure fluidizing air is bypassed to the hot primary air flue.

The high pressure fluidized blower is constant volume Roots blower with high pressure head and small air volume, and each furnace is provided with two high pressure fluidized blowers. One is in operation and one for spare when the boiler is in normal operation.

3.2.5.6 Bottom ash cooler system

Each boiler is provided with four drum type water-cooling bottom ash cooler, and the cooling water of the bottom ash cooler is closed circulating cooling water. The temperature of the boiler bottom residue after cooling by drum-type slag cooler is lower than 200°C , and the residue enters into the slag bin via the mechanical mucking system.

3.2.5.7 Raw coal supply system

The raw coal reaching the boiler design requirements after crushing is fed into the front raw coal bunker by the coal handling belt, and then directly sent into six coal feed inlets in the front of the boiler by the weighing coal belt feeder via the coal dropping pipe. The raw coal supply system of each boiler consists of two raw coal bunkers and six weighing coal belt conveyors. The capacity of two raw coal bunkers can meet the coal consumption of the burning designed coal species in continuous operation for over 8 hours. The coal belt conveyor is weighing pressure resistant type, capable of precisely weighing the as-fired coal.

The raw coal is fed into the furnace by coal spreading air at positive pressure. The sealing air

of the coal feeder is from the outlet of the primary fan, to prevent the coal belt conveyor from pulverized coal leakage.

3.2.5.8 Bed material adding system

The bed material adding system can meet the requirements for replenishing bed materials in the process of adding bed materials and operation at the startup of the boiler, and the pneumatic conveying way is used in this system. It mainly consists of startup bed material bin and pneumatic conveying system.

3.2.5.9 Boiler ignition and combustion supporting oil system

Oil for boiler ignition and combustion supporting is 0# light diesel oil. The oil unloading, storage and supply facilities shall be newly built, and the system shall be provided with 2x500m³ steel oil storage tanks and three oil supply pumps, to adapt to the flexible oil feeding way of the unit. Two unloading pumps with capacity of 100% and necessary sump oil purification devices.

3.2.6 Ash and slag handling system

3.2.6.1 Ash removal system

At present, the pneumatic conveying technology develops quickly, and it is widely applied to thermal power plants of China; in addition to various vessel type pneumatic conveying system self-developed in China, negative pressure pneumatic ash conveying systems, low positive pressure pneumatic ash conveying system, dense phase positive pressure pneumatic ash conveying system, double-tube positive pressure pneumatic ash conveying system, and so on are introduced abroad.

The dense phase positive pressure pneumatic ash conveying system is one of internationally advanced pneumatic conveying technologies at present. It adopts the pneumatic conveying principle of gas-solid two-phase flows to convey materials by dynamic pressure of compressed air, and it is safe, reliable, efficient and energy-saving pneumatic conveying system, featured by low conveying air pressure, low conveying speed, long conveying distance, high ash and gas proportion, small diameter in conveying pipeline, no wear-resistant material for conveying pipe (wear-resistant material only for elbow), small maintenance work, etc.

The dense phase positive pressure pneumatic ash conveying system is proposed in the Project.

1) Process flow:

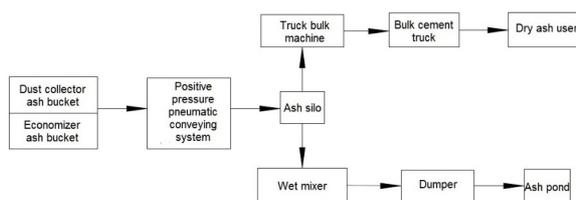


Figure 3.2-1 Process Flow of Ash and Slag Handling System

2) system description

One pneumatic ash conveyor is respectively installed under each ash bucket of the electric bag deduster and economizer, and the discharge period is set and the operation time is adjusted. In the meanwhile, the high-level signal is configured to control ash to be preferably discharged into the ash conveying pipeline. For alternative operation of the transmitters, the continuous operation way is applied for the entire pneumatic conveying system to convey the fly ash to the ash storage for storage. The bag type deduster is provided on top of the ash silo, for discharging the ash conveying air to the atmosphere upon cleaning and filtering. To

facilitate overhaul and maintenance of ash conveyor, one manual slide valve is provided at the outlet of each ash bucket.

The output of the pneumatic conveying system is considered as per 150% of the boiler ash discharge volume of burning designed coal species under MCR, and the output of the pneumatic conveying system of each furnace is about 20t/h.

To guarantee the ash bucket of the electric bag deduster from smoothly dropping ash, a gasification device is provided for each ash bucket. Three ash bucket gasification blowers are provided every two electric bag dedusters, two in operation and one for spare. The gasification blower parameters: flow gasification blower $Q=8.2\text{m}^3/\text{min}$, pressure $P=0.058\text{MPa}$. In addition, two electric heaters are provided, with power of 30kW, in coordinated operation with the gasification blower; there is no electric heater for spare.

The system is provided with three ash silos, and each ash is $\Phi 9\text{m}$ in diameter and 900m^3 in volume. Three ash silos can store the ash discharge volume of the burning designed coal species of four boilers for about 35h.

Two sets of ash unloading devices are provided under each ash silo: one set of humidifying mixer and one set of truck bulk machine. Dry ash shall be put in the tank truck for ash through truck bulk machine, and then transported to users for comprehensive utilization; dry ash shall be unloaded into the ash truck after humidified and mixed through the humidifying mixer, and then transported to the ash yard for storing. The outputs of the truck bulk machine and the humidifying mixer are 100t/h.

To make the ash silo unload smoothly, the bottom of each ash silo is provided with radial gasification gutter. The ash silo gasification blower feeds air into the electric heater for heating, and the heated air is blown into the gasification gutter so that the ash at the bottom of the silo is in the suspended fluidization state for flowing. The Project is designed with four ash silo gasification blowers, three in operation and one for spare. The gasification blower parameters: flow gasification blower $Q=8.6\text{m}^3/\text{min}$, pressure $P=0.078\text{MPa}$. In addition, three ash silo electric heaters are provided, each power of 30kW, in coordinated operation with the gasification blower, and each gasification blower is corresponding to one ash silo.

The flying ash delivery pipe is ordinary seamless steel pipe, and elbow is wear-resisting elbow. The ash conveying pipelines are laid in an overhead manner.

One complete plant compressed air supply center is proposed to supply air for pneumatic ash removal and complete plant overhaul, instrument air, etc. It is proposed to provide five $43.7\text{m}^3/\text{min}$ screw air compressors for the whole plant, 4 in operation and 1 spare; 5 sets of compressed air purification equipment are provided to remove water, dust, oil, etc. in the air.

3.2.6.2 Slag handling system

The mechanical ash and slag handling system is to be used. The dry slag discharged by the boiler bottom ash cooler is discharged continuously by chain bucket, delivered to the transfer slag bin by bucket elevator, and then regularly transported to the users for comprehensive utilization by dump truck.

1) The procedure

Truck bulk machine → sealed tanker → outward transport

Bottom ash cooler → bucket chain conveyor → bucket elevator → slag silo → wet mixer → dumper → outward transport

2) system description

There are two drum-type slag coolers respectively at the both sides of boiler hearth, with the slag handling temperature of slag cooler of less than 200°C . Every two or three boilers share two sets of mechanical slag handling systems, each of which is provided with two slag extraction conveyors, one in use and one for spare; the system output is 25~100t/h.

The bottom ash cooler outlet is connected with one-stage bucket chain conveyor, and then slag is delivered to the transfer slag bin via the two-stage bucket elevator.

Two sets of slag unloading devices are provided under the slag bin: one set of humidifying mixer and one set of truck bulk machine. Dry slag shall be put in the tank truck for ash through truck bulk machine, and then transported to users for comprehensive utilization; dry slag shall be unloaded into the ash truck after humidified and mixed through the humidifying mixer, and then transported to the ash yard for storing. The outputs of the truck bulk machine and the humidifying mixer are 100t/h.

3.2.6.3 Control of ash and slag handling system

Control of ash and slag handling system is program centralized control. Pneumatic conveying part, slag removing part (except for the slag unloading part), ash silo part (except for the ash unloading part) is under PLC control, and communicated with DCS; the ash unloading part of ash silo and slag silo are under local control.

3.2.6 Auxiliary works

3.2.6.1 Coal unloading facility

The coal unloading device of the Project in this Phase receives coal from the slot type coal hopper. The coal unloading device is designed as per the annual coal unloading amount of 180×10⁴t, with the upper part of large-span light steel roof, and the lower part of double-line slot type coal hopper. The slot type coal hopper is provided with nine unloading positions, and the head and tail are provided with overhaul spans; the effective length is 54m, and the total length is 77m; the coal storage is about 1,300t, which can meet about 6h coal consumption of 4×410t/hCFB boilers. The double-line slot type coal hopper is of throughout layout, to reserve enough rotation places for coal vehicles and improve the coal unloading speed.

One impeller coal feeder is installed under each line slot type coal hopper, two sets in total, mutual standby, having the conditions of simultaneous operation; the output of the impeller coal feeder is 300t/h. The fired coal in the slot type coal hopper is conveyed to the coal yard or raw coal bunker through double-way belt conveyor system.

3.2.6.2 Coal yard

The storage of the coal yard in this Project is considered as per 15-day coal consumption of 5×410t/hCFB+4×CB60MW units. The Project is provided with one bucket wheel machine bar-type coal yard, and one cantilever type bucket-wheel stacker reclaimer is arranged in the coal storage yard; the bucket-wheel stacker reclaimer is of turn-back layout. Steel structure dry coal shed is provided in the coal storage yard, for 4×410t/hCFB+4×CB60MW units of the power plant to burn for about 4 days.

In addition, two TY220 coal pushers and two ZL50 loaders are used for assisting operation in the coal yard, as the auxiliary operation equipment of the coal yard.

The spraying water dust-controlling devices are provided around the coal yard.

3.2.6.3 Block removing and screening equipment

The receiving hopper of the slot type coal hopper is provided with small inclination angle vibrating comb for separating blocks of over 300mm. A block remover is provided in the system.

The coal breaker room is arranged in the coal conveying system behind the coal yard; the tilting roll screen with output of 300t/h is used for the screening device, and the particle size of the screen underflow is less than 10mm. The crushing equipment is teeth-roller cracker with output of 300t/h; the feeding size is ≤300mm, and the discharging size is ≤10mm.

3.2.6.4 Belt conveyor system

The belt conveyors of the coal unloading system and loading system in the Project are B=800mm, output Q=300t/h. The double-way belt conveyor is used, one in operation and one for spare, having the same conditions of simultaneous operation.

The electric double-side plow discharger is used for unloading coal in the coal bunker room.

3.2.6.5 System anti-blocking measure:

To prevent coal blocking, the anti-blocking abrasion resistant lining plate is design and lined according to the inclination angle of $\geq 60^\circ$ between each coal dropping pipe of the coal conveying system and the horizontal plane; the vibratory anti-blocking device is installed where it is easy to block in the coal falling pipe.

3.2.6.6 Auxiliary production facilities

The coal handling system is provided with rail weigher, electronic belt weigher, object calibration device, as-fired coal sampling device, iron separator, lifting device, hydraulic cleaning system and other auxiliary equipment.

The coal handling system is provided with coal bulldozer house, coal conveying complex building and other auxiliary production facilities.

The lighting, communication, ventilation, heating and dust removal of the coal conveying system are designed by relevant disciplines. The head and tail of each belt conveyor, coal breaker building, each forwarding station and coal bulldozer house are provided with lifting equipment for installation and maintenance of equipment.

3.2.6.7 System control

Except for the cantilever bucket-wheel stacker reclaimer, sewage pump, other equipment is under system program control and local control, and program control has remote one-to-one control function.

3.2.7 Chemical water treatment system

3.2.7.1 Water source and water quality

The water for the boiler feedwater treatment system in the Project is the reclaimed water from the wastewater treatment plant, and reach the requirements for the quality of the production water for the CHP Project through treatment; the Owner has currently provided a rough water quality report, and the water quality must meet the requirements for the feedwater quality of the chemical water according to the requirements in *Technical Code for the Chemical Design of Fossil Fuel Power Plant*.

3.2.7.2 Furnace feedwater handling system

(1) Furnace feedwater handling system

The output of the chemical water treatment system is 550t/h (considering the water quantity of self use), and the chemical water after treatment is conveyed to each water use site of the main power house. The chemical treatment room needs the following raw auxiliary materials: mixed bed cation resin 7t/a, mixed bed anion resin 12t/a, cation bed cation resin 42t/a, anion bed anion resin 34t, with the annual resin replacement rate of 5~10%. The reclaimed acid dosage is 3,277t/a, and base dosage is 1,657t/a. Two 50m³ storage tanks shall be used for acid-base storage. 700m³ wastewater neutralization tank shall be built near the acid-base storage area.

According to the water quality report and unit parameters and requirements for the boiler water quality, to guarantee the effluent quality of the water treatment system, filter + primary desalination + mixed bed system is proposed in the design of the boiler feedwater treatment system at the feasibility study stage.

The technological process of the chemical water system is: clarified water by water supply discipline → clear water tank → clear water pump → PCF filter → activated carbon filter → cation exchanger → decarbonator → middle water tank → middle water pump → anion exchanger → mixed bed → demineralized water tank → demineralized water pump → main power house

System connection mode: The cation exchanger, middle water tank, middle water pump, anion exchanger, filter and the mixed bed are connected by the common header. Operation and regeneration are under program control.

After raw water is treated by the above system, the effluent quality is as follows: hardness \approx 0 μ mol/L; silicon dioxide \leq 20 μ g/L; conductivity (25°C) \leq 0.2 μ s/cm

(2) Layout of boiler feedwater treatment room

The boiler feedwater treatment workshop is L-shaped building, and the water treatment equipment is arranged in the workshop; two 500m³ clear water tanks, two 1,500m³ demineralization water tanks, one 300m³ middle water tank, acid-base storage equipment are arranged outdoors.

(3) Laboratory

The whole power plant (including Comprehensive Solid Wastes Utilization Project) will be provided with a complete set of water kerosene laboratory, and corresponding laboratory appliances are provided according to the high temperature and high pressure unit standard.

(4) Raw material and solid waste management

The mixed bed cation resin, mixed bed anion resin, cation bed cation resin, anion bed anion resin are normal stored under normal conditions, and directly purchased if necessary to replace. The replaced resins belong to hazardous wastes, directly recycled and disposed by the hazardous waste recycling & disposal unit.

3.2.7.3 Heat supply network backwater treatment system

The design flow of the heat supply network backwater treatment system is: heat supply network backwater by the maintenance discipline → iron removal filter → low pressure heater.

The iron removal filter is connected with thermal system by the common header system, and a bypass system is provided. Heat supply network backwater treatment system equipment is arranged in the main power house.

3.2.7.4 Circulating cooling water treatment

The circulating cooling water of the auxiliary engine in the Project is treated by adding stabilizer and bactericide, and one set of stabilizer and bactericide adding device is provided.

3.2.7.5 Oil management of power plant

The oil treatment system of the whole power plant (including Comprehensive Solid Wastes Utilization Project) is provided with one mobile insulating oil purifier.

3.2.7.6 Feedwater, boiler water correction treatment and steam and water sampling system

To meet the water quality requirements for feedwater and boil water of the unit, every two units are provided with one set of feedwater adding ammonia, in-boiler dosing treatment system, respectively, each of which uses two-tank three-pump dosing device; the equipment is arranged on the 0m floor of the main power house.

To monitor the operation condition of thermal system, each unit is provided with one set of concentrated water and steam sampling analysis system; each set of device includes high temperature and high pressure panel and analysis meter panel, both of which are arranged separately, and provided with separate high temperature and high pressure panel room. Heat supply network backwater treatment system equipment is arranged in the main power house.

3.2.7.7 Wastewater treatment

The acid-base wastewater generated by the boiler feedwater treatment system is discharged to the wastewater treatment plant of 2.20Mt/a High-grade Packaging Board Project of Changtai after pH is regulated in the neutralization tank.

The boiler chemical cleaning is generally cleaning by units with acid pickling qualifications; the cleaning agent of the Project is hydrochloric acid, and the acid pickling wastewater is first discharged to the neutralization tank with volume of 700m³ (including use for Comprehensive

Solid Wastes Utilization Project); after pH is regulated, it is discharged to the wastewater treatment plant of 2.20Mt/a High-grade Packaging Board Project of Changtai.

3.2.8 Thermal automation

3.2.8.1 Automation level and function

The distributed control system DCS is mainly used in the Project, with assistance of the matched field automation instrument for achieving monitoring, control, protection, etc. of startup, shutdown and operation of utility systems of the machines, boilers and units in the whole plant.

Phase I and Phase II of the Project are provided with centralized control room, respectively, in which no regular control panel is provided, in order to realize full LCD monitoring. An industrial parameter data display window of important parameter is provided, and the monitoring pictures of closed circuit televisions in the whole plant are on the background wall of the centralized control room. Unit operator station, DEH operator station (provided by the steam turbine plant) and unit auxiliary system operator station are arranged on the control room console.

Each unit is provided with an electronic equipment room nearby, on the operation floor of the main power house, beside the centralized control room. The equipment room of the auxiliary system is arranged according to the local distribution principle, as close to the monitored equipment as possible.

A few necessary emergency boil stop/shutdown devices are arranged on the centralized control room console, in order to provide necessary manual operation means in startup, stop or emergency state.

MIS management information system, as the information system facing operation, production and administrative management of power plant, can provide their required information for various administrative staff at all levels (functional managers, leadership decision makers) in the plan accurately and comprehensively in time, provide effective modern management means for production operation, office automation and leadership scientific decision-making, in order to achieve information sharing in the production process of the whole plant.

MIS system forms effective information through effective data analysis and comprehensive means, and provides systematic operation guidance for operation personnel; provides operation index of the production process for management personnel; provides economic index and decision-making basis for decision makers.

MIS system is a complete system for convenient use, having unified personnel and authority setting. All functional modules have unified entries and interface style. The information transfer in MIS system can flow completely and automatically; in case of human participation, the system shall be capable of informing the handler by email, internal message, short message, etc.

The main functions of MIS system include: production management, equipment management, supply management, financial management, assistant management, office automation, etc.

MIS reserves the interface with the Owner's superior management information system, and the interface standards are set according to the Owner's uniform requirements.

3.2.8.2 DCS network of the whole plant

The control functions of DCS system include data acquisition system DAS, modulating control system MCS, sequence control system SCS, furnace safeguard supervisory system FSSS, digital electro-hydraulic control system DEH (provided by the steam turbine plant). The monitoring range of unit DCS includes automatic supervisory control of main information on furnace and unit in the main power house (pressure, temperature, flow, liquid level, material level and equipment startup, stop, failure, etc.) and main controlled equipment (motor, electrically operated gate, actuator and electromagnetic valve, etc.) and electrical supervisory control of generator-transformer unit and station service system (see Electrical

Specification for details).

Phase I and Phase II of the Project are provided with one set of DCS system, respectively, and the control range includes: steam turbine, boiler, deaerator feedwater system, deduster, desulfurization, denitration system, electrical system, ash and slag handling system; the utility system of the Phase I and Phase II is provided with one set of DCS utility system, and the control range includes utility system of the whole plant, specifically speaking, chemical water treatment system, integrated water system and air compressor system, etc. Monitoring of all information of the whole plant can be completed in the centralized control room.

The engineering design will be incorporated into DCS control range together with small program control provided by the main engine (such as boiler ash blowing program control system, electric bag deduster system), and the incorporation way is that small program control can still use the control unit provided with the controlled equipment; it is necessary to establish a feasible communication interface between the provided unit and unit DCS. According to the quantity and distribution of survey points, the control of small systems can also be directly incorporated into DCS.

3.2.8.3 Power supply and air source

(1) Power supply

To guarantee safe and reliable operation of the unit, power supply of thermal control equipment shall be ensured, and power supply shall be provided as follows according to user objects' requirements:

The thermal control AC power of boiler and steam turbine is 380V/220V, 50Hz, supplied to boiler, steam turbine thermal control power distribution cabinet by two different auxiliary power bus sections.

220V thermal control AC of the distributed control system DCS shall be from two different power supply sections, one of which is AC uninterruptible power supply (UPS).

The thermal control 220V DC power supply is supplied to thermal control DC distribution cabinet or each control cabinet by electric accumulator, which is two-way power supply.

(2) Air source

The instrument air is compressed air provided by the air compressor station system to meet the instrument air requirements, and instrument air storage tank is provided; when all air compressors are stopped, equipment air consumption of no less than 5min shall be met under condition that the air supply pressure is not lower than the minimum allowable working pressure (0.5MPa).

The pressure of the instrument compressed air source is 0.8MPa; the oil content is less than 8ppm; the dust particle diameter is not greater than 3 μ m; the dew point under working pressure is 10°C lower than the lowest work temperature.

The instrument air source supply object is pneumatic check valve, drain valve, pneumatic actuator, pneumatic diaphragm valve, etc.

Air filter purification device (10 sets considered for Phase I and Phase II respectively) shall be provided, and filter regulator shall be arranged on each gas branch pipe or in front of the pneumatic control valve.

3.2.9 Water supply and drainage system and cooling facility

3.2.9.1 Water supply system

(1) Water source

The industrial water of the Project is recycled upon treatment by the reclaimed water treated to reach the standards at the wastewater treatment plant of 2.20Mt/a High-grade Packaging Board Project of Changtai. The water source of the domestic water supply system is the water supply station of Changtai Paper Plant, and the design boundary line is 1m beyond the red line of thermal power plant area. The industrial fresh water consumption is 716m³/h, the

domestic water supply is 5m³/h, and the total fresh water consumption of the Project is 721m³/h.

The circulating water consumption of the Project is 4,812m³/h (2,406m³/h for Phase I). The actual water consumption is 721m³/h (360.5m³/h for Phase I), and the water demand of the whole project is 964.52m³/h (282.26m³/h for Phase I), where the reclaimed water is 243.52m³/h (121.76m³/h for Phase I).

(2) Basic configuration of water supply system

Each unit in the Project is provided with one circulating water pump, and the parameter of single water pump is: Q=1,250m³/h, H=20m; meanwhile, four units are provided with 2 contraflow mechanical draft cooling towers, and the cooling water volume of single tower is 2,500t/h. The plan view size of single tower is LxB=12.4x12.4m. The water supply static lift of the cooling tower is 9m. The cooling tower fan is variable-frequency, and the power of single fan is about 110kW. The circulating water supply and return mains is D1020x10Q235B steel pipe.

(3) Industrial service water system

Main building (structure): industrial pond and integrated water pump house. There are two industrial ponds, each with volume of 500m³, semi-underground reinforced concrete structure, and the unit size is 21.4m×11.7m×3.5m.

The integrated water pump house shows a linear type in architecture, semi-underground reinforced concrete structure. The aboveground architecture is 48.0m long, 8m wide, and 7.0m high; the underground one is 30m long, 8m wide and 3.0m deep. The underground part is provided with industrial water pump, circulating water pump, etc. The aboveground part is provided with distribution, control room, dosing room and pharmaceutical warehouse, etc.

The main technical parameters of the industrial water pump are: 3×50%, two in use and one for spare. Flow: 100m³/h, lift: 50m, motor power: 22kw, voltage: 380V

3.2.9.2 Water Drainage System

The project drainage system is divided into rainwater drainage, domestic wastewater and industrial wastewater drainage.

It is planned to apply the separated project drainage system, namely domestic wastewater drainage system, industrial wastewater drainage system and rainwater drainage system.

The project rain water pipe is d300~d1000mm reinforced concrete pipe. The rain water in the plant area is discharged to the rain water pipeline system of the paper plant upon collection by the pipeline, and then uniformly discharged out of the plant; the design boundary line is 1m beyond the red line of thermal power plant area.

(1) Industrial wastewater drainage

The industrial wastewater drainage system of the Project is divided into five parts:

Most drainage of the industrial service water is recycled to sewage drainage pit, and pumped to the water inlet forebay of the integrated water pump house by water pump as the makeup water of the circulating water system.

The back wash drainage and regenerated wastewater drainage of the chemical water system are directly discharged to the wastewater treatment plant of Changtai of 2.20Mt/a High-grade Packaging Board Project via the sewer lines.

The sewage discharged by the desulfurization system is recycled as the water for spraying the ash yard upon treatment to reach the emission standards.

The coal bearing wastewater is collected to the coal beating wastewater treatment station by separate drainage system, treated by the coal bearing wastewater treatment facility and recycled for flushing the coal handling system.

Other industrial wastewater has reached the emission standards of three industrial wastes, and is recycled as trestle flushing water, ash silo ground flushing water, etc. The main

technical parameters of the variable frequency reusing water pump are: 3×50%, two in use and one for spare, flow: 40m³/h, lift: 30m, motor power: 11kw, voltage: 380V.

(2) Domestic sewage treatment

The domestic wastewater of the plant area is discharged to the wastewater treatment plant of Changtai of 2.20Mt/a High-grade Packaging Board Project upon collection by the pipeline.

3.2.9.3 Firefighting System

The firefighting system of the Project is designed according to relevant national policies and regulations, based on the principle of “putting prevention first and combining prevention and fire-fighting”, as well as national and industrial specifications and codes, etc. in order to provide comprehensive and reliable fire protection for personal safety of operation personnel and safe operation of equipment in the power plant, and minimize or reduce the possible loss arising from fire.

The fire water of the project is not provided with relevant fire pumps and stabilized pressure pump set, etc. and relevant fire parameters are put forward for thermal power project; the paper plant takes overall consideration into the configuration of fire water pumps and other facilities; all firefighting measures shall be considered in the plant area of thermal power project, except for the fire pump.

The pipe network of the fire hydrant water supply system in the Project is arranged as ring shape in the main power house area, coal yard and main auxiliary shops and around the ancillary buildings, in order to increase water supply reliability. The outdoor pipe network is provided with outdoor fire hydrants based on certain spacing, where the spacing around the main power house is not more than 80m, and the spacing around other buildings is not more than 120m.

There are two and more fire extinguishing methods for important buildings and equipment; a variety of sufficient fire extinguishers are provided in the building; fire detection, alarm and control system of the whole plant is established; the power plant must develop various specific systems on firefighting, firefighting organization, fire suppression and fire supervision, and fire management shall be strengthened and concerned; the whole plant shall be designed as per the fire frequency of once within the same time period.

Roads in the plant area shall meet the requirements for a firefighting truck to pass, and no firefighting truck shall be considered temporarily in the Project.

3.2.10 Main raw and auxiliary materials

The main raw material of generating power by fired coal in the Project is fired coal. In addition, some auxiliary material will also be involved in the operation process of thermal power plant, and the use and consumption are as shown in Table 3.2-6.

Table 3.2-6 Consumption of Main Raw and Auxiliary Materials

SN	Description	Unit	Consumption of Phase I	Consumption of the final phase	Remarks
1	Fired coal	10,000 t/a	2×47.49	4×47.49	Forwarding mainly by North to South Coal Diversion Railway and truck
2	Water	(10,000 m ³ /a)	294.168	588.336	Separately intake water from Yangtze River (721m ³ /h)
3	Mixed bed cation resin	t/a	3.5	7	The main component of the resin is: with the consumption of one-time filling amount and annual replacement of 5~10%, this assessment is subject to checking fully according to the annual replacement rate of 8%
4	Mixed bed anion resin	t/a	6	12	
5	Cation bed cation resin	t/a	21	42	
6	Anion bed anion resin	t/a	17	34	
7	Acid	t/a	1638.5	3277	Hydrochloric acid with concentration of 31%
8	Alkali	t/a	828.5	1657	The main component is caustic soda (NaOH)

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9	Desulphurization gypsum	10,000 t/a	2×1.779	4×1.779	The main component is CaCO ₃ , with content of >90% and particle size of <20mm.
10	Ammonia	t/a	2×979.2	4×979.2	The concentration is not more than 20%
11	Light diesel oil	t/a	22.5	45	

3.2.11 Main equipment

The main equipment of the Project includes fluidized bed boiler, steam turbine unit and generator unit, and meanwhile assorted coal crushing and conveying facilities, flue gas control facilities and chemical water treatment equipment, etc. are also provided. See Table 3.2-7 for details

Table 3.2-7 Main Equipment of the Project

SN	Device name	Main parameter	Person	Qty.	Remarks
I. Coal yard equipment					
1	Bucket-wheel stacker reclaimers	DQ300/300.30 type, turning radius 30m	Set	1	
2	Coal pusher	TY220 type	Set	3	
3	Wheel loader	ZL50 type	Set	2	
4	Impeller coal feeder	Output 2,000t/h,	Set	2	
5	Heavy truck scale	80t	Set	1	
6	Empty truck scale	30t	Set	1	
II. Belt conveying system					
1	No. 1 AB belt conveyor	Tape width B=800mm, tape speed V=1.5m/s, output 300t/h, inclination angle $\alpha=14^\circ$, L=186m, H=18.5m	Set	2	
2	No. 2 AB belt conveyor	Tape width B=800mm, tape speed V=1.5m/s, output 300t/h, inclination angle $\alpha=9^\circ$, L=89.5m, H=7.5m	Set	2	
3	No. 3 belt conveyor	Tape width B=800mm, tape speed V=1.5m/s, output 300t/h, inclination angle $\alpha=0^\circ$, L=293m, H=0m	Set	1	
4	No. 4 AB belt conveyor	Tape width B=800mm, tape speed V=1.5m/s, output 300t/h, inclination angle $\alpha=5^\circ$, L=300m, H=22.8m	Set	2	
5	No. 5 AB belt conveyor	Tape width B=800mm, tape speed V=1.5m/s, output 300t/h, inclination angle $\alpha=9^\circ$, L=220m, H=32m	Set	2	
6	No. 6 AB belt conveyor	Tape width B=800mm, tape speed V=1.5m/s, output 300t/h, inclination angle $\alpha=0^\circ$, L=210m, H=0m	Set	2	
III. Crushing equipment					
1	Four-roll crusher	Q=300t/h; discharging size $\leq 10\text{mm}$; feeding size is $\leq 300\text{mm}$	Set	2	
2	Block remover	Q=300t/h, particle size of the screen underflows $\leq 200\text{mm}$	Set	2	
3	Tilting roll screen	Output Q=300t/h	Set	2	
IV. Auxiliary equipment					
1	Electric double-side plow coal unloader	B=800mm	Set	38	
2	Permanent magnet belt type iron remover	B=800mm	Set	2	
3	Electromagnetic plate type iron remover	B=800mm	Set	5	
4	Vibrator	Exciting force 500kg	Set	12	
5	Wiper	B=1400mm	Set	4	
6	Buffer air lock	B=800mm 650X650	Set	16	
7	Vulcanizing machine	B=800mm	Set	2	
8	Vulcanizing repair	B=800mm	Set	1	
V. Overhaul, maintenance and lifting equipment					
1	Electric single-beam bridge crane	Lifting capacity 5t, lifting height 6m, span 7.5m	Set	1	
2	Electric single beam overhang crane	Lifting capacity 10t, lifting height 9m, span 4m	Set	1	

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3	Electric hoist	Lifting capacity 5t, lifting height 42m	Set	2	
4	Electric hoist	Lifting capacity 5t, lifting height 12m	Set	2	
5	Electric hoist	Lifting capacity 5t, lifting height 9 (6)m	Set	3	
6	Electric hoist	Lifting capacity 3t, lifting height 6m	Set	4	
7	Electric hoist	Lifting capacity 2t, lifting height 12m	Set	2	
8	Manual trolley	Lifting capacity 1t, lifting height 6m	Set	4	
9	Manual-operated chain block	Lifting capacity 1t, lifting height 6m	Set	4	
VI Slag handling system					
1	Bucket chain slag conveyor	Q=25~100t/h	Set	2	
2	Bucket elevator	Q=25~100t/h	Set	4	
3	Slag silo	Diameter: \varnothing 9m Volume: V=500m ³	Set	2	
4	Bag-type dust collector	HMC-24	Set	2	
5	Pressure-and-vacuum release valve	SFP508	Set	2	
6	Pneumatic slide valve	DN300	Set	4	
7	Manual slide valve	DN300	Set	4	
8	Electric air lock	Q=100t/h	Set	4	
9	Double-shaft mixer	Q=100t/h	Set	2	
10	Truck bulk machine	Q=100t/h	Set	2	
11	Electric hoist	Lifting capacity 1t, lifting height 24m	Set	1	
VII. Pneumatic ash handling system					
1	Pneumatic conveying system	Q=20t/h	Set	5	
2	Gasification fan of ash bucket	Q=8.2Nm ³ /min,P=58.8kPa	Set	6	
3	Ash bucket electric heater	N=30kW	Set	4	
4	Pressure-and-vacuum release valve	508	Set	3	
5	Electric air lock	Q=100t/h	Set	6	
6	Bag collector	Filter area: 60m ²	Set	3	
7	Double-shaft mixer	Q=100t/h	Set	3	
8	Truck bulk machine	Q=100t/h	Set	3	
9	Gasification blower of ash silo	Q=8.6Nm ³ /min,P=78kPa	Set	4	
10	Ash silo electric heater	N=30kW	Set	3	
11	Electric hoist	Q=1t, H=236m	Set	1	Ash silo top
VIII. Compressed air system					
1	Air compressor (screw)	Q=43.6Nm ³ /min,P=0.75MPa	Set	5	
2	Adsorption drier	Q=50Nm ³ /min,P=0.85MPa	Set	5	
3	Dust removal filter	Q=50Nm ³ /min,P=0.85MPa	Set	5	
4	Oil removal filter	Q=50Nm ³ /min,P=0.85MPa	Set	5	
5	Air collector	V=20m ³ ,P=1.0MPa	Set	5	
6	Electric hoist	Lifting capacity 3t, lifting height 8m	Set	1	

3.2.12 General plane layout and transportation

3.2.12.1 General layout

(1) General Layout of Changtai Paper Industry (Wuhan) Co., Ltd.

According to the approved EIA report of the 2.20Mt/a High-grade Packaging Board Project, the Project covers a total area of 1,523,333.33m², where the planned land area of the 2.20Mt/a High-grade Packaging Board Project is 1,314,000m², and thermal power plant cover an area of 209,333.33m² (land for the Comprehensive Solid Wastes Utilization Hubei Academy of Environmental Sciences

Project). The office and life service areas of the whole plant are arranged at the northeast corner of the whole plant area, and wastewater treatment station of the whole plant arranged at the northwest corner; the south of the wastewater treatment station is reserved for thermal power project and Comprehensive Solid Wastes Utilization Project; packaging material processing workshop, starch preparation workshop, end socket core production workshop and warehouse shall be provided between the office living area and wastewater treatment station. The waste paper shed is arranged close to the wastewater treatment plant and thermal power plant in the south-north direction, the waste paper sorting shed and pulp board warehouse are arranged in the south-north direction of the east, the finished paper warehouse is arranged in the south-north direction of the easternmost, and other production workshops and assorted facility workshops are not arranged in the middle and south of the plant area; the Project is arranged in the southwest corner of Changtai Paper Industry (Wuhan) Co., Ltd., covering a total area of about 209,333.33m²; the north-south length of the plot of the thermal power plant (including Comprehensive Solid Wastes Utilization Project) is about 648m, and the east-west width is about 323m.

(2) Thermal power plant (Comprehensive Solid Wastes Utilization Project)

The plant area of the Project is divided into four major regions: coal yard region, main power house region and auxiliary and ancillary facility region. The plant area of the Project is divided into four major regions: coal yard region, main power house region and auxiliary and ancillary facility region. The fixed end of the main power house faces south and the expansion is towards north.

The main power house region is located in the middle of the plant area, and the coal handling trestle is led in from the fixed end of the main power house region. The steam turbine house, deaerator bay, coal bunker bin, boiler room, precipitator, induced draft fan, chimney and desulfurization facilities are arranged in the main power house region from the west to the east. Main transformer, etc. are arranged out of row A.

The coal yard region includes automobile coal unloading station, coal storage yard, coal bearing wastewater treatment facility, forwarding station and trestle, etc. The automobile coal unloading station is located in the northernmost of the power plant, close to the logistics exit. A bar-shaped coal yard is arranged in the south of the automobile coal unloading station.

The auxiliary and ancillary facilities include integrated water pump house, mechanical draft cooling tower, industrial pond, reusing water tank, material depot and maintenance room, boiler feedwater treatment workshop, etc. mainly arranged on the fixed end, and located in the south of the main power house.

The land for the plant area of the Project covers an area of 171,666.67m² within the boundary line.

The Comprehensive Solid Wastes Utilization Project is arranged between thermal power plant and the southern boundary, covering an area of about 37,666.67m².

(3) General Layout of water supply system

The common header circulating water supply system with counter flow mechanical ventilation cooling towers are used for 4×60MW units in the Project according to water source conditions, and each unit is provided with one circulating water pump; four units are provided with two Q=2,500m³/h counter flow mechanical ventilation cooling towers. According to the general layout, one water pump house (integrated water pump house) is configured for four units, and the cooling tower is connected with the circulating water pump house by a channel. The circulating cooling water enters into the circulating water suction sump of the integrated water pump house via the circulating water drainage ditch, and then enters into each auxiliary equipment upon boosting by the circulating water pump through circulating water inlet pipe; the effluent water of the auxiliary equipment is discharged into the cooling tower through the circulating water return pipe.

(4) Layout of desulfurization device

The desulfurization place is located near the chimney at the tail of the boiler. Behind the

induced draft fan is sequentially arranged with: original flue, absorption tower and clean flue. The absorption tower is arranged between the induced draft fan and the chimney, and the slurry circulating pump and the oxidation air blower are arranged near the absorption tower. The pulp making and gypsum dehydration workshop is arranged behind the absorption tower. The roads in the desulfurization island and the roads in the whole plant form a road network, in order to facilitate equipment installation and operation maintenance.

(5) General layout index of CHP Project

The general layout index of the Project is as shown in Table 3.2-8.

Table 3.2-8 General Layout Index of CHP Project

SN	Item	Unit	Indicator Value	Remarks
1	Land area in plant enclosure	hm ²	17.39	
2	Land area of unit capacity	m ² /KW	0.87	
3	Land area of buildings in plant area	m ²	83472	
4	Building occupation coefficient	%	48.0	
5	Site use area in plant	m ²	123816	
6	Utilization coefficient	%	71.2	
7	Plant road and square floor	m ²	28000	
7	Coefficient of road and plaza	%	16.1	
9	Earth and stone work amount of the plant	Excavation	10 ⁴ m ³	Unified Consideration of General Design Institute
		Fill	10 ⁴ m ³	
10	Land area for greening	m ²	31300	
11	Greening rate	%	18.0	

3.2.12.2 Transport organization

(1) Transportation of raw materials

The main raw material of the Project is fired coal, which is mainly the coal by the north to south coal diversion; the coal is transported from "north to south coal diversion" railway to Gong'an Station of Jingzhou-Yueyang Railway, and then forwarded to the coal yard of the power plant by highway. The offsite transportation part is mainly the road planned via Yangjiachang Town Industrial Park (the planned road has not been built at present); the transportation vehicle time is 5Nr./h (50t/Nr.); the transportation vehicle is van truck (covered with tarpaulin); the materials are crushed in the crushing section upon entering into the dry coal shed, and then forwarded to the front stock bin by belt, etc.

In addition, the one with larger freight volume is site transportation of desulfurization gypsum; the raw material gypsum is transported to the plant area by highway, and 5 Nr./d of raw material gypsum is transported. The freight volume is not high.

20% ammonia and chemicals used for demineralized water station are transported to the site by corresponding special transport vehicle, all depending on highway transportation.

The raw water is led into the plant area by the special water intake pipeline of the paper making project.

(2) Outward transport of solid wastes

The solid wastes generated in the Project mainly include boiler ash and slag, desulphurization gypsum and various waste and old resins from replacing the demineralized water station. The boiler ash slag and desulphurization gypsum are transported to the proposed offsite temporary slag and slag yard for storage, and the transportation way is to transport to the proposed temporary ash and slag yard by box tilting cart (covered with tarpaulin); the transportation route is the road planned in Yangjiachang Town; after the Project is built, the ash slag transportation route must be in accordance with the building place of the ash yard and the transportation route designated by the park management department.

The waste and old resins generated by the demineralized water station (belonging to hazardous wastes) must be delivered to qualified manufacturers for treatment; there is no temporary hazardous waste treatment place, and the way of site replacement and site transportation is used. The transportation also depends on qualified units who transport wastewater according to specified requirements and discharge it into the Yangtze River through the special river drainage pipeline of the wastewater treatment station upon treatment of the wastewater treatment station to reach the standards.

3.2.13 Working system and manpower staffing

The organization of the Project is uniformly considered as per $4 \times 410t/h + 4 \times 60MW$, and the unit operation organization discipline has wide coverage, and strong integrity; the recommended personnel staffing is 166 persons in total (including spare personnel), and the specific staffing calculation is as shown in Table 3.2-9.

Table 3.2-9 Personnel Staffing of Project

Item	Staffing (person)	Description
I. Production personnel	148	
(I) Units operating	111	
1. Operation of main engine	66	(1 shift chief operator +2×(1 principal shift supervisor+3 deputy shift supervisors)+6 inspectors)×4 shift supervisors+6 spare personnel=66 persons
2. Operation of auxiliary system	45	(2 principal shift supervisors+2 deputy shift supervisors+6 inspectors)×4 shift supervisors+5 spare personnel=45 persons (including ash removal, dust removal, desulfurization, chemical water, coal loading)
(II) Units maintenance	30	
1. Warm-up and desulfurization	15	
2. Electrical appliances	10	
3. Thermal control	5	
(III) Fuel system	5	
(IV) Others	2	
1. Warehouse	2	
2. Vehicles	0	External employment
II. Management personnel	10	
III. Party-mass working personnel	5	
IV. Service-type administrator	3	
Total staffing of the whole plant	166	

3.2.14 Main technical/economic indexes

Main technical/economic indexes of the Project are as shown in Table 3.2-10.

Table 3.2-10 Main Economic/Technical Indexes of the Project

SN	Item	Unit	Total
1	Design operating hours of the unit per year	h	8160
2	Rated evaporation of boiler	t/h	410
3	Boiler efficiency	%	91
4	Rated power of unit	MW	60
5	Heat rate	kJ/kWh	3518.5
6	Annual generating capacity	kWh/a	16.49×10^8
7	Annual power supply	kWh/a	13.54×10^8
8	Annual heat supplied	GJ/a	2650.48×10^4
9	Annual average standard coal consumption of power	g/kWh	136.17

	generation		
10	Annual average standard coal consumption of power supply	g/kWh	151.3
11	Annual average standard coal consumption of heat supply	kg/GJ	39.33
12	Annual average heat efficiency of the whole plant	%	85.73
13	Annual average heat-to-electric ratio	%	543.7

3.2.15 Implementation schedule

According to the production plan requirements for the Project, in combination with the specific conditions of the Project, the construction schedule of the Project is arranged as follows:

Construction Preparation: September 2015 ~ November 2015 (3 months)

Foundation construction of main power house: December 2015 ~ April 2016 (5 months)

Installation, commissioning and production of 1# Unit: May 2016 ~ October 2017 (18 months)

Commissioning and production of 2# Unit: November 2017 ~ December 2017 (2 months)

Phase I of the Project is planned to complete and put into production at the end of 2017, and the total construction period is 25+3=28 months (including 3 months for construction preparations); the Phase II of the Project is planned to complete and put into production at the end of 2019.

3.3 Heat Supply Load Analysis

The Project is an assorted heat supply project of Gong'an County Qingji Industrial Park and Yangjiachang Town Industrial Park, and the heat load is mainly supplied to Changtai Paper Industry (Wuhan) Co., Ltd.; a little steam is supplied to other enterprises in the industrial park.

According to the *Application Report of Yangjiachang Town Industrial Park CHP Project in Gong'an County* and *Special Heat Supply Plan for Central City of Gong'an County (2014-2030)* prepared by Central Southern China Electric Power Design Institute (CSEPD) of China Power Engineering Consulting Group Corporation, the heat supply load analysis for the Project is as follows:

3.3.1 Heat supply status of heat supply user

The centralized heat supply has not been achieved in Gong'an County at present. The industrial heat use enterprises build their own boiler rooms (fired coal, fuel oil or fuel gas) to solve the heat use problems in enterprises; for the public commercial heat users, except for a small part using coal-fired boilers, others use electric air conditioners to heat in winter and cool in summer; residential users are cooled by electric air conditioners in summer, and others uses are heated by electric air conditioners except that very few parts of residential users are heated by wall-mounted gas boilers. The biggest heat users within the heat supply range of the Project include Changtai Paper Industry (Wuhan) Co., Ltd., Shine Star (Hubei) Biological Engineering Co., Ltd. and several industrial enterprises in Qingji Industrial Park.

Shine Star (Hubei) Biological Engineering Co., Ltd., a key new high-tech enterprise, is a hydrolytic amino acid production enterprise with the largest scale in the world. It is the first enterprise for independent development and hydrolysis extraction of L-arginine, L-histidine series products in China and such production process is applied to large-scale production, which fills the gap of domestic production in this field. The amino acid products of the Company are incorporated into "New Hi-Tech Export Product in China" by five ministries in China. For the pharmaceutical chemical project jointly invested by Fosun and this company, the total investment is CNY 0.62 billion, the annual fermented protein feed material production is 100,000 tons, the annual synthesis ammonia production is 150,000 tons, the annual amino acid production is 25,000 tons, the annual sales is CNY 2 billion, and the tax is CNY 0.4 billion.

In addition, enterprises which Gong'an County proposes to incorporate into gas supply substitute include 30 steam users, such as Hubei Qinchu Paper Industry Co., Ltd., COFCO Cereals and Oils Industry (Jingzhou) Co., Ltd., Hubei Tianle New Materials Co., Ltd., Hubei Zhencheng Paper Co., Ltd., except for the High-grade Packing Board Project which the Employer will build, the steam consumption of other potential steam users will reach 263.1t/h.

3.3.2 Description of heat load parameter

According to *Special Heat Supply Plan for Central City of Gong'an County (2014-2030)* and parameter description of thermal power plant provided by Changtai Paper Industry, the heat load of the Project is as follows:

1) The paper making scale of Changtai Paper Industry is 2.20 million t/a (270t/h), built by two phases:

1,100,000t/a for Phase I of the paper plant. Completed in 2017, with the construction period of 2.5 years;

1,100,000t/a for Phase II of the paper plant. Completed in 2019, with the construction period of 2.5 years;

2) The maximum steam consumption of 1t paper (winter) is about 2.4t.

3) The pressure of steam for dryer in the paper making workshop of Changtai Paper Industry is 0.6MPa, and the pressure of steam for drying oven is 1.2MPa; the external steam pressure is 0.8~1.2MPa (to the workshop).

4) The steam consumption of the paper making system of Changtai Paper Industry is: 626t/h (maximum in winter), including 300t/h for Phase I, and 326t/h for Phase II, and 20t/h (1.2MPa) for the steam of drying oven.

5) Implemented steam consumption of external enterprises of heat load: 325t/h (maximum in winter), including:

135t/h (exclusive of Shine Star (Hubei) Biological Engineering Co., Ltd.) for Phase I, 24t/h for 1.2MPa steam, and 111t/h for 0.8MPa steam;

190t/h for Phase II, with pressure of 0.8MPa (inclusive of Shine Star (Hubei) Biological Engineering Co., Ltd.).

3.3.3 Design heat load of thermal power project

The summary of design heat load (including Comprehensive Solid Wastes Utilization Project) of the Project is as shown in Table 3.3-1:

Table 3.3-1 Design Heat Load (Including Comprehensive Solid Wastes Utilization Project) of the Project

Planning period	Heat load type	Design heat load (t/h)	Outlet medium and parameter (superheated steam)
Phase I (put into production in 2017)	Steam for paper making workshop in Changtai Paper Industry	300	0.8MPa(a), 230°C
	Steam A for external enterprise	111	0.8MPa(a), 230°C
	Steam B for external enterprise	24	1.2MPa(a), 290°C
Phase II (put into production in 2019)	Steam for paper making workshop in Changtai Paper Industry	306	0.8MPa(a), 230°C
	Steam for drying oven in Changtai Paper Industry	20	1.2MPa(a), 290°C
	Steam for external enterprise	190	0.8MPa(a), 230°C

3.4 Dependence Relations with the Project under Construction

According to the approved EIA report of the 2.20Mt/a High-grade Packaging Board Project and introduction to the construction contents of the EIA report for the ongoing Comprehensive Solid Wastes Utilization Project, the dependence relations between the Project and other two projects are as shown in Table 3.4-1.

Table 3.4-1 Dependence Relations of Three Projects in the Whole Plant

Item	2.20Mt/a High-grade Packaging Board Project	CHP Project	Comprehensive Solid Wastes Utilization Project	Dependence relations
Land requisition	1,523,333.33m ² for the whole plant (including 209,333.33m ² for thermal power project)	Covering a total area of 171,666.67m ² , in 2.20Mt/a High-grade Packaging Board Project	Total area of 37,666.67m ²	The land for thermal power project and Comprehensive Solid Wastes Utilization Project is in the land occupation range of the whole plant
Water supply system	It is planned to build one 70,000m ³ /d water intake facility, 35,000m ³ /d for Phase I, with closed construction of water supply pipe network for the paper plant	The water supply pipe network within the Project is only built in the Project by using the water supply system planned in the High-grade Packaging Board Project	The water supply pipe network within the Project is only built in the Project by using the water supply system planned in the High-grade Packaging Board Project	Water supply system planned by using the water supply system planned in the High-grade Packaging Board Project
Water Drainage System	It is planned to build wastewater and rainwater drainage system in the whole plant, and wastewater & rainwater is discharged to Yangtze River section in Gong'an County Qingji Industrial Park by one about 2,500m long, DN800mm special steel pipe. The rainwater in the plant area is collected by open ditches or pipelines, is discharged into the channel, and finally enters into Xuzhang Canal.	A collection pipe network within the Project is only built for the Project, wastewater enters into the wastewater treatment station of the whole plant and rainwater enters into the rainwater system of the whole plant	A collection pipe network within the Project is only built for the Project, wastewater enters into the wastewater treatment station of the whole plant and rainwater enters into the rainwater system of the whole plant	The thermal power project and comprehensive solid wastes utilization project only have collection pipe network within the Project, and water is discharged outside depending on the pipe network of the Board Project upon collection within the scope of the project
sewage treatment station	One 55,000m ³ /d wastewater treatment station will be built in the final phase of the Project, 27,500m ³ /d for each phase	Use the wastewater treatment station of High-grade Packaging Board Project	Use the wastewater treatment station of High-grade Packaging Board Project	The wastewater collection facility within the Project is only built for thermal power project and Comprehensive Solid Wastes Utilization Project, and wastewater depends on Board Project
Demineralized water station		The boiler feedwater treatment workshop is L-shaped building, and the water treatment equipment is arranged in the workshop; two 500m ³ clear water tanks, two 1,500m ³ demineralization water tanks, one 300m ³ middle water tank, acid-base storage equipment are arranged outdoors	Depend on the chemical water treatment system of thermal power station	The chemical preparation system of Comprehensive Solid Wastes Utilization Project depends on the CHP Project
Chimney		One 180m high chimney is built, and 3 flues are provided therein (two Φ4m flues and one Φ3m flue), including 2 flues for Phase I (one Φ4m flue for thermal power project and one Φ3m flue for Comprehensive Solid Wastes Utilization	Discharge by using Φ3m flue in 180m chimney built in thermal power project	Comprehensive Solid Wastes Utilization Project builds own flue gas collection treatment system, and the flue gas is discharged via the flue with the outlet diameter of 3m in 180m high

		Project)		chimney of thermal power project
Office and living facilities	The office and living quarters shall be built in the northeastern corner of the general layout	Use the office and living quarters planned in the Board Project	Use the office and living quarters planned in the Board Project	Shared by three projects of the whole plant
Accident tank	One 20,000m ³ emergency pool is built for the whole plant	Reply on the emergency pool of the whole plant	Reply on the emergency pool of the whole plant	Shared by three projects of the whole plant

4. Engineering Analysis

4.1 Engineering Pollution Analysis for the Project under Construction

This assessment is to carry out pollution analysis for the works under construction by using the accounting data of approved EIA report of the 2.20Mt/a High-grade Packaging Board Project and analyze the engineering pollution of the Project under construction by using the preliminary accounting data of EIA report of Comprehensive Solid Wastes Utilization Project.

The assessment range excludes temporary ash and slag yard assorted with the Project, so pollution of ash and slag yard is not analyzed.

4.1.1 2.20Mt/a High-grade Packaging Board Project

4.1.1.1 Waste gas

According to the accounting data of approved EIA report of the 2.20Mt/a High-grade Packaging Board Project, the waste gas emission of the Project is as shown in Table 4.1-1.

4.1.1.2 Waste water

According to the accounting in the approved EIA report of the 2.20Mt/a High-grade Packaging Board Project, the wastewater production and discharge of the 2.20Mt/a High-grade Packaging Board Project of Changtai are as shown in Tables 4.1-2, 4.1-3 and 4.1-4.

Table 4.1-1 Waste Gas Discharge of 2.20Mt/a High-grade Packaging Board Project

Category	Production stage	Source of Pollution	Discharge amount	Pollutant name	Production concentration	Output (t/a)	Emission concentration	Discharge amount (t/a)	Disposal measures	Treatment rate (%)	
Unorganized waste gas	Phase I	sewage treatment station	/	NH ₃	/	0.030kg/h	/	0.030kg/h	① The malodorous gas is collected into the scrubbing tower for treatment upon collection by fan, and discharged by 15m high exhaust funnel; the uncollected malodorous gas is discharged in an unorganized manner. In the meantime, the health protection distance shall be provided; odor inhibitor shall be regularly sprayed for removing odor; environmental management and plant greening shall be strengthened. ② The sulfuric acid mist and hydrochloric acid mist waste gas are collected into the acid mist absorption tower for treatment, and discharged into 15m high exhaust funnel.	/	
			/	H ₂ S	/	0.0021kg/h	/	0.0021kg/h		/	
			/	Chlorine hydride	/	0.01kg/h	/	0.01kg/h		/	
			/	Sulfuric acid mist	/	0.07kg/h	/	0.07kg/h		/	
	Phase II	sewage treatment station	/	NH ₃	/	0.013kg/h	/	0.013kg/h		/	
			/	H ₂ S	/	0.0013kg/h	/	0.0013kg/h		/	
	First phase + second phase	sewage treatment station	/	NH ₃	/	0.043kg/h	/	0.043kg/h		/	
			/	H ₂ S	/	0.0034kg/h	/	0.0034kg/h		/	
			/	Chlorine hydride	/	0.01kg/h	/	0.01kg/h		/	
			/	Sulfuric acid mist	/	0.07kg/h	/	0.07kg/h		/	
Organized waste gas	Phase I	sewage treatment station	22500m ³ /h	NH ₃	2	0.045kg/h	0.4	0.009kg/h	80		
				H ₂ S	0.13	0.0031kg/h	0.03	0.0006kg/h	80		
			5000	Chlorine hydride	18.56	0.093kg/h	0.93	0.005kg/h	95		
				Sulfuric acid mist	61.94	0.62kg/h	3.09	0.031kg/h	95		
	Phase II	sewage treatment station	22500m ³ /h	NH ₃	/	0.015kg/h	/	0.004kg/h	80		
				H ₂ S	/	0.0020kg/h	/	0.0004kg/h	80		
	First phase + second phase	sewage treatment station	22500m ³ /h	NH ₃	2.88	0.065kg/h	0.58	0.013kg/h	80		
				H ₂ S	0.23	0.0051kg/h	0.04	0.001kg/h	80		
			5000	Chlorine hydride	18.56	0.093kg/h	0.93	0.005kg/h	95		
				Sulfuric acid mist	61.94	0.62kg/h	3.09	0.031kg/h	95		
	Cooking fume	Phase I	Staff canteen	40.80 million m ³ /a	Cooking fume	11.42	0.466t/a	1.71	0.07t/a	The canteen flue gas treated by the cooking fume purifier is discharged from	85

	Phase II	Staff canteen	32.64 million m ³ /a	Cooking fume	9.58	0.313t/a	1.44	0.047t/a	the special flue	85
	First phase + second phase	Staff canteen	73.44 million m ³ /a	Cooking fume	10.61	0.779t/a	1.52	0.117t/a		85
Motor vehicle	Phase I	Motor vehicle	/	HC	/	0.22kg/h	/	0.22kg/h	Strengthen greening around the plant area, purify air	0

Tail gas	Phase II	Motor vehicle		Particles	/	0.17kg/h	/	0.17kg/h	Strengthen greening around the plant area, purify air	0				
				CO	/	0.51kg/h	/	0.51kg/h		0				
				NO ₂	/	1.24kg/h	/	1.24kg/h		0				
				HC	/	0.22kg/h	/	0.22kg/h		0				
				Particles	/	0.17kg/h	/	0.17kg/h		0				
				CO	/	0.51kg/h	/	0.51kg/h		0				
	First phase + second phase	Motor vehicle	/	HC	/	0.44kg/h	/	0.44kg/h	Strengthen greening around the plant area, purify air	0				
				Particles	/	0.33kg/h	/	0.33kg/h		0				
				CO	/	1.02kg/h	/	1.02kg/h		0				
				NO ₂	/	1.24kg/h	/	1.24kg/h		0				
				Phase I	Transportation	/	Particles	/		2.45kg/h	/	1.08kg/h	Watering for dust reduction	56
				Phase II	Transportation	/	Particles	/		2.45kg/h	/	1.08kg/h	Watering for dust reduction	56
First phase + second phase	Transportation	/	Particles	/	4.9kg/h	/	2.74kg/h	Watering for dust reduction	56					

Table 4.1-2 Production and Predicted Discharge of Wastewater Pollutants in Phase I Packaging Board Project

Source of Pollution	Amount of wastewater (m ³ /d)	Discharge way	Item	Pollution factor							Proposed control measures
				pH*	COD	BOD ₅	SS	Ammonia nitrogen	Total phosphorus	Petroleum	
Paper making process wastewater	22390	Continuous	Production concentration (mg/L)	8.2	4353	1412	1712	5.0	1.0		Into the sewage treatment station
			Output (t/d)		97.46	31.61	38.33	0.11	0.02		
Domestic sewage	193.8	Continuous	Production concentration (mg/L)	8.0	300	150	150	25	0.8		Into the sewage treatment station
			Output (t/d)		0.058	0.029	0.029	0.005	0.000		
Water supply station	1750	Continuous	Production concentration (mg/L)				20				Clean sewer
			Output (t/d)				0.04				
sewage treatment station	4	Intermittent	Production concentration (mg/L)	8.7			500				Into the sewage treatment station
			Output (t/d)				0.02				
Compressed air station	2	Intermittent	Production concentration (mg/L)				30			20	Clean sewer
			Output (t/d)				0			0	
Fire-fighting wastewater	2,252m ³ /time	Intermittent	Production concentration (mg/L)		1000		1200			40	Automatically flow into the wastewater treatment station upon interception by the emergency pool of the wastewater treatment station
			Output (t/time)		2.25		2.70			0.09	
Initial rainwater	18.64m ³ /time	Intermittent	Production concentration (mg/L)		20		400				Automatically flow into the wastewater treatment station upon interception by the emergency pool of the wastewater treatment station
			Output (t/time)		0.004		0.008				
Incoming water of sewage treatment station	22583.8	Continuous	Production concentration (mg/L)	8.2	4318	1401	1700	5.09	1.0		/
			Output (t/d)		97.52	31.64	38.36	0.11	0.02		
Rainwater drain outlet (air station + water supply station)	1752	Continuous	Emission concentration (mg/L)				21				Clean sewer
			Discharge amount				0.04				
Effluent water of sewage treatment station	22583.8	Continuous	Emission concentration (mg/L)	7.9	60	10	10	5	0.5		/
			Discharge (t/d)		1.355	0.226	0.226	0.113	0.011		

Note: dimensionless pH.

Table 4.1-3 Production and Predicted Discharge of Wastewater Pollutants in Phase II Packaging Board Project

Source of Pollution	Amount of wastewater (m ³ /d)	Discharge way	Item	Pollution factor						Proposed control measures
				pH*	COD	BOD ₅	SS	Ammonia nitrogen	Total phosphorus	
Paper making process wastewater	22390	Continuous	Production concentration (mg/L)	8.2	4206	1353	1623	5.0	1.0	Into the sewage treatment station
			Output (t/d)		94.17	30.29	36.35	0.11	0.02	
Domestic sewage	130.2	Continuous	Production concentration (mg/L)	8.0	300	150	150	25	0.8	Into the sewage treatment station
			Output (t/d)		0.039	0.020	0.020	0.003	0.000	
Water supply station	1750	Continuous	Production concentration (mg/L)				20			Clean sewer
			Output (t/d)				0.04			
Compressed air station	2	Intermittent	Production concentration (mg/L)				30		20	Clean sewer
			Output (t/d)				0		0	
Fire-fighting wastewater	2,252m ³ /time	Intermittent	Production concentration (mg/L)		1000		1200		40	Automatically flow into the wastewater treatment station upon interception by the emergency pool of the wastewater treatment station
			Output (t/time)		2.25		2.70		0.09	
Incoming water of sewage treatment station	22520.2	Continuous	Production concentration (mg/L)	8.2	4172	1342	1610	5	1	/
			Output (t/d)		94.21	30.31	36.37	0.11	0.02	
Rainwater drain outlet (air station + water supply station)	1752	Continuous	Emission concentration (mg/L)				21			Clean sewer
			Discharge amount				0.04			
Effluent water of sewage treatment station	22520.2	Continuous	Emission concentration (mg/L)	7.9	60	10	10	5	0.5	/
			Discharge (t/d)		1.351	0.225	0.225	0.113	0.011	

Note: dimensionless pH.

Table 4.1-4 Production and Predicted Discharge of Wastewater Pollutants in the Final Phase (Phase I + Phase II) of Packaging Board Project

Source of Pollution	Amount of wastewater (m ³ /d)	Discharge way	Item	Pollution factor							Proposed control measures
				pH*	COD	BOD ₅	SS	Ammonia nitrogen	Total phosphorus	Petroleum	
Paper making process wastewater	44780	Continuous	Production concentration (mg/L)	8.2	4280	1382	1668	5	1		Into the sewage treatment station
			Output (t/d)		191.63	61.9	74.67	0.22	0.04		
Domestic sewage	324	Continuous	Production concentration (mg/L)	8.0	300	150	150	25	0.8		Into the sewage treatment station
			Output (t/d)		0.097	0.049	0.049	0.008	0.000		
Water supply station	3500	Continuous	Production concentration (mg/L)				20				Clean sewer
			Output (t/d)				0.07				
sewage treatment station	4	Intermittent	Production concentration (mg/L)	8.7			500				Into the sewage treatment station
			Output (t/d)				0.02				
Compressed air station	4	Intermittent	Production concentration (mg/L)				30			20	Clean sewer
			Output (t/d)				0			0	
Fire-fighting wastewater	4,504m ³ /time	Intermittent	Production concentration (mg/L)		1000		1200			40	Automatically flow into the wastewater treatment station upon interception by the emergency pool of the wastewater treatment station
			Output (t/time)		4.5		5.4			0.18	
Initial rainwater	18.64m ³ /time	Intermittent	Production concentration (mg/L)		200		400				Automatically flow into the wastewater treatment station upon interception by the emergency pool of the wastewater treatment station
			Output (t/time)		0.004		0.008				
Incoming water of sewage treatment station	45104	Continuous	Production concentration (mg/L)	8.2	4251	1374	1657	5.1	1		/
			Output (t/d)		191.73	61.95	74.72	0.23	0.05		
Rainwater drain outlet	3504	Continuous	Emission concentration (mg/L)				21				Clean sewer
			Discharge amount				0.08				
Effluent water of sewage treatment station	45104	Continuous	Emission concentration (mg/L)	7.9	60	10	10	5	0.5		/
			Discharge (t/d)		2.706	0.451	0.451	0.226	0.023		
			Discharge amount (t/a)		920.12	153.35	153.35	76.68	7.67		

Note: dimensionless pH; production time calculated as per 340 days per year.

4.1.1.3 Noise

The production equipment noise of Packaging Board Project is from chain plate conveyor, pulper, millstone mill, broke pulper, etc. and the source intensity is 73~116dB(A). The equivalent sound levels A of various noise sources and sound source intensity after treatment are listed in Table 4.1-5.

Table 4.1-5 Noise Production of Packaging Board Project

Noise production section/workshop	Noise production equipment	Producing way	dB before treatment (A)	Quantity (Set)	Control measures	dB after treatment (A)	Remarks
Pulp preparing workshop	Chain plate conveyor	Continuous	90~105	8	Vibration reduction and acoustic insulation	70~85	4 sets added in Phase II
	Hydraulic pulper	Continuous	85~100	8	Vibration reduction and acoustic insulation	65~80	4 sets added in Phase II
Pulping workshop	Pulp pump and pulp screen	Continuous	90~105	8	Vibration reduction and acoustic insulation	70~85	4 sets added in Phase II
Paper-making workshop	Vacuum pump, blower	Continuous	90~105	8	Vibration reduction, acoustic insulation and noise reduction	65~85	4 sets added in Phase II
Water supply station	Water pump	Continuous	89~103	4	Noise reduction and acoustic insulation	69~83	2 sets added in Phase II
sewage treatment station	Water pump and fan	Continuous	90~115	19	Noise reduction and acoustic insulation	70~95	9 sets added in Phase II
Air compression station	Air compressor	Continuous	73~116	24	Noise reduction and acoustic insulation	53~96	12 sets added in Phase II

The noise of the transport vehicle in the Packaging Board Project is closely related to the vehicle type and operation state, and the noise values of various vehicle types are as shown in Table 4.1-6.

Table 4.1-6 Noise Pressure Levels of Various Vehicle Types

Vehicle type	Operation conditions	Noise pressure level, dB(A)	Remarks
Car	Idle running	55~60	Equivalent noise level at 7.5m
	Normal running	61~70	
	Whistle	80~85	
Medium-sized car	Idle running	60~65	Equivalent noise level at 15m
	Normal running	62~76	
	Whistle	80~90	
Large Vehicle	Idle running	60~70	Equivalent noise level at 15m
	Normal running	65~80	
	Whistle	85~90	

4.1.1.4 Solid Waste

After the Phase I and Phase II of the High-grade Packaging Board Project are built for production, the production and discharge of solid wastes are as shown in Table 4.1-7 and Table 4.1-8. After the Phase I project and Phase II project are built for production, the production and discharge of solid wastes are as shown in Table 4.1-9.

Table 4.1-7 Production and Discharge of Solid Wastes of Phase I Packaging Board Project

SN	No.	Coming from	Category	Main component	Output (t/a)	Discharge amount (t/a)	Measures to be adopted
1	SA1, SA5	PM15 pulp preparation and paper making workshop	86 industrial refuse	Pulp slag (water content 45%)	28843.21	0	Delivered to the boiler for burning at thermal power station
	SB1, SB5	PM16 pulp preparation and paper making workshop			28843.21	0	
	SC1, SC5	PM17 pulp preparation and paper making workshop			19750.97	0	
	SD1, SD5	PM18 pulp preparation and paper making workshop			22008.65	0	
2	SA2~SD2	Wire cutting machine, etc.	55 metal wastes	Waste iron wires, iron bars, etc.	11813.8	0	Comprehensive utilization for sales
3	SA3~SD3	Cylindrical sieve	86 industrial refuse	Plastic sheet, etc.	29040	0	
4	SA4~SD4	Desander	86 industrial refuse	Sandstone (water content 45%)	18472	0	Comprehensive Utilization
5	SI1-1	Water supply station	86 industrial refuse	Sediment (water content 45%)	1870	0	Comprehensive Utilization
6	SJ1-1~SJ5-1	sewage treatment station	57 organic wastewater sludge	Settling sludge (water content 55%)	103039	0	Delivered to the boiler for burning at thermal power station
7	SK1-1 SK3-1	Air compression station	86 industrial refuse	Waste paper air filter grill	400	0	Delivered to the boiler for burning at thermal power station
8	SK2-1	Air compression station	86 industrial refuse	Waste desiccant	160	0	Recycling
9	SL1-1	Office and living quarter	99 other wastes	Domestic garbage	274.55	0	Environmental sanitation department entrusted for disposal
10	SL2-1	Machinery maintenance	HW08 used mineral oil	Waste oil	2	0	Qualified unit entrusted for disposal
Total					264519.39		

Table 4.1-8 Production and Discharge of Solid Wastes of Phase II Packaging Board Project

SN	No.	Coming from	Category	Main component	Output (t/a)	Discharge amount (t/a)	Measures to be adopted
1	SE1, SE5	PM19 pulp preparation and paper making workshop	86 industrial refuse	Pulp slag (water content 45%)	28843.21	0	Delivered to the boiler for burning at thermal power station
	SF1, SF5	PM20 pulp preparation and paper making workshop			28843.21	0	
	SG1, SG5	PM21 pulp			19750.97	0	

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		preparation and paper making workshop					
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SN	SN	Coming from	Category	Main component	Output (t/a)	Discharge amount (t/a)	Measures to be adopted
	SH1, SH5	PM22 pulp preparation and paper making workshop			1425.38	0	
2	SE2~SH2	Wire cutting machine, etc.	55 metal wastes	Waste iron wires, iron bars, etc.	11813.8	0	Comprehensive utilization for sales
3	SE3~SH3	Cylindrical sieve	86 industrial refuse	Plastic sheet, etc.	19360	0	
4	SE4~SH4	Desander	86 industrial refuse	Sandstone (water content 45%)	18472	0	Comprehensive Utilization
5	SI1-2	Water supply station	86 industrial refuse	Sediment (water content 45%)	1870	0	Comprehensive Utilization
6	SJ1-2~SJ5-2	sewage treatment station	57 organic wastewater sludge	Settling sludge (water content 55%)	103039	0	Delivered to the boiler for burning at thermal power station
7	SK1-2 SK3-2	Air compression station	86 industrial refuse	Waste paper air filter grill	400	0	Delivered to the boiler for burning at thermal power station
8	SK2-2	Air compression station	86 industrial refuse	Waste desiccant	160	0	Recycling
9	SL1-2	Office and living quarter	99 other wastes	Domestic garbage	184.45	0	Environmental sanitation department entrusted for disposal
10	SL2-2	Machinery maintenance	HW08 used mineral oil	Waste oil	2	0	Qualified unit entrusted for disposal
Total					234166.02		

Table 4.1-9 Production and Discharge of Solid Wastes of Phase I and Phase II of Packaging Board Project upon Production

SN	No.	Coming from	Category	Main component	Output (t/a)	Discharge amount (t/a)	Measures to be adopted
1	SA1~SH1 SA5~SH5	Pulp preparation and paper making workshop	86 industrial refuse	Pulp slag (water content 45%)	178308.8		Delivered to the boiler for burning at thermal power station
2	SA2~SH2	Wire cutting machine, etc.	55 metal wastes	Iron wire scrap	23627.6	0	Comprehensive utilization for sales
3	SA3~SH3	Cylindrical sieve	86 industrial refuse	Plastic sheet	48400	0	
4	SA4~SH4	Desander	86 industrial refuse	Sandstone (water content 45%)	36944	0	Comprehensive Utilization
5	SI1	Water supply station	86 industrial refuse	Sediment (water content 45%)	3740	0	Comprehensive Utilization
6	SJ1~SJ5	sewage treatment station	57 organic wastewater sludge	Settling sludge (water content 55%)	206078	0	Delivered to the boiler for burning at thermal power station

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7	SK1	Air compression station	86 industrial refuse	Waste paper air filter grill	800	0	Delivered to the boiler for burning at thermal power station
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SN	No.	Coming from	Category	Main component	Output (t/a)	Discharge amount (t/a)	Measures to be adopted
	SK3						
8	SK2	Air compression station	86 industrial refuse	Waste desiccant	320	0	Recycling
9	SL1	Office and living quarter	99 other wastes	Domestic garbage	459	0	Environmental sanitation department entrusted for disposal
10	SL2	Machinery maintenance	HW08 used mineral oil	Waste oil	4	0	Qualified unit entrusted for disposal
Total					498685.4		

4.1.2 Comprehensive Solid Wastes Utilization Project

4.1.2.1 Waste gas

According to the preliminary calculation for the pollution source of the Project in the preparing EIA report of the Comprehensive Solid Wastes Utilization Project in Yangjiachang Town Industrial Park of Gong'an County, the waste gas emission is as shown in Table 4.1-10.

Table 4.1-10 Source Intensity and Predicted Discharge of Main Pollutant Sources of Comprehensive Solid Wastes Utilization Project

Discharge source	Volume of flue gas	Discharge way	Pollutant name		Production condition			Proposed control measures	Removal efficiency %	Discharge condition			Discharge standard mg/m ³	Parameters of exhaust funnel		
					Production concentration mg/m ³	Output				Emission concentration mg/m ³	Discharge amount			Height m	Inside Diameter m	temperature °C
						kg/h	t/a				kg/h	t/a				
Incinerator waste gas	Phase I: 135,226.5Nm ³ /h; final phase: 270,453 Nm ³ /h	Continuous	SO ₂	Phase I	461.75	62.44	509.51	Fluidized bedboiler + SNCR denitration device + semi-dry desulfurization device + deacidification tower + activated + chimney	84.84	870	10.96	89.47	100	180	3.0	140
				Final phase		124.88	1019.02				21.93	178.94				
			NO _x	Phase I	350	47.33	386.21		40.0	210.1	28.40	231.73	300			
				Final phase		94.66	772.42				56.80	463.46				
			Soot	Phase I	6660	900.57	7348.64		99.56	29.5	3.99	32.55	30			
				Final phase		1801.14	14697.28				7.98	65.10				
			HCl	Phase I	350	101.08	424.81		85.71	50	6.76	55.17	60			
				Final phase		202.16	849.62				13.52	110.34				
			CO	Phase I	22~121	10.82	88.27		-	80	10.82	88.27	100			
				Final phase		21.64	176.54				21.64	176.54				
			Hg	Phase I		0.00175	0.0143		-	0.013	0.00175	0.0143	0.05			
				Final phase		0.0035	0.0286				0.0035	0.0286				
			Pb	Phase I		0.0101	0.0826		-	0.0749	0.0101	0.0826	1.0			
				Final phase		0.0202	0.1652				0.0202	0.1652				
Cd	Phase I		0.00107	0.0087	-	0.0079	0.00107	0.0087	0.1							
	Final phase		0.0021	0.0174			0.0021	0.0174								
Dioxin	Phase I	5ngTEQ/Nm ³	676132.5 ngTEQ/h	5.517 gTEQ/a	98.0	0.074 ngTEQ/Nm ³	10006.76 ngTEQ/h	0.08265 gTEQ/a	0.1 ngTEQ/Nm ³							
	Final phase		1352265 ngTEQ/h	11.034 gTEQ/a			20013.5 ngTEQ/h	0.1633 gTEQ/a								

4.1.2.2 Waste water

The wastewater discharge of the Project preliminarily calculated in the EIA report of the Comprehensive Solid Wastes Utilization Project is as shown in Table 4.1-11.

Table 4.1-11 Wastewater Pollution Source Intensity of Comprehensive Solid Wastes Utilization

Wastewater source	Output (m ³ /d)	Contaminant	Production concentration (mg/L)	Output (kg/d)		Emission concentration (mg/L)	Discharge amount (kg/d)	
				Phase I	Final phase		Phase I	Final phase
Landfill leachate	Phase I 48 Final phase 96	CODcr	50000	2400	4800			
		BOD ₅	30000	1440	2880			
		NH ₃ -N	2000	96	192			
		SS	5000	240	480			
Laboratory wastewater	Phase I 6 Final phase 12	CODcr	150	0.9	1.8			
		BOD ₅	60	0.36	0.72			
		NH ₃ -N	15	0.09	0.18			
		SS	150	0.9	1.8			
Machine maintenance wastewater	Phase I 6 Final phase 12	Petroleum	500	3.0	6.0			
		CODcr	400	2.4	4.8			
		BOD ₅	150	0.9	1.8			
		SS	150	0.9	1.8			
Concentrated water from chemical water workshop	Phase I 36 Final phase 72	pH	5~11					
		CODcr	40	1.44	2.88			
		BOD ₅	60	2.16	4.32			
		SS	80	2.88	5.76			
Boiler wastewater	Phase I 331.2 Final phase 662.4	pH	5~11					
		CODcr	40	13.248	26.496			
		BOD ₅	60	19.872	39.744			
		SS	80	26.496	52.992			
Delivery system flushing wastewater	Phase I 72 Final phase 144	CODcr	250	18.0	36.0			
		BOD ₅	200	14.4	28.8			
		NH ₃ -N	35	2.52	5.04			
		SS	150	10.8	21.6			
Domestic sewage	8.4	CODcr	250	2.1	4.2			
		BOD ₅	150	1.26	2.52			
		NH ₃ -N	30	0.252	0.504			
		SS	200	1.68	3.36			
Initial rainwater	4.8	CODcr	80	0.384	0.768			
		BOD ₅	30	0.144	0.288			
		NH ₃ -N	5	0.024	0.048			
		SS	100	0.48	0.96			
Partial recycled, excess discharged outside upon treatment in the plant area	Phase I 320.4 Final phase 627.6	CODcr				60	19.224	37.656
		BOD ₅				10	3.204	6.276
		NH ₃ -N				5	1.602	3.138
		SS				10	3.204	6.276

Remarks: 120m³/d boiler wastes is recycled for Phase I, and 211.2m³/d is discharged; 240m³/d recycled for the final phase, and 422.4m³/d discharged.

4.1.2.3 Noise

The noise source intensity of the Comprehensive Solid Wastes Utilization Project is as shown in Table 4.1-12.

Table 4.1-12 Main Equipment Noise Source Intensity of Proposed Project

SN	Equipment	Acoustic characteristic	Noise level (dB)	Location	Treatment measures and effects, dB(A)	Noise level after treatment dB(A)
1	Electric generator	Continuous	100	Steam turbine room	Noise isolation hood, power house sound insulation, 20	80
2	Steam turbines	Continuous	90		Noise isolation hood, power house sound insulation, 20	70
3	Induced draft fan	Continuous	100	Steam turbine room	Power house sound insulation, micropole diffusor, 25	75
4	Blower	Continuous	98	Incinerator room	Power house sound insulation, micropole diffusor, 25	63
5	Feed pump	Continuous	92	Steam turbine room	Pump house sound insulation, noise insulation hood, 20	72
6	Circulating water pump	Continuous	80	Circulating water pump house	Pump house sound insulation, noise insulation hood, 20	60
7	Cooling tower	Continuous	85	Cooling tower	—	85
8	Air compressor	Continuous	90	Steam turbine room	Power house sound insulation, 15	75
9	Boiler exhaust	Intermittent	110	—	Silencer, 30	80

4.1.2.4 Solid Waste

The production and treatment of solid wastes in the Comprehensive Solid Wastes Utilization Project are as shown in Table 4.1-13.

Table 4.1-13 Discharge of Solid Wastes in Solid Wastes Project

Description	Production section	Stages	property	Category	Quantity (t/a)	Disposal measures
Slag	Waste incineration	Phase I	General wastes		36768	The Employer proposes to synchronously build temporary ash and slag yard, and has signed a comprehensive slag utilization treatment agreement with one of Gong'an Huifeng Energy Development Co., Ltd., Gong'an Ruifeng New Wall Materials Co., Ltd., and Gong'an Jinsha Commerce Limited Liability Company.
		Final phase			73536	
Flying ash and reaction products	Waste incinerator, flue gas dust removal installation	Phase I	Hazardous wastes	HW18	7316 9950*	Enter into the urban refuse landfill or qualified units entrusted for treatment upon solidified treatment
		Final phase			14632 19900*	
Used oil	Machine maintenance	Phase I	Hazardous wastes	HW08	1.5	Incineration treatment in the incinerator
		Final phase			3.0	
Waste activated carbon, waste bag, etc.	Waste gas treatment facility, wastewater treatment facility	Phase I	Hazardous wastes	HW08	2.5	Qualified hazardous waste disposal unit entrusted for treatment
		Final phase			5.0	
Domestic garbage	Office	Phase I	General wastes		15.3	Incineration treatment in the incinerator
		Final phase			26.52	

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Total	Phase I	General wastes		36783.3	
	Final phase			73562.52	
	Phase I	Hazardous wastes		7320	
	Final phase			14640	

Note: “*” refers the amount together with the solidification medium upon taking the solidification measures.

4.2 Proposed CHP Project

4.2.1 Main fuel and raw and auxiliary materials

(1) Fuel coal

Hubei Province is poor in coal resources, and most fuel coal depends on introduction from other provinces; according to the current status and development planning of coal industry in China, the coal for thermal power generation in Hubei will mainly depend on supply of Shanxi, Western Inner Mongolia and Shaanxi in the future. The coal for the Project is provided by Jingzhou Zhongnan Coal Investment Co., Ltd.

The CHP Project of Yangjiachang Town Industrial Park and Jingzhou Zhongnan Coal Investment Co., Ltd. signed Intentional Contract on Coal Purchase and Sales, in which coal supply and coal quality requirements are specifically agreed. The analysis report for the coal composition of the fired coal consumed by the Project is as shown in Table 4.2-1.

Table 4.2-1 Characteristics of Coal Composition

SN	Item	Symbol	Unit	Design fuel	Check fuel
1	As-received carbon	Car	%	45.56	50.1
2	As-received hydrogen	Har	%	3.14	2.07
3	As-received oxygen	Oar	%	4.45	4.77

SN	Item	Symbol	Unit	Design fuel	Check fuel
4	As-received nitrogen	Nar	%	0.68	1.2
5	As-received sulfur	Sar	%	1.0	1.2
6	As-received moisture	Mar	%	8.3	6.77
7	Aar	Aar	%	36.87	34.23
8	Dry-ash-free volatile matter	Vdaf	%	24.87	18.61
9	Lower heating value of as-received basis	Qnet.ar	MJ/kg	19.867	18.880

The boiler coal consumption calculated according to the feasibility study report is as shown in Table 4.2-2.

Table 4.2-2 Boiler fuel consumption

Item		Hourly consumption (t/h)	Daily consumption (t/d)	Annual consumption (t/a)
4×410t/h boiler	Design fuel	4×55.1	4×1322.4	4×44.96×10 ⁴
4×410t/h boiler	Check fuel	4×58.2	4×1396.8	4×47.49×10 ⁴

Note: The daily utilization hours are calculated for 24 hours, and the annual utilization hours are calculated for 8,160 hours.

(2) Limestone source and supply

The wet desulfurization is used in the Project, and the limestone consumption required is as shown in Table 4.2-3.

Table 4.2-3 Limestone Consumption

Unit capacity (MW)	Hourly consumption (t/h)		Daily consumption (t/d)		Annual consumption (10 ⁴ t/a)	
	Design	Checked by	Design	Checked by	Design	Checked by
1×410t/h	1.71	2.18	41.04	52.32	1.395	1.779
4×410t/h	6.84	8.42	164.16	209.28	5.58	7.116

Note: The limestone consumption is as per MNCR condition of the boiler, and the daily utilization hours are calculated for 24 hours; the annual utilization hours are calculated for 8,160 hours.

Yangjiachang Town Industrial Park has reached a limestone flour supply and transportation intentional agreement with Songzi Huiyou Novel Environmental Protection Material Co., Ltd., and the annual supply of limestone flour is 4×10⁴t/a. Limestone flour quality: CaO purity>50%, MgO<2%, fineness: 250 meshes, with passing rate of 95%.

(3) Denitration material (ammonia)

SNCR denitration process is proposed in the feasibility study, and 9,000t ammonia with concentration of 20%, the ammonia tank (1×100m³) with normal storage of 90t in the plant area, as well as the acid-base tank of the chemical water treatment workshop are used annually in thermal power project (including the consumption for the Comprehensive Solid Wastes Utilization Project).

4.2.2 Main technological process and pollution production node

410t/h boiler production process and pollution discharge node are as shown in Figure 4.2-1.

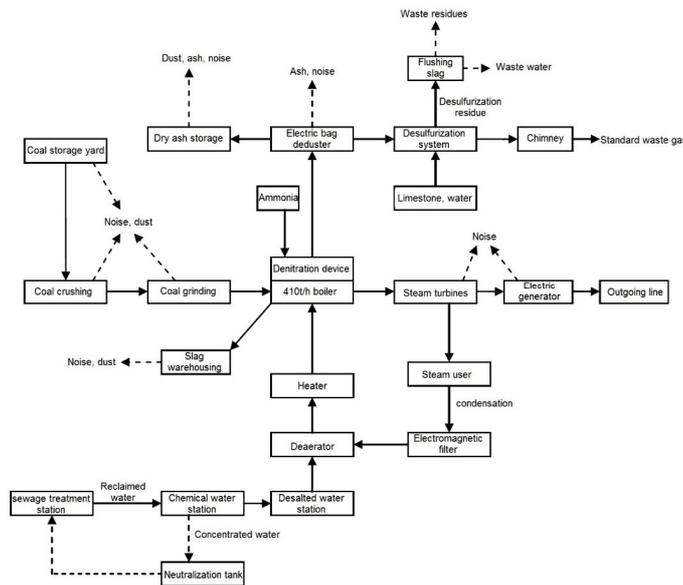


Figure 4.2-1 Technological Process of Power Plant and Pollution Discharge Node

4.2.3 Water balance

(1) Initial rainwater checking

According to the rainstorm intensity formula in Jingzhou: $q=684.7(1+0.854lgp)/t^{0.526}$

(L/s·ha.), where: P-recurrence period, 1 year, t-rainfall duration (min). Take P=1, t=15min, then $q=164.7$ (L/s·ha.), calculate the rainwater flow according to the formula $Q=q \times F \times \varphi$ (φ is the runoff coefficient, 0.5). The plant area covers an area of about $173,900\text{m}^2$, and upon calculation, the initial storm sewage flow is about $1.432\text{m}^3/\text{s}$, and the initial rainwater is $1,288.8\text{m}^3/\text{time}$. There are about six rainstorms in a year, and the initial rainwater is about $7,732.8\text{m}^3$, averagely $3.4\text{m}^3/\text{d}$.

(2) Water balance

Combining the water consumption of the proposed works, the Phase I of the Project is only built with three (two in use and one for spare) 410t/h boilers and assorted steam turbine units and generator units; this assessment is to carry out water balance analysis according to 4×60MW units, and conversion shall be conducted by building only half of the water consumption and halving the displacement. See Table 4.2-4 for the water balance of the Project.

Table 4.2-4 Water Balance of the Final Phase (4×60MW) of the Project

SN	Section	Water consumption (m^3/h)					Loss m^3/h	Displacement m^3/h	Remarks
		Total	Reclaimed water of wastewater station	Demineralized water	Recycled water	Recycling Reclaimed water			
1	Circulating cooling station	4904.16			4812	92.16	70.64	21.52	Drainage as industrial make-up water
2	Industrial water system (including cooling water for blower bearing, etc., dosing and air conditioner make-up water)	181.52	160				6	154	60 of them is cooled in the intermission-draining pit, then 142.16 recycled for the cooling tower, and the rest 11.84 enters into the reusing water tank
								21.52	Enter into the reusing water tank
3	Boiler make-up water system	546	546				496	50	Enter the wastewater treatment station of the whole plant
4	Water for desulfurization system	50				50	45	5	Discharge for dust reduction in the ash yard
5	Spraying of ash yard	5				5	5		
6	Ground flushing of main power house and tank farm	1.36				1.36		1.36	Enter the wastewater treatment plant of the whole plant
7	Humidifying by ash handling system	2				2	2		
8	Slag handling system make-up water	10				10	10		
9	Spraying coal yard for dedusting	10				10	10		
10	Flushing ash handling region	5				5	2	3	Outer drainage enters the coal bearing wastewater treatment station
11	Flushing makeup water for the coal handling system	25				25		25	

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12	Domestic water	5	5 (fresh water)			1	4	Enter the wastewater treatment station of the whole plant
13	Incidental water consumption		10			10		
Total		5745.04	721			222.04	657.64	285.4

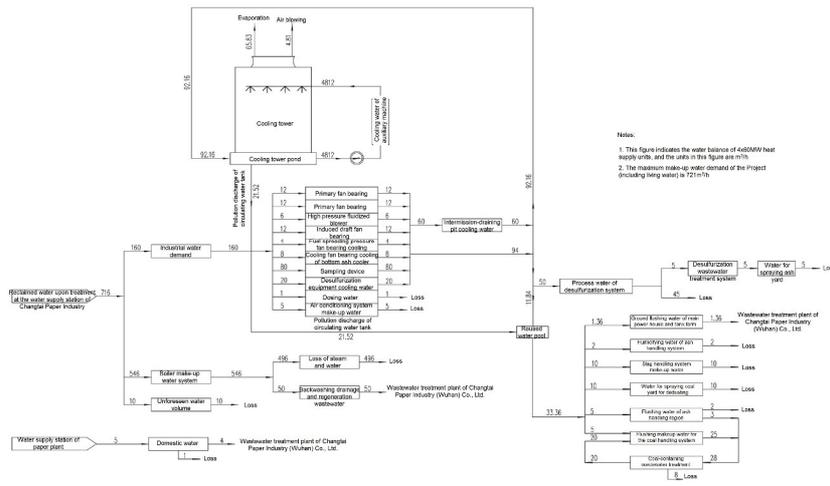


Figure 4.2-2 Project Water Balance

4.2.4 Steam balance

The steam balance of the whole plant is as shown in Figure 4.2-5.

Table 4.2-5 Steam and Water Balance of the Whole Plant

SN	Item	Quantity (t/h)
1	Loss of circulation of water vapor in the plant	49.2
2	Blowdown loss of boiler	32.8
3	Steam for paper plant	187.8
4	Steam for external supply	211.25
5	Closed cooling water 4×120t/h, water make-up rate 1%	4.8
6	Unforeseeable water volume	10
Total		495.85

According to Letter of the People's Government of Gong'an County on Reporting the Scheme of Shutting Down Small Boilers of the Enterprise in Qingji Industrial Park of Hubei Gong'an Economic Development Zone by Gong'an County (People's Government of Gong'an County, July 8, 2015) and schedules issued by Gong'an County to Provincial Development and Reform Commission, the Project supplies steam outwards, while a small part of small boilers are shut down; the list of shutdown small boilers receiving steam from the Project is as shown in Table 4.2-6 (see annex for details).

Table 4.2-6 Details of Proposed Shutdown Small Boilers in Qingji Industrial Park

SN	Name of employer	Boiler type	Qty.	Evaporation (t/h)
1	Hubei Zhencheng Paper Co., Ltd.	SHX8-1.6-WIII	1	8

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2	Hubei Fuyi Building Materials Co., Ltd.	YLL-1400MA	1	2.5
3	Qinchu Paper Industry Co., Ltd.	XL35/3.82	1	35
4	Kaiyuan Packaging Co., Ltd.	SZL4-1.25-AD	1	4
5	Hairui Fishery Co., Ltd.	DZL-4-1.25-AII	1	4
		DZL-2-1.25-AII	1	2
6	Hubei Isolane Agricultural Science and Technology Co., Ltd.	DZL-2-1.25-AII	1	2
		XG-35/3.82-M	2	70
7	Shine Star (Hubei) Biological Engineering Co., Ltd.	Q60/820-20-20-1.27-350	1	20
		SHX2.5-1.25-W1	1	25
8	Hubei Huaye Aquatic Product Co., Ltd.	DZL-4-1.25-M(X)	1	4
9	COFCO Cereals and Oils Industry (Jingzhou) Co., Ltd.	SZL10-1.25-AII	1	10
		SZL20-1.25-AII	1	20
		SZL10-1.25-AII	1	10

4.2.5 Balance analysis for main materials

(1) Material balance analysis

The main material of the Project is fired coal, and the annual coal consumption of the final phase of the Project is $4 \times 47.4912 = 1,899,648 \text{t/a}$; in addition, limestone is added to the desulfurization part, and ammonia (with concentration of lower than 20%) must be added to denitration; since good combustion of fired coal will be greatly reduced, the main material balance is as shown in Figure 4.2-3.

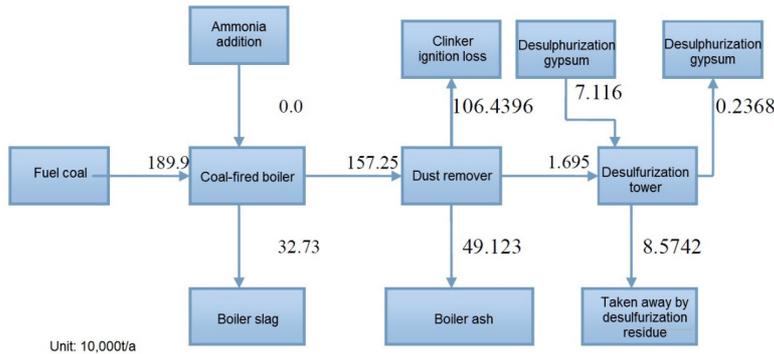


Figure 4.2-3 Material Balance of Final Phase of the Project

(2) Sulfur element balance analysis

According to the coal consumption provided by the Employer ($4 \times 474,912 \text{t/a}$) and the coal element analysis report (design coal contains 1.0% sulfur), combining the proposed desulfurization scheme, as well as the combustion mode and ash handling form of boiler, this assessment is to analyze the sulfur element balance based on the design coal consumption at full load operation of the final phase ($4 \times 410 \text{t/h}$ boilers); the diesel oil for each ignition is about 15t, ignition for three times every year, and the sulfur content of diesel oil is calculated by 0.2% Phase I project is halved, and the sulfur balance of the proposed project is as shown in Figure 4.2-3.

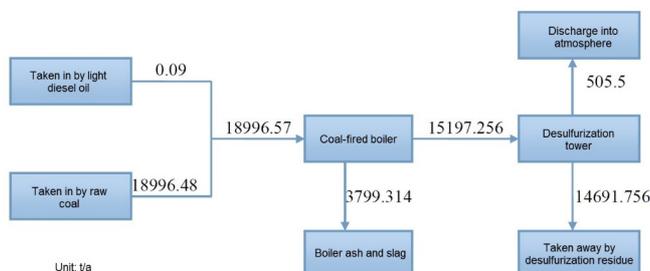


Figure 4.2-3 Sulfur Balance of Final Phase of the Project

4.3 Analysis for Pollution Factors

4.3.1 Pollution factors during construction

(1) Construction dust

The flying dust will be generated during site leveling, piling, excavation, backfilling, road pouring, transportation of building materials, storage in the open air, loading and unloading, stirring, etc. in the whole construction process, and construction dust will be worsened in case of strong wind and dry weather.

(2) Construction noise

The noise during construction is mainly divided into mechanical noise, construction noise and construction vehicle noise. The mechanical noise is mainly caused by construction machineries, such as leveling machine, road roller, stirrer and milling machine, etc. most of which is point acoustic source; the construction noise mainly refers to some sporadic beating noise, crash noise of handling vehicles, cries, crash noise of demolition and assembly of formwork, most of which is instant noise; the construction vehicle noise belongs to traffic noise.

(3) Construction wastewater

The wastewater during construction mainly includes domestic wastewater of construction personnel, subsurface filtration, slurry generated in the construction process, flushing wastewater of construction vehicles and construction machineries and wastewater of water and soil loss arising from rainfall.

(4) Solid wastes

The site of the proposed works is flat; there is a little site leveling cut and fill according to the general layout, which can be basically balanced, thus spoil will not be generated during construction. However, a certain amount of construction wastes and household garbage will be generated in the construction process.

4.3.2 Analysis for pollution factors during operation

(1) Waste gas

The main fuel of the Project is fired coal. The main waste gas includes tail gas emitted by vehicles in coal transportation, flue gas generated by fluidized bed incinerator, and unorganized odor generated in the forwarding and storage process of paper making waste residue and sludge, etc.

1) For the flue gas generated by the fluidized bed boiler in the combustion process, the main pollutants can be divided into dust (particle), SO₂, NO_x, mercury and its compound, etc. These pollutants are mainly discharged to the environment through the chimney of the

works, i.e. organized emission source.

- 2) Dust will be generated in the fired coal unloading process, i.e. unorganized emission source.
- 3) The incoming of raw coal, desulphurization gypsum and other bulk materials, and the outgoing of ash and slag and desulphurization gypsum will bring about flying dust along the offsite transportation roads and vehicle exhaust influence.
- 4) Transferring and crushing of raw and auxiliary materials in the plant area will generate dust.
- 5) Dust of fired coal storage yard, dust generated by the ash bin and slag bin.
- 6) Cooking fume from the canteen (the staff's lives of the Project depend on relevant facilities of the paper plant project).

(2) Waste water

Production wastewater: In accordance with water utilization and feasibility study report, wastewater generated from the Project mainly includes flushing wastewater of coal handling trestle and forwarding station, etc., ground flushing wastewater of main power house and tank farm, backwashing drainage and regeneration wastewater, wastewater from laboratory and machine maintenance, desulfurization wastewater, boiler wastewater and chemical water workshop backwashing water, etc. The main pollution factors include pH, COD, BOD₅, SS and ammonia nitrogen, etc.

Sanitary wastewater: domestic wastewater generated by the living quarters and office area, mainly pollution factors include COD, BOD₅, SS, etc.

In addition, the initial rainwater is also included.

(3) Noise

The noise of the Project is mainly from boiler room, generator and other supporting facilities, and in addition, automobile transportation and loader operation noise will be generated in transportation of the raw and auxiliary materials and solid wastes. The influence on the offsite is mainly along the transportation roads.

(4) Solid waste

Ash and slag and desulphurization gypsum slag generated in the process of burning coal, a few used resins (hazardous wastes) generated in the demineralized water station, and household garbage generated by the staff in daily life.

4.4 Proposed Pollution Control Measures

4.4.1 Prevention and control measures for water pollution

It is planned to apply the separated drainage system, namely drainage systems for domestic sewage, production wastewater and rainwater.

The wastewater mainly includes water drained from the chemical water treatment system, domestic sewage, washing water from the coal handling system, oily sewage, wastewater from the desulfurization system, sewage from the cooling tower and other kinds of wastewater. The corresponding treatment facilities shall be taken based on the generation place and water quality and quantity. Various pollutant indexes upon treatment shall meet the requirements of standard A of *Integrated Wastewater Discharge Standard* (GB8978-1996). Main control measures to be taken are as follows:

(1) Water drained from the chemical water treatment system

Backwashing drained water and regenerated wastewater is generated by the boiler feedwater treatment system at the speed of about 50t/h, and then drained to Sewage Treatment Plant of Changtai Paper Industry (Wuhan) Co., Ltd. after its pH value is adjusted in the neutralization tank.

(2) Domestic sewage

The treated domestic sewage is drained to the wastewater treatment plant proposed to be built by Changtai Paper Industry (Wuhan) Co., Ltd.

(3) Washing water from the coal handling system

Washing water drained from the coal handling system flows into the coal-water settling pond; water drained from the coal yard flows into the coal-water settling pond through drainage ditches around the coal yard; and finally the treated drained water is recycled. Its treatment process flow is as follows: wastewater washing → settling pond → filter plant → clean water tank → recycling

(4) Oily wastewater

The oily wastewater mainly includes: washing water from the steam engine room and wastewater for flushing boiler room and grounds of other oily places, which are drained to the wastewater treatment plant of Changtai Paper Industry (Wuhan) Co., Ltd. after being collected by pipes and treated by mechanical gravity type or multi-stage combined efficient oil-water separator.

(5) Wastewater from the desulfurization system

The desulfurization wastewater enters the desulfurization wastewater treatment device for neutralization (alkalization) and flocculation treatment, and then delivered to the settling/concentration tank, and the effluent is recycled after its pH value is adjusted in the clear water tank. It is used for spraying the ash yard after being treated by the desulfurization wastewater treatment system. The treatment process is as follows: wastewater desulfurization → buffer tank → wastewater pump → neutralization tank → reaction tank → flocculation tank → settling/concentration tank → clear water tank → clear water pump → filter → reuse point; desulfurization residue treatment way: mud → filter press → mud bucket → transportation by truck.

(6) Wastewater from the cooling tower

Wastewater from the cooling tower of the power plant flows into the reusing water tank for recycling.

Based on the principle of water conservation, various kinds of treated wastewater generated by the power plant enter the reusing water tank for afforesting in the plant, road washing, dry ash humidifying, and make-up water for flushing from coal handling system and dust removal system. On this basis, various kinds of wastewater generated by the Project lead to low effect on the water environment around the plant site.

4.4.2 Control measures for waste gas pollution

Flue gas pollution control measures of the Project:

(1) SO₂

The circulating fluidized bedboiler + external limestone - gypsum wet flue gas desulfurization system shall be applied to ensure the total desulphurization efficiency to be greater than or equal to 96.5%. The flue upon reaching the standard shall be exhausted by the exhaust funnel with height of 180m and outlet diameter of 4m.

(2) Soot

Smoke dust shall be removed by the electric bag dedusting system with the total dedusting efficiency of greater than or equal to 99.93% (the electric bag deduster (99.85%) + desulfurization system (50%)), and then discharged by the exhaust funnel with height of 180m and outlet diameter of 4m upon reaching the standard.

(3) NO_x

The SNCR denitration technology is applied for the boiler. The ammonia water shall be

served as the denitrifying agent with the denitrifying efficiency of greater than or equal to 50%. Nox shall be exhausted by the exhaust funnel with height of 180m and outlet diameter of 4m.

(4) Mercury and its compounds

Mercury can be controlled to be discharged by virtue of desulfurization of conventional desulfurization, denitration and dedusting technologies or devices, with the removal efficiency of mercury of more than 70%. The demercuration efficiency of the Project shall be taken into account based on 70%.

(5) The wind-proof and dust-suppressing net shall be provided around the open fuel coal storage yard. Influences on the environment by coal dust and dust can be lowered by providing the green belt of a certain width in the ash yard and spraying water for dust suppression.

4.4.3 Measures for Prevention of Noise Pollution

Noise is mainly from mechanical power generated by various kinds of equipment during operation, gas power noise from different fans, air ducts and steam pipes and alternating motions of magnetic fields of electric equipment, such as turbine, generator, blower, cooling tower, etc.

Control measures for noise pollution taken by the Project are as follows:

(1) The one with low noise of the same kind of equipment shall be selected in equipment selection. The equipment noise limit shall be proposed to the manufacturer at the time of signing Technical Agreement on Equipment Supply.

(2) The manufacturer shall be required to provide the heat shield lined with the acoustic panel absorber to the steam turbine generator unit to lower noise, meeting the state-specified standards.

(3) Independent foundation shall be applied for such large equipment as steam turbine, generator, induced draft fan and various water pumps for aseismatic design. Noise control shall be made for the cooling tower, and such noise reduction measures as noise reduction barriers and other noise reduction measures shall be additionally provided if necessary.

(4) Silencer shall be provided at the exhaust inlet of the blower to lower aerodynamic noise.

(5) Vibration and impact control shall be concerned in pipe layout design and selection of supports and hangers, so as to lower noise.

(6) The centralized control room shall be provided with the foyer and dual-layer glass sound-proof doors and windows. Acoustic and sound-insulation materials shall be applied on its interior wall, and acoustic ceiling is applied for its roof. Shock-absorbent ceiling, shock-absorbent interior wall and shock-absorbent floor are applied during the structural design so that noise in the centralized control room is lowered to be less than 60dB(A).

(7) Workshops with strong noise source are provided with duty rooms to isolate the workplace from the strong noise environment, so as to protect the worker's health.

(8) Overall planning and reasonable layout shall be realized in general layout of plant area. Sound source equipment and workshops shall be intensively arranged and shall keep away from the noise-sensitive regions.

(9) Influences on the outside by the noise shall be lowered generally by taking into account the green belt in the greening design of the plant area and making the best of noise reduction of the plants.

4.4.4 Measures for Prevention of Solid Waste Pollution

Solid wastes of the Project mainly include ash and slag and desulfurization gypsum. This assessment does not include the ash yard. The Employer will entrust the qualified Hubei Academy of Environmental Sciences

Environmental Impact Assessment Organization to make an assessment on environmental impact of the ash yard.

(1) Ash and slag

The policies of combination of storage and use and active use will be applied for ash and slag disposal. Except for the schemes of ash and slag separation and dry ash handling in the plant, the plant is internally provided with the intermediate ash (slag) transport storage and vehicle bulk machine and sealed tanker. Slag is transported to the ash yard by the sealed tanker, and the dried ash humidified is transported to the ash yard or delivered to the user by virtue of the sealed tanker. Ash is stored in the ash yard by humidifying and rolling the stored ash in a dried manner.

The positive pressure pneumatic ash handling system is applied for the ash removal system: ash bucket of deduster → bin pump → ash silo → bulk machine → tanker → user. The mechanical slag handling system is applied for slag removal: submerged scraper conveyor → bucket chain conveyor → slag warehouse → sealed tanker → ash yard.

(2) Desulphurization gypsum

The gypsum, the dehydrated by-product of the desulfurization system, is comprehensively used or stored in the ash yard.

4.5 Analysis for Pollutant Discharge

4.5.1 Waste gas

(1) Boiler flue gas

Estimation (check of the type of coal) is made by data provided by the feasibility report, and check is made based on the boiler of 4×410t/h. With the smoke volume of 4×379,230m³/h of the Project, the flue gas is denitrated in the furnace, and then exhausted by the exhaust funnel with height of 180m and outlet diameter of 4m upon dust removal and desulfurization to meet the standards. Besides, the boiler is ignited by light diesel oil three times a year. The light diesel oil is consumed for about 15t every time, and 45t every month.

1) SO₂

Based on sulfur balance, fuel coal takes 18,996.48t/a of sulfur. By the conversion rate of 80%, the amount of SO₂ is 30,393.6t/a. Desulfurization by wet processes is applied for desulfurization of the flue gas generated by boiler combustion. Besides, with partial desulfurization effect of the electric bag deduster, 505.5t/a of sulfur exhausted from the exhaust funnel is converted into 1,011.0t/a of SO₂ emission, and emission concentration into 81.68mg/m³.

For ignition lasts 6-8h, this assessment is calculated based on average 7h. The flue gas amount is 67,000m³/h at the time of ignition. Ignition or extension requires exhaust by the desulfurization system. By the sulfur content of light diesel oil of lower than 0.2%, the annual diesel oil consumption is 90kg, namely 0.18t of SO₂ (converted theoretically and completely). In fact, unlike the sulfur content, combustion temperature, conversion rate and desulphurization efficiency, the actual value of the amount of SO₂ generated by light diesel oil is greatly lower than the theoretical value. By referring to sulfur balance in the fire coal of this assessment, this assessment is reduced into the fire coal. SO₂ emission calculated in the assessment is regarded to include the emissions of fuel coal and light diesel oil.

2) NO_x

The low NO_x combustion technology + SNCR denitration technology is planned to be applied for the boiler to remove NO_x generated by the Project. The low NO_x combustion technology can be applied for the fluidized bed boiler to control the NO_x concentration in the boiler flue gas to be less than 200mg/m³. Upon the SNCR denitration technology (the denitration effect is required to be greater than or equal to 50%), calculated by 55.5%, the emission of NO_x exhausted from its combustion is 1,014t/a and its emission concentration is

81.92mg/m³ in this assessment.

Likewise, NO_x from the ignition diesel oil flue gas is not separately checked in this assessment on account that the consumption of light diesel oil is tiny compared with the fire coal consumption, and the flue gas passes through the denitration system. NO_x emission calculated in the assessment is regarded to include the emissions of fuel coal and light diesel oil.

3) Soot

On the basis of the checked flue gas amount, when the output of smoke is preliminarily checked to be 0.0936kg/kg based on the related computation formations, the output is 177,802.56t/a and the generation concentration is 14,364.32mg/m³. Electrostatic-bag precipitation efficiency and emission standard ($\leq 30\text{mg/m}^3$) are planned to be checked based on 28mg/m³ in this assessment, and the preliminarily checked emission is 346.59t/a.

Likewise, smoke from the ignition diesel oil flue gas is not separately checked in this assessment on account that the consumption of light diesel oil is tiny compared with the fire coal consumption, and the flue gas passes through the dust removal system. Smoke emission calculated in this assessment is regarded to include the emissions of fuel coal and light diesel oil.

4) Mercury and its compounds

Mercury can be controlled to be discharged by virtue of desulfurization of conventional desulfurization, denitration and dedusting technologies or devices, with the removal efficiency of mercury of more than 70%. Considering demercuration efficiency as 70% of the Project, the actual mercury emission concentration can meet the discharge standards of mercury and its compounds in the fire coal boiler to be 0.003mg/m³, and the annual emission is 0.037t/a.

(2) Quick lime warehouse and delivery system

For quick lime, as the desulfurizer for desulfurization in the project furnace, finished product power is purchased. It is planned to build two quick lime powder warehouses with effective volumes. By the designed coal quality, their storages can meet the demands of 4 boilers. The capacities are designed to be 450m³ (two) based on 5 days of storages of 2 furnaces for flue gas desulfurization as the effective volume. Limestone flour finished product is transported to the quick lime warehouses by virtue of the sealed tanker. The overall process of transporting quick lime powder to the plant for storage, and then transporting to join reaction is essentially conducted in the sealed environment. Moreover, the dust control unit provided with negative pressure exhaust is disposed around the discharge hopper and the top of the quick lime powder warehouse. The top of the quick lime powder warehouse is provided with the bag filter to extract gas from the ash silo by virtue of the fan. Besides, the gas is filtrated by the bag filter and then directly exhausted to the atmosphere by the outlet of the fan.

The limestone flour for desulfurization is transported by the sealed tanker, and then transported to the limestone powder warehouse for seal and storage by the air pump. Ammonia water for denitration is transported by the sealed tanker, the special transportation vehicle, and then downloaded to the ammonia water tank for storage by the pump.

(3) Coal breaking and transfer

One breaking room and two middle transfer stations are provided. Raw coal from the dry coal shed is transported by the tunnel 1# and the trestle, passes through the coal handling trestle 2# after passing through the transfer station 1#, and then enters the tunnel 3# and the coal handling trestle after passing through the transfer station 2#, enters the breaking room, and finally enters the deaerator and coal-bunker bay through the coal handling trestle 4# after being broken to reach the requirements. The entire process is conducted in the sealed channel of the whole delivery system. However, the transfer stations 1# and 2# and the

breaking room will generate numerous powder, and then discharged by the 15m-high exhaust funnel upon dust removal by the bag filter.

(4) Ash silo and slag silo

Two slag storages and three ash bins are built. Ash and slag temporarily stored in the plant are transported to the proposed ash yard by the tanker (environmental impact assessment is made additionally). For the ash silo and the slag silo are provided with the dedusters, flying dust is exhausted by the 15m-high exhaust funnel after being dedusted by the bag filter.

(5) Ash silo and slag silo

The dense phase pneumatic conveying system with positive pressure is applied for the ash handling system. One pneumatic ash conveyer is respectively installed under each ash bucket of the electric bag deduster and economizer, and the discharge period is set and the operation time is adjusted. In the meanwhile, the high-level signal is configured to control ash to be preferably discharged into the ash conveying pipeline. For alternative operation of the transmitters, the continuous operation mode is applied for the entire pneumatic conveying system to convey the fly ash to the ash silo for storage. The bag type deduster is provided on top of the ash silo, for discharging the ash conveying air to the atmosphere upon cleaning and filtering. The purified air is exhausted in an unorganized way. By the analogy analysis, the unorganized emission source intensity is 0.01g/s, the annual emission is 0.294t/a, and the total emission of the ash silo and the slag yield is 0.588t/a.

(5) Calculation for dusting in the coal yard

The flying dust in the coal storage yard is from the surface of the natural coal pile and operation of the stacker and the taker.

① Dusting amount on the surface of the coal pile of the coal yard

The empirical formula of the dusting amount of the coal dust from the coal pile under an action of natural wind power:

$$Q = 2.1(\mu - \mu_0)^3 P e^{-1.023W} \cdot f_i$$

Where: Q - dusting amount of the coal yard, kg/a;

P - coal storage of the coal yard;

f_i - annual frequencies of different air speeds, %;

W - water content of the coal surface, %;

U₀ - dusting wind velocity, taking 4.4m/s here;

U - ambient wind velocity, m/s.

The coal pile leads to dusting only if the ambient wind velocity is greater than the dusting wind velocity. In terms of local weather analysis of Gong'an County, the maximum air speed is 2.2m/s under the local monthly average air speed. Also, the wind-proof and dust-suppressing net is additionally installed to further lower the wind velocity, which is far from meeting the dusting wind velocity. As a result of this, it is believed that the surface of the coal pile in the coal yard does not result in dust after the wind-proof and dust-suppressing net is additionally installed.

② Loading/unloading dusting amount of the coal yard

The empirical formula is applied to calculation of the dusting amount during coal piling in the coal yard:

$$Q=1133.33 \times U \times 1.6 \times H \times 1.23 \times e^{-0.28W}$$

Where: Q - dusting amount of the coal yard, mg/s;

H - material drop, m; taking 0.5m;

U - average meteorological wind velocity, m/s; taking 1.41m/s;

W - water content of the coal yard, %; water is sprayed to lower flying dust during coal loading/unloading in the coal yard. The water content of the coal could reach 8%, and W could take 8%.

Based on the aforesaid formula, the dusting amount of the dry coal shed of the proposed project is about 816.7mg/s. Powder coal dust could be reduced to be more than 75% by applying the sealed power house as the dry coal shed, spraying water in the plant area during loading/unloading, and prohibiting operation in windy days. Therefore, the unorganized powder discharge is 6t/a after the flying dust is obstructed by the power house.

Table 4.5-1 List of Intensities of Main Pollution Sources and Predictive Emissions of the Proposed Works

SN	Waste gas generation node		Volume of flue gas (Nm ³ /h)	Exhaust funnel		Outlet temperature, °C	Contaminant	Generation			Removal efficiency, %	Emission		
				Height	Inner diameter of outlet			Concentration (mg/Nm ³)	kg/h	t/a		Concentration (mg/Nm ³)	Discharge amount (kg/h)	Discharge amount (t/a)
1	4×410t/h Boiler flue gas		4×379230	180	4	60	SO ₂	2455.44	3724.71	30393.6	99.97	81.68	123.89	1011
							NO _x	180	273.04	2228	55.5	81.92	124.26	1014
							Soot	14364.32	21789.53	177802.56	99.76	28	42.47	346.59
							Mercury and its compounds	0.01	0.015	0.1233	0	0.003	0.00453	0.037
2	1# transfer station	Phase I	10000	15	0.8	20	Particles	2000	20	163.2	99.5	10	0.1	0.816
		Phase II	10000	15	0.8	20	Particles	2000	20	163.2	99.5	10	0.1	0.816
3	2# transfer station	Phase I	10000	15	0.8	20	Particles	2000	20	163.2	99.5	10	0.1	0.816
		Phase II	10000	15	0.8	20	Particles	2000	20	163.2	99.5	10	0.1	0.816
4	Crusher room	Phase I	10000	15	0.8	20	Particles	20000	200	1632	99.8	40	0.40	3.264
		Phase II	10000	15	0.8	20	Particles	20000	200	1632	99.8	40	0.40	3.264
5	Coal bunker	Phase I	10000	15	0.8	20	Particles	2000	20	163.2	99.5	10	0.1	0.816
		Phase II	10000	15	0.8	20	Particles	2000	20	163.2	99.5	10	0.1	0.816
6	Ash silo 1		25000	20	1.5	20	Particles	5000	125	1020	99.7	15	0.375	3.06
	Ash silo 2		25000	20	1.5	20	Particles	5000	125	1020	99.7	15	0.375	3.06
	Ash silo 3 (Phase II)) 25000	20	1.5	20	Particles	5000	125	1020	99.7	15	0.375	3.06
7	Slag silo	Phase I	10000	22	0.5	20	Particles	3000	30	244.8	99.5	15	0.15	1.224
		Phase II	10000	22	0.5	20	Particles	3000	30	244.8	99.5	15	0.15	1.224

Total	Phase I (build 3 boilers, 2 for use and 1 for spare)				SO ₂			15196.8			615.5
					NOx			1114			557
					Soot			88901.28			173.295
					Mercury and its compounds			0.06165			0.0185
					Dust			2937.6			13.056
	Phase II (build 2 boilers)				SO ₂			15196.8			615.5
					NOx			1014			557
					Soot			88901.28			173.295
					Mercury and its compounds			0.06165			0.0185
					Dust			2937.6			9.996
	Phase I + Phase II (5 boilers in total, 4 for use and 1 for spare)				SO ₂			30393.6			1011
					NOx			2228			1014
					Soot			177802.56			346.59
)			Mercury and its compounds			0.1233			0.037
				Dust			4855.2			23.052	

4.5.2 Waste water

Based on the principles of "Distributary of Clear Water and Sewage" and "Multiple-use of Water", various kinds of wastewater are treated. Rainwater is drained to the municipal rainwater pipe network system after flowing into the rainwater pipe network in the plant area. Wastewater normally drained includes intermission-draining cooling water, water drained from the chemical water treatment system and domestic sewage; wastewater abnormally drained includes boiler washing wastewater. With low overall water discharge, the pollutants mainly include salts, COD and ammonia nitrogen.

Generation conditions of wastewater discharged by the Project are as follows:

(1) Intermission-draining cooling water

The circulating cooling water is recycled after being cooled by the mechanical ventilating cooling tower. The intermission-draining cooling water includes wastewater drained from the cooling water and water drained from the blow-down cooling well of the boiler, with the water discharge of 9.5m³/h in total. To clean the sewage, it can be directly drained into the sewage pipe network of the development zone.

(2) Water drained from the chemical water treatment system and for washing the boiler

The amount of wastewater generated by ion exchange resin regeneration and washing of the chemical water treatment system is 50m³/h. It can be directly drained into the wastewater treatment plant after being treated in the neutralizing water tank.

When the stopped boiler is pickled, main pollutants of the pickling water include pH value and SS. With frequency of wastewater for washing the boiler as 500m³/furnace-times, the boiler is washed about once about 3-4 years. The 700m³ wastewater neutralization tank is built in the plant. The specialized corporation is entrusted to neutralize, coagulate, absorb and precipitate the chemical washing wastewater for the boiler. The wastewater is drained into the wastewater treatment station proposed by Changtai after meeting the standard.

(3) Water for washing ash handling system of washer of coal handling system

Main pollutants of the washing water drained from the coal handling system include coal cinder and SS. The washing water flows into the coal-water settling pond; water drained from the coal yard flows into the coal-water settling pond through drainage ditches around the coal yard; and finally the treated drained water is recycled.

(4) Oily wastewater

Main pollutants of the oily wastewater include SS and petroleum. It flows into the wastewater treatment plant after oil is removed.

(5) Wastewater from the desulfurization system

Suspended matters in the desulfurated wastewater, pH value, mercury, arsenic, fluorine, calcium, magnesium, aluminum, iron as well as chloride, sulfate, sulfite and carbonate are enriched to lead to high concentration, so they must be discharged to prevent corrosion on equipment. It is used as the water for spraying the ash yard after being treated by the desulfurization wastewater treatment system. Wastewater volume is 5t/h (120t/d).

(6) Domestic sewage

With output of 4.0m³/h, the domestic sewage of the Project fully flows into the wastewater treatment station for treatment after being pre-treated by the septic-tank.

See generation, reuse and drainage of the wastewater in Table 4.5-2.

Table 4.5-2 Wastewater Generation, Reuse and Drainage of the Proposed Project

SN	Category	Output (t/h)	Main pollutant	Treatment measures and orientation	Recycling amount (t/h)	Discharge amount (t/h)

EIA Report on the Yangjiachang Town Industrial Park CHP Project in Gong'an County

1	Intermission-draining cooling water	154.0	Salts	92.16t/h is directly reused to the tower basin of the cooling tower, 50t/h reused to the desulfurization system, and the rest 11.84 flowing into the reusing water tank	154	0
2	Wastewater drained from the chemical water treatment system and for washing the boiler	50.0	pH, SS	It flows into the wastewater treatment plant after being neutralized and clarified	0	50
3	Wastewater for washing coal handling system (inclusive of water for washing the ash handling system)	28.0	SS	Treated by the coal-containing wastewater treatment station, it is continuously reused to the coal handling system for water supplementation	20	
4	Wastewater from the desulfurization system	5.0	pH, SS	After treated by the desulfurization wastewater treatment system, it is applied as water spraying roads in the plant area		
5	Oily wastewater	1.36	SS and petroleum	It flows into the wastewater treatment plant after being treated by the oil-water separation device		1.36
6	Domestic sewage	4.0	SS, COD, BOD, NH ₃ -N	It is delivered to the wastewater treatment plant for treatment after being pre-treated by the septic-tank		4.0
Total		242.36	/		154	55.36

Note: The wastewater volume is the one upon completion, so the wastewater amount of phase I project is checked based on half of the wastewater amount.

See wastewater generation, reuse and drainage of the Project finally in Table 4.5-3.

Table 4.5-3 Discharge of Wastewater Pollutants of the Proposed Project

SN	Discharge type of wastewater		Output and discharge (m ³ /a)	Concentration discharge of main pollutants						
				pH	SS	COD	BOD ₅	NH ₃ -N	Petroleum	
1	Wastewater drained from the chemical water treatment system and for washing the boiler	Generation	Concentration (mg/L)	408000	6~9	45	30	--	--	
			Quantity(t/a)			18.36	12.24			
	Emission	Concentration (mg/L)	6~9		10	30	--	--		
		Quantity(t/a)			4.08	12.24				
2	Oily wastewater	Generation	Concentration (mg/L)	11097.6	6~9	45	30	--	--	30
			Quantity(t/a)			0.5	0.33			0.33
	Emission	Concentration (mg/L)	6~9		45	30	--	--	5	
		Quantity(t/a)			0.5	0.33			0.055	
3	Domestic sewage	Generation	Concentration (mg/L)	32640	6~9	150	300	200	40	10
			Quantity(t/a)			4.896	9.792	6.528	1.306	0.326
	Emission	Concentration (mg/L)	6~9		10	60	10	5	5	
		Quantity(t/a)			0.326	1.96	0.326	0.163	0.163	
Discharge of the Project			Quantity(t/a)	451737.6		4.906	14.53	0.326	0.163	0.218

Note: The wastewater volume is the one upon completion, so the wastewater amount of phase I project is checked based on half of the wastewater amount.

4.5.3 Solid waste

(1) By-products generated from operation period of the proposed ash project mainly include ash and slag, desulfurization gypsum, etc. Schemes of ash and slag separation and dry ash handling are applied. Limestone-gypsum wet flue gas desulfurization technology is planned to be applied for feasibility report of the Project. The ash and slag amount of the Project is checked in the feasibility report based on the type of the designed coal; the daily utilization hours of the units are 24 hours, and the annual utilization hours are 8,160. See ash and slag discharge in Table 4.8-4.

Table 4.5-4 Amount of Ash and Slag

Unit capacity (MW)	Ash amount of an hour(t/h)			Amount of daily ash (t/d)			Annual ash amount (10 ⁴ t/a)		
	Ash	Slag	Ash and slag	Ash	Slag	Ash and slag	Ash	Slag	Ash and slag
1×410	15.05	10.03	25.08	361.2	240.72	601.92	12.281	8.1845	20.4653
4×410	60.2	40.12	100.32	1444.8	962.88	2407.7	49.123	32.738	83.8675

(2) Desulphurization gypsum

See the output of desulfurization gypsum calculated by the type of the designed coals in the feasibility report in Table 4.5-5.

Table 4.5-5 Gypsum Output

Installed capacity	Gypsum output	Design coal type
4×410MW	Hourly gypsum output (t/h)	12.52
	Daily gypsum output (t/d)	300.48
	Annual gypsum output (10 ⁴ t/a)	10.216

(3) Waste resin

Waste resin is mainly from the desalting station. According to its consumption and replacement, 95.0t of resin needs to be filled in total. On the basis of annual replace of 10%, the annual waste resin amount is 9.5t. The waste resin is a kind of dangerous waste with number of HW13. On this basis, the Employer needs to authorize the qualified unit for treatment.

(4) Domestic garbage

If 166 employees are temporarily allocated for the Project, the annual amount of office and household garbage is 56.44t in terms of amount of waste of 1.0kg per person per day.

4.5.4 Noise

The noise of the proposed project is mainly from continuous noise generated by boiler induced & forced draft fan, cooling tower, various pumps and air flue gas flow, and short-time high noise generated in boiler exhaust to the air, safety exhaust and noise generated by the garbage truck.

See the noise source intensity of the Project in Table 4.5-6.

Table 4.5-6 Main Equipment Noise Source Intensity of Proposed Project

SN	Equipment	Acoustic characteristic	Noise level (dB)	Location	Treatment measures and effects, dB(A)	Noise level after treatment dB(A)
1	Electric generator	Continuous	100	Steam turbine room	Noise isolation hood, power house sound insulation, 20	80
2	Steam turbines	Continuous	90		Noise isolation hood, power house sound insulation, 20	70
3	Induced draft fan	Continuous	100	Steam turbine room	Power house sound insulation, micropole diffusor, 25	75
4	Blower	Continuous	98	Incinerator room	Power house sound insulation, micropole diffusor, 25	63

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5	Feed pump	Continuous	92	Steam turbine room	Pump house sound insulation, noise insulation hood, 20	72
6	Circulating water pump	Continuous	80	Circulating water pump house	Pump house sound insulation, noise insulation hood, 20	60
7	Cooling tower	Continuous	85	Cooling tower	—	85
8	Air compressor	Continuous	90	Steam turbine room	Power house sound insulation, 15	75
9	Boiler exhaust	Intermittent	110	—	Silencer, 30	80

4.5.5 Summary of Pollutant Discharge of the Proposed Works

See pollutant discharge of the proposed works in Table 4.5-7.

Table 4.5-7 List of Pollutant Discharge of the Proposed Works

Item	Pollutant name	Phase I project	Phase II Project	Total discharge upon full completion
Waste gas	Amount of boiler flue gas ($\times 10^6 \text{m}^3$)	61.890336	61.890336	123.780672
	SO ₂ (t/a)	615.5	615.5	1011
	NO _x (t/a)	557	557	1014
	Flue gas (t/a)	173.295	173.295	346.59
	Dust (t/a)	13.056	9.996	23.052
	Mercury and compounds (t/a)	0.0185	0.0185	0.037
Waste water	Wastewater volume (m ³)	225868.8	225868.8	451737.6
	COD(t/a)	7.265	7.265	14.53
	BOD(t/a)	0.163	0.163	0.326
	SS(t/a)	2.453	2.453	4.906
	NH ₃ -N(t/a)	0.0815	0.0815	0.163
	Petroleum (t/a)	0.109	0.109	0.218
Solid waste	Ash and slag (t/a)	419337.5	419337.5	838675
	Desulfurization gypsum (t/a)	51080	51080	102160
	Household garbage (t/a)	28.22	28.22	56.44
Noise	After various kinds of noise from fans, steam engines, generators, cooling towers, induced draft fan and water pumps are silenced and anti-vibrated, their noise source intensities are between 65dB(A) and 85dB(A).			

4.6 Analysis for “Three Pollutants Discharge Quantities”

The project is the ancillary works of High-grade Packing Board Project with Annual Output of 2.2 million tons approved to be built by Changtai Paper Industry (Wuhan) Co., Ltd. Also, three items of Comprehensive Solid Wastes Utilization Project of Changtai Paper Industry (Wuhan) Co., Ltd. are being subject to environmental impact assessment and are new items respectively, but the three items belong to the same Employer and built in the same planned plant area. As a result of this, the items substantially belong to the technical innovation and expansion project. By referring to EIA Report on 2.20Mt/a High-grade Packaging Board Project and Environmental Impact Report on Comprehensive Utilization of Solid Waste being prepared, “Three Pollutants Discharge Quantities” of main pollutants are preliminarily checked. Moreover, based on the time sequence of staged construction of the three items, the “Three Pollutants Discharge Quantities” are checked to be “Three Pollutants Discharge Quantities” of Phase I project and final phase project (fully completed). See them in Tables 4.6-1 and 4.6-2 respectively.

Table 4.6-1 Accounting of “Three Pollutants Discharge Quantities” of Main

Pollutants in Phase I Project

Item	Pollutant name	High-grade Packing Board Project	Comprehensive Solid Wastes Utilization Project	The Project	Upon construction of the Project	Amount of increase or decrease
Waste gas (t/a)	SO ₂		77.84	505.5	583.34	+505.5
	NO ₂		97.10	507	604.10	+507
	Soot		32.55	173.295	205.845	+173.295
	Dust			13.056	13.056	+13.056
	Mercury and compounds		0.0143	0.0185	0.0328	+0.0185
Wastewater (t/a)	COD	467.1	19.224	14.53	493.589	+14.53
	BOD	76.78	3.204	0.163	80.147	+0.163
	SS	76.78	3.204	2.453	82.437	+2.453
	NH ₃ -N	38.39	1.602	0.0815	40.074	+0.0815
	Petroleum			0.109		+0.109
Solid waste (t/a)	Ash and slag	-	36768	419337.5	456105.5	+419337.5
	Pulp slag	99446.04			99446.04	0
	Silt and sandstone	20342			20342	0
	Empty filter and desiccant	560			560	0
	Sludge	103039			103039	0
	Waste steel wire and plastic	40853.8		-	40853.8	0
	Desulphurization gypsum	-		51080	51080	+51080
	Domestic garbage	274.55	15.3	28.22	318.7	+28.22
	Flying ash (hazardous waste)		7316		7316	0

Table 4.6-2 Accounting of "Three Pollutants Discharge Quantities" of Main Pollutants in Final Phase Project (Three Items are Completed)

Item	Pollutant name	High-grade Packing Board Project	Comprehensive Solid Wastes Utilization Project	The Project	Upon construction of the Project	Amount of increase or decrease
Waste gas (t/a)	SO ₂		155.68	1011	1166.68	+1011
	NO ₂		194.21	1014	1208.21	+1014
	Soot		65.10	346.59	411.69	+346.59
	Dust			23.052	23.052	+23.052
	Mercury and compounds		0.0286	0.037	0.0656	+0.037
Wastewater (t/a)	COD	920.12	37.656	14.53	972.306	+14.53
	BOD	153.35	6.276	0.326	159.952	+0.326
	SS	153.35	6.276	4.906	164.532	+4.906
	NH ₃ -N	76.68	3.138	0.163	79.981	+0.163
	Petroleum			0.218	0.218	+0.218
Solid waste (t/a)	Ash and slag	-	73536	838675	912211	+838675
	Pulp slag	178308.8		-	178308.8	
	Silt and sandstone	40684		-	40684	
	Empty filter and desiccant	1120		-	1120	
	Sludge	206078		-	206078	

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Waste steel wire and plastic	81707.6		-	81707.6	
Desulphurization gypsum	-		102160	102160	+102160
Domestic garbage	459	26.52	56.44	541.96	+56.44
Flying ash (hazardous waste)		14632	-	14632	

5. Environmental Overview of the Project Area

5.1 Natural environment

5.1.1 Geographic location

Gong'an County is situated at the margin of south-central Hubei Province, the middle reach of the Yangtze River and south bank of Jingjiang River. It neighbors Shishou City in the east, connects Songzi County in the west, borders on Anxiang County, Hunan Province in the south, and is next to the Yangtze River to the north. Also, it is separated from the central city area of Jingzhou City by the river. It is 111°48'~112°25' east longitude and 29°37'~30°18' north latitude. With total national territorial area of 2,186km², it is 76.8km long from south to north and 57.7km wide from east to west.

The Project is located at the northeast of Yangjiachang Town Industrial Park in Gong'an County. It is next to the southeast boundary originally planned by Qingji Industrial Park to the north (see its specific location in attached figure for details). Qingji Industrial Park and Yangjiachang Town are located in Yangjiachang Town, Gong'an County where is situated at the south bank of the middle and lower reaches of the Yangtze River. The plant site is 2.1km from Gong'an County to the west, 1.6km from Yangjiachang Town to the northeast, and 2.0km from the Yangtze River to the north.

See the geological location of the project building area in Attached Figure 1 for details.

5.1.2 Meteorological Features

Gong'an County belongs to subtropical monsoon climate, with moderate and humid climate and four distinct seasons. It features short frost season, sufficient sunshine, abundant rainfall, short spring, much east wind, frequent raining and severe temperature change. The annual average temperature is 16.4°C; the annual minimum temperature is -14.7°C; the yearly maximum temperature is 38.1°C. The annual mean air pressure is 1,012.1mb; the annual maximum air pressure is 1,044.9mb; the yearly minimum air temperature is 989.6mb. The annual average relative humidity is 81%, and the annual average minimum relative humidity is 71%. The mean annual precipitation is 1,125.2mm, the annual maximum precipitation is 1,588.6mm, and the annual minimum precipitation is 712.6mm. The annual average evaporation is 1,312.5mm. The maximum snow depth is 22cm. Northeast wind and north wind are annual prevailing wind directions. South wind prevails in summer, with the maximum wind velocity of 19m/s.

5.1.3 Water system and hydrography

The catchment area of Gong'an County is 199.391 km², including 14 outer rivers. The Yangtze River enters the county at Taiping port and leaves from Ouchi port to enter Shishou City, crossing 85.62 km and covering an area of 87.69 km². With rivers all around the county, there are 18 rivers, including Hudu, Songxi, Songdong, Ouchi, Youjiang, other than the Yangtze River. They flow into Dongting Lake and the Yangtze River. The project is located in Yangjiachang Town, a town along the Yangtze River. In addition to the Yangtze River, there are such inland rivers as Liuxin and Dongganqu nearby. Dongganqu is the main drainage port for domestic wastewater in Yangjiachang Town. For long-term wastewater discharge, the functions of water from Dongganqu fail to meet the standards. For this, the centralized wastewater treatment plant is built in Qingji Industrial Park and tail water discharge outlet is built in Gong'an Section of the Yangtze River depending on long-term development.

Based on years of hydrological statistic data, the annual mean water level of Gong'an Section of the Yangtze River is 34.020m, 45.0m highest in history; the mean width of the river surface is 1,950.0m, the maximum width is 2,880.0m, and the minimum width is 1,035.0m; the average water depth is 10.50m, the deepest water depth is 42.20m; the mean velocity is 1.480m/s, and the maximum velocity is 4.33m/s; the average flow is 14,129.0m³/s, the maximum flow is 71,900.0m³/s, and the minimum flow is 2,900.0m³/s; the average water temperature is 17.830°C, the highest water temperature is 29.0°C, and the lowest water temperature is 3.7°C; in the normal season (from April to June, from October to December), the average water level is 32.220m, the mean velocity is 1.49m/s, and the mean flow rate is 10,200.0m³/s; in the rain season (from July to September), the mean water level is 36.28m, the mean velocity is 1.69m/s, and the mean flow rate is 24,210.0m³/s; in the dry season (from January to March), the mean water level is 31.01m, the mean velocity is 1.18m/s, and the mean flow rate is 4,910.0m³/s.

5.1.4 Landform and Physiognomy

Based on the plain lake area, Gong'an County belongs to Huaiyang and Jiangnan Depression. It is a transition zone between Jiangnan Plain and Southeastern Hubei Hilly Terrain. With flat territory, it has flood plains in the middle and northeast and flat downland undulated slightly in the southwest. Affected by extension of Wuling Mountain, a small amount of hills can be found. It includes about 76.97% of plain, about 22.73% of plain downland and about 0.3% of low hill. The highest point is Huangshantou in the southwest border across the territory, with altitude of 236.8m. The lowest point is the bottom of Lake Yunihu, with altitude of 25m and relative height difference of 211.8m. The plain area has the highest altitude of 39.4m, the lowest altitude of 31.6m, and the relative height difference of 7.8m.

5.1.5 Geology and Seismology

Gong'an County is located in the southwest margin of Jiangnan depression basin. It is next to the uplift mountain in western Hubei to the west and Dongting Basin to the south. Yanshanian movement since Mesozoic leads to decline of Jiangnan Basin (the decline center is located between Shashi City and Qianjiang), with the surrounding mountainous areas uplifted. The basic geological structure outline and the geomorphic outline are therefore formed within territory of Gong'an County. Since the Quaternary, the strong subsidence area has constituted in the NE margin of the county under an action of Himalayan movement, with mean sedimentation rate of 8mm/100. The weak subsidence area has formed in most areas in the middle, with mean sedimentation rate of about 3.3mm/100. The tilting activity place is formed at the margin of southwest.

Hubei Earthquake Administration conducted zoning of seismic risk region and earthquake-intensity area in future 100 years in 1977. Most areas of Gong'an County are determined as seismic risk regions with earthquake magnitude M of levels 4.7~5 (intensity I0=VI degrees), and the SW zone of Ouchi port is seismic risk region with earthquake magnitude M of levels 5.1/4~5.3/4 (intensity I0=VII degrees).

5.1.6 Soil

According to the second national soil survey, the county has 4 soil groups, 7 subgroups, 19 soil genus and 99 soil species. Yellow brown soil is extensively distributed in the southwest downland. Moisture soil and meadow soil are distributed in the middle, the northeast and the western plain lake area. On account of running water sorting, grain size and silt percentage are distributed horizontally and regularly. Coarse sand grains are deposited nearby the riverbed; fine sand grains, powder grains and slime are sequentially deposited far away from the riverbed. From river bed to downland in the plain area of Gong'an County, soil texture gradually transits from sand to clay, and soil species have the distribution rules of drift sand soil, grey sand soil, grey soil-bonded sand soil, grey soil and loses correspondingly.

5.1.7 Groundwater

As per *Geotechnical Investigation Report* issued by Hubei Pengcheng Planning and Architecture Co., Ltd., the ground water around the site of the proposed project is 0.52m deep. It is stagnant water in the upper gap occurred in Layer ① plain fill, with small water yield. It is mainly supplemented by atmospheric precipitation infiltration and drained by vertical runoff infiltration. Also, it is the main source of groundwater during foundation pit excavation. However, the general centralized drainage method is applied for its small water yield. With weak water permeability, Layers ②~④ are relative impervious layers.

5.1.8 Aquatic environment

Environmental survey on aquatic environment made by Yangtze River Fisheries Research Institute of Chinese Academy of Fishery Sciences shows that 8 phylums, 57 genus of phytoplankton are detected in Gong'an Section of the Yangtze River. The quantity of bacillariophyta algae is in the ascendant, and other kinds of bacillariophyta are rather less, without the obvious dominant species. The diatom with the average amount of $13,115 \times 10^4 \text{ ind/L}$ accounts for 7,011%, followed by green alga with average amount of $1,199 \times 10^4 \text{ ind/L}$ and cyanophyta with average amount of $1,154 \times 10^4 \text{ ind/L}$, respectively accounting for 1,017% and 813%, and other kinds of algae are few. The average amount is $18,155 \times 10^4 \text{ ind/L}$, and the change scope is $9,153 \sim 26,130 \times 10^4 \text{ ind/L}$. 32 zooplanktons (exclusive of anhistozoa) are detected from the river section at the same period, with average amount of 5,135 ind/L and change scope of 1,101~125 ind/L. Based on data of Kolkwitz and Marsson system methods, the pollution degree of the water is determined by indicator organisms in the water body. In the plankton species served as the indicator organisms collected in 1997-2002, many pollution indicator species are found in β , including *Melosiragranulate* (Ehr1), *FragilariacapucinaDESM1*, *Synedraulina*(Nitzsch1) Ehr1, *Naviculabacillum* Ehr, *Keratella valga*, *Bosmina coregoni*, *Bosmina longirostris*, *Chydorus sphaericus*.

5.1.9 Current situation of fishery resources

(1) Current situation of fishery resources

With abundant fishery resources in the Yangtze River basin, the yield accounts for about 60% of national freshwater fishery yield and is as highest as 42.17 million tons in history. On this basis, it is the major centralized area for producing freshwater fishes in China. Over the years, the fishery resources of the Yangtze River are severely impacted for hydraulic construction, environmental pollution and heavy fishing in the reservoir, etc. In 1970s, the Ministry of Agriculture organized six provinces and one city to cooperate with investigation on fishery resources in the Yangtze River system, in which population biology features of commercial fishes and the spawning site are investigated and studied. 59 kinds of fishes collected from monitoring for catches in Jingzhou river section belong to 5 orders, 11 families, 43 genus and 59 species. There are 36 Family Cyprinidae, 8 Family Bagridae, 3 Family Serranidae, 3 Family cobitidae, and 8 families, 9 kinds of others. From the perspective of catches, 9 kinds of fishes, including *Coreius heterodon* (Bleeker), *Silurus soldatovi meridionalis* (Chen), *Leiocassis longirostris* (Günther), *Pseudobagrus fulvidraco*(Richardson), *CtenopHaryngodon idellus* (Cuvier et Valenciennes), Bighead Carp, Cyprinidae, black carp and *HypopHthalmichthys molitrix* (Cuvier et Valenciennes), account for 81.51% and 91.86% of total catch weights of Jingzhou and Yueyang river sections. Divided by the river section, *Coreius heterodon* (Bleeker), such main catches as *Silurus soldatovi meridionalis* (Chen) and *Pseudobagrus fulvidraco* (Richardson) in Jingzhou river section mainly account for 45.90%, 13.53% and 7.38%. The catch weight percentage sequence is *Coreius heterodon* (Bleeker) > *Silurus soldatovi meridionalis* (Chen) > *Leiocassis longirostris* (Günther) > *Pseudobagrus fulvidraco* (Richardson) > *CtenopHaryngodon idellus* (Cuvier et Valenciennes) > Bighead Carp > *HypopHthalmichthys molitrix* (Cuvier et Valenciennes) > black carp > Cyprinidae.

The diversity index of Shannon-Weaver and dominance index of McNaughton are applied. The biodiversity and species dominance indexes of Jingzhou and Yueyang river sections

(2001-2003) are calculated. Through 3 years of monitoring, it is indicated that the diversity index of Shannon-Weaver ascends in Jingzhou river section, but the species dominance index descends; while diversity index of Shannon-Weaver descends in Yueyang river section, but the species dominance index ascends. Based on X-inspection analysis, there is no significant difference between the diversity index of Shannon-Weaver and the dominance index of McNaughton in Jingzhou and Yueyang sections in the middle reach of the Yangtze River.

Table 5.1-1 Composition of Catches in Weijiazhou Section, Buhe Town, Jingzhou

Category	Weight (kg)	Percentage (%)
<i>CtenopHaryngodon idellus</i> (Cuvier et Valenciennes)	9.40	4.23
<i>HypopHthalmichthys molitrix</i> (Cuvier et Valenciennes)	7.00	3.58
<i>Silurus soldatovi meridionalis</i> (Chen)	25.77	9.11
<i>Pseudobagrus fulvidraco</i> (Richardson)	61.87	17.45
<i>Cyprinus carpio</i> (Linnaeus)	19.49	6.17
<i>Carassius auratus</i> (Linnaeus)	15.85	9.22
<i>Rhinogobio ventralis</i> (Sauvage et Dabry)	4.92	1.17
<i>Leiocassis longirostris</i> (Günther)	8.74	2.07
<i>Leiocassi crassilabis</i> (Günther)	6.55	1.55
<i>Leptobotia elongata</i> (Bleeker)	21.36	7.02
<i>Leptobotia taeniaps</i> (Sauvage)	14.80	3.51
<i>Leptobotia rubrilabris</i> (Dabry)	18.53	4.35
<i>Botia Sinibotia superciliiaris</i> (Günther)	3.65	1.36
<i>Coreius heterodon</i> (Bleeker)	22.8	11.12
<i>Siniperca whiteheadi</i> (Basilewsky)	1.70	3.56
<i>H. maculatus</i> (Bleeker)	0.93	0.22
<i>Sinilabeo rendahli</i> (Kimura)	0.55	0.13
<i>Leiobagru marginatus</i> (Gungber)	3.04	0.98
<i>Garra pingi</i> (Tchang)	0.77	1.18
<i>Opsarichthys uncirostris bidens</i> (Günther)	1.62	2.98
<i>Erythroculter ilishaeformis</i> (Bleeker)	9.95	5.35
<i>Gobiob. abbreviata</i> (Fang et Wang)	5.41	1.28
<i>Nemachilus potanini</i> (Gunther)	0.38	1.19
<i>Megalobrama amblvcephala</i> (Yih)	0.20	1.22
Total	265.28	100

The Yangtze River is the main place to live and breed four aquaculture fishes, including black carp, *CtenopHaryngodon idellus* (Cuvier et Valenciennes), *HypopHthalmichthys molitrix* (Cuvier et Valenciennes) and *Cyprinidae*. On the basis of investigation made by Yangtze River Fisheries Research Institute of Chinese Academy of Fishery Sciences, there are 9 spawning sites between Yichang Section of the Yangtze River and Chenglingji Section, with the egg laying amount of 42.17% of the total egg laying amount of the entire river (for details, see Table 4.1-2). See distribution of spawning sites at the upper reach section of Jingjiang in the Attached Figure. There are two spawning sites for four kinds of aquaculture fishes in Gong'an section of the Yangtze River: Hudu River - Muchenyuan Section, Ouchi River Estuary - Shishou Section, in which there is no spawning ground for rare fishes in Gong'an County Section of the Yangtze River.

"Four aquaculture fishes", including *CtenopHaryngodon idellus* (Cuvier et Valenciennes), black carp, *HypopHthalmichthys molitrix* (Cuvier et Valenciennes) and *Cyprinidae*, are mainly cultivated and fished in China. They are main composition of natural fish resources in the Yangtze River system. They breed, grow and fatten in the Yangtze River system, constituting the main freshwater fish objects produced and fished in the Yangtze River basin.

Table 5.1-2 Distribution of Spawning Sites of Four aquaculture fishes between Yichang and Chenglingji River Sections in the Middle Reaches of the Yangtze River

SN	Location	Scope	Extension mileage
1	Yichang	Shilihong - Gulaobei	24
2	Yidu	Yunchi - Yidu	10
3	Zhijiang	Yangxi - Zhijiang	29
4	Jiangkou	Jiangkou - Woshi	15
5	Jingzhou	Hudu River - Muchenyuan	25
6	Shishou	Ouchi River Estuary - Shishou	15
7	Diaoguan	Lajjiapu - Diaoguan	34
8	Jianli	Tashiyi - Shajiabian	25
9	Fanzui	Yanchuantao - Jingjiangmen	6

Based on the investigation on four aquaculture fishes in the middle reach of the Yangtze River by Yangtze River Fisheries Research Institute of Chinese Academy of Fishery Sciences, the overall situation of the aquatic organism resources in the Yangtze River is as follows: the overall quantity of resources is declined; changes of regional fish distribution structure shows replacement of individual small and young species; the spawning sites for migratory fishes and fishes spawning floating eggs are destroyed or reduced; recession of four aquaculture fishes mainly comprises the following causes: ① growth and reproduction of these fishes are affected by damming and building the gate between the trunk stream of the Yangtze River and the lake along the river and blocking the migratory channel for four aquaculture fishes; ② the area of lake is increasingly reduced by water and soil loss for turning lakes into fields; according to statistics, the lake area was 25,828km² in the Yangtze river basin in 1949, and is only 14,073km² now, with a decrease of 45.5%, so the space for living four aquaculture fishes is reduced by decline of the lake area; ③ excessive fishing intensity and repeated unsuccessful prohibitions of such hazardous work as fish poisoning and exploding are main causes to decrease the quantity of population size of the four aquaculture fishes.

(2) Current situation of the rare aquatic animals

The Yangtze River is a channel for migratory fishes from river and sea. Chinese sturgeon, white-flag dolphin and river dolphin are state protected rare aquatic animals. According to statistics, there are such first-class national protected animals as white-flag dolphin, Chinese paddlefish and Chinese sturgeon, and such second-class national protected animals as river dolphin and mullet in the Yangtze River. In recent years, it is difficult to find out these rare fishes in Gong'an section of the Yangtze River for decline of overall quality of the water in the Yangtze River in recent years as well as construction and artificial destruction of Gezhou Dam.

White-flag dolphin is cetacea mammal, belonging to freshwater dolphin. No one can be found in Gong'an section of the Yangtze River.

Chinese paddlefish is one of the two kinds of current acipenseridae. Its spawning site is located in Yibin section in the lower reach of Jinsha River. A part of breeding fish fries and juvenile fishes is detained in the trunk stream and tributary of the upper reach to grow, and the other part floats into the middle and lower reaches of the Yangtze River. Upon construction of Gezhouba Water Control Project, Chinese paddlefish individual can be found occasionally in the upstream of the Yangtze River because its quantity is rare.

Chinese sturgeon is a kind of migratory acipenseridae fish. It grows in the sea, and then swims to rivers for breeding. Prior to construction of Gezhou Dam, the spawning sites are located in the upper reach of the Yangtze River and the lower reach of Jinsha River. Upon construction of Gezhou Dam, its spawning site was migrated under the dam, mainly located

between Yichang Shipyard of SINOTRANS&CSC SBICO second channel sluice of Gezhou Dam and Shilihong river section. The hatched Chinese sturgeon fries float into the sea along the river water at the spawning period from October to November. Chinese sturgeon is a kind of bottom fish like swimming through deep groove and sandbank at the time of migration.

River dolphin, with common name as river pig, with spindle body, short head and elongated snout, is kind of small dolphin extensively distributed. They like herding to move in the inshore area, with gentle and timid characters. Except for the coastal region, most river dolphins are distributed widely in the middle and lower reaches of the Yangtze River. They often inhabit in the intersection between the tributary or the lake and the Yangtze River, or nearby the bottom land and the bend river section because these places have slow water flow with flow velocity of 0.3~0.5m/s generally. Experts believe that there are about 1,000 cowfishes mainly inhabiting in the river sections between Jingzhou and Wuhan as well as between Jiujiang and Tongling.

Mullet belongs to cypriniformes. They inhabit in the middle and lower layers of the river. Most adult fishes are found and spawn in the upper reach. Juvenile fishes are often clustered in the scattered stones in the middle and lower reaches of the river and river to the lake with quiet water current. Its spawning sites are distributed in the trunk stream at the upper reach of the Yangtze River and Jinsha River, Minjiang River and Jialing River. Upon construction of Gezhou Dam, Mullet could develop maturely in the middle and lower reaches blocked by the dam, and breed naturally at the river section under the dam. The river section nearby Yichang is a new mullet's spawning site. For several reasons, the quantity of mullets in the Yangtze River is declined year by year. Even, no mullets have been found in the catch investigation for years in Gong'an section of the Yangtze River.

5.2 An overview of the social environment

Gong'an County has 16 townships and towns, with layout area of 2,257km² and population of 1.01 million. As a famous abundant place, it is a national key production base of grain, cotton and oil. Mr. Bi Ye, a famous author, called it "Silver Gong'an". "Hubei Axle" and "Kaile Science and Technology" were listed in 1990s. This creates a miracle of listing two corporations in the inland agricultural county. In recent years, the county party committee and government have actively developed the industry, actively regulated economic structure and optimized the investment environment. On this basis, the industry in this county shows a cascade structure of "such leading enterprises as Kaile Science and Technology, Hubei Axle, Shine Star (Hubei), Hubei Jin'an Textile, such key enterprises as Jingdu Group, ISOLANE, followed by a multitude of small and medium sized private enterprises". Hence, this leads to six mainstay industries, including auto parts, new plastics, biochemical engineering, textile & clothing, agriculture products processing, and packaging & paper.

Yangjiachang Town, Gong'an County has a population of 54,000, is under the jurisdiction of 18 administrative villages and 3 community residents committees. It is an important town of industry in Gong'an County, Hubei Province. The industrial land of development zone is selected as the project site, which neither belongs to prime cropland preservation area, nor has the cultural relics in the assessment scope.

5.3 Overview of Qingji Industrial Park in Gong'an County

To strongly implement "Waist-Building Project" determined by Hubei Provincial Party Committee and Government determine Qingji Industrial Park as the carrier, the Party Committee and Government of Gong'an County put effort into construction of undertaking industrial transfer demonstration area in Jingzhou, create the investment depression, accelerate industry by combining provincial and municipal requirements with the local actuality. In the meanwhile, they completed *Controllable Detailed Planning for Gong'an Economic Development Zone (Qingji Industrial Park)* and assessment on planning environmental impact, and received reply suggestion from Environmental Protection Department of Hubei Province (EHH [2013] No. 35) on January 11, 2013.

5.3.1 Population development situation in the park

Qingji Industrial Park is one of five groups for overall urban planning in Gong'an County. Its planning area involves 3 villages, 2 fields, 25 villager groups. The jurisdiction has a population of 25,000, including the rural population of 21,000 and the rural labor force population of 18,000.

5.3.2 Development objective and index of the park

It is necessary to make the best of the favorable location and transportation conditions of Gong'an County, strengthen the second industry, actively develop the third industry, and boost economic development speed on the basis of quality improvement, structure optimization and benefit improvement, so as to promote economy to come to a new step, and make sure good circulation of urban economic development. It is required to highlight institutional innovation and scientific and technological innovation, advance diversified and scaled progress, and give full play to ecological functions of infrastructure construction, so as to improve the living standard of the people and cultural and ideological progress, and speed up comprehensive economic and social development. Also, it is needed to strengthen environmental protection and natural ecological protection, and build the development zone as an environmentally-friendly zone by taking "environmental region" as the idea and "ecologicalization and afforestation" as the main objective. The development zone will be built to be a novel region with high-tech industry, modern facility and efficient management. It will be a major economic support point optimizing the industrial structure of Gong'an County, improving the industrial level and building economically strong county.

5.3.3 Park land layout

The recent construction of Qingji Industrial Park in Gong'an County involves comprehensive supporting western ring road pavement and pipe network facilities. The recent industrial construction projects at both sides of the western ring road include electronic technology, agricultural product and by-product processing, light industrial machinery, medicine, biochemical engineering, etc. In future, the export-oriented development zone with complete facilities, reasonable functions, beautiful environments and significant comprehensive advantages will be formed by improving road network and comprehensive pipe network facilities, improving industrial cluster, and forming scale effect.

The planning objective is to insist on the principles of "Concentrated Placement, Intensive Land Use, and Industrial Agglomeration" and the policy of "Three Mains and Two Commitments", highlight industrial feature, comprehensively promote innovation of environment, system and science of the development zone, strive to develop the development zone as the demonstration area which fully implements the scientific outlook on development, the gathering area of modern manufacturing industry and high-tech industry, and the pilot area developing outward-looking economy and institutional innovation.

This planning constitutes the land-use structure morphology of "One Center, Three Axles and Five Areas".

"One Center" involves forming the public center of the development zone in the northeast of the intersection between Chanling Avenue and Guanlv Road depending on the industrial service.

"Three Axles" refer to taking Chanling Avenue and Xingye Road as the main development axes of the development zone, and Guanlv Road as the landscape axle of the development zone.

"Five Areas" include industrial area, warehousing logistics area, industrial service area, living area and ecological greening area.

5.3.4 Infrastructure in the park

5.3.4.1 Water supply planning

There are two water works in Gong'an County. Gong'an County No. 1 Water Plant supplies 20,000t of tap water per day, and Gong'an County No. 2 Water Plant supplies 60,000t of tap

water per day. For the development zone, construction of the diversion works shall be actively strengthened to improve the composite water rate. Moreover, the water supply network construction between the urban area and Qingji Industrial Park shall be accelerated on the basis of water conversation and making the best of the current water supply facilities. We strive to form the complete water supply system in this area.

This planning is expanded based on the water plants of Yangjiachang Town, Gong'an County, covering 7ha. Its water supply capacity (100,000t/d) could meet the water use demands of the development zone.

5.3.4.2 Wastewater planning

As the industrial area, the rain and sewage diversion system shall be applied for the drainage system of the development zone. In Gong'an Qingji Industrial Park, current wastewater pipelines are only provided for enterprises located along Chengye Road, Xingye Road and Kaile Avenue. Drainage pipe networks have not been allocated throughout the rest of place. As per the relevant requirements of drainage project planning in *Overall Urban Planning of Gong'an County*, all roads in the Gong'an Qingji Industrial Park are provided with wastewater pipelines. All the sewage flows into the wastewater treatment plant in planning, and then finally drained into Qingluo Canal after being treated by the wastewater treatment plant.

Domestic sewage needs to be treated by the septic-tank. Industrial wastewater needs to be treated to meet urban sewer standards by the enterprises, and then can be drained into the urban sewage pipelines. A new wastewater treatment plant with daily capacity of 60,000t is built at the northeast corner of Gong'an Qingji Industrial Park. The discharge outlet for finally treated tail water is provided at Gong'an section of the Yangtze River.

5.3.4.3 Rainwater planning

① Zhujiatan, Donggan Canal, Xuzhang Canal, Honglv Canal and Xuema District could be served as the rainwater drainage water bodies of the development zone in this planning area.

② The rain and sewage diversion system is served as the planned drainage water body system of the development zone, in which rainwater is collected by the rainwater pipe network in the development zone and then drained to the nearby water bodies.

③ The rainwater inspection well is dug when the turn of the rainwater pipe and the linear section of the intersection exceed 40-50m.

④ The rainwater collection and reuse system is additionally built in the further planning of the development zone, so as to forcibly require enterprises with high water quantity to reuse water.

5.3.4.4 Power planning

① load

The total power load capacity of the planning area of Gong'an Qingji Industrial Park is 210,200kW, and Gong'an Qingji Industrial Park needs the installed capacity for the transformer of 218,000kW in total.

② Power grid construction

To make sure safety power supply of this planning area, Chanling Substation (110KV) and Yangjiachang Substation (110KV) provide bi-power supply in the development zone.

According to load calculation, fourteen 10KV/0.4KV switching stations are built in the entire development zone. All switching stations are powered by the regional substations in a two-circuit radial system, 10KV power transmission line could be buried, and 0.4KV circuit could be overhead.

5.3.4.5 Natural gas planning

It is planned to invest the new natural gas pipe in Gong'an County to convey natural gas by virtue of the regional LPG pipelines. In the Gong'an Qingji Industrial Park, the pipe network is laid in Jingjiang Avenue, and secondary pipes are laid along the paths to supply natural gas. It is predicted that 11,000 residents could use natural gas in 2010, with annual consumption of 56,000m³, and 67,800 residents could use natural gas in 2020, with annual consumption of 224,000m³.

Low-medium pressure secondary air supply way of medium pressure gas transmission, regional pressure regulation and low pressure distribution will be applied. Also, Medium pressure primary gas supply way of medium pressure gas distribution and building pressure regulation will be partially applied. 0.2~0.4Mpa shall be taken as the pressure level of the medium pressure pipe network. The planning medium pressure trunk pipe will be laid annularly along the urban road, with pipe diameter of DN200-DN300. The medium pressure branch pipe is leaded out to the regional box type pressure regulator or user building pressure regulator by the planning medium pressure, and then supplies gas to the user through the low pressure pipe upon pressure regulation. Steel pipe is selected as the pipe material, and PE pipe as pipe material for residential areas. The living heat consumption index of Gong'an Qingji Industrial Park is 2,302mj/person·a, the rate of gasification is 80% in the planning period, the industrial gas consumption is 60% of the resident's gas consumption, and the gas consumption for public facilities is 30% of the resident's gas consumption. The unforeseen gas consumption is 5% of gas consumption of resident, public facility and industry, and the total gas consumption of Gong'an Qingji Industrial Park is 5,773,400Nm³/a.

5.3.5 Environmental protection of the development zone

(1) Measures for Prevention of Atmospheric Pollution

① Adjust the industrial structure and improve the industrial layout of development zone.

Arrange the industrial enterprises with high atmosphere pollution emission in the downwind direction of the prevailing wind direction in the town. Apply the centralized and gradual transition layout principles of types I, II and III industrial zoning in the industrial area, in which type I industry area is served as living area and types II and III areas are industrial isolation belts to lower influences from industrial pollution resources.

② Govern old pollution resources and cut down discharge capacities.

Build urban control system to strictly control approval for the fuel facilities in the control area. Improve atmosphere pollutant resource of new energy in the embankment of the Yangtze River gradually in future, resulting in no large pollution resources essentially in the urban area. Transform the pollution treatment system of Kaile Science and Technology, and cut down wastewater and waste gas discharges to strengthen clean fuel replacement.

③ Improve the green coverage ratio

Plant plants and shelter forest belts with strong planting and anti-pollution capacity for various kinds of pollution, so as to purify the environment. Try to plant trees with strong toxin resistance in the pollution area, trees with strong purification power in the living area; for greening layout of the shelter forest belts, arrange the wind greening in the upwind direction and closed greening layout in the downwind direction to be beneficial for harmful gas to diffuse successfully. Provide the high broad leaved tree belt in the dust pollution area, living area and office to block and absorb dust. Provide the greenbelt between the residence zone and the groups. Choose different plants for different pollution sources in the industrial area.

(2) Control measures for water body pollution

The planning requires that the discharge concentration of the water body pollutants shall not exceed the state-regulated discharge concentration, and determines the total discharge of

Kommentiert [S.Y.1]: 此处原文为“年使用量 22.4m³”，根据上下文，疑为“年使用量 22.4 万 m³”。暂按 22.4 万 m³ 处理，请确认

pollutants more than the allowable discharge of the water body as the pollutant reduction quantity of the enterprise. The pollutants discharge license system shall be implemented to enhance supervision and management on pollutant discharging units. Current industrial enterprises which are difficult to meet the environmental governance requirements shall grasp regulation of structural transformation of internal products, or use the technology to hold onto pollution regulation.

Requiring sanitary protection zone for water source, the first-grade and second-grade protection areas and quasi protection area shall be set up in the drinking water source region of the Yangtze River. The first-grade protection area is an area with semi-diameter of the intake as 100m. The second-grade protection area covers the region including 1,000m in the upstream and 100m in the downstream by taking the edge of the first-grade protection area as the origin. The quasi protection area covers the region including 1,000m in the upstream and 50m in the downstream by taking the edge of the second-grade protection area as the origin. At present, there are water plants in Douhudi Town and Yangchang Town, where are located in Gong'an section of the Yangtze River. To cooperate with wastewater treatment construction of Qingji Industrial Park, Environmental Protection Bureau of Gong'an County plans to get rid of the drinking water intake of Yangjiachang Town. Now, functions of the Yangtze River are completed, and the intake replacement work is under way.

The urban wastewater treatment system shall be built to carry out the drainage system of the rain and sewage diversion system. Enterprise wastewater needs to be drained into urban sewage pipeline after being treated to reach the standards, and then converged with domestic sewage, and finally delivered to the urban wastewater treatment plant. Any kind of sewage shall not be drained into natural water body directly. We shall push water conversion, implement the water use quota system and improve the repeated utilization factor of industrial water.

(3) Measures for Prevention of Noise Pollution

For noise control, the road network system shall be improved in such a manner of allowing the traffic flow to be concentrated on the trunk road with wide pavement and high traffic flow. The traffic management measures shall be enhanced by limiting some vehicles to pass through, constraining the highest time speed of the vehicle, and minimizing driving routes in the residential area. It is necessary to carry out economic countermeasures, formulate the noise violation charge system, and strengthen the penalty system for violation of the traffic rules.

Control standards: The standardized environmental noise area refers to allowing environmental noise level in the region and the environmental noise management measures to meet the following requirements based on the applicable zoning of *Environmental Quality Standard for Noise* (GB3098-2008).

1) Average equivalent regional environment noise reaches the environment noise standards conducted in this area.

2) The boundary noise from more than 90% fixed noise source (inclusive of enterprises and public institutions emitting noise to the surrounding living environment) does not exceed *Emission Standard for Industrial Enterprises Noise at Boundary* (GB12348-2008) executed in this region; the boundary noise of the fixed noise source failing to meet the emission standards does not exceed the standard 5dB(A).

3) The construction noise of buildings in this region does not exceed *Noise limits for Construction Factory*; there are specific provisions for management on building construction noise in this region.

Measures:

① Regulate the layout of traffic facilities, scientifically organize the road network, and effectively shunt internal, external and through traffic in the urban area.

② Strengthen management on noise from transport vehicles, public amenities, central business districts and business of residential areas.

③ Set up the greenbelts around the noise source to form the sound insulation belt.

(4) Control measures for solid waste pollution

With urban development, the output, type and floor area of solid waste will be increased, so the comprehensive utilization ratio will be further improved. The comprehensive utilization of wastes could be further improved by means of soil burial and deep-well injection as well as expanding the use scope and scale.

Measures:

1) Strengthen comprehensive utilization of solid wastes, and encourage and popularize the comprehensive waste residue use technology.

2) Strengthen management on discharge and piling of industrial solid wastes, intensively pile and process the poisonous and harmful industrial wastes at the fixed place, and strengthen management.

3) The comprehensive utilization ratio of industrial solid wastes is 80% recently, and 100% in future.

4) The household garbage disposal is 100% and harmless treatment rate is 100%.

5.3.6 Current infrastructures

(1) Power facilities

There are Douhudi and Yangjiachang 110KV substations in the central urban area of Gong'an County, in which Douhudi substation has the main transformer capacity of 20+3.15MVA and floor area of 0.93ha; Yangjiachang substation has the main transformation capacity of 2-3.15MVA and the floor area of 1.13ha. Now, there is 10KV circuit introduced from Chanling 110KV substation in the industrial park.

(2) Fuel gas

The fuel gas structure of Gong'an Economic Development Zone mainly involves LPG and fuel coal. Natural gas is planned to pass through the urban area of Gong'an County to solve the civil fuel supply problem.

(3) Water supply

At present, the industrial park has the complete water supply plan, laying 16,500m of pipe network in total, including 500m of DN600mm main pipe, 4,000m of DN500mm main pipe, 2,500m of DN400mm main pipe, 2,500m of DN300mm main pipe and 7,000m of below DN200mm main pipe.

(4) Drainage

Drain pipes are laid along roads in Gong'an Economic Development Zone. Rain and sewage diversion pipes are laid from the west to the east by virtue of the terrain, including main pipes of DN500, DN600, DN700, DN900, DN1000 and DN1200. Finally, the wastewater is drained into Qingluo Canal after being lifted by the lift pump station.

The wastewater treatment plant of Qingji Industrial Park is located at the southeast corner of the park and the east side of the project site, with the handling capacity of 60,000m³/d. Recently, the completed civil works would be put into operation in February 2015. It receives production and domestic wastewater in the planning scope of the industrial park. With the improved A²O technology applied as the wastewater treatment technology, the wastewater is drained into the Yangtze River (Gong'an section) through the discharge pipe network. Production and domestic wastewater generated from the Project is treated by the self-built wastewater treatment station and does not enter the wastewater treatment plant of the park.

(5) Solid waste disposal

Comprehensively used general industrial wastes from the current enterprises in urban area of Gong'an County shall be recycled and used comprehensively. General industrial waste and household garbage that cannot be comprehensively used shall be entrusted to be transported by the local environmental sanitation department, and then uniformly transported to Jingzhou Jimei Thermal Power Co., Ltd. for burning. Now, Gong'an County fails to set up the place for disposing the hazardous wastes, which shall be processed and disposed by the qualified unit.

(6) Road

Chanling Avenue, Xingye Road, Kaile Avenue, Guanlv Road, Chengye Road, Xingsheng Road, Youyi Road East were built in the industrial park. The total length of the built roads is 30km in total.

5.4 Overview of Yangjiachang Town Industrial Park

5.4.1 Population development situation in the park

The current population is rural population, including 4,038 persons and 1,048 families.

5.4.2 Development objective and index of the park

The development orientation of Yangjiachang Town Industrial Park in future 15 years is to take achievement of "Being famous in Central China, Leading in Hubei Province and First in Jingzhou" as the direction, be based in Hubei, connect "Dongting-Jiangnan Plain", face the central west, radiate Yangtze River Economic Zone, build the leading advanced manufacturing base in Hubei Province, and communicate and connect the transfer logistics hub of "Dongting-Jiangnan Plain". With active important growth pole, Hubei Yangtze River Economic Zone is a county economic development demonstration area in Hubei Province, and a new ecological industry-appreciate area with Yangtze river delta features and styles of Gong'an County.

5.4.3 Park land layout

The spatial layout structure of "Three Axles and Three Areas, One Belt and One Corridor" is planned to formed.

"Three Axles": Three main axles developed in the park are formed along Shugang Road, Minsheng No.2 Road and Guanlv Road.

"Three Areas": The entire industrial park is divided into three functional areas, including industrial production area, warehousing logistics area and supporting service area.

"One Belt": There is a waterfront landscape permeability zone formed along Yangma Reservoir.

"One Corridor": There is a green ecological landscape corridor laid along corridor for overhead HV transmission line and Shashi-Gong'an Expressway.

5.4.4 Infrastructure in the park

5.4.4.1 Water supply planning

The urban water plant shall supply water to the industrial park. The planned daily water consumption is 213,000 tons (the daily highest). The daily change coefficient is 1.3, and the timely change coefficient is 1.4. The water supply pipe network is laid based on the principles of safe and reliable water supply in the planning area. Moreover, the pipe network layout is annular mainly. The pressure of the planned pipe network is required to be 0.35~0.45mpa. Individual high-rise buildings require pressurizing to solve the water supply problem.

5.4.4.2 Drainage planning

The rain and sewage diversion system shall be applied as the drainage system in the industrial park. The independent wastewater drainage system is formed in the industrial park.

The land use property in the planning area is based on land for industry, logistics and warehousing, living, public management and public service facilities and greening. For this, wastewater consists of industrial wastewater and domestic sewage. The wastewater amount is calculated by 80% of average daily water amount; the sewage collection rate is 90%; the groundwater infiltration is calculated by 10% of the predicted sewage amount. The wastewater consumption is 129,800t/d in the planning area.

5.4.4.3 Power planning

① load

It is calculated that the total installed load of Yangjiachang Town Industrial Park is 475,000KW. Considering the load coincidence factor of 0.7, the actual calculation load is 332,500kw in the planning area.

② Power grid construction

In the planning area, power supply provided by 110KV Yangjiachang Substation is served as the first power supply, a new 110KV substation is built as the second power supply along the east side of Xingsheng Road in the mid-west of the park. The double circuit feeding way is applied by the substation to make sure reliability of power supply.

5.4.4.4 Natural gas planning

The industrial gas consumption is associated with production scale, shift system and industrial features. It is difficult to precisely calculate the gas consumption of the industrial uses at the planning stage. Based on 60% of the resident's gas consumption, 37.7143 million Nm³/yr. is obtained. The total gas consumption is 118.7999 million Nm³/yr. in the planning area.

The low-medium secondary pipe network shall be applied. Fuel gas shall be conveyed into regulator stations from the low-pressure regulating-metering station, and gas for use shall be accessed by the low-pressure pipe of the regulator station. The starting pressure of low pressure pipe network is not higher than 0.2MPa, the terminal pressure is not lower than 0.005Mpa, and the outlet pressure of the pressure regulation is about 3,200Pa.

5.4.5 Environmental protection of the development zone

(1) Measures for Prevention of Atmospheric Pollution

① Strengthen comprehensive treatment of atmospheric pollution, and strictly control the total discharge of pollutants.

② Convert the energy structure, popularize clean energy, control and change the fuel coal based energy structure, and gradually transit to liquid-state and gas-state high combustion values, low pollution, even no pollution energy.

③ Conduct regional centralized heat supply depending on accumulative effect of industrial park development.

④ Encourage unleaded gasoline, CNG, LPG and clean fuel; economically popularize tail gas purification device; strengthen vehicle emission standardization management to effectively decline pollution caused by vehicle tail gas.

⑤ Enhance greening and other fundamental constructions to gradually improve the greening rate in the park.

(2) Control measures for water body pollution

① Strengthen water environment protection and governance to control concentration and total pollutant discharge.

- ② Save water and make a plan to use water. Improve the repeated utilization factor of industrial water.
- ③ Improve the drainage system, boost construction of the wastewater treatment plant in the park, improve the centralized processing rate of wastewater, and lower pollutant discharge.
- ④ Transform the production technology, and apply the cleaning technology to control production of the severely polluted products.
- ⑤ Enhance pollutant resource governance. Strictly manage key polluting enterprises, and urge them to improve governance measures.
- ⑥ Do a good job of channel dredging and improvement, and taking various hydraulic engineering measures to alleviate inland river pollution.

(3) Measures for Prevention of Noise Pollution

Make a reasonable planning for industrial layout, take full into account influences on the ambient environment by the industrial production noise when the land for industrial development is planned, and choose various active means to limit noise pollution, so as to strive to minimize the pollution degree. Strictly approve the new enterprise to allow the factory boundary noise meet the standard. Emphasize on greening and beautifying the plant environment, improve the greening cover rate, and plant the greenbelts at both sides of the roads and between the plant areas to decline noise pollution.

Strengthen traffic noise control and management, and control the permissible noise limit.

Strengthen control for noise of social activities. Manage noise from culture and entertainment as well as the market. Improve technical equipment and level for building construction, and generalize low-noise construction technology; and enhance management on construction noise.

(4) Control measures for solid waste pollution

Take such comprehensive control measures as reduction first, recycling based, harmless disposal and market-oriented operation for industrial wastes and household garbage. Adopt such comprehensive treatment measures as comprehensive use, burning and biochemical treatment.

(5) Ecological environmental protection measures:

Reasonably develop and use the land resources; regulate the industrial structure; improve economic benefits, and strengthen self-regulating ability; improve the hydraulic engineering network, and enhance ecological anti-disaster ability; expand the greening area, build the protective forest belt, protect the ecological environment, and keep ecological balance.

5.4.6 Current infrastructures

(1) Power facilities

110KV and UHV 800KV lines go across the park to mainly power the current residents in the planning park.

(2) Fuel gas

There are no fuel gas pipe network project facilities in the planning area.

(3) Water supply

No urban water supply facilities are provided in the recently planned industrial park. Current residents in the planning area take the distributed well as the drinking water source.

(4) Drainage

There are no urban drainage facility system and wastewater treatment facility in the industrial park. However, most rivers and channels receive water freely drained from the ground. This leads to no systematic organized drainage pipe network. With construction of road infrastructures, water and wastewater pipe network in the planning park will be laid. There is no rainwater pipe network essentially in the planning area, and ground rainwater flows into the nearby rivers along the terrain.

(5) Solid waste disposal

The yield of urban household garbage is calculated based on 0.8~1.0kg/d·person. Waste transfer stations are built in towns and townships to be in charge of collecting garbage from villages in the town, and then transporting to the county garbage disposal plant for treatment. Such recyclables as papers, plastics and waste metal shall be processed by the local reclamation depots; such organic matters in the garbage as vegetable leaves, peels and other putrescible substances shall be locally composted for agriculture to decrease the freight volume.

(6) Road

In the planning area, Yangjiawan-Mayuan Highway, Youyi Road East, a part of village level roads, as well as part of sections of Xingye Road, Xingsheng Road and Guanlv Road were built, Minsheng No. 4 Road is under construction.

5.5 Current Situation of Pollutant Source Discharge in the Industrial Park

5.5.1 Investigation on wastewater pollutant resource

According to statistics, main drainage enterprises include Shine Star (Hubei) Biological Engineering Co., Ltd., Hubei Tianle New Materials Co., Ltd., Hubei Hanxing Technology Co., Ltd., Hubei Zhencheng Paper Industry Co., Ltd. in Gong'an Economic Development Zone. See detailed statistics for wastewater discharges of enterprises in the Table 5.5-1 below.

Table 5.5-1 Wastewater Pollutant Sources of Current Enterprises in Qingji Industrial Park

No.	Name of the Enterprise	Wastewater discharge (m ³ /d)
1	Shine Star (Hubei) Biological Engineering Co., Ltd.	22720
2	COFCO Cereals and Oils Industry (Jingzhou) Co., Ltd.	440
3	Hubei Hanxing Technology Co., Ltd.	114
4	Hubei Xinhua Plastics Co., Ltd.	20
5	Jin'an Group Co., Ltd.	320
6	Hubei Jingdu Group Co., Ltd.	120
7	Hubei Huaye Aquatic Product Co., Ltd.	420
8	Hubei Kaile Technology Co., Ltd.	120
9	Hubei Xinda Pipes Co., Ltd.	100
10	Hubei Xinsha Building Materials Co. Ltd.	60
11	Hubei Tianle New Materials Co., Ltd.	25
12	Hubei Boteng New Materials Co., Ltd.	100
13	Hubei Isolane Agricultural Science and Technology Co., Ltd.	46
14	Quanxin Kangli (Hubei) Garment Limited	160
15	Zhejiang Liren Wood Industry Group Co., Ltd.	48
16	Jingzhou Xinyuan Precision Foundry Co., Ltd.	100
17	Hubei Zhencheng Paper Co., Ltd.	427
18	Hubei Qinchu Paper Industry Co., Ltd. (under construction)	10440
Total		35780

Production and living wastewater generated from enterprises in Qingji Industrial Park is recently drained to the Yangtze River after being treated by the self-built wastewater

treatment station through the drain outlet of Qingji Industrial Park. In the future, the comprehensive wastewater from enterprises in the park would be drained into the Yangtze River after being treated by the wastewater treatment plant in the park after the wastewater treatment plant is put of Qingji Industrial Park into operation in 2015. Recently, the discharge of drain outlet of Qingji Industrial Park is 20,000m³/d. See discharge of point source pollutions from the two banks (Gong'an section) of the Yangtze River into the Yangtze River in Table 5.5-2.

Table 5.5-2 Discharge of Point Source Pollutions from the Two Banks (Gong'an Section) of the Yangtze River Into the Yangtze River

EIA Report on the Yangjiachang Town Industrial Park CHP Project in Gong'an County

Location	Inflow condition	Point source	Nearest water intake distance	Wastewater category	Drainage method	Drainage	Pollutant discharge
Right of the river	Gong'an section	Drain outlet of Qingji Industrial Park	1.2km downstream away from Yangchang water intake	Industrial wastewater	Pipe discharge	50,000m ³ /d	COD1095t/a

Location	Inflow condition	Point source	Nearest water intake distance	Wastewater category	Drainage method	Drainage	Pollutant discharge
		Set (s)		Domestic sewage			
Left of the river	Development zone	Drain outlet of the Yangtze River for Shashi Thermal Power Plant	6km upstream away from intake in Guanyinsi Village, Tanqiao Town	Industrial wastewater	Pipe discharge	2000m ³ /d	COD18.5t/a
Left of the river	Jiangling County	Jiangling County Xingcheng Paper Co., Ltd	1.1km downstream away from Haoxue water intake	Industrial wastewater and domestic sewage	Pipe discharge	30,000m ³ /d	COD471.2t/a
		Haoxue Youpin Wharf	1km downstream away from Haoxue water intake	Industrial wastewater and domestic sewage	Pipe discharge	500m ³ /d	COD1.5t/a

5.5.2 Investigation on waste gas pollutant resource

According to statistics, main drainage enterprises include Shine Star (Hubei) Biological Engineering Co., Ltd., Hubei Tianle New Materials Co., Ltd., Hubei Hanxing Technology Co., Ltd., Hubei Zhencheng Paper Industry Co., Ltd. in Gong'an Economic Development Zone. See detailed statistics for waste gas discharge of enterprises in Table 5.4-3 below. Main pollutants include SO₂, NO_x and particles.

Table 5.4-3 Waste Gas Pollutant Sources of Current Enterprises in Qingji Industrial Park

SN	Name of the Enterprise	Exhaust waste gas (10,000 m ³ /a)	Pollutant discharge
1	Shine Star (Hubei) Biological Engineering Co., Ltd.	292066	18.17t/a of ammonia gas, 940.1t/a of SO ₂ , 143.3t/a of smoke and 0.1t/a of hydrogen chloride
2	COFCO Cereals and Oils Industry (Jingzhou) Co., Ltd.	21600	87.14t/a of SO ₂ , 150.3t/a of NO _x , and 32.34t/a of smoke
3	Hubei Hanxing Technology Co., Ltd.	6000	44.1t/a of flue gas and 11.22t/a of smoke
4	Hubei Xinhua Plastics Co., Ltd.	/	0.81t/a of particulate matters
5	Hubei Zhongshuo Technology Co., Ltd.	/	0.86t/a of particulate matters
6	Hubei Huaye Aquatic Product Co., Ltd.	2802.5	3.136t/a of SO ₂ , 1.54t/a of NO _x and 1.67t/a of smoke
7	Hubei Tianle New Materials Co., Ltd.	4176	3.52t/a of particulate matters, 0.8t/a of non-methane hydrocarbon and 0.68t/a of hydrogen chloride
8	Hubei Zhencheng Paper Co., Ltd.	11113.92	78.52t/a of SO ₂ , 40.44t/a of NO _x and 19.53t/a of smoke
9	Hubei Qinchu Paper Industry Co., Ltd. (under construction)	77695.2	67.42t/a of SO ₂ , 223t/a of NO _x and 37.29t/a of smoke

6. Investigation and Assessment on Current Situation of Environmental Quality

In January 2015, Hubei Jingzhou Environmental Protection Technology Co., Ltd. finished *EIA Report (Draft for Approval) on 2.20Mt/a High-grade Packaging Board Project by Changtai Paper Industry (Wuhan) Co., Ltd.* The land for 2.20Mt/a High-grade Packaging Board Project by Changtai Paper Industry (Wuhan) Co., Ltd. covers the Project located at the southwest corner of the Project. For this purpose, this assessment applies a part of field monitoring and assessment results of high-grade packing board project with annual yield of 2.2 million tons, and a part of monitoring factors of investigation on current water environment situation quotes the site monitoring and assessment results of Yangjiachang Town Industrial Park. The Employer additionally authorized the qualified unit to monitor current noise environment situation. The corresponding assessment results are as follows.

6.1 Assessment on Current Situation of Ambient Air Quality

6.1.1 Relevant historical monitoring data

A part of site monitoring and assessment results of 2.20Mt/a High-grade Packaging Board Project is selected as a part of ambient air quality monitoring factor, with the specific monitoring scheme and assessment results as follows:

(1) Selection of the monitoring site

There are 6 monitoring sites in the project construction area by Gong'an County Environmental Monitoring Station. See monitoring sites and relative locations of the Project in Table 6.1-1.

Table 6.1-1 Distribution of Monitoring Sites of Current Situation of Ambient Air Quality

SN	Name	Description	Linear distance between site and boundary (m)
1#	Welfare outside north boundary of the project	0° at the upwind direction of the predominant wind direction	500
2#	Greening outside west boundary of the project	90° at the upwind direction of the predominant wind direction	500
3#	Greening outside southwest boundary of the project	135° at the upwind direction of the predominant wind direction	500
4#	Greening outside south boundary of the project	180° at the upwind direction of the predominant wind direction	430
5#	Welfare outside east boundary of the project	270° at the upwind direction of the predominant wind direction	400
6#	Welfare outside northeast boundary of the project	315° at the upwind direction of the predominant wind direction	170

(2) Monitoring factors and methods

Monitoring factors of each monitoring site in the project site selection area are NO₂, SO₂, PM₁₀ and TSP. See detailed monitoring methods in Table 6.1-2.

Table 6.1-2 Method for Monitoring and Analysis of Ambient Air Quality and Method Source

Monitoring items	Determination method	Method source
SO ₂	Formaldehyde absorption - pararosaniline spectrophotometry	HJ482-2009
NO ₂	N(1-naphthyl)-ethylenediamine dihydrochloride spectrophotometry	HJ479-2009
PM ₁₀	Weight method	HJ618-2011
TSP	Weight method	GB/T15432-1995

(3) Monitoring duration and frequency

According to the provisions on effective sampling time of ambient air by *Ambient Air Quality Standards* (GB3095-2012), the hourly average concentrations of SO₂ and NO₂ are sampled 4 times per day (specially at 07:00, 11:00, 14:00 and 18:00), and sampled for 45min every

time; 24-hour average concentrations of SO₂ and NO₂ are sampled for at least 18h continuously per day. PM₁₀ shall be sampled once a day for no less than 20h per day. The 24-hour average concentration of TSP shall be sampled for 24h per day. Conventional and feature monitoring projects of the ambient air quality shall be monitored for 7 days continuously from November 3 to 9, 2014.

(4) Evaluation Method

The current situation of ambient air quality shall be assessed by virtue of the maximum concentration standard share ratio method, with the calculation formula as follows:

$$li = Ci / CSi$$

Where:

li - maximum concentration standard share ratio of the ith pollutant, %;

Ci - monitoring value of the pollutant (mg/m³)

CSi - assessment standard of the pollutant (mg/m³)

When li > 100%, the pollutant exceeds the standard.

(5) Evaluation criterion

The Grade II standard of *Ambient Air Quality Standards* (GB3095-2012) shall be executed for ambient air in the proposed works assessment area.

(6) Ambient air monitoring result and analysis

Monitoring statistic results of ambient air quality of the pollutants shall be listed into Table 6.1-3, and the assessment results shall be listed into Table 6.1-4. Based on the ambient air quality monitoring results of the site selection area, none of hourly average concentrations of SO₂ and NO₂ exceeds the standards in each monitoring site, and 24-hour average concentrations of SO₂, NO₂, TSP and PM₁₀ also do not exceed the standards by comparing analysis for standard values.

Table 6.1-3 List of Ambient Air Quality Monitoring and Assessment

Site	Item	Contaminant	Scope of concentration, μg/m ³	Standard value, μg/m ³	Over limit rate	Maximum concentration standard share ratio, %
1#	Hourly average value	SO ₂	44-54	500	0	10.8
		NO ₂	30-38	200	0	19
	24-hour average value	SO ₂	17-18	150	0	12
		NO ₂	12-14	80	0	17.5
		PM ₁₀	92-113	150	0	75.3
	TSP	118-130	300	0	43.3	
2#	Hourly average value	SO ₂	46-55	500	0	11
		NO ₂	29-37	200	0	18.5
	24-hour average value	SO ₂	18-20	150	0	13.3
		NO ₂	11-14	80	0	17.5
		PM ₁₀	91-113	150	0	75.3
	TSP	119-132	300	0	44	
3#	Hourly average value	SO ₂	45-54	500	0	10.8
		NO ₂	28-37	200	0	18.5
	24-hour average value	SO ₂	17-21	150	0	14
		NO ₂	9-15	80	0	18.75
	PM ₁₀	91-112	150	0	73.7	

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		TSP	117-131	300	0	43.7
4#	Hourly average value	SO ₂	42-53	500	0	10.6
		NO ₂	25-36	200	0	18
		SO ₂	16-20	150	0	13.3
	24-hour average value	NO ₂	10-13	80	0	16.25
		PM ₁₀	89-113	150	0	75.3
		TSP	116-132	300	0	44
5#	Hourly average value	SO ₂	46-55	500	0	11
		NO ₂	29-37	200	0	18.5
	24-hour average value	SO ₂	18-22	150	0	14.7
		NO ₂	11-16	80	0	20
		PM ₁₀	92-119	150	0	79.3
		TSP	118-135	300	0	45
6#	Hourly average value	SO ₂	45-57	500	0	11.4
		NO ₂	25-36	200	0	18
	24 hours	SO ₂	17-21	150	0	14
		NO ₂	10-15	80	0	18.75
	Mean	PM ₁₀	97-105	150	0	70
		TSP	117-130	300	0	43.3

Note: * is a primary value, with concentration unit of mg/m³.

6.1.2 Supplementary monitoring for project feature factors

Wuhan Chujiang Environment Protection Co., Ltd. made a supplementary monitoring for project feature factors (PM_{2.5} and Hg) on April 16 to 22.

(1) Distribution of monitoring point

The planning environmental impact assessment of Yangjiachang Industrial Park is applied as routine monitoring. In combination with emission of gaseous PM_{2.5} and mercury from the flue gas, this environmental impact assessment will make a field monitoring for mercury, the item feature pollutant. See description for site location in Table 6.1-4 below.

6.1-4 Distribution of Ambient Air Monitoring Site and Setup Instruction

No.	Monitoring Points	Setup instruction
1#	Yangjiachang Town	Clean control point and sensitive point in the upwind direction
2#	Jinghe Village, 3,000m southward from the boundary	Concerned point at the downwind monitoring site

(2) Monitoring project and monitoring and analysis method

Feature factors PM_{2.5} and Hg monitored by the Project See monitoring method in Table 6.1-5.

Table 6.1-5 Method for Monitoring and Analysis of Ambient Air Quality and Method Source

Category	Test items	Method basis	Analysis method	Instrument & equipment and number	Detection limit
Ambient air	Hg	HJ542-2009	Cold vapor atomic fluorescence spectrometry	Atomic fluorescence spectrophotometer CJ-YQ-28	0.0066μg/m ³
	PM _{2.5}	HJ618-2011	Weight method	Electronic balance CJ-YQ-08	0.010mg/m ³

(3) Evaluation criterion

PM_{2.5} shall be in accordance with requirements for Grade II standard specified in *Ambient Air Quality Standard* (GB3095-2012), and the mercury shall conform to the maximum permissible concentration (Table 1) specified in the *Hygiene Standard for the Design of Industrial Enterprises* (TJ36-79) for the harmful substances in the air in residential area.

(4) Ambient air monitoring result and analysis

Monitoring statistic results of ambient air quality of the pollutants shall be listed into Table 6.1-6. According to the ambient air quality monitoring result of the site selection area, none of ambient concentrations (background concentration) of pollution factors in the surrounding environment and associated with the Project exceeds the standard regardless of monitoring data when environment impact assessment was made for paper-making project in 2014 or supplementary monitoring in this environment impact assessment by comparing analysis for standard values. However, with high standard share ratios of concentrations of PM₁₀ and PM_{2.5}, the local environmental protection department must strengthen supervision for infrastructures in the surrounding areas and working condition enterprise construction sites, so as to further lower PM₁₀ and PM_{2.5} in the ambient air.

Table 6.1-6 Statistical Monitoring Results of Site Monitoring Ambient Air Quality

Site	Item	Contaminant	Concentration range mg/m ³	Standard Value mg/m ³	Over limit rate	Maximum concentration standard share ratio, %
1#	Primary value	Hg	0.0066L	0.00405	0	—
	Daily mean value	PM _{2.5}	0.047~0.069	0.075	0	92.0
2#	Primary value	Hg	0.0066L	0.00405	0	—
	Daily mean value	PM _{2.5}	0.041~0.050	0.075	0	66.7

Note: The standard value of Hg is obtained by multiplying 9 based on the yearly average concentration of 12 standards.

6.2 Assessment on Current Situation of Environmental Quality of Surface Water

Statistical data shows that the dry season of the Yangtze River lasts from January to April, the raining season lasts from May to October, and the normal season lasts from November to December. The surface water normal period refers to data for monitoring water environment quality of Gong'an section of the Yangtze River on the site in *EIA Report (Draft for Approval) on 2.20Mt/a High-grade Packaging Board Project by Changtai Paper Industry (Wuhan) Co., Ltd.* from November 3 to 5, 2014. Monitoring for water quality in the dry season shall refer to monitoring data for Gong'an section of the Yangtze River made by *EIA Report on Yangjiachang Town Industrial Park* from March 20 to 22 (dry season).

6.2.1 Normal period

(1) Distribution of monitoring sites

Four monitoring sections are provided in this water quality monitoring. Site 1# is located at 500m at the upstream where the drain outlet drains wastewater into Gong'an section of the Yangtze River. Site 2# is located at 1,000m at the downstream where the drain outlet drains wastewater into Gong'an section of the Yangtze River. Site 3# is located at located at 2,500mm at the downstream where the drain outlet drains wastewater into Gong'an section of the Yangtze River. Site 4# located at 5,000m at the downstream where the drain outlet drains wastewater into Gong'an section of the Yangtze River.

(2) Monitoring items

pH, COD, BOD₅, NH₃-N, total phosphorus, permanganate index, dissolved oxygen and volatile phenol.

(3) Sampling time and frequency

Sampling was made for three days continuously from November 3 to 5, 2014, once a day.

(4) Sampling and analyzing method

Right half river surface: Four sampling perpendiculars are set on each sampling section, respectively located on the main stream line of the sampling section, the place with obvious water flow 5m from the right bank of the main stream line, and centers of the two sampling perpendiculars with obvious water flow (about 50m and 150m from the bank). One water sample is taken on the same perpendicular under the water surface for 0.5m and 0.5m from the bottom of the river. Water quality sampling shall be conducted as per the requirements of *Technical Specifications Requirements for Monitoring of Surface Water and Waste Water* (HJ/T91-2002). See monitoring and analysis method in Table 6.2-4.

Table 6.2-4 Analysis Method for Water Quality Monitoring Factor

SN	Item	Method	Method source
1	pH	Glass electrode method	GB6920-86
2	DO	Iodometric method	GB7489-87
3	Permanganate index	Potassium permanganate oxidation method	GB11892-89
4	COD	Dichromate method	GB7488-87
5	BOD ₅	Dilution and inoculation test	HJ505-2009
6	NH ₃ -N	Nessler's reagents spectrophotometer	HJ535-2009
7	Volatile phenol	4-aminoantipyrine spectrophotometry	HJ503-2009
8	Total phosphorus	Ammonium molybdate spectrophotometry	GB11893-89

(5) Evaluation Method

The standard single water quality index method shall be applied for this assessment.

(6) Monitoring results and assessment

Statistics for monitoring results shall be listed into Table 6.2-5. See assessment results of each section in Table 6.2-6.

It can be seen from assessment results that the standard index of each monitoring factor of Gong'an section of the Yangtze River is less than 1, meeting the water quality standard requirements for the functions of the corresponding water areas of Type III area in *Environmental Quality Standards for Surface Water* (GB3838-2002).

Table 6.2-5 Monitoring Results of Current Situation of Environmental Quality of Surface Water (Unit: mg/L, pH: dimensionless)

Monitoring items	Section date	1#				2#				3#				4#			
		5m at the right bank	50m at the right bank	150m at the right bank	Main stream line	5m at the right bank	50m at the right bank	150m at the right bank	Main stream line	5m at the right bank	50m at the right bank	150m at the right bank	Main stream line	5m at the right bank	50m at the right bank	150m at the right bank	Main stream line
pH	December 3	7.11	7.21	7.17	7.20	7.14	7.11	7.21	7.18	7.15	7.19	7.12	7.20	7.15	7.22	7.15	7.16
	December 4	7.11	7.14	7.15	7.19	7.21	7.19	7.11	7.17	7.18	7.15	7.13	7.20	7.18	7.15	7.19	7.14
	December 5	7.13	7.18	7.11	7.13	7.14	7.17	7.20	7.18	7.16	7.18	7.13	7.11	7.15	7.13	7.14	7.12
COD	December 3	8.66	8.75	8.84	8.69	8.90	8.75	8.68	9.00	8.91	8.67	8.76	8.85	8.89	8.79	8.92	8.90
	December 4	9.00	8.95	8.87	8.79	8.75	8.81	8.80	8.75	8.90	8.90	8.89	8.88	8.86	8.77	9.00	8.94
	December 5	8.89	8.77	8.90	9.00	8.87	8.91	8.89	8.86	8.69	8.79	8.79	8.74	8.67	8.90	8.85	8.76
BOD ₅	December 3	1.62	1.63	1.59	1.66	1.58	1.60	1.70	1.65	1.59	1.62	1.64	1.58	1.67	1.61	1.59	1.56
	December 4	1.64	1.59	1.63	1.58	1.70	1.66	1.62	1.58	1.64	1.60	1.67	1.66	1.60	1.63	1.59	1.57
	December 5	1.68	1.66	1.59	1.62	1.68	1.58	1.60	1.66	1.61	1.59	1.62	1.58	1.59	1.60	1.62	1.65
Ammonia nitrogen	December 3	0.352	0.361	0.358	0.347	0.370	0.355	0.360	0.370	0.355	0.357	0.359	0.364	0.358	0.364	0.366	0.36
	December 4	0.361	0.367	0.367	0.372	0.362	0.371	0.355	0.366	0.367	0.364	0.359	0.358	0.360	0.370	0.367	0.36
	December 5	0.362	0.360	0.370	0.359	0.361	0.366	0.358	0.359	0.360	0.362	0.361	0.359	0.359	0.364	0.364	0.36
Total phosphorus	December 3	0.067	0.070	0.071	0.069	0.068	0.069	0.072	0.072	0.075	0.069	0.068	0.070	0.064	0.070	0.070	0.07
	December 4	0.073	0.069	0.068	0.068	0.071	0.072	0.065	0.078	0.072	0.071	0.069	0.068	0.070	0.068	0.070	0.07
	December 5	0.072	0.069	0.070	0.072	0.069	0.067	0.073	0.075	0.068	0.070	0.072	0.069	0.075	0.068	0.069	0.07
Permanganate	December 3	2.26	2.31	2.28	2.32	2.35	2.24	2.34	2.20	2.26	2.26	2.24	2.31	2.34	2.28	2.32	2.30
	December 4	2.34	2.34	2.33	2.35	2.36	2.28	2.27	2.34	2.31	2.30	2.28	2.34	2.30	2.25	2.26	2.31

Index	December 5	2.28	2.27	2.23	2.26	2.28	2.30	2.33	2.36	2.30	2.38	2.28	2.29	2.30	2.31	2.29	2.24	
Dissolved Oxygen	December 3	7.24	7.30	7.29	7.31	7.28	7.36	7.28	7.25	7.33	7.29	7.28	7.39	7.24	7.33	7.28	7.30	
	December 4	7.35	7.29	7.30	7.26	7.31	7.24	7.26	7.35	7.31	7.28	7.35	7.24	7.34	7.32	7.28	7.33	
	December 5	7.26	7.28	7.26	7.25	7.22	7.24	7.30	7.31	7.28	7.25	7.30	7.24	7.26	7.31	7.36	7.30	
	December 3	0.0009	0.0010	0.0010	0.0009	0.0010	0.0010	0.0009	0.0010	0.0010	0.0009	0.0010	0.0009	0.0010	0.0010	0.0009	0.0009	0.001
Volatile phenol	December 4	0.0009	0.0010	0.0009	0.0010	0.0009	0.0010	0.0010	0.0009	0.0009	0.0009	0.0010	0.0009	0.0009	0.0009	0.0009	0.0009	0.001
	December 5	0.0010	0.0010	0.0009	0.0009	0.0009	0.0010	0.0009	0.0009	0.0009	0.0010	0.0010	0.0009	0.0010	0.0009	0.0010	0.001	

Table 6.2-6 Standard Single Water Quality Index of Assessed Water Area

Section	1#				2#				3#				4#				
	5m at the right bank	50m at the right bank	150m at the right bank	Main stream line	5m at the right bank	50m at the right bank	150m at the right bank	Main stream line	5m at the right bank	50m at the right bank	150m at the right bank	Main stream line	5m at the right bank	50m at the right bank	150m at the right bank	Main stream line	
pH	Extremum	7.13	7.21	7.17	7.20	7.14	7.19	7.21	7.18	7.18	7.19	7.13	7.20	7.18	7.22	7.19	7.16
	Index	0.065	0.105	0.085	0.1	0.07	0.095	0.105	0.09	0.09	0.095	0.065	0.1	0.09	0.11	0.095	0.08
COD	Extremum	9.00	8.95	8.90	9.00	9.00	8.90	8.91	9.00	8.91	8.90	8.89	8.88	8.89	8.90	9.00	8.94
	Index	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.44	0.44	0.59	0.59	0.60	0.60
BOD ₅	Extremum	1.68	1.66	1.63	1.66	1.70	1.66	1.70	1.66	1.64	1.62	1.67	1.66	1.67	1.61	1.62	1.65
	Index	0.42	0.42	0.41	0.42	0.43	0.42	0.43	0.42	0.41	0.41	0.42	0.42	0.56	0.54	0.54	0.42
Ammonia nitrogen	Extremum	0.362	0.367	0.370	0.372	0.370	0.371	0.360	0.370	0.367	0.364	0.361	0.364	0.360	0.370	0.364	0.362
	Index	0.36	0.37	0.37	0.37	0.37	0.37	0.36	0.37	0.37	0.36	0.36	0.36	0.72	0.74	0.73	0.72

Total phosphorus	Extremum	0.073	0.070	0.071	0.072	0.071	0.072	0.073	0.078	0.075	0.071	0.072	0.070	0.075	0.070	0.070	0.069
	Index	0.37	0.35	0.36	0.36	0.36	0.36	0.37	0.39	0.38	0.36	0.36	0.35	0.75	0.70	0.70	0.69
Permanganate index	Extremum	2.34	2.34	2.33	2.35	2.36	2.36	2.30	2.33	2.34	2.31	2.38	2.28	2.34	2.31	2.32	2.31
	Index	0.39	0.39	0.39	0.39	0.39	0.39	0.38	0.39	0.39	0.39	0.40	0.38	0.59	0.58	0.58	0.39
Dissolved Oxygen	Extremum	7.24	7.28	7.26	7.25	7.22	7.24	7.26	7.25	7.28	7.25	7.28	7.24	7.24	7.31	7.28	7.30
	Index	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.64	0.63	0.64	0.72
Volatile phenol	Extremum	0.001	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
	Index	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.5	0.5	0.5	0.5

Note: Monitoring sections 1#, 2# and 3# shall be assessed as per Type III Standards for water area, and 4# monitoring section shall be assessed based on Type II water area.

6.2.2 Dry season

Monitoring data for water quality in the dry season of the Project shall refer to monitoring data for surface water environment quality of Gong'an section of the Yangtze River made by Gong'an County Environmental Monitoring Station in *EIA Report on Yangjiachang Town Industrial Park*.

(1) Distribution of monitoring sites

Four monitoring sections are provided in this water quality monitoring. Drain outlet 1# drains wastewater into 500m in the upstream of Gong'an section of the Yangtze River. Drain outlet 2# drains wastewater into 1,000m in the downstream of Gong'an section of the Yangtze River. Drain outlet 3# drains wastewater into 2,500m in the downstream of Gong'an section of the Yangtze River. Drain outlet 4# drains wastewater into 5,000m in the downstream of Gong'an section of the Yangtze River.

(2) Monitoring items

pH, COD, permanganate index, Cr⁶⁺, dissolved oxygen, BOD₅, volatile phenol, ammonia nitrogen, total phosphorus, Cd, Pb, Zn, Cr⁶⁺, cyanide, sulfate, nitrate, As and Hg.

(3) Sampling time and frequency

Monitoring was carried out for 3 days from March 20 to 22, 2015, once a day.

(4) Sampling and analyzing method

The mixed section sample is applied. Hydrometric determinations are made when sampling is conducted. Water quality sampling shall be conducted as per the requirements of *Technical Specifications Requirements for Monitoring of Surface Water and Waste Water* (HJ/T91-2002). See monitoring and analysis method in Table 6.2-7.

Table 6.2-7 Analysis Method for Water Quality Monitoring Factor

SN	Monitoring items	Analysis method and method source	Monitoring instrument and model
1	pH	Glass electrode method (GB/T6920-86)	Laboratory pH meter, SJ-3F
2	Chemical oxygen demand (COD)	Dichromate method (GB/T11914-89)	Standard COD digester, 101C series
3	Permanganate index	Acid process (GB11892-89)	/
4	DO	Iodometric method (GB7489-87)	Burette
5	Five-day biochemical oxygen demand (BOD ₅)	Dilution and inoculation test (HJ505-2009)	Biochemical incubator (WM2K-10)
6	Volatile phenol	4-aminoantipyrine spectrophotometry (HJ503-2009)	Spectrophotometer 723
7	Ammonia nitrogen (NH ₃ -N)	Nessler's reagents spectrophotometer (HJ535-2009)	Spectrophotometer 723
8	Total nitrogen	Alkaline potassium persulfate digestion ultraviolet spectroscopy (HJ636-2012)	Ultraviolet spectroscopy
9	Total phosphorus	Molybdate-antimony-scandium spectrophotometry	Spectrophotometer 723
10	Cd	Atomic absorption spectrophotometry (GB/T7475-87)	TAS-986 atomic absorption spectrophotometer
11	Pb	Atomic absorption spectrophotometry (GB/T7475-87)	TAS-986 atomic absorption spectrophotometer
12	Zn	Atomic absorption spectrophotometry (GB/T7475-87)	TAS-986 atomic absorption spectrophotometer
13	Cr ⁶⁺	1,5-diphenylcarbazide spectrophotometry (GB/T7467-87)	Spectrophotometer 723
14	Cyanide	Isonicotinic acid-barbituric acid spectrophotometry (HJ484-2009)	Spectrophotometer 723
15	Sulfate	Barium chromate spectrophotometry (HJ/T342-	Spectrophotometer 723

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2007)			
16	Nitrate	Phenol disulfonic acid spectrophotometry (GB/T7480-87)	Spectrophotometer 723
17	As	Atomic fluorescence spectrometry in <i>Water and Wastewater Monitoring and Analysis Method</i> (4 th edition) by The State Environmental Protection Administration (2002)	Atomic fluorescence
18	Hg	Atomic fluorescence spectrometry in <i>Water and Wastewater Monitoring and Analysis Method</i> (4 th edition) by The State Environmental Protection Administration (2002)	Atomic fluorescence

(5) Evaluation Method

The standard single water quality index method shall be applied for this assessment.

(6) Monitoring results and assessment

Statistics for monitoring results shall be listed into Table 6.2-8.

See assessment results of each section in Table 6.2-9.

Table 6.2-8 Monitoring Results of Water Environmental Quality (Unit: mg/L, pH: dimensionless)

Date	March 20				March 21				March 22			
	1#	2#	3#	4#	1#	2#	3#	4#	1#	2#	3#	4#
pH	7.35	7.31	7.30	7.32	7.33	7.30	7.33	7.31	7.30	7.31	7.32	7.30
COD	8.22	7.93	8.31	8.04	8.15	8.22	8.03	7.84	7.95	8.11	8.23	8.02
Permanganate index	1.82	2.14	2.01	1.86	1.87	1.82	1.93	1.97	1.95	1.84	1.85	1.90
DO	8.16	8.22	8.16	8.17	8.17	8.20	8.21	8.19	8.17	8.20	8.19	8.21
BOD ₅	1.05	1.11	1.00	1.05	1.06	1.10	1.08	1.03	1.04	1.02	1.08	1.07
Volatile phenol	0.0009	0.0010	0.0009	0.0009	0.0010	0.0009	0.0009	0.0009	0.0009	0.0010	0.0009	0.0009
Ammonia nitrogen	0.169	0.152	0.144	0.154	0.158	0.147	0.153	0.148	0.150	0.152	0.148	0.147
Total nitrogen	1.69	1.89	1.73	1.75	1.70	1.73	1.76	1.75	1.80	1.76	1.81	1.77
Total phosphorus	0.085	0.088	0.093	0.087	0.086	0.090	0.091	0.087	0.086	0.091	0.092	0.088
Cadmium (Cd)	0.001L											
Plumbum (Pb)	0.01L											
Zinc (Zn)	0.02L											
Hexavalent chromium (Cr ⁶⁺)	0.004	0.006	0.004	0.005	0.005	0.006	0.006	0.004	0.005	0.006	0.006	0.005
Cyanide	0.001L											
Sulfate	39.6	39.8	39.7	39.8	39.4	39.5	39.8	39.7	39.7	39.5	39.7	39.7
Nitrate	3.45	3.40	3.35	3.28	3.30	3.35	3.40	3.37	3.40	3.38	3.34	3.37
Arsenic (As)	0.0003L											
Mercury (Hg)	0.00004L											

Table 6.2-9 Standard Single Water Quality Index of Assessed Water Area

Date	March 20				March 21				March 22			
	1#	2#	3#	4#	1#	2#	3#	4#	1#	2#	3#	4#
pH	0.175	0.155	0.150	0.160	0.165	0.150	0.165	0.155	0.150	0.155	0.160	0.150
COD	0.411	0.397	0.416	0.402	0.408	0.411	0.402	0.392	0.398	0.406	0.412	0.401
Permanganate index	0.303	0.357	0.335	0.310	0.312	0.303	0.322	0.328	0.325	0.307	0.308	0.317
BOD ₅	0.263	0.278	0.250	0.263	0.265	0.275	0.270	0.258	0.260	0.255	0.270	0.268
Volatile phenol	0.180	0.200	0.180	0.180	0.200	0.180	0.180	0.180	0.180	0.200	0.180	0.180
Ammonia nitrogen	0.169	0.152	0.144	0.154	0.158	0.147	0.153	0.148	0.150	0.152	0.148	0.147
Total nitrogen	1.690	1.890	1.730	1.750	1.700	1.730	1.760	1.750	1.800	1.760	1.810	1.770
Total phosphorus	0.425	0.440	0.465	0.435	0.430	0.450	0.455	0.435	0.430	0.455	0.460	0.440
Cadmium (Cd)	0.001L	0.001L	0.001L	0.001L	0.001L	0.001L	0.001L	0.001L	0.001L	0.001L	0.001L	0.001L
Plumbum (Pb)	0.01L	0.01L	0.01L	0.01L	0.01L	0.01L	0.01L	0.01L	0.01L	0.01L	0.01L	0.01L
Zinc (Zn)	0.02L	0.02L	0.02L	0.02L	0.02L	0.02L	0.02L	0.02L	0.02L	0.02L	0.02L	0.02L
Hexavalent chromium (Cr ⁶⁺)	0.080	0.120	0.080	0.100	0.100	0.120	0.120	0.080	0.100	0.120	0.120	0.100
Cyanide	0.001L	0.001L	0.001L	0.001L	0.001L	0.001L	0.001L	0.001L	0.001L	0.001L	0.001L	0.001L
Sulfate	0.158	0.159	0.159	0.159	0.158	0.158	0.159	0.159	0.159	0.158	0.159	0.159
Nitrate	0.345	0.340	0.335	0.328	0.330	0.335	0.340	0.337	0.340	0.338	0.334	0.337
Arsenic (As)	0.0003L	0.0003L	0.0003L	0.0003L	0.0003L	0.0003L	0.0003L	0.0003L	0.0003L	0.0003L	0.0003L	0.0003L
Mercury (Hg)	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004

It can be seen from Table 4.5-12 that the total nitrogen index of Gong'an section of the Yangtze River exceeds the standards in the dry season, and the standard index ranges from 1.69 to 1.89. Standard indexes of other monitoring factors are less than 1, meeting the standard requirements for type III water areas functions specified in *Environmental Quality Standards for Surface Water* (GB3838-2002).

6.3 Assessment on Current Situation of Noise environment quality

The current situation of noise refers to data for monitoring sensitive points around the plant area in *EIA Report (Draft for Approval) on 2.20Mt/a High-grade Packaging Board Project by Changtai Paper Industry (Wuhan) Co., Ltd.* from March 23 to 24, 2015.

(1) Distribution of monitoring sites

The Environment Monitoring Station of Gong'an County monitored sensitive points around the project for 2 days continuously from March 23 to 24, 2015. Four noise monitoring sites were set up in total, including one in 2 residential areas in the south of the plant site and 2 residential areas in the southwest of the plant site. Four noise monitoring sites were provided for monitoring within 2 continuous days, once respectively at night and in the daytime a day.

(2) Evaluation criterion

Based on environmental function division of the project location, the surrounding environment sensitive points of the Project shall conform to Type III Standards (namely 65dB(A) in the daytime and 55dB(A) at night) specified in *Environmental Quality Standard for Noise* (GB3095-2008). The current situation of noise shall be assessed by taking the equivalent sound level Leq as the amount of assessment in terms of the monitoring data.

(3) Results

See statistic results for monitoring in Table 6.3-1. It can be seen from monitoring results in the table that the noise of boundary sensitive point meets the standards for Type III specified *Environmental Quality Standard for Noise* (GB3095-2008).

Table 6.3-1 Statistics for Monitoring Results of the Current Noise Unit, dB(A)

Site No.	Orientation and function	Day time		Night		Condition of meeting standards
		March 23	March 24	March 23	March 24	
1	Group 11, Qingji Village	49.8	50.1	43.1	42.7	Meet the standard
2	Groups 9 and 10, Renhe Village	49.1	48.2	42.5	42.8	Meet the standard
3	Group 5 of Lvhua Village	45.3	43.6	41.2	41.4	Meet the standard
4	Group 10 of Fuli Village	44.2	43.8	40.8	41.1	Meet the standard

Besides, another organization was authorized to monitor the current situations of environment noise quality of several residential areas closer to the Project by combining project features with actual conditions of the surrounding environment of the Project. See monitoring assessment results in Table 6.3-2. The residential areas shall abide by the standards for 60dB (A) in the daytime and 50dB (A) at night.

As can be seen from the monitoring assessment results, the project is located in the planning industrial park, but rural areas to be developed are around it. For this, the quality of the surrounding noise environment fully meets the function division requirements of type II noise environment. The noise environment quality is good.

Table 6.3-2 Statistics for Monitoring Results of Noise in Main Surrounding Residential Areas

Site No.	Orientation and function	Day time		Night		Condition of meeting
		March 23	March 24	March 23	March 24	

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						standards
1#	Group 11, Qingji Village	49.8	50.1	43.1	42.7	Meet the standard
2#	Groups 9 and 10, Renhe Village	49.1	48.2	42.5	42.8	Meet the standard
3#	Group 5 of Lvhua Village	45.3	43.6	41.2	41.4	Meet the standard
4#	Group 10 of Fuli Village	44.2	43.8	40.8	41.1	Meet the standard

6.4 Assessment on Current Situation of Groundwater Environment

6.4.1 Relevant historical monitoring data

The current situation of groundwater refers to data for monitoring sensitive points around the plant area in *EIA Report (Draft for Approval) on 2.20Mt/a High-grade Packaging Board Project by Changtai Paper Industry (Wuhan) Co., Ltd.* from November 3 to 5, 2014.

(1) Monitoring site, factor and time

The quality of groundwater environment of the project area shall conform to Type III standards specified in *Quality Standard for Ground Water* (GB/T4848-93). Three groundwater monitoring sites were set up. See locations of ground water monitoring sites in Table 6.4-1.

Table 6.4-1 Description for groundwater monitoring sites in industrial park

SN	Position of site	Function division	Description
1	Group 5 of Lvhua Village	GB/T4848-93—III	Upstream of the construction project site
2	Site of the proposed project	GB/T4848-93—III	Construction project site
3	Group 8 of Fuli Village	GB/T4848-93—III	Downstream of construction project site

(2) Monitoring factor and analysis method

According to principles and requirements of Type III standards specified in *Quality Standard for Ground Water* (GB/T4848-93), the ground water monitoring factors shall be determined as pH, total hardness, permanganate index, ammonia nitrogen, nitrate, nitrite, volatile phenol, As, sulfate, Cd, Cr⁶⁺ and Pb. Sampling and analysis methods and monitoring frequency shall be conducted as per the national relevant provisions. See monitoring factor as well as sampling and analysis methods in Table 6.4-2.

Table 6.4-2 List of Groundwater Quality Monitoring Factors and Analysis Methods

Pollutant name	Methods	Standards and specifications
pH	Glass electrode method	GB6920-86
Total hardness	EDTA titrimetry	GB/T7477-87
Permanganate index	Acid process	GB11892-89
Ammonia nitrogen	Nessler's reagent colorimetry	GB7479-2009
Nitrate	Phenol disulfonic acid spectrophotometry	GB/T7480-87
Nitrite	N-naphthyl ethylenediamine spectrophotometry	GB13580.7-92
Volatile phenol	4-aminoantipyrine spectrophotometry	HJ503-2009
As	Atomic fluorescence spectrometry	GB/T5750
Sulfate	Barium chromate spectrophotometry	HJ/T342-2007
Cadmium (Cd)	Flame atomic absorption spectrometry	GB/T7475-87
Hexavalent chromium (Cr ⁶⁺)	1,5-diphenylcarbazide spectrophotometry	GB7467-87
Plumbum (Pb)	Flame atomic absorption spectrometry	GB7475-87

(3) Monitoring duration and frequency

Sampling was made for three days continuously from November 3 to 5, 2014, once a day.

(4) Evaluation Method

For the assessment method for current situation of the groundwater environment quality, it is planned to determine the situation of ground water environment quality by applying the single component assessment method which is the same as the single water quality parameter assessment method of ground water.

(5) Monitoring result and assessment conclusion

See monitoring results and single standard index of pollutants at each site in Table 6.4-3.

Table 6.4-3 Lists of Groundwater Quality and Assessment Results of Project Site Selection Area (Unit: mg/L, pH: dimensionless)

SN	Monitoring items	Standard Value	1#		2#		3#	
			Monitored value	Assessment index	Monitored value	Assessment index	Monitored value	Assessment index
1	pH	6.5~8.5	7.16	0.11	7.24	0.16	7.22	0.15
2	Total hardness	450	235	0.52	241	0.54	220	0.49
3	Permanganate index	3	2.36	0.79	2.42	0.81	2.51	0.84
4	Ammonia nitrogen	0.2	0.084	0.42	0.088	0.44	0.087	0.44
5	Nitrate	20	0.841	0.04	0.831	0.04	0.820	0.04
6	Nitrite	0.02	0.003L	/	0.003L	/	0.003L	/
7	Volatile phenol	0.002	0.0011	0.55	0.0010	0.50	0.0011	0.55
8	As	0.05	0.0005L	/	0.0005L	/	0.0005L	/
9	Sulfate	250	41.0	0.16	40.4	0.16	41.6	0.17
10	Cd	0.01	0.001L	/	0.001L	/	0.001L	/
11	Cr ⁶⁺	0.05	0.008	0.16	0.007	0.14	0.008	0.16
12	Pb	0.05	0.01L	/	0.01L	/	0.01L	/

In comparison with *Quality Standard for Ground Water* (GB/T14848-93), the ground water concentration monitoring results within this investigation scope meet the limit value of concentration specified by Type III standard.

6.4.2 Supplementary monitoring data of the Project

Wuhan Chujiang Environment Protection Co., Ltd. made a supplementary monitoring for project feature factors on April 16.

(1) Distribution of monitoring point

See distribution of monitoring sites of the supplementary monitoring items in Table 6.4-4.

6.4-4 Distribution of Monitoring Sites and Setup Instruction

SN	Position of site	Description
1	Group 11, Qingji Village	The plant site is in west-southwest.
2	Group 9, Fuli Village	East boundary of the paper plant

(2) Monitoring project and monitoring and analysis method

The monitoring feature factors of the Project include water temperature, pH, SS, permanganate index, As, chloride, sulfate, nitrate, total hardness, ammonia nitrogen, TP, Cd, Cr⁶⁺, and Pb.

(4) Supplementary monitoring result and analysis

Statistic results for supplementary monitoring of pollutant factors shall be listed into Table 6.4-5. Based on control value comparison and analysis, all monitoring factors of each

monitoring point do not exceed the standard, lower than the standard limit value specified in *Quality Standard for Ground Water* (GB/T14848-93).

6.4-5 Assessment on Supplementary Monitoring of Groundwater Environment Quality

SN	Monitoring items	Standard Value	1#		2#	
			Monitored value	Assessment index	Monitored value	Assessment index
1	pH	6.5~8.5	7.39	0.65	7.35	0.68
2	Permanganate index	3	2.86	0.95	2.66	0.89
3	Ammonia nitrogen	0.2	0.13	0.65	0.16	0.80
4	Total hardness	450	345	0.77	432	0.96
5	Sulfate	250	106	0.42	116	0.46

SN	Monitoring items	Standard Value	1#		2#	
			Monitored value	Assessment index	Monitored value	Assessment index
6	Chloride	250	36.2	0.14	41.7	0.17
7	Nitrate	20	0.65	0.03	0.72	0.04
8	Cr ⁶⁺	0.05	0.016	0.32	0.007	0.14
9	Pb	0.05	2.5L	—	2.5L	—
10	Cd	0.01	0.5L	—	0.5L	—
11	As	0.05	1.0L	—	1.0L	—

6.5 Assessment on Soil Environment Quality

Wuhan Chujiang Environment Protection Co., Ltd. conducted sampling and monitoring for the proposed project site and its surrounding soil on April 16.

(1) Distribution of monitoring sites

See distribution of monitoring sites in Table 6.5-1.

Table 6.5-1 Distribution of Monitoring Sites for Current Quality of Soil Environment

SN	Position of site	Description
1#	Center of the plant site	
2#	3,000m from the south direction of the plant site	Same as the monitoring site in the downwind monitoring site

(2) Sampling and analyzing method

Soil sample collection and preparation shall be conducted based on the routine methods for the related samples specified in "Standard Analysis Method for Environment Sample". Monitoring and analysis method shall be conducted based on *Recent Analysis Method for Soil Elements*.

(3) Monitoring project and analysis method

See monitoring project and analysis method in Table 6.5-2.

6.5-2 Soil Sampling and Analysis Method

Category	Test items	Method basis	Analysis method	Instrument & equipment and number	Detection limit
Soil	pH	NY/T1377-2007	Glass electrode method	CJ-YQ-54 by pH	—
	Copper	NY/T1613-2008	Atomic absorption spectrometry	Atomic absorption spectrophotometer CJ-YQ-26	2mg/kg

Category	Test items	Method basis	Analysis method	Instrument & equipment and number	Detection limit
	Zinc	NY/T1613-2008	Atomic absorption spectrometry	Atomic absorption spectrophotometer CJ-YQ-26	20.4mg/kg
	Plumbum	NY/T1613-2008	Atomic absorption spectrometry	Atomic absorption spectrophotometer CJ-YQ-26	5mg/kg
	Cadmium	NY/T1613-2008	Atomic absorption spectrometry	Atomic absorption spectrophotometer CJ-YQ-26	0.01mg/kg
	Chromium	NY/T1613-2008	Atomic absorption spectrometry	Atomic absorption spectrophotometer CJ-YQ-26	5mg/kg
	Arsenic	GB/T22105.2-2008	Atomic fluorescence spectrometry	Atomic fluorescence spectrophotometer (CJ-YQ-28)	0.01mg/kg
	Mercury	GB/T22105.1-2008	Atomic fluorescence spectrometry	Atomic fluorescence spectrophotometer (CJ-YQ-28)	0.002mg/kg
	Nickel	NY/T1613-2008	Atomic absorption spectrometry	Atomic absorption spectrophotometer CJ-YQ-26	2mg/kg

(4) Monitoring results and assessment

See monitoring statistic results in Table 6.5-3.

Table 6.5-3 Statistics for Monitoring Results of Current Soil Environment

Item	1#		2#	
	Monitored value	Evaluation	Monitored value	Evaluation
Copper (mg/kg)	27.2	0.272	39.1	0.391
Zinc (mg/kg)	56.7	0.189	76.6	0.255
Plumbum (mg/kg)	5L	—	5L	—
Cadmium (mg/kg)	0.224	0.373	0.270	0.450
Chromium (mg/kg)	80.6	0.322	90.7	0.363
Arsenic (mg/kg)	24.2	0.968	24.7	0.988
Mercury (mg/kg)	0.368	0.368	0.826	0.826
Nickel (mg/kg)	30.3	0.505	33.4	0.557

It can be seen from Table 6.5-3 that the environment of surrounding soil of the proposed project site could meet the requirements of Type II Standard of *Environmental Quality Standard for Soils* (GB15618-1995).

7. Environmental Impact Prediction and Assessment

7.1 Analysis of environmental impact during the construction

7.1.1 Overview of Construction

Yangjiachang Town Industrial Park CHP Project in Gong'an County will last about 25 months

from civil engineering construction of the main power house to equipment installation and commissioning completion. On this basis, there are factors polluting the environment in various activities of construction.

Construction machinery includes equipment for digging, shoving, lifting and transportation. Construction equipment for front civil engineering stage is mainly based on digging, shoveling and vehicle; construction equipment for later engineering equipment installation stage is mainly based on lifting, vehicle, mixing, air compressor, etc. A large number of such building materials as steel, cement, woods, sandstone and bricks are required during construction of the proposed works. Soil and stone required by engineering construction could be drawn on local resources. Also, steel, cement, wood, building machinery and engineering equipment shall be transported into the construction site by the vehicle.

7.1.2 Construction environment impact feature

Environment impact from construction of the proposed works is divided into surface source and line source based on types of the source, and is divided into waste gas, wastewater, noise and solid waste residue by types of the pollutants. With the more complicated environment pollution behavior way during the construction period, waste gas and noise from engineering construction result in rather heavy environment pollution impact on the basis of analysis for pollution degree and scope. However, environment pollution of the construction period only leads to short-period impact, and could be eliminated basically with engineering completion impact, causing beneficial effects. See engineering construction environment pollution impacts in Table 7.1-1.

Table 7.1-1 Construction environment impact feature

Construction Activities	Description for construction environment impact features
Earth and rock excavation	Waste gas exhausted by excavation machinery, including main pollutants as NO ₂ , SO ₂ and CO; tail gas from transportation vehicles and ground dust, including main pollutants as dust, NO ₂ , SO ₂ , CO and HC.
	Noise from excavation and piling machinery, stone processing and transportation, etc.
	Waste slag from construction
	Wastewater from domestic wastewater of constructors and rainwater for washing stone, with high SS amount
Installation and construction	Waste gas from tail gas from transportation vehicles, including such main pollutants as HC and NO ₂ ; ground dust, including such main pollutants as dust; flue gas from arc welding.
	Noise from vehicle, machinery for lifting and shoveling, and air compressor, and mixing machinery
	Wastewater from water for washing sandstone and domestic wastewater of constructors
	Waste slag from various waste bricks and stones for construction

7.1.3 Analysis for atmospheric environmental impact

The waste discharge source affecting the atmospheric environment includes road dust generated by transportation, vehicle exhaust, and waste gas exhausted by excavator and bulldozer. Based on engineering analogy and analysis, main pollution sources during the construction period include road dust and vehicle tail generated by transportation during the construction.

Analogical field monitoring results show that airborne particles and construction powder are generated from site flattening during the construction period, loading/unloading of construction materials and vehicle transportation. The concentration of dust on the ground nearby the construction site could be 1.5~30mg/m³, which is higher than the limit value of the secondary standard concentration *Ambient Air Quality Standard* (GB3095-96). It leads to influences on the construction site environment. Considering high mechanical degree of the construction site, there are a few constructors. Besides, its pollution scope is only limited within the construction site and areas nearby the two sides of the road for large particle size of dust and natural settling. However, this kind of dust is easily raised again under an action of wind power to result in the secondary pollution. In order to control dust pollution during the construction period, reasonable layout of the construction site shall be strengthened and scientifically managed. Construction materials shall be classified and piled up to minimize

dust in the construction site.

Vehicle exhaust prediction results of analogical field operation site show that the maximum concentration values of NO₂ generated from vehicle exhaust at the two sides of the road are 0.013mg/m³, lower than limit value of the secondary standard concentration of *Ambient Air Quality Standard* (GB3095-96). It results in few influences on the ambient environment.

With good current quality situation of ambient air in the construction site, the environment capacity is high. For this, atmospheric pollutants will not have any influences on regional atmospheric environment.

What's more, road dust is generated when the transportation vehicles operate during the construction period. Flying dust is diffused at both sides of the road. With the maximum flying dust concentrations at the two sides of the road, the distance away from the roadside is gradually decreased to be tend to the background value. Under common conditions, the influence scope is within 30m at both sides of the roadside. As a result of this, vehicle dust results in a certain degree of pollution on the small scope of atmosphere of the transportation routes, but its pollution disappears upon completion of the Project.

7.1.4 The analysis of noise impact

Noise during the construction period of the Project includes noise from traffic and construction machinery. The former is intermittent noise, and the latter is continuous noise. Based on site selection of construction machinery and equipment and related data provided by the engineering design, the source intensities of main construction noise sources are listed in Table 7.1-2.

Table 7.1-2 Sound Levels of Construction Noise Sources

Type of light source	Name of equipment and system	Noise level (dB(A))
Fixed point source	Civil engineering drill, crusher, concrete mixer and air compressor	75-105
Flowing line source	Loading vehicle, excavator and bulldozer	82-109

As per *Emission Standard of Environment Noise for Boundary of Construction Site* (GB12523-2011), the limit value of operation noise at different construction stages is 70dB(A) in the daytime and 55dB(A) at night.

The calculation is that the construction site could reach Type III control standard in the daytime when it is more than 350m away from the fixed sound source, and control standards at night when it is more than 1,000m away from the fixed sound source. The flowing source could reach the standard when areas at the two sides of the traffic artery are more than 50m away from it. The Employer shall take effective control measures for construction noise and conduct housekeeping on account that Lvhuo Village, Fuli Village and other residential areas are 360m away from the periphery of the proposed plant area. Low-noise equipment shall be applied to lower noise pollution during construction. Construction shall be stopped from 22:00 to 6:00 at night to guarantee resident's rest at night. On the basis of reasonable construction arrangement, construction with high noise equipment shall not be conducted at night. Moreover, preparations for personnel, equipment, site and material shall be made when concrete needs to be operated continuously, so as to minimize the operation time of mixer.

Besides, numerous earthwork and raw materials are needed during the construction period. If the flow of transportation vehicles to and fro is increased, the traffic noise will be increased suddenly, especially the construction area will lead to a certain influence on the surrounding environment.

7.1.5 Analysis for surface water environment impact

Waste water produced during the construction period mainly includes wastewater from engineering construction and domestic sewage. Engineering construction wastewater includes cooling water for construction machinery, water for washing construction site and building materials, as well as concrete pouring, maintenance and washing. The part of wastewater includes a certain amount of oil sewage and silt. Domestic sewage from the

constructor includes a certain amount of organic matters and germs. Besides, ground runoff water on the construction site in the rainy season includes a certain amount of mud and high-concentration suspended matters.

The Construction Contractor shall be required to drain wastewater after building such simple temporary sewage treatment facilities as temporary collecting basin and grit basin. Domestic wastewater from the constructors shall be transported to environmental sanitation department for treatment after being treated by the environment-friendly mobile toilets. Pollution for water body can be effectively controlled by taking aforesaid measures. It is predicated that there is a few influences on the water environment during the construction period. With the end of the construction period, this kind of pollution will be no longer in existence.

7.1.6 Analysis for solid waste

The solid waste from engineering construction mainly includes construction waste slag and daily solid waste from constructors.

Construction waste slag is mainly from the basic excavation stage, some broken bricks at the civil engineering project stage, and solid wastes from cement mortar. Based on the engineering construction plan, discarded soil and dregs during the construction shall be used for back filling the site. Special storage yard or transportation shall not be provided. During earth and rock excavation and construction, transportation of excavated materials may result in a small amount of scattering. In case rainwater washes floating soil and waste slag in the construction site, water and soil loss could be caused. However, no large influence is caused on the ambient environment since the construction scope of the proposed works is large; the water and soil loss degree is slight and will stop when the construction period is completed.

Daily solid wastes from the constructors mainly include peel, vegetable residue, leftover, waste metal, waste plastics, and waste paper, solid waste from 2.20Mt/a High-grade Packaging Board Project of the current project under construction shall be collected and then treated by entrusting the environmental sanitation department.

7.1.7 Analysis for water and soil loss

During the construction of the Project, damage for original surface configuration, ground vegetation and soil structure leads to increasing of the bare area, so that resistance to corrode and impact of surface soil could be weakened. Moreover, soil and earth are moved to generate a certain amount of spoil. For instance, severe water and soil loss will be caused if no corresponding control measures are taken in stormy days, so as to aggravate water and soil loss in the surrounding areas of the Project.

It can be seen from the construction scheme of the Project that construction preparation and body project can be conducted synchronously. Most occupied lands of the construction area during the construction are disturbed and tied up at different degrees. The exposed surface easily leads to new water and soil loss under an action of such natural factors as rainfall. The superficial planting soil temporarily piled is loose and weak in resistance to corrode. It is one of main sources of water and soil loss caused by the Project. Temporary waste slag generated during the construction will result in water and soil loss at different degrees.

Upon engineering construction, various factors of water and soil loss caused by construction are gradually weakened, surface disturbance is essentially stopped, and water and soil loss is obviously decreased. However, there is a certain amount of water and soil loss in a short time for plant measures cannot exert the water and soil conservation functions in the short period.

7.2 Analysis for Environmental Impact during Operation Period

7.2.1 Prediction and analysis for atmospheric environmental impact

7.2.1.1 Analysis for meteorological features of regional pollution

(1) Meteorological statistics

Gong'an County, the project site, is located in the south of Jiangnan Plain, belonging to the subtropical monsoon climate. With distinct four seasons, it is cold in winter and hot in summer, and moderate in both spring and autumn. According to climate data of recent five years, the local average annual precipitation is 1,352.9mm, the annual average temperature is 17.25°C, the extreme maximum temperature is 37.2°C, the extreme minimum temperature is -5.0°C, the annual average relative humidity is 80%, the annual mean air pressure is 1,011.8hpa, the annual mean wind velocity is 1.41m/s, the annual prevailing wind direction is N, and the secondary prevailing wind direction is NE.

(2) Investigation and analysis for meteorological features of regional pollution

Based on 2012 meteorological data provided by Gong'an Meteorological Bureau, the results are as follows by analyzing general ground observational data per day in 2012:

① temperature

See Table 7.2-1 and Figure 7.2-1 for mean monthly temperature variations in Gong'an County. See heights and temperature inversion frequencies of monthly and quarterly mixed layers in Table 7.2-2 respectively. The annual average temperature is 17.25°C, the highest average air temperature in July is (30.43)°C, and the lowest average air temperature in January is (4.45)°C.

Table 7.2-1 Monthly Variation of Mean Annual Temperature of Gong'an County

Month	January	February	March	April	May	June	July	August	September	October	November	December	Average
Temperature(°C)	4.45	5.78	10.13	17.86	22.50	27.12	30.43	28.64	24.24	18.52	11.75	5.25	17.25

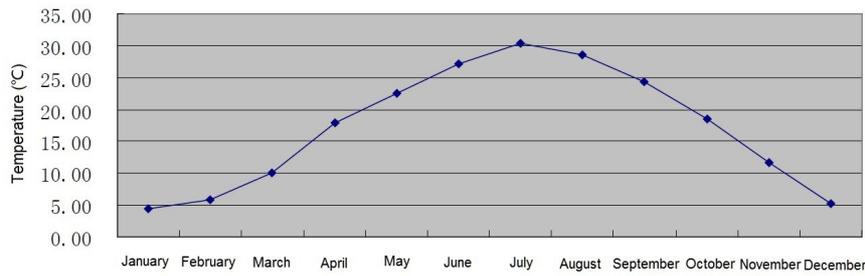


Figure 7.2-1 Monthly Variation of Mean Annual Temperature

Table 7.2-2 Heights and Temperature Inversion Frequencies of Monthly Mixed Layers

Time level	1	2	3	4	5	6	7	8	9	10	11	12	All year
Height of mixed layer (m)	351	388	428	510	423	470	652	543	527	319	314	394	443
Temperature inversion frequency (%)	32.26	29.89	31.18	28.89	27.96	30.00	30.11	30.11	31.11	38.71	41.11	30.11	31.79

Table 7.2-3 Heights and Temperature Inversion Frequencies of Quarterly Mixed Layers

Season	Spring	Summer	Autumn	Winter
Height of mixed layer (m)	453	556	386	377
Temperature inversion frequency (%)	29.35	30.07	37.00	30.77

② Wind speed

See monthly variation of annual mean wind velocity in Gong'an County in Table 7.2-4 and

variation curve of annual mean wind velocity in Figure 7.2-2. It can be seen from the table and figure that the annual mean wind velocity of Gong'an County is 1.41m/s; the annual mean wind velocities of July and December are 1.74m/s and 1.73m/s maximally; the annual mean wind velocity is 0.97m/s minimally in October. The mean wind velocity of each month is distributed in a wavy manner, but has not high relief degree. The mean wind velocity is maximum in summer, but minimum in winter.

Table 7.2-4 Monthly Variation of Annual Mean Wind Velocity

Month	January	February	March	April	May	June	July	August	September	October	November	December	Average
Wind speed (m/s)	1.57	1.61	1.26	1.34	1.14	1.21	1.74	1.58	1.36	0.97	1.47	1.73	1.41

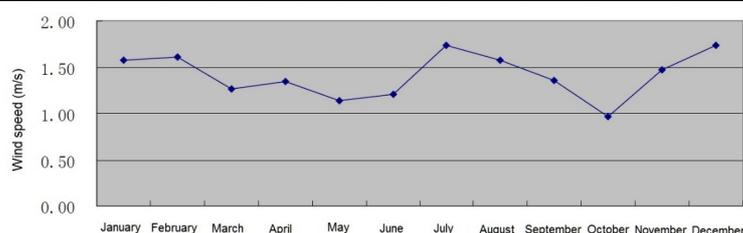


Figure 7.2-2 Monthly Variation of Annual Mean Wind Velocity

See mean wind velocities under wind directions in Table 7.2-5.

Table 7.2-5 List of Quarterly and Annual Wind Velocities

Wind direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Average
All year	2.01	1.38	1.13	1.07	1.02	1.16	1.58	1.64	1.81	1.67	1.08	0.65	0.74	0.75	0.89	1.85	1.41
Spring	1.80	1.19	1.12	1.02	0.98	1.17	1.68	1.63	1.85	1.56	1.08	0.35	0.55	0.77	0.96	1.77	1.25
Summer	1.90	1.24	0.86	0.99	1.17	1.24	1.78	1.85	2.20	2.12	1.18	1.13	0.90	1.90	0.94	2.06	1.52
Autumn	1.96	1.25	0.91	0.92	0.80	1.13	1.26	1.53	1.31	1.22	0.93	0.57	0.79	0.71	0.84	1.69	1.26
Winter	2.20	1.60	1.55	1.37	1.10	1.00	1.28	1.42	1.38	1.59	1.14	0.55	0.50	0.52	0.93	1.88	1.64

② Wind direction and frequency

+ Wind frequency statistics

See monthly, quarterly and annual variation of mean wind velocity in Table 7.2-6. It can be seen from the table that the annual prevailing wind direction is S wind (N), the wind direction frequency is 33.33%, and the calm wind frequency is 3.30%; the prevailing wind direction in winter is NNE wind (N), the wind direction frequency is 21.98%, and the clam wind frequency is 4.76%; the prevailing wind direction in summer is N wind (N), the wind direction frequency is 19.93%, and the calm wind frequency is 15.94%.

Table 7.2-6 Monthly, Quarterly and Annual Mean Wind Velocity (%) in Gong'an County

Wind direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	C
Spring	21.86	8.01	9.38	4.92	3.19	2.19	4.64	4.19	6.28	6.92	2.91	1.28	1.28	1.82	3.37	10.02	7.74
Summer	19.93	5.07	5.80	4.71	3.26	1.09	6.16	3.62	8.33	3.99	4.35	0.72	0.72	2.54	3.26	10.51	15.94
Autumn	12.32	9.42	9.78	3.99	5.07	3.26	6.16	6.16	8.70	9.78	2.90	1.09	0.36	0.36	1.81	11.96	6.88
Winter	21.98	5.13	9.89	5.86	3.30	3.30	1.83	2.56	4.03	8.06	2.56	1.10	3.66	2.56	6.96	12.45	4.76
All year	33.33	12.45	12.09	5.13	1.10	1.10	4.40	4.40	4.03	5.86	1.83	2.20	0.37	1.83	1.47	5.13	3.30

★ Wind Rose

See monthly, quarterly and annual wind frequency rose in Figure 7.2-3.

④ Pollution coefficient

The pollution coefficient reflects comprehensive influence on pollution diffusion by wind direction and velocity. Table 7.2-7 and Figure 7.2-4 make an assessment on regional atmospheric pollution coefficients. Pollution coefficients are obviously as high as 15.15, 7.78 and 7.80 in N, NNE and NE directions, and minimum pollution coefficients are in W, E and ESE directions. This indicates that the regional waste gas pollution degrees in the directions nearby S, SSW and SW are rather high.

Table 7.2-7 Pollution Coefficients of Quarterly and Annual Wind Directions

Quarter	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
All year	10.88	5.80	8.30	4.60	3.13	1.89	2.94	2.55	3.47	4.14	2.69	1.97	1.73	2.43	3.79	5.42
Spring	11.07	4.26	5.18	4.62	3.33	0.93	3.67	2.22	4.50	2.56	4.03	2.06	1.31	3.30	3.40	5.94
Summer	6.48	7.60	11.37	4.03	4.33	2.63	3.46	3.33	3.95	4.61	2.46	0.96	0.40	0.19	1.93	5.81
Autumn	11.21	4.10	10.87	6.37	4.13	2.92	1.45	1.67	3.08	6.61	2.75	1.93	4.63	3.61	8.29	7.37
Winter	15.15	7.78	7.80	3.74	1.00	1.10	3.44	3.10	2.92	3.69	1.61	4.00	0.74	3.52	1.58	2.73

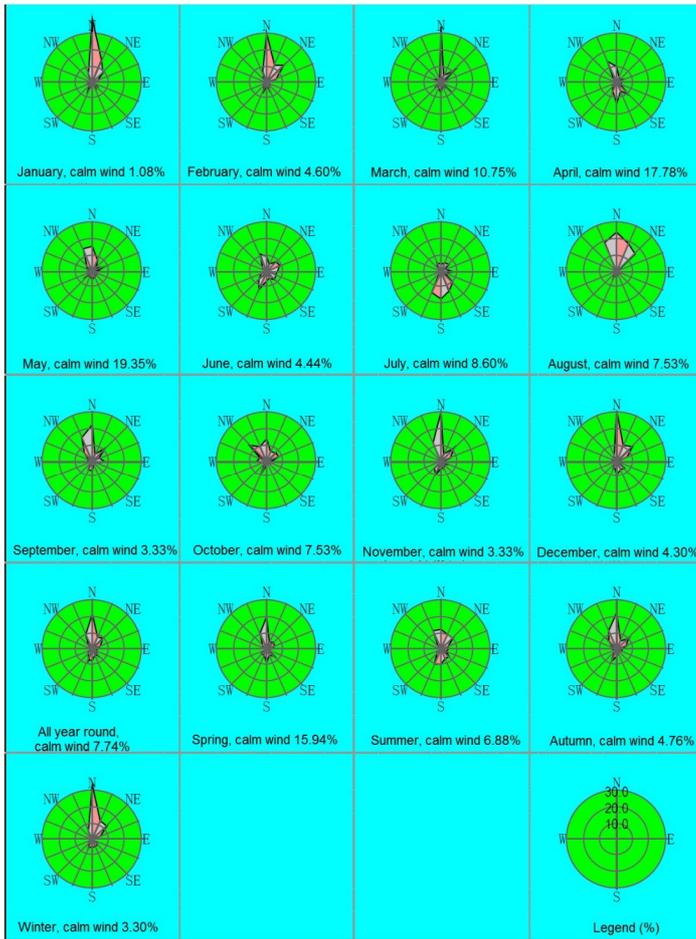
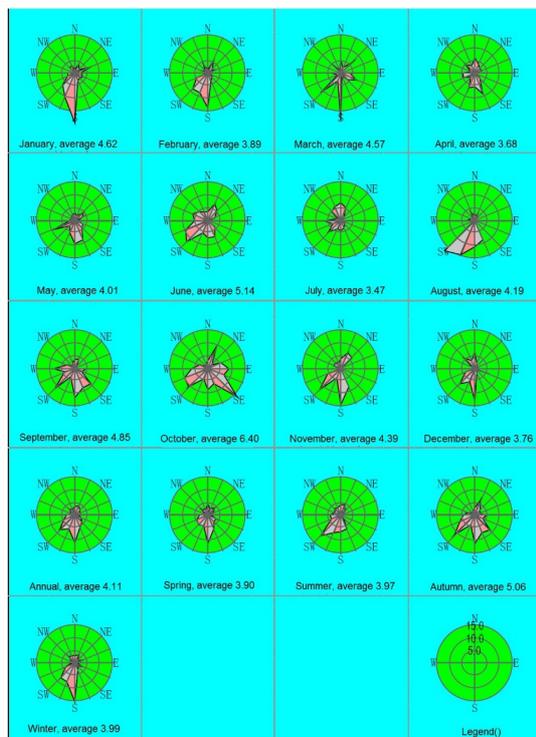


Figure 7.2-3 Monthly, Quarterly and Annual Wind Frequency Rose



7.2-4 Quarterly and Annual Pollution Coefficient Rose

7.2.1.2 Prediction module and parameter for atmospheric environmental impact

(1) Prediction factors

According to the pollutants discharge features of the Project, the normal prediction factors include SO₂, NO₂, PM¹⁰, PM_{2.5}, Hg and compounds thereof. The prediction factors under abnormal discharge condition include SO₂, NO₂ and PM₁₀.

(2) Prediction scheme

The assessment grade of this assessment is grade II, covering the rectangular region by taking the chimney of the plant area as the center and side lengths of 2.5km.

Pursuant to provisions on new guidelines of *Technical Guidelines for Environmental Impact Assessment - Atmospheric Environment* (HJ2.2-2008), the assessment contents mainly include:

under annual hourly or successively hourly meteorological conditions, ambient air protection object, ground concentration at the grid point and maximum ground hourly concentration within the assessment scope, as well as occurrence probability and times of the maximum concentration;

under daily meteorological conditions, ambient air protection object, ground concentration at the grid and maximum ground daily concentration within the assessment scope, as well as occurrence probability and times of the maximum concentration;

under long-term meteorological conditions, ambient air protection object, ground concentration at the grid and maximum ground annual concentration within the assessment

scope;

under abnormal discharge conditions, annual hourly or successively hourly meteorological conditions, maximum ground hourly concentration of the ambient air protection object and maximum hourly ground concentration within the assessment scope.

According to the guidelines, the assessment on the project is conducted in two phases. See scenario combination in Table 7.2-8:

Table 7.2-8 List of Combination of Project Assessment Prediction Scenarios

SN	Category of pollution source	Prediction factors	Calculation point	Conventional prediction content	Remarks
1	New pollution source of Phase I (Normal discharge)	SO ₂ , NO ₂ , PM ₁₀ , Hg, PM _{2.5}	Maximum ground concentration point of ambient air protection object grid point	Hourly concentration, daily average concentration, annual average concentration	Phase I of the Project
2	New pollution source of Phase I (Abnormal discharge)	SO ₂ , NO ₂ , PM ₁₀	Maximum ground concentration point in the ambient air protection object area	Hourly concentration	
3	New pollution source of Phase II (normal discharge)	SO ₂ , NO ₂ , PM ₁₀ , Hg, PM _{2.5}	Maximum ground concentration point of ambient air protection object grid point	Hourly concentration Daily average concentration Average concentration	Phase II of the Project
4	New pollution source of Phase II (Abnormal discharge)	SO ₂ , NO ₂ , PM ₁₀	Maximum ground concentration point in the ambient air protection object area	Hourly concentration	
5	Replaced pollution source	SO ₂ , NO ₂ , PM ₁₀	Ambient air protection objective	Daily average concentration Average concentration	Current pollution source of the development area
6	Related pollution source of the project under construction	SO ₂ , NO ₂ , PM ₁₀	Ambient air protection objective	Daily average concentration, annual concentration	Multi-purpose project for comprehensive solid waste burning

(3) Determination for the assessment point

Points 1#-6# in current situation monitoring are assessment points. Prediction points are positioned by the rectangular coordinates by taking the exhaust funnel of the plant area as the original point of coordinate, forward direction of x axis in the east, and forward direction of y axis in the north. See positions of assessment points in the coordinate system in Table 7.2-9.

Table 7.2-9 Coordinate Positions of Sensitive Concerned Points

SN	Description	Direction and distance	X	Y
1	Group 3 of Fuli Village	N,500	166	1381
2	Group 5 of Lvhuo Village	W,500	-714	111
3	Group 6, Lvhuo Village	SW,500	-381	-798
4	Group 4 of Lvhuo Village	S,430	496	-675
5	Group 8 of Fuli Village	E,400	1635	20
6	Group 4, Fuli Village	NE,170	948	1115

(4) List of Pollution Source Intensities

When prediction is made in this assessment, the list of pollution source intensities includes point source pollution intensity and surface source pollution intensity (see list of pollution source intensities in Table 7.2-10). See list of surface source intensities in Table 7.2-11. 90%

of conversion rate of NO_x is taken into the source intensity of NO₂. The source intensity of PM_{2.5} considers 48% of conversion rate of PM₁₀.

See list of intensities of the related pollution sources of the project under construction in Table 7.2-12.

According to *EIA Report on Controllable Detailed Planning (edited and revised) of Qingji Industrial Park of Gong'an Economic Development Zone*, see pollutant discharge of current enterprises (namely industrial pollution source) in Table 7.2-13.

Table 7.2-10 List of Point Source Intensities of Proposed Project

Name of pollution source		Point source coordinate	Point source H	Point source D	Point source T	Volume of flue gas	SO ₂	NO ₂	PM ₁₀	PM _{2.5}	Hg
			m	m	°C	Nm ³ /h	kg/h	kg/h	kg/h	kg/h	kg/h
Boiler exhaust funnel	Phase I	0, 0	180	4	60	2×379230	61.95	62.13	21.24	10.19	0.00227
	Phase II	0, 0	180	4	60	2×379230	61.95	62.13	21.24	10.19	0.00227
1# transfer station	Phase I	-175,242	15	0.8	20	10000	-	-	0.1	-	-
	Phase II	-175,242	15	0.8	20	10000	-	-	0.1	-	-
2# transfer station	Phase I	-147,167	15	0.8	20	10000	-	-	0.1	-	-
	Phase II	-147,167	15	0.8	20	10000	-	-	0.1	-	-
Crusher room	Phase I	-80, -91	15	0.8	20	10000	-	-	0.40	-	-
	Phase II	-80, -91	15	0.8	20	10000	-	-	0.40	-	-
Coal bunker	Phase I	124,4	15	0.8	20	10000	-	-	0.1	-	-
	Phase II	99,87	15	0.8	20	10000	-	-	0.1	-	-
Slag silo	Phase I	115, -67	22	0.5	20	10000	-	-	0.15	-	-
	Phase II	87,56	22	0.5	20	10000	-	-	0.15	-	-
Ash silo 1		-28,8	20	1.5	20	25000	-	-	0.375	-	-
Ash silo 2		-32,14	20	1.5	20	25000	-	-	0.375	-	-
Ash bin 3 (Phase II)		-36,20	20	1.5	20	25000	-	-	0.375	-	-

Table 7.2-11 List of Surface Source Intensities of Proposed Project

Name of pollution source		Central position	Near round semi-diameter / L x W	Effective height, He	PM ₁₀ (kg/h)
Slag silo	Phase I	115, -67	Circular diameter, 8m	10m	0.036
	Phase II	87,56	Circular diameter, 8m	10m	0.036
Ash silo	Phase I	-32,14	2 × circular diameter, 9m	10m	0.072
	Phase II	-36,20	Circular diameter, 9m	10m	0.036
Dry coal shed	Phase I	-4,194	198m×103m	5m	0.3675
	Phase II	-4,194	198m×103m	5m	0.3675

Table 7.2-12 List of the Related Pollution Sources of the Project under Construction

Name of the	Name of pollution	Point source	Point source	Point source	Point source	Volume of flue gas	SO ₂	NO ₂	PM ₁₀	PM _{2.5}	Hg
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proposed project	source	coordinate	H	D	T						
			m	m	°C	Nm ³ /h	kg/h	kg/h	kg/h	kg/h	kg/h
Comprehensive Solid Wastes Utilization Project	Exhaust funnel (Phase I)	0, 0	180	3	140	135226.5	9.54	28.40	3.99	1.92	0.00175
	Exhaust funnel (Phase II)	0, 0	180	3	140	135226.5	9.54	28.40	3.99	1.92	0.00175

Table 7.2-13 List of Replaced Pollution Source Intensities

SN	Name of pollution source	Waste gas exhaust (10,000Nm ³ /a)	Parameters of exhaust funnel (m)	Name of pollutant and discharge (t/a)			
				SO ₂	Particles	NO _x	NH ₃
1	COFCO Cereals and Oils Industry (Jingzhou) Co., Ltd.	21600	50	87.14	32.42	150.3	-
2	Hubei Hanxing Technology Co., Ltd.	6000	30	44.1	11.22	-	-
3	Hubei Zhongshuo Technology Co., Ltd.	-	-	-	0.86	-	-
4	Hubei Xinhua Plastics Co., Ltd.	-	-	-	0.81	-	-
5	Shine Star (Hubei) Biological Engineering Co., Ltd.	292066		940.1	143.3	-	18.17
6	Hubei Huaye Aquatic Product Co., Ltd.	2802.5		3.136	1.67	1.54	-
7	Hubei Tianle New Materials Co., Ltd.	4176		-	3.52	-	-
8	Hubei Zhencheng Paper Co., Ltd.	11113.92		78.52	19.53	40.44	-
9	Hubei Qinchu Paper Industry Co., Ltd. (under construction)	77695.2		67.42	37.29	223	-
Total (t/a)		-	-	1220.416	250.62	415.28	18.17
Discounted hourly discharge (kg/h)		-	-	169.50	34.8	57.68	-

(5) Prediction mode and parameter selection

1) Prediction mode

It is proposed to apply the AERMOD mode for further prediction proposed in Appendix A in Environmental Impact Assessment Guideline in this assessment.

2) Selection of prediction parameters

The project is located in the flat-bottomed land. In connection with the atmosphere guideline: the terrain within the scope 5km away from the center point of the pollution source lower than the exhaust funnel is defined as simple terrain. Pursuant to terrain height within the project area, terrain data analysis and height (180m) of the main chimney of the proposed project, the terrain within the surrounding 5km is lower than the exhaust funnel, and the surrounding terrain conditions belong to simple terrain without correction of geological data.

7.2.1.3 Impact prediction result and analysis

((1) Comprehensive conditions of maximum values under various conditions

1) See comprehensive conditions of maximum SO₂ value under prediction conditions in Tables 7.2-14 and 7.2-15.

Table 7.2-14 Summary of Maximum SO₂ Concentration Values of Concerned Points in Phase I Project

Descri	Type of	Concentration	Occurrence	Background	Background	Assessment	Standard share	Whether
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point	concentration	increment (mg/m ³)	time (YYMMDDHH)	concentration (mg/m ³)	superposed concentration (mg/m ³)	criterion (mg/m ³)	ratio, % (after the background is superposed)	to exceed standard
1	1 hour	0.005853	12070814	0.054	0.059853	0.5	11.97	Meet the standard
	Daily mean	0.003849	120704	0.018	0.021849	0.15	14.57	Meet the standard
	Annual average	0.000338	Mean	0.006	0.006338	0.06	10.56	Meet the standard
2	1 hour	0.006717	12032714	0.055	0.061717	0.5	12.34	Meet the standard
	Daily mean	0.002239	120327	0.02	0.022239	0.15	14.83	Meet the standard
	Annual average	0.000296	Mean	0.00667	0.006966	0.06	11.61	Meet the standard
3	1 hour	0.007273	12080114	0.054	0.061273	0.5	12.25	Meet the standard
	Daily mean	0.002424	120801	0.021	0.023424	0.15	15.62	Meet the standard
	Annual average	0.000691	Mean	0.007	0.007691	0.06	12.82	Meet the standard
4	1 hour	0.006408	12092214	0.053	0.059408	0.5	11.88	Meet the standard
	Daily mean	0.002136	120922	0.02	0.022136	0.15	14.76	Meet the standard
	Annual average	0.000409	Mean	0.00667	0.007079	0.06	11.8	Meet the standard
5	1 hour	0.003226	12121214	0.055	0.058226	0.5	11.65	Meet the standard
	Daily mean	0.001075	121212	0.022	0.023075	0.15	15.38	Meet the standard
	Annual average	0.000047	Mean	0.00733	0.007377	0.06	12.29	Meet the standard
6	1 hour	0.009554	12060908	0.057	0.066554	0.5	13.31	Meet the standard
	Daily mean	0.003331	120421	0.021	0.024331	0.15	16.22	Meet the standard
	Annual average	0.000195	Mean	0.007	0.007195	0.06	11.99	Meet the standard
Grid	1 hour	0.013336	12042508	0.054667	0.068003	0.5	13.6	Meet the standard
	Daily mean	0.004445	120425	0.020333	0.024779	0.15	16.52	Meet the standard
	Annual average	0.000862	Mean	0.006778	0.007641	0.06	12.73	Meet the standard

Table 7.2-15 Summary of Maximum SO₂ Concentration Values of Concerned Points in Phase II Project

Description	Type of concentration	Concentration increment (mg/m ³)	Occurrence time (YYMMDDHH)	Background concentration (mg/m ³)	Background superposed concentration (mg/m ³)	Assessment criterion (mg/m ³)	Standard share ratio, % (after the background is superposed)	Whether to exceed standard
1	1 hour	0.011706	12070814	0.054	0.065706	0.5	13.14	Meet the standard
	Daily mean	0.007697	120704	0.018	0.025697	0.15	17.13	Meet the standard
	Annual average	0.000676	Mean	0.006	0.006676	0.06	11.13	Meet the standard
2	1 hour	0.013434	12032714	0.055	0.068434	0.5	13.69	Meet the standard
	Daily mean	0.004478	120327	0.02	0.024478	0.15	16.32	Meet the standard
	Annual	0.000591	Mean	0.00667	0.007261	0.06	12.1	Meet the standard

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	average							standard
3	1 hour	0.014547	12080114	0.054	0.068547	0.5	13.71	Meet the standard
	Daily mean	0.004849	120801	0.021	0.025849	0.15	17.23	Meet the standard
	Annual average	0.001381	Mean	0.007	0.008381	0.06	13.97	Meet the standard
4	1 hour	0.012816	12092214	0.053	0.065816	0.5	13.16	Meet the standard
	Daily mean	0.004272	120922	0.02	0.024272	0.15	16.18	Meet the standard
	Annual average	0.000818	Mean	0.00667	0.007488	0.06	12.48	Meet the standard
5	1 hour	0.006451	12121214	0.055	0.061451	0.5	12.29	Meet the standard
	Daily mean	0.00215	121212	0.022	0.02415	0.15	16.1	Meet the standard
	Annual average	0.000093	Mean	0.00733	0.007423	0.06	12.37	Meet the standard
6	1 hour	0.019108	12060908	0.057	0.076108	0.5	15.22	Meet the standard
	Daily mean	0.006662	120421	0.021	0.027662	0.15	18.44	Meet the standard
	Annual average	0.00039	Mean	0.007	0.00739	0.06	12.32	Meet the standard
Grid	1 hour	0.026672	12042508	0.054667	0.081339	0.5	16.27	Meet the standard
	Daily mean	0.008891	120425	0.020333	0.029224	0.15	19.48	Meet the standard
	Annual average	0.001725	Mean	0.006778	0.008503	0.06	14.17	Meet the standard

2) See summary of maximum PM₁₀ concentration value under various conditions in Tables 7.2-16 and 7.2-17.

Table 7.2-16 Summary of Maximum PM₁₀ Concentration Values of Concerned Points in Phase I Project

Description	Type of concentration	Concentration increment (mg/m ³)	Occurrence time (YYMMDDHH)	Background concentration (mg/m ³)	Background superposed concentration (mg/m ³)	Assessment criterion (mg/m ³)	Standard share ratio, % (after the background is superposed)	Whether to exceed standard
1	Daily mean	0.02555	120413	0.113	0.13855	0.15	92.37	Meet the standard
	Annual average	0.000813	Mean	0.03767	0.038483	0.07	54.98	Meet the standard
2	Daily mean	0.036178	120901	0.113	0.149178	0.15	81.68	Meet the standard
	Annual average	0.001468	Mean	0.03767	0.039138	0.07	55.91	Meet the standard
3	Daily mean	0.028135	120127	0.112	0.140135	0.15	93.42	Meet the standard
	Annual average	0.00181	Mean	0.03733	0.03914	0.07	55.91	Meet the standard
4	Daily mean	0.02897	120923	0.113	0.14197	0.15	94.65	Meet the standard
	Annual average	0.00142	Mean	0.03767	0.03909	0.07	55.84	Meet the standard
5	Daily mean	0.015275	121026	0.119	0.134275	0.15	89.52	Meet the standard
	Annual average	0.000289	Mean	0.03967	0.039959	0.07	57.08	Meet the standard

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6	Daily mean	0.018895	120718	0.105	0.123895	0.15	82.6	Meet the standard
	Annual average	0.000561	Mean	0.035	0.035561	0.07	50.8	Meet the standard
Grid (within the boundary)	Daily mean	0.065873	120104	0.1125	0.178373	0.15	118.92	Over limit
	Annual average	0.009031	Mean	0.037502	0.046533	0.07	66.48	Meet the standard

Table 7.2-17 Summary of Maximum PM₁₀ Concentration Values of Concerned Points in Phase II Project

Description	Type of concentration	Concentration increment (mg/m ³)	Occurrence time (YYMMDDHH)	Background concentration (mg/m ³)	Background superposed concentration (mg/m ³)	Assessment criterion (mg/m ³)	Standard share ratio, % (after the background is superposed)	Whether to exceed standard
1	Daily mean	0.051099	120413	0.113	0.164099	0.15	109.4	Over limit
	Annual average	0.001606	Mean	0.03767	0.039276	0.07	56.11	Meet the standard
2	Daily mean	0.072356	120901	0.113	0.185356	0.15	123.57	Over limit
	Annual average	0.002901	Mean	0.03767	0.040571	0.07	57.96	Meet the standard
3	Daily mean	0.056228	120127	0.112	0.168228	0.15	112.15	Over limit
	Annual average	0.003539	Mean	0.03733	0.040869	0.07	58.38	Meet the standard
4	Daily mean	0.057896	120923	0.113	0.170896	0.15	113.93	Over limit
	Annual average	0.002742	Mean	0.03767	0.040412	0.07	57.73	Meet the standard
5	Daily mean	0.030562	121026	0.119	0.149562	0.15	99.71	Meet the standard
	Annual average	0.000565	Mean	0.03967	0.040235	0.07	57.48	Meet the standard
6	Daily mean	0.037789	120718	0.105	0.142789	0.15	95.19	Meet the standard
	Annual average	0.001099	Mean	0.035	0.036099	0.07	51.57	Meet the standard
Grid	Daily mean	0.131278	120104	0.1125	0.243778	0.15	162.52	Over limit
	Annual average	0.017758	Mean	0.037502	0.055259	0.07	78.94	Meet the standard

3) See summary of maximum NO₂ concentration value under various conditions in Tables 7.2-18 and 7.2-19.

Table 7.2-18 Summary of Maximum NO₂ Concentration Values of Concerned Points in Phase I Project

Description	Type of concentration	Concentration increment (mg/m ³)	Occurrence time (YYMMDDHH)	Background concentration (mg/m ³)	Background superposed concentration (mg/m ³)	Assessment criterion (mg/m ³)	Standard share ratio, % (after the background is superposed)	Whether to exceed standard
1	1 hour	0.004767	12070814	0.038	0.042767	0.24	17.82	Meet the standard
	Daily mean	0.003134	120704	0.014	0.017134	0.12	14.28	Meet the standard
	Annual average	0.000275	Mean	0.00467	0.004945	0.08	6.18	Meet the standard

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2	1 hour	0.00547	12032714	0.037	0.04247	0.24	17.7	Meet the standard
	Daily mean	0.001823	120327	0.014	0.015823	0.12	13.19	Meet the standard
	Annual average	0.000241	Mean	0.00467	0.004911	0.08	6.14	Meet the standard
3	1 hour	0.005924	12080114	0.037	0.042924	0.24	17.88	Meet the standard
	Daily mean	0.001975	120801	0.015	0.016975	0.12	14.15	Meet the standard
	Annual average	0.000562	Mean	0.005	0.005562	0.08	6.95	Meet the standard
4	1 hour	0.005219	12092214	0.036	0.041219	0.24	17.17	Meet the standard
	Daily mean	0.00174	120922	0.013	0.01474	0.12	12.28	Meet the standard
	Annual average	0.000333	Mean	0.00433	0.004663	0.08	5.83	Meet the standard
5	1 hour	0.002627	12121214	0.037	0.039627	0.24	16.51	Meet the standard
	Daily mean	0.000876	121212	0.016	0.016876	0.12	14.06	Meet the standard
	Annual average	0.000038	Mean	0.00533	0.005368	0.08	6.71	Meet the standard
6	1 hour	0.007781	12060908	0.036	0.043781	0.24	18.24	Meet the standard
	Daily mean	0.002713	120421	0.015	0.017713	0.12	14.76	Meet the standard
	Annual average	0.000159	Mean	0.005	0.005159	0.08	6.45	Meet the standard
Grid	1 hour	0.010861	12042508	0.036833	0.047694	0.24	19.87	Meet the standard
	Daily mean	0.00362	120425	0.0145	0.01812	0.12	15.1	Meet the standard
	Annual average	0.000702	Mean	0.004833	0.005536	0.08	6.92	Meet the standard

Table 7.2-19 Summary of Maximum NO₂ Concentration Values of Concerned Points in Phase II Project

Description	Type of concentration	Concentration increment (mg/m ³)	Occurrence time (YYMMDDHH)	Background concentration (mg/m ³)	Background superposed concentration (mg/m ³)	Assessment criterion (mg/m ³)	Standard share ratio, % (after the background is superposed)	Whether to exceed standard
1	1 hour	0.009533	12070814	0.038	0.047533	0.24	19.81	Meet the standard
	Daily mean	0.006269	120704	0.014	0.020269	0.12	16.89	Meet the standard
	Annual average	0.000551	Mean	0.00467	0.005221	0.08	6.53	Meet the standard
2	1 hour	0.01094	12032714	0.037	0.04794	0.24	19.98	Meet the standard
	Daily mean	0.003647	120327	0.014	0.017647	0.12	14.71	Meet the standard
	Annual average	0.000481	Mean	0.00467	0.005151	0.08	6.44	Meet the standard
3	1 hour	0.011847	12080114	0.037	0.048847	0.24	20.35	Meet the standard
	Daily mean	0.003949	120801	0.015	0.018949	0.12	15.79	Meet the standard

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	Annual average	0.001125	Mean	0.005	0.006125	0.08	7.66	Meet the standard
4	1 hour	0.010438	12092214	0.036	0.046438	0.24	19.35	Meet the standard
	Daily mean	0.003479	120922	0.013	0.016479	0.12	13.73	Meet the standard
	Annual average	0.000666	Mean	0.00433	0.004996	0.08	6.25	Meet the standard
5	1 hour	0.005254	12121214	0.037	0.042254	0.24	17.61	Meet the standard
	Daily mean	0.001751	121212	0.016	0.017751	0.12	14.79	Meet the standard
	Annual average	0.000076	Mean	0.00533	0.005406	0.08	6.76	Meet the standard
6	1 hour	0.015562	12060908	0.036	0.051562	0.24	21.48	Meet the standard
	Daily mean	0.005426	120421	0.015	0.020426	0.12	17.02	Meet the standard
	Annual average	0.000318	Mean	0.005	0.005318	0.08	6.65	Meet the standard
Grid	1 hour	0.021722	12042508	0.036833	0.058555	0.24	24.4	Meet the standard
	Daily mean	0.007241	120425	0.0145	0.021741	0.12	18.12	Meet the standard
	Annual average	0.001404	Mean	0.004833	0.006238	0.08	7.8	Meet the standard

4) See summary of maximum PM_{2.5} concentration value under prediction conditions in Tables 7.2-20 and 7.2-21.

Table 7.2-20 Summary of Maximum PM_{2.5} Concentration Values of Concerned Points in Phase I Project

Description	Type of concentration	Concentration increment (mg/m ³)	Occurrence time (YYMMDDHH)	Background concentration (mg/m ³)	Background superposed concentration (mg/m ³)	Assessment criterion (mg/m ³)	Standard share ratio, % (after the background is superposed)	Whether to exceed standard
1	Daily mean	0.00052	120704	0	0.00052	0.075	0.69	Meet the standard
	Annual average	0.000046	Mean	0	0.000046	0.035	0.13	Meet the standard
2	Daily mean	0.000302	120327	0	0.000302	0.075	0.4	Meet the standard
	Annual average	0.00004	Mean	0	0.00004	0.035	0.11	Meet the standard
3	Daily mean	0.000328	120801	0	0.000328	0.075	0.44	Meet the standard
	Annual average	0.000093	Mean	0	0.000093	0.035	0.27	Meet the standard
4	Daily mean	0.000289	120922	0	0.000289	0.075	0.38	Meet the standard
	Annual average	0.000055	Mean	0	0.000055	0.035	0.16	Meet the standard
5	Daily mean	0.000145	121212	0	0.000145	0.075	0.19	Meet the standard
	Annual average	0.000006	Mean	0	0.000006	0.035	0.02	Meet the standard
6	Daily mean	0.00045	120421	0	0.00045	0.075	0.6	Meet the standard
	Annual	0.000026	Mean	0	0.000026	0.035	0.08	Meet the standard

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	average							standard
Grid	Daily mean	0.000601	120425	0	0.000601	0.075	0.8	Meet the standard
	Annual average	0.000116	Mean	0	0.000116	0.035	0.33	Meet the standard

Table 7.2-21 Summary of Maximum PM_{2.5} Concentration Values of Concerned Points in Phase II Project

Description	Type of concentration	Concentration increment (mg/m ³)	Occurrence time (YYMMDDHH)	Background concentration (mg/m ³)	Background superposed concentration (mg/m ³)	Assessment criterion (mg/m ³)	Standard share ratio, % (after the background is superposed)	Whether to exceed standard
1	Daily mean	0.00104	120704	0	0.00104	0.075	1.39	Meet the standard
	Annual average	0.000091	Mean	0	0.000091	0.035	0.26	Meet the standard
2	Daily mean	0.000605	120327	0	0.000605	0.075	0.81	Meet the standard
	Annual average	0.00008	Mean	0	0.00008	0.035	0.23	Meet the standard
3	Daily mean	0.000655	120801	0	0.000655	0.075	0.87	Meet the standard
	Annual average	0.000187	Mean	0	0.000187	0.035	0.53	Meet the standard
4	Daily mean	0.000577	120922	0	0.000577	0.075	0.77	Meet the standard
	Annual average	0.000111	Mean	0	0.000111	0.035	0.32	Meet the standard
5	Daily mean	0.000291	121212	0	0.000291	0.075	0.39	Meet the standard
	Annual average	0.000013	Mean	0	0.000013	0.035	0.04	Meet the standard
6	Daily mean	0.0009	120421	0	0.0009	0.075	1.2	Meet the standard
	Annual average	0.000053	Mean	0	0.000053	0.035	0.15	Meet the standard
Grid	Daily mean	0.001201	120425	0	0.001201	0.075	1.6	Meet the standard
	Annual average	0.000233	Mean	0	0.000233	0.035	0.67	Meet the standard

5) See summary of maximum Hg concentration value under various conditions in Tables 7.2-22 and 7.2-23.

Table 7.2-22 Summary of Maximum Hg Concentration Values of Concerned Points in Phase I Project

Description	Type of concentration	Concentration increment (mg/m ³)	Occurrence time (YYMMDDHH)	Background concentration (mg/m ³)	Background superposed concentration (mg/m ³)	Assessment criterion (mg/m ³)	Standard share ratio, % (after the background is superposed)	Whether to exceed standard
1	1 hour	0.000000	12070814	0.000000	0.000000	0.0003	0.06	Meet the standard
2	1 hour	0.000000	12032714	0.000000	0.000000	0.0003	0.07	Meet the standard
3	1 hour	0.000000	12080114	0.000000	0.000000	0.0003	0.07	Meet the standard
4	1 hour	0.000000	12092214	0.000000	0.000000	0.0003	0.06	Meet the standard

5	1 hour	0.000000	12121214	0.000000	0.000000	0.0003	0.03	Meet the standard
6	1 hour	0.000000	12060908	0.000000	0.000000	0.0003	0.1	Meet the standard
Grid	1 hour	0.000000	12042508	0.000000	0.000000	0.0003	0.13	Meet the standard

Table 7.2-23 Summary of Maximum Hg Concentration Values of Concerned Points in Phase II Project

Description	Type of concentration	Concentration increment (mg/m ³)	Occurrence time (YYMMDDHH)	Background concentration (mg/m ³)	Background superposed concentration (mg/m ³)	Assessment criterion (mg/m ³)	Standard share ratio, % (after the background is superposed)	Whether to exceed standard
1	1 hour	0.000000	12070814	0.000000	0.000000	0.0003	0.12	Meet the standard
2	1 hour	0.000000	12032714	0.000000	0.000000	0.0003	0.13	Meet the standard
3	1 hour	0.000000	12080114	0.000000	0.000000	0.0003	0.15	Meet the standard
4	1 hour	0.000000	12092214	0.000000	0.000000	0.0003	0.13	Meet the standard
5	1 hour	0.000000	12121214	0.000000	0.000000	0.0003	0.06	Meet the standard
6	1 hour	0.000000	12060908	0.000000	0.000001	0.0003	0.19	Meet the standard
Grid	1 hour	0.000000	12042508	0.000000	0.000001	0.0003	0.27	Meet the standard

(2) Statistics for over limit times and rate

On the basis of the aforesaid prediction results, the concerned points of phase I project of the proposed project do not have the over limit times under the current meteorological condition. Therefore, the completed proposed project has few influences on environmental sensitive points within the impact scope.

In terms of the aforesaid prediction results, prediction contribution values of SO₂, NO₂, PM_{2.5} and Hg of Phase II project of the proposed project and concentration upon background superposition do not exceed the standards; while the concentration of the superposed PM₁₀ exceeds the standard for the background value is high, and the maximum standard share ratio is 162.52%; the long-term annual prediction result of PM₁₀ does not exceed the standard.

(3) Environmental impact by the project under typical hourly meteorological conditions

Impact prediction is analyzed by virtue of typical hours within the assessment scope. Figures 7.2-4 to 7.2-8 are corresponding contour distribution diagrams when the maximum value of regional hourly mean concentration is found in the assessment scope.

(4) Environmental impact by typical daily meteorological conditions

Impact prediction is analyzed by virtue of typical days within the assessment scope, respectively. Figures 7.2-9 to 7.2-16 are corresponding contour distribution diagrams when the maximum value of regional daily mean concentration is found in the assessment scope.

(5) Annual average concentration distribution under long-term meteorological condition

Figures 7.2-17 to 7.2-24 are respectively annual average concentration contour diagrams of pollution factors under the long-term meteorological condition

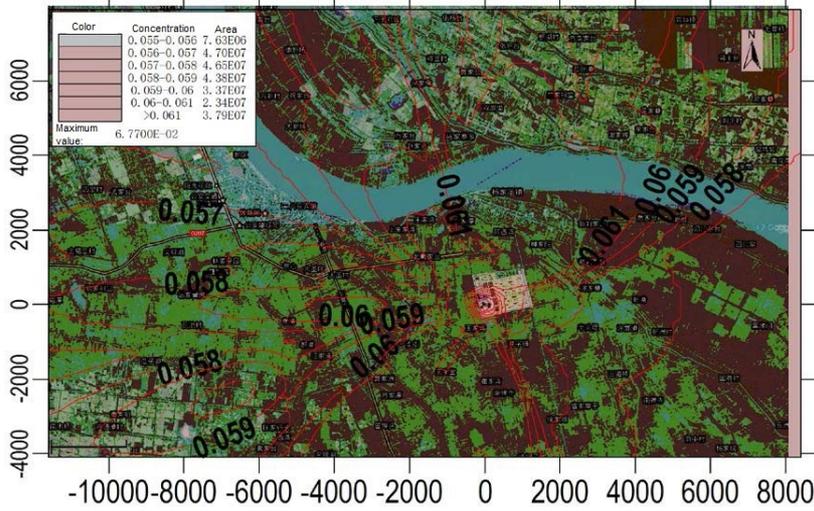


Figure 7.2-5 Distribution of Hourly Maximum SO₂ Concentration of Typical Hours in Phase I Project

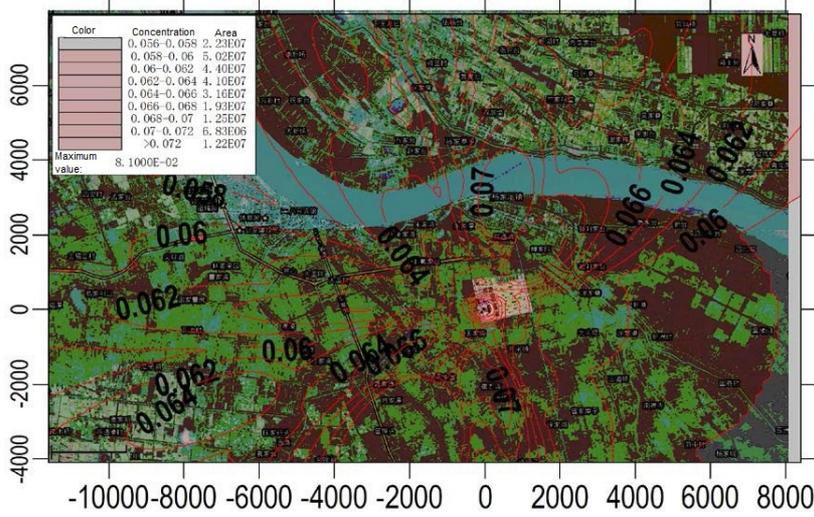


Figure 7.2-6 Distribution of Hourly Maximum SO₂ Concentration of Typical Hours in Phase II Project

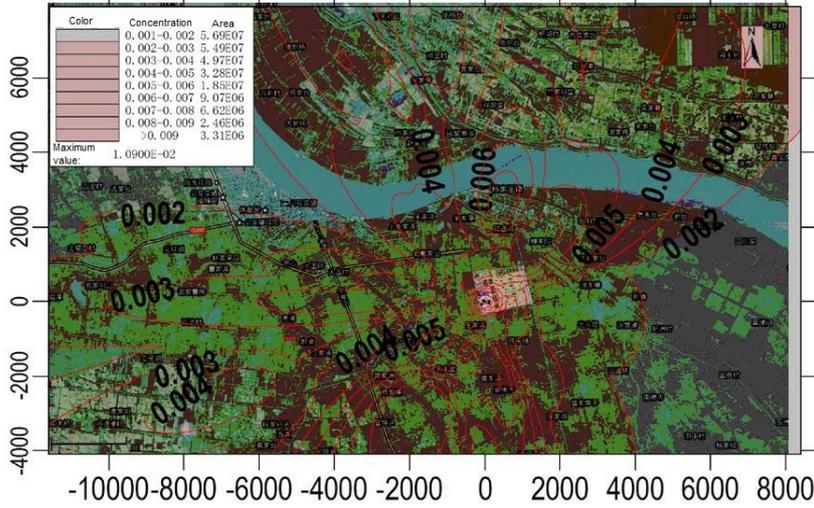


Figure 7.2-7 Distribution of Hourly Maximum NO₂ Concentration of Typical Hours in Phase I Project

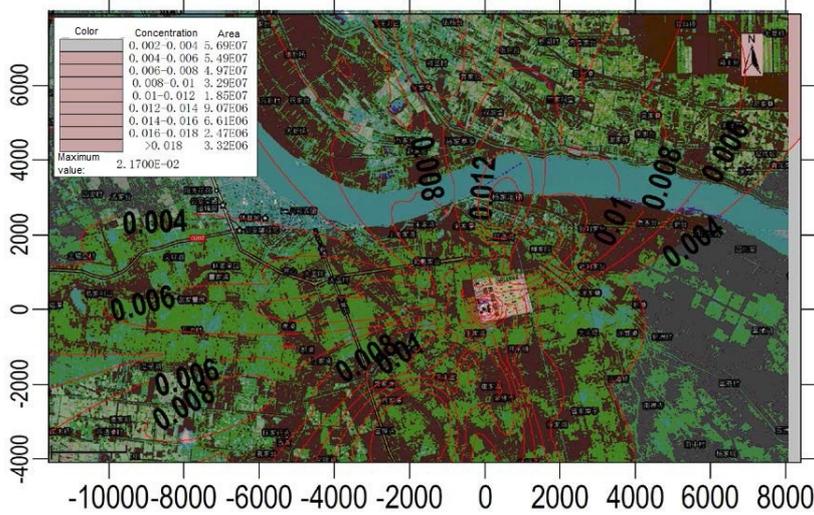


Figure 7.2-8 Distribution of Hourly Maximum NO₂ Concentration of Typical Hours in Phase II Project

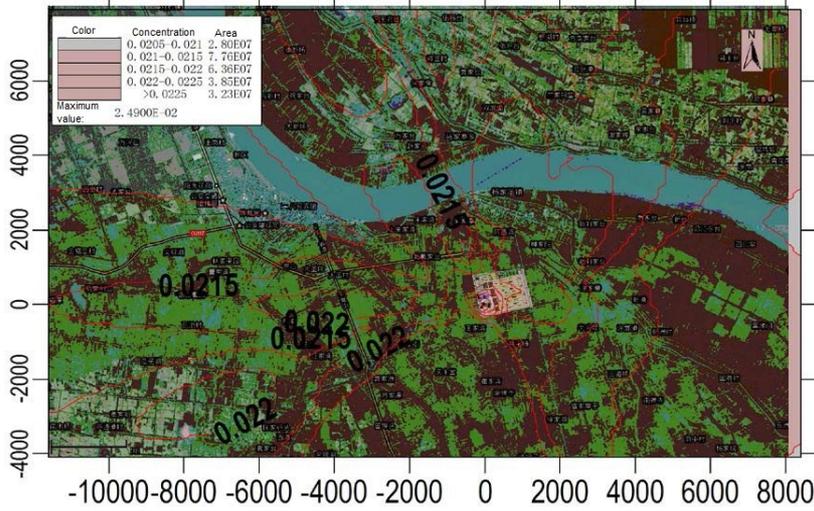


Figure 7.2-9 Distribution of Daily SO₂ Concentration of Typical Day in Phase I Project

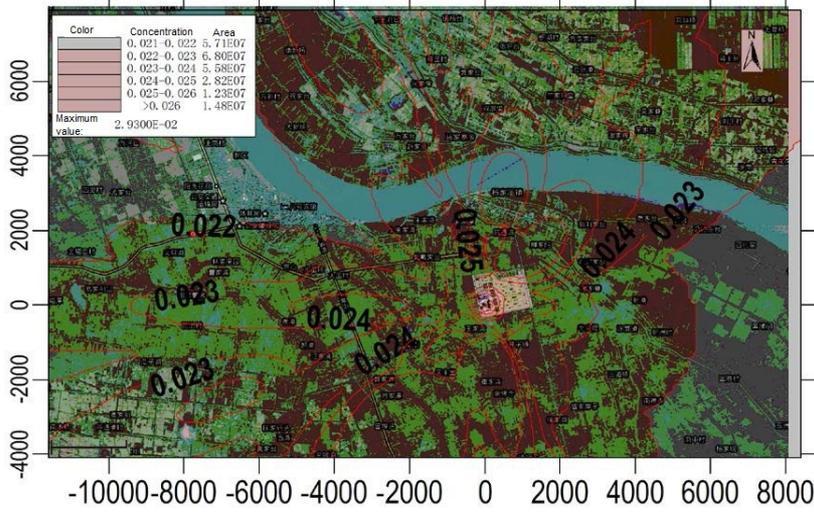


Figure 7.2-10 Distribution of Daily SO₂ Concentration of Typical Day in Phase II Project

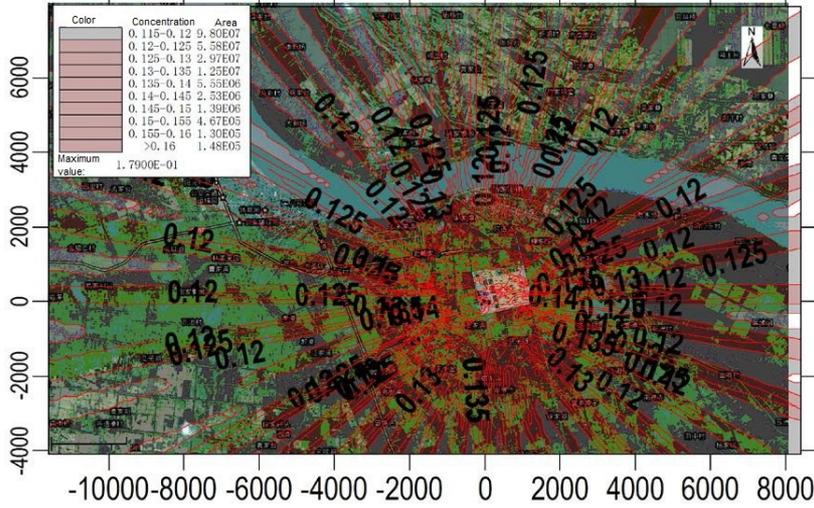


Figure 7.2-11 Distribution of Daily PM₁₀ Concentration of Typical Day in Phase I Project

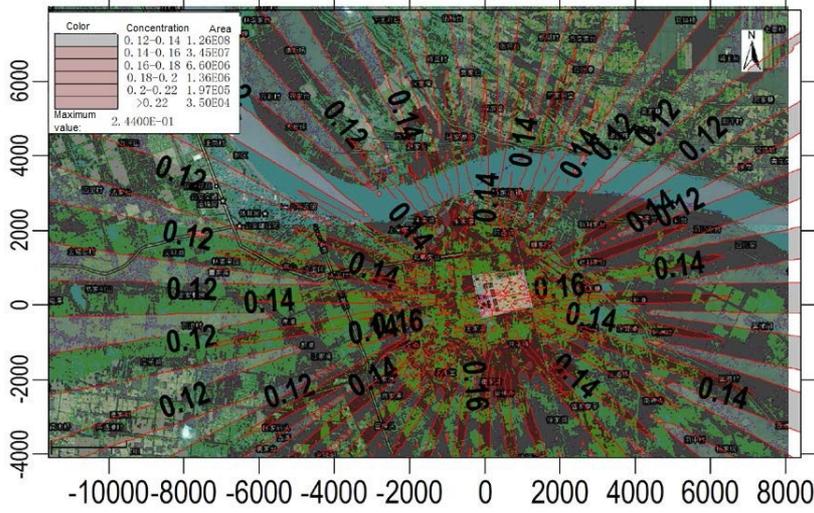


Figure 7.2-12 Distribution of Daily PM₁₀ Concentration of Typical Day in Phase II Project

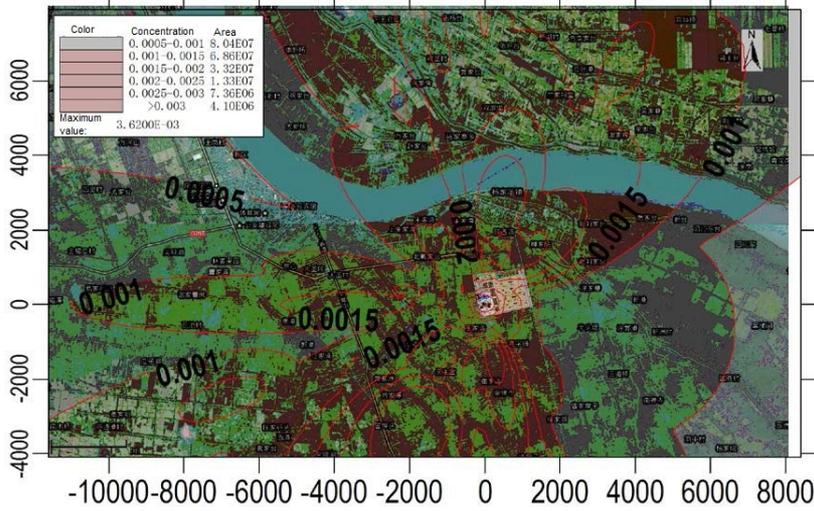


Figure 7.2-13 Distribution of Daily NO₂ Concentration of Typical Day in Phase I Project

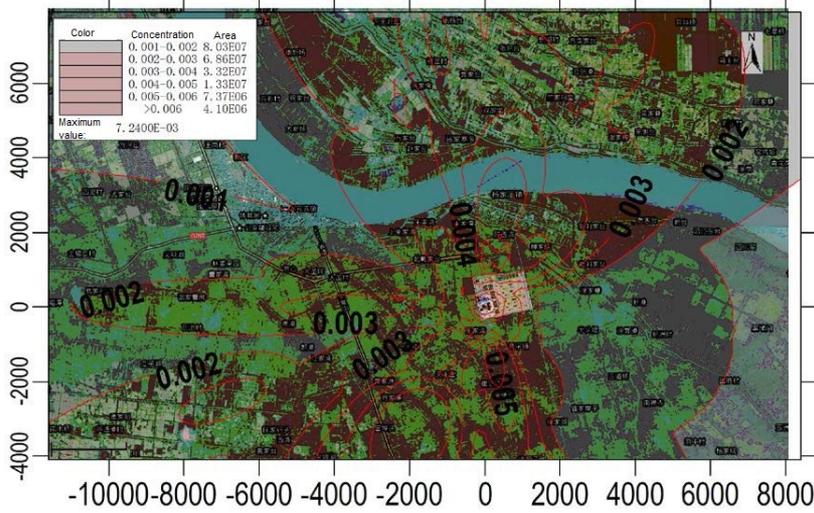


Figure 7.2-14 Distribution of Daily NO₂ Concentration of Typical Day in Phase II Project

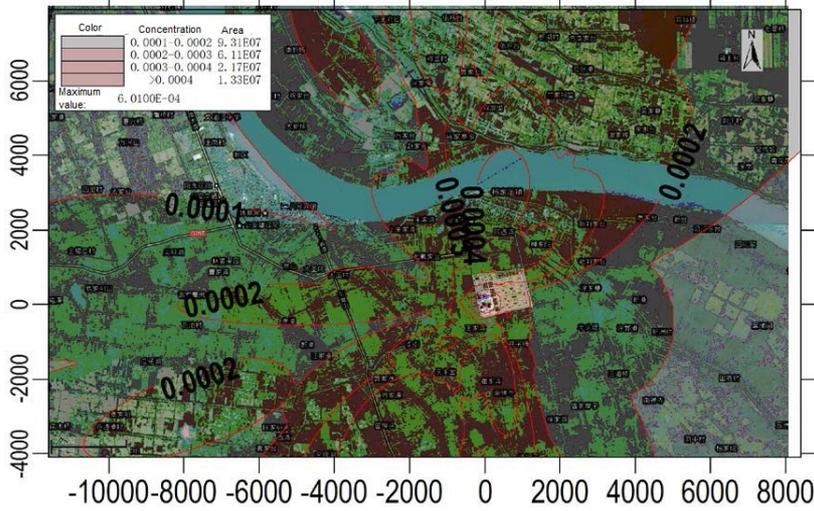


Figure 7.2-15 Distribution of Daily PM_{2.5} Concentration of Typical Day in Phase I Project

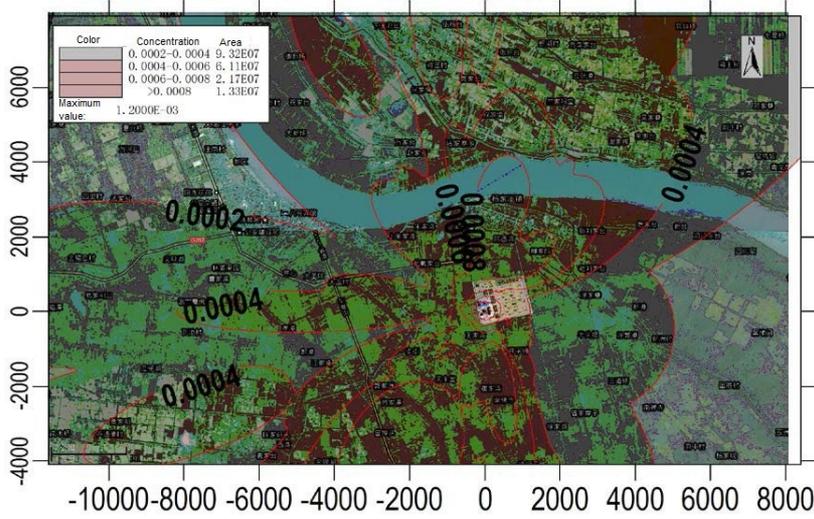


Figure 7.2-16 Distribution of Daily PM_{2.5} Concentration of Typical Day in Phase II Project

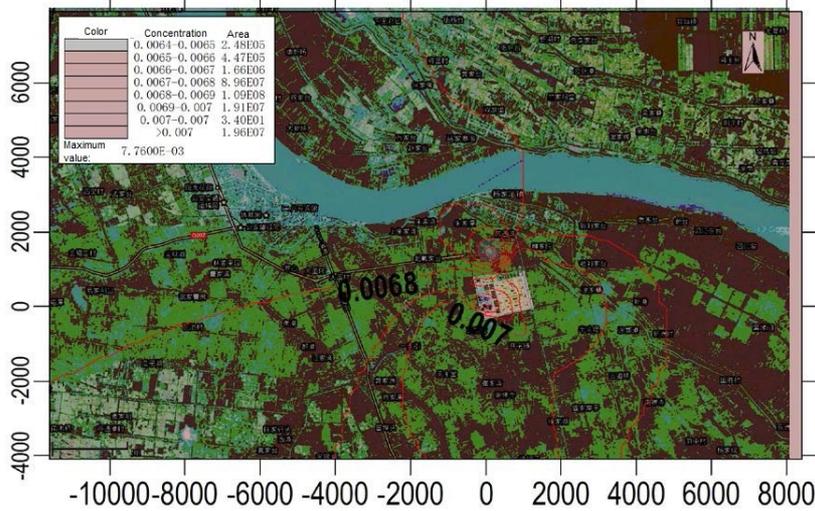


Figure 7.2-17 Distribution of SO₂ Annual Mean Concentration of Phase I Project

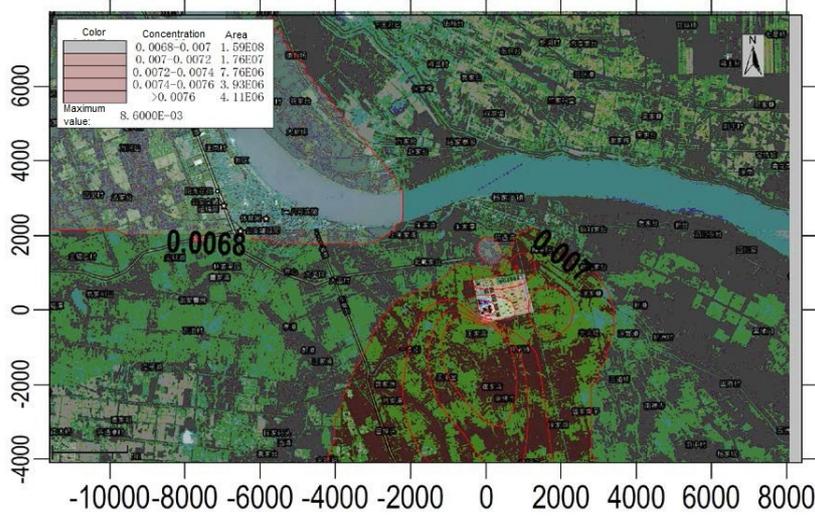


Figure 7.2-18 Distribution of SO₂ Annual Mean Concentration of Phase II Project

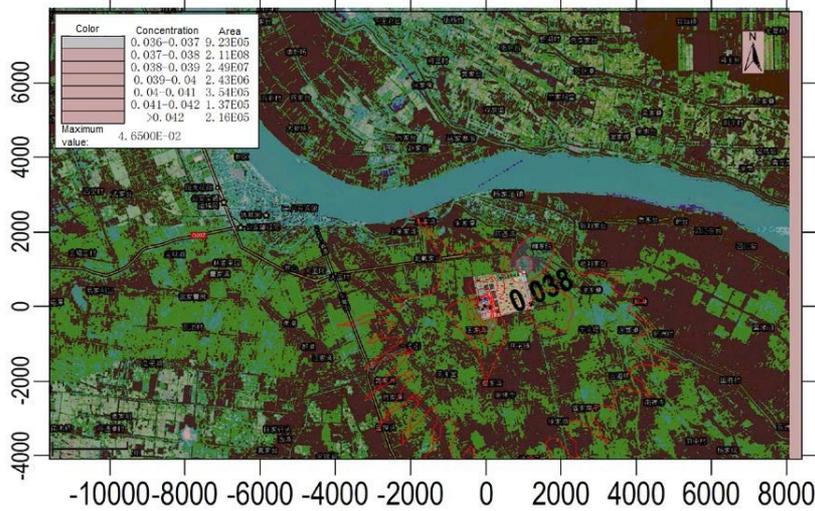


Figure 7.2-19 Distribution of PM₁₀ Annual Mean Concentration of Phase I Project

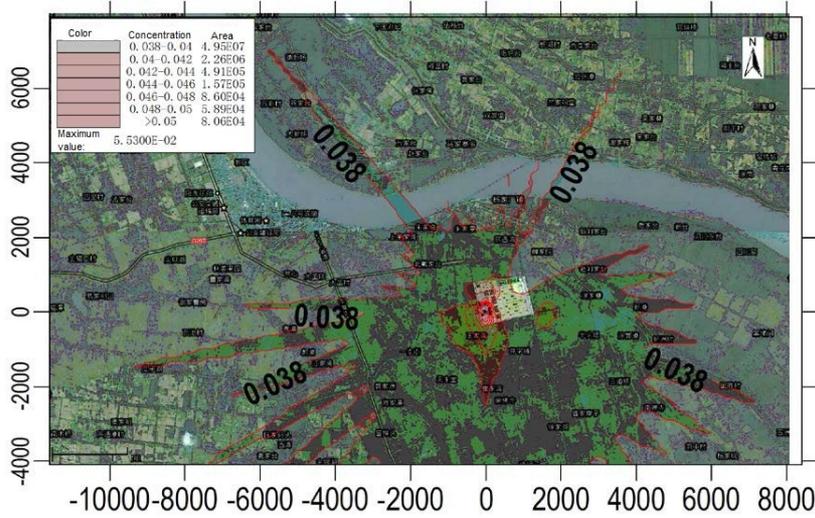


Figure 7.2-20 Distribution of PM₁₀ Annual Mean Concentration of Phase II Project

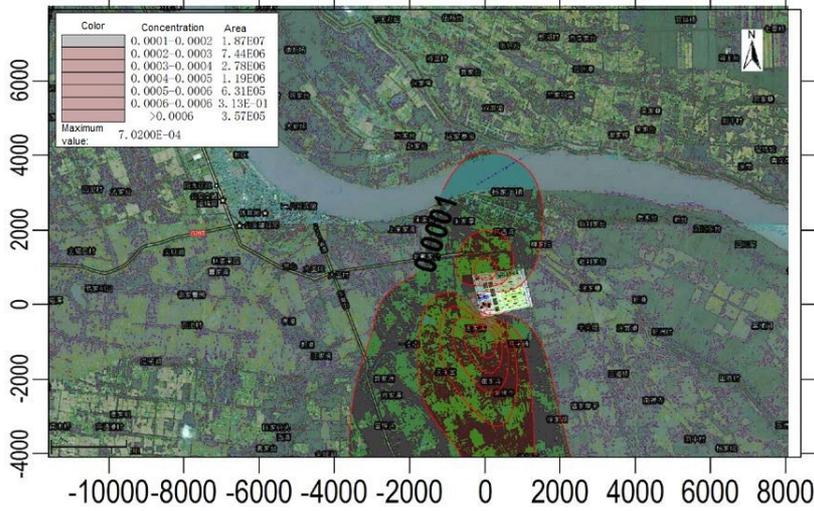


Figure 7.2-21 Distribution of NO₂ Annual Mean Concentration of Phase I Project

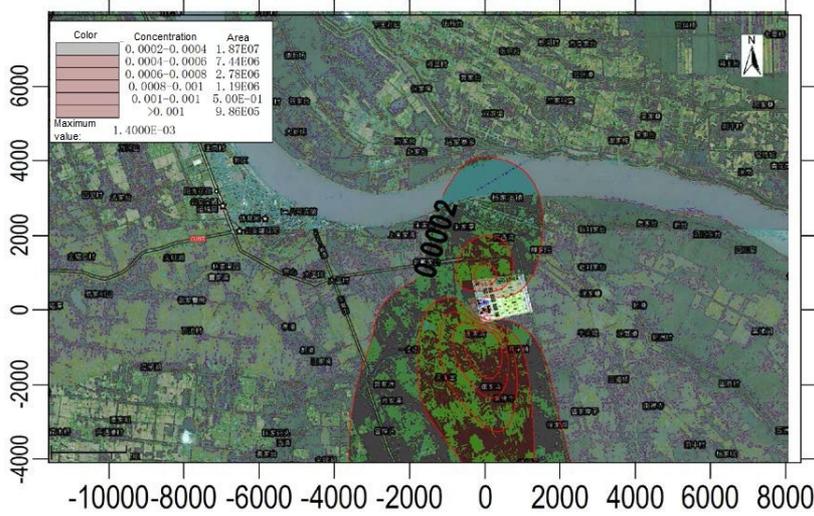


Figure 7.2-22 Distribution of NO₂ Annual Mean Concentration of Phase II Project

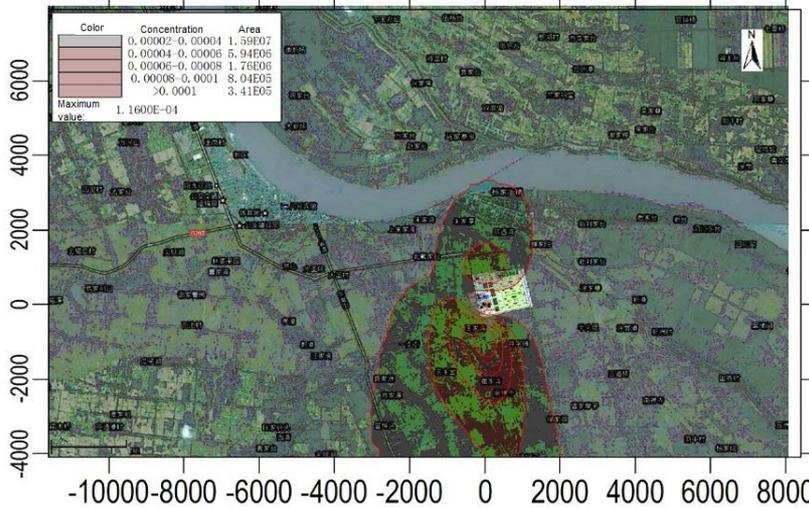


Figure 7.2-23 Distribution of PM_{2.5} Annual Mean Concentration of Phase I Project

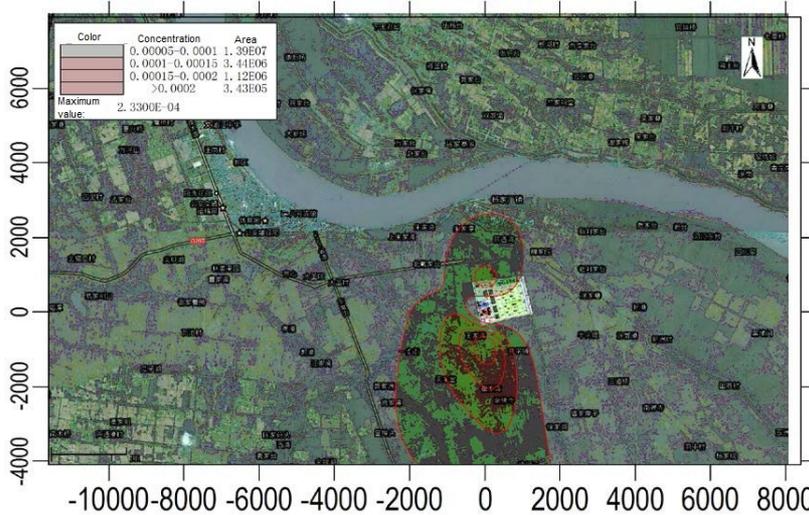


Figure 7.2-24 Distribution of PM_{2.5} Annual Mean Concentration of Phase II Project

(7) Analysis for prediction impact of abnormal operating condition

① Prediction for abnormal discharge

Abnormal discharge of the power plant mainly refers to: (a) the electric precipitator breaks down to cause operation stop of one or more electric fields. It is supposed that the collection efficiency of the electrostatic precipitator is declined to 98.85% from 99.85%, and the total collection efficiency is declined to 99.43%. (b) When the desulfurization system breaks down to result in sufficient desulfurizer supply, the desulfurization efficiency is declined and the SO₂ emission concentration is increased. The prediction desulfurization efficiency is

declined to 90%, the abnormal discharge condition. See prediction for abnormal discharge in Table 7.2-24.

Table 7.2-24 Atmospheric Pollutant Discharge of Abnormal Discharge Condition

Abnormal condition	Duration	Complete plant efficiency (%)	SO ₂ emission (kg/h)		PM ₁₀ emission (kg/h)	
			Phase I	Phase II	Phase I	Phase II
Electric dust remover	3~4h	99.4	--	--	65.37	130.73
Desulfurization system	Short-term	90	186.24	372.47	--	--

② Prediction for ground level concentration of abnormal discharge

See Tables 7.2-25 and 7.2-26 for maximum ground level concentration and standard share ratio of the exhausted flue gas when boiler flue gas purifying facility is in the abnormal operating condition.

For phase I project, it can be seen from Table 7.2-25 that the maximum PM₁₀ ground level concentration is 0.0362mg/m³ and the maximum ground level concentration is found at 953m when the electric precipitator breaks down; when the desulfurization facility is in fault, the maximum SO₂ ground level concentration is 0.1030mg/m³, and the maximum ground level concentration is found at 953m. It can be seen that the exhausted flue gas will have great influences on ambient air in the downwind direction in case of abnormal discharge accident. For this, the Employer shall take necessary control measures to overhaul equipment regularly, and shall be diligent in inspection to prevent faults during operation.

For phase II project, it can be seen from Table 7.2-26 that the maximum PM₁₀ ground level concentration is 0.0475mg/m³ and the maximum ground level concentration is found at 1,082m when the electric precipitator breaks down; when the desulfurization facility is in fault, the maximum SO₂ ground level concentration is 0.1354mg/m³, and the maximum ground level concentration is found at 1,082m. It can be seen that the exhausted flue gas will have great influences on ambient air in the downwind direction in case of abnormal discharge accident. For this, the Employer shall take necessary control measures to overhaul equipment regularly, and shall be diligent in inspection to prevent faults during operation.

(8) Summary of prediction of air environment impact

Upon completion of the proposed project, the waste gas of the Project could be controlled well based on the project analysis. Under various meteorological conditions, the contribution concentrations of predictive factors (NO₂, SO₂, PM₁₀ and PM_{2.5}) meet the secondary standards of *Ambient Air Quality Standard* (GB3095-2012).

The prediction results after the background value is predicted, the concerned points of phase I project of the proposed project do not have the over limit times under the current meteorological condition. Therefore, the completed proposed project has few influences on environmental sensitive points within the impact scope. Prediction contribution values of SO₂, NO₂, PM_{2.5} and Hg of Phase II project of the proposed project and concentration upon background superposition do not exceed the standards; while the concentration of the superposed PM₁₀ exceeds the standard for the background value is high, and the maximum standard share ratio is 162.52%; the long-term annual prediction result of PM₁₀ does not exceed the standard.

Assessment suggestions: the intensity of replaced industrial pollution source needs to be specified after the CHP Project operates; construction of the Project has the feasibility after the current value of ambient air is cut down.

Table 7.2-25 Prediction Results of Hourly Average Concentration of Phase I Project (Abnormal Operating Condition)

Distance	Abnormal discharge of SO ₂ when the desulfurization device is in fault		Abnormal discharge of PM ₁₀ when the deduster is in fault	
	Concentration (mg/m ³)	Standard ratio, %	Concentration (pgTEG/m ³)	Standard ratio, %
100	0.00000	0.00	0.00000	0.00
200	0.00000	0.00	0.00000	0.00
300	0.00000	0.00	0.00000	0.00
400	0.00010	0.02	0.00000	0.01
500	0.00440	0.88	0.00150	0.34
600	0.02510	5.01	0.00880	1.95
700	0.05030	10.05	0.01760	3.92
800	0.08500	17.00	0.02980	6.63
900	0.10130	20.26	0.03560	7.90
953	0.10300	20.60	0.03620	8.03
1000	0.10210	20.42	0.03580	7.96
1100	0.10260	20.52	0.03600	8.00
1200	0.09910	19.82	0.03480	7.73
1300	0.09410	18.81	0.03300	7.34
1400	0.08920	17.84	0.03130	6.96
1500	0.08470	16.95	0.02970	6.61
1600	0.08070	16.14	0.02830	6.30
1700	0.07710	15.41	0.02700	6.01
1800	0.07370	14.75	0.02590	5.75
1900	0.07070	14.14	0.02480	5.51
2000	0.06790	13.58	0.02380	5.29
2100	0.06530	13.06	0.02290	5.09
2200	0.06290	12.58	0.02210	4.91
2300	0.06070	12.14	0.02130	4.73
2400	0.05870	11.73	0.02060	4.57
2500	0.05670	11.35	0.01990	4.43
2600	0.05500	10.99	0.01930	4.29
2700	0.05330	10.66	0.01870	4.16
2800	0.05170	10.34	0.01820	4.03
2900	0.05070	10.13	0.01780	3.95
3000	0.05050	10.10	0.01770	3.94
3500	0.04830	9.66	0.01690	3.77
4000	0.04730	9.47	0.01660	3.69
4500	0.04470	8.93	0.01570	3.48
5000	0.04160	8.31	0.01460	3.24

Table 7.2-26 Prediction Results of Hourly Average Concentration of Phase II Project (Abnormal Operating Condition)

Distance	Abnormal discharge of SO ₂ when the desulfurization device is in fault		Abnormal discharge of PM ₁₀ when the deduster is in fault	
	Concentration (mg/m ³)	Standard ratio, %	Concentration (pgTEG/m ³)	Standard ratio, %
100	0.00000	0.00	0.00000	0.00
200	0.00000	0.00	0.00000	0.00

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300	0.00000	0.00	0.00000	0.00
400	0.00000	0.00	0.00000	0.00
500	0.00120	0.25	0.00040	0.10
600	0.01820	3.64	0.00640	1.42
700	0.04840	9.68	0.01700	3.78
800	0.07240	14.48	0.02540	5.65
900	0.11120	22.24	0.03900	8.67
1000	0.13140	26.28	0.04610	10.25
1082	0.13540	27.08	0.04750	10.56
1100	0.13530	27.06	0.04750	10.55
1200	0.13090	26.18	0.04590	10.21
1300	0.12430	24.86	0.04360	9.69
1400	0.11830	23.66	0.04150	9.23
1500	0.11370	22.74	0.03990	8.87
1600	0.10920	21.84	0.03830	8.52
1700	0.10500	21.00	0.03690	8.19
1800	0.10100	20.20	0.03540	7.88
1900	0.09730	19.46	0.03420	7.59
2000	0.09390	18.78	0.03300	7.32
2100	0.09070	18.14	0.03180	7.07
2200	0.08770	17.54	0.03080	6.84
2300	0.08490	16.98	0.02980	6.62
2400	0.08230	16.46	0.02890	6.42
2500	0.07980	15.96	0.02800	6.23
2600	0.07750	15.50	0.02720	6.04
2700	0.07530	15.06	0.02640	5.87
2800	0.07320	14.65	0.02570	5.71
2900	0.07130	14.26	0.02500	5.56
3000	0.06940	13.89	0.02440	5.42
3500	0.06350	12.70	0.02230	4.95
4000	0.06240	12.48	0.02190	4.87
4500	0.05900	11.80	0.02070	4.60
5000	0.05490	10.99	0.01930	4.29

7.2.1.4 Impact prediction result and analysis upon superposition of pollution source under construction

1) See Tables 7.2-27 and 7.2-28 for summary of maximum SO₂ concentration values under prediction conditions upon superposition of solid waste under construction.

Table 7.2-27 Summary of Maximum SO₂ Concentration Values of Concerned Points after the Project (Phase I Project) is Superposed to Solid Waste Project under Construction (Phase I Project)

Description	Type of concentration	Concentration increment (mg/m ³)	Occurrence time (YYMMDDHH)	Background concentration (mg/m ³)	Background superposed concentration (mg/m ³)	Assessment criterion (mg/m ³)	Standard share ratio, % (after the background is superposed)	Whether to exceed standard
1	1 hour	0.00693	12070408	0.054	0.06093	0.5	12.19	Meet the standard
	Daily mean	0.004486	120704	0.018	0.022486	0.15	14.99	Meet the standard
	Annual	0.000395	Mean	0.006	0.006395	0.06	10.66	Meet the standard

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	average							standard
2	1 hour	0.00793	12032714	0.055	0.06293	0.5	12.59	Meet the standard
	Daily mean	0.002643	120327	0.02	0.022643	0.15	15.1	Meet the standard
	Annual average	0.000353	Mean	0.00667	0.007023	0.06	11.7	Meet the standard
3	1 hour	0.008398	12080114	0.054	0.062398	0.5	12.48	Meet the standard
	Daily mean	0.002799	120801	0.021	0.023799	0.15	15.87	Meet the standard
	Annual average	0.000825	Mean	0.007	0.007825	0.06	13.04	Meet the standard
4	1 hour	0.007491	12092214	0.053	0.060491	0.5	12.1	Meet the standard
	Daily mean	0.002497	120922	0.02	0.022497	0.15	15	Meet the standard
	Annual average	0.000487	Mean	0.00667	0.007157	0.06	11.93	Meet the standard
5	1 hour	0.003837	12121214	0.055	0.058837	0.5	11.77	Meet the standard
	Daily mean	0.001279	121212	0.022	0.023279	0.15	15.52	Meet the standard
	Annual average	0.000054	Mean	0.00733	0.007384	0.06	12.31	Meet the standard
6	1 hour	0.011072	12060908	0.057	0.068072	0.5	13.61	Meet the standard
	Daily mean	0.003957	120421	0.021	0.024957	0.15	16.64	Meet the standard
	Annual average	0.000227	Mean	0.007	0.007227	0.06	12.05	Meet the standard
Grid	1 hour	0.015794	12042508	0.054667	0.070461	0.5	14.09	Meet the standard
	Daily mean	0.005265	120425	0.020333	0.025598	0.15	17.07	Meet the standard
	Annual average	0.001032	Mean	0.006778	0.00781	0.06	13.02	Meet the standard

Table 7.2-28 Summary of Maximum SO₂ Concentration Values of Concerned Points after the Project (Phase II Project) is Superposed to Solid Waste Project under Construction (Phase II Project)

Description	Type of concentration	Concentration increment (mg/m ³)	Occurrence time (YYMMDDHH)	Background concentration (mg/m ³)	Background superposed concentration (mg/m ³)	Assessment criterion (mg/m ³)	Standard share ratio, % (after the background is superposed)	Whether to exceed standard
1	1 hour	0.01386	12070408	0.054	0.06786	0.5	13.57	Meet the standard
	Daily mean	0.008973	120704	0.018	0.026973	0.15	17.98	Meet the standard
	Annual average	0.00079	Mean	0.006	0.00679	0.06	11.32	Meet the standard
2	1 hour	0.01586	12032714	0.055	0.07086	0.5	14.17	Meet the standard
	Daily mean	0.005287	120327	0.02	0.025287	0.15	16.86	Meet the standard
	Annual average	0.000706	Mean	0.00667	0.007376	0.06	12.29	Meet the standard
3	1 hour	0.016796	12080114	0.054	0.070796	0.5	14.16	Meet the standard

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								standard
	Daily mean	0.005599	120801	0.021	0.026599	0.15	17.73	Meet the standard
	Annual average	0.001649	Mean	0.007	0.008649	0.06	14.42	Meet the standard
4	1 hour	0.014981	12092214	0.053	0.067981	0.5	13.6	Meet the standard
	Daily mean	0.004994	120922	0.02	0.024994	0.15	16.66	Meet the standard
	Annual average	0.000973	Mean	0.00667	0.007643	0.06	12.74	Meet the standard
5	1 hour	0.007674	12121214	0.055	0.062674	0.5	12.53	Meet the standard
	Daily mean	0.002558	121212	0.022	0.024558	0.15	16.37	Meet the standard
	Annual average	0.000108	Mean	0.00733	0.007438	0.06	12.4	Meet the standard
6	1 hour	0.022144	12060908	0.057	0.079144	0.5	15.83	Meet the standard
	Daily mean	0.007915	120421	0.021	0.028915	0.15	19.28	Meet the standard
	Annual average	0.000455	Mean	0.007	0.007455	0.06	12.42	Meet the standard
Grid	1 hour	0.031588	12042508	0.054667	0.086255	0.5	17.25	Meet the standard
	Daily mean	0.010529	120425	0.020333	0.030863	0.15	20.58	Meet the standard
	Annual average	0.002063	Mean	0.006778	0.008841	0.06	14.74	Meet the standard

2) See Tables 7.2-29 and 7.2-30 for summary of maximum NO₂ concentration values under prediction conditions upon superposition of Comprehensive Solid Wastes Utilization Project under construction.

Table 7.2-29 Summary of Maximum NO₂ Concentration Values of Concerned Points after the Project (Phase I Project) is Superposed to Comprehensive Solid Wastes Utilization Project under Construction (Phase I Project)

Description	Type of concentration	Concentration increment (mg/m ³)	Occurrence time (YYMMDDHH)	Background concentration (mg/m ³)	Background superposed concentration (mg/m ³)	Assessment criterion (mg/m ³)	Standard share ratio, % (after the background is superposed)	Whether to exceed standard
1	1 hour	0.009706	12041908	0.038	0.047706	0.24	19.88	Meet the standard
	Daily mean	0.005033	120704	0.014	0.019033	0.12	15.86	Meet the standard
	Annual average	0.000445	Mean	0.00467	0.005115	0.08	6.39	Meet the standard
2	1 hour	0.009081	12032714	0.037	0.046081	0.24	19.2	Meet the standard
	Daily mean	0.003027	120327	0.014	0.017027	0.12	14.19	Meet the standard
	Annual average	0.000412	Mean	0.00467	0.005082	0.08	6.35	Meet the standard
3	1 hour	0.009271	12080114	0.037	0.046271	0.24	19.28	Meet the standard
	Daily mean	0.00314	120627	0.015	0.01814	0.12	15.12	Meet the standard
	Annual	0.000962	Mean	0.005	0.005962	0.08	7.45	Meet the standard

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	average							standard
4	1 hour	0.008453	12092514	0.036	0.044453	0.24	18.52	Meet the standard
	Daily mean	0.002818	120925	0.013	0.015818	0.12	13.18	Meet the standard
	Annual average	0.000564	Mean	0.00433	0.004894	0.08	6.12	Meet the standard
5	1 hour	0.004447	12121214	0.037	0.041447	0.24	17.27	Meet the standard
	Daily mean	0.001482	121212	0.016	0.017482	0.12	14.57	Meet the standard
	Annual average	0.00006	Mean	0.00533	0.00539	0.08	6.74	Meet the standard
6	1 hour	0.0123	12060908	0.036	0.0483	0.24	20.12	Meet the standard
	Daily mean	0.004578	120421	0.015	0.019578	0.12	16.31	Meet the standard
	Annual average	0.000255	Mean	0.005	0.005255	0.08	6.57	Meet the standard
Grid	1 hour	0.018574	12042508	0.036833	0.055408	0.24	23.09	Meet the standard
	Daily mean	0.006191	120425	0.0145	0.020691	0.12	17.24	Meet the standard
	Annual average	0.001209	Mean	0.004833	0.006042	0.08	7.55	Meet the standard

Table 7.2-30 Summary of Maximum NO₂ Concentration Values of Concerned Points after the Project (Phase II Project) is Superposed to Comprehensive Solid Wastes Utilization Project under Construction (Phase II Project)

Description	Type of concentration	Concentration increment (mg/m ³)	Occurrence time (YYMMDDHH)	Background concentration (mg/m ³)	Background superposed concentration (mg/m ³)	Assessment criterion (mg/m ³)	Standard share ratio, % (after the background is superposed)	Whether to exceed standard
1	1 hour	0.019413	12041908	0.038	0.057413	0.24	23.92	Meet the standard
	Daily mean	0.010066	120704	0.014	0.024066	0.12	20.05	Meet the standard
	Annual average	0.000891	Mean	0.00467	0.005561	0.08	6.95	Meet the standard
2	1 hour	0.018163	12032714	0.037	0.055163	0.24	22.98	Meet the standard
	Daily mean	0.006054	120327	0.014	0.020054	0.12	16.71	Meet the standard
	Annual average	0.000823	Mean	0.00467	0.005493	0.08	6.87	Meet the standard
3	1 hour	0.018542	12080114	0.037	0.055542	0.24	23.14	Meet the standard
	Daily mean	0.006281	120627	0.015	0.021281	0.12	17.73	Meet the standard
	Annual average	0.001924	Mean	0.005	0.006924	0.08	8.65	Meet the standard
4	1 hour	0.016905	12092514	0.036	0.052905	0.24	22.04	Meet the standard
	Daily mean	0.005635	120925	0.013	0.018635	0.12	15.53	Meet the standard
	Annual average	0.001128	Mean	0.00433	0.005458	0.08	6.82	Meet the standard
5	1 hour	0.008893	12121214	0.037	0.045893	0.24	19.12	Meet the standard

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								standard
	Daily mean	0.002964	121212	0.016	0.018964	0.12	15.8	Meet the standard
	Annual average	0.00012	Mean	0.00533	0.00545	0.08	6.81	Meet the standard
6	1 hour	0.0246	12060908	0.036	0.0606	0.24	25.25	Meet the standard
	Daily mean	0.009155	120421	0.015	0.024155	0.12	20.13	Meet the standard
	Annual average	0.00051	Mean	0.005	0.00551	0.08	6.89	Meet the standard
Grid	1 hour	0.037149	12042508	0.036833	0.073982	0.24	30.83	Meet the standard
	Daily mean	0.012383	120425	0.0145	0.026883	0.12	22.4	Meet the standard
	Annual average	0.002417	Mean	0.004833	0.00725	0.08	9.06	Meet the standard

3) See Tables 7.2-31 and 7.2-32 for summary of maximum PM₁₀ concentration values under prediction conditions upon superposition of Comprehensive Solid Wastes Utilization Project under construction.

It can be seen from the prediction results that the superposed prediction impact exceeds the standard for PM₁₀ concentration of the background value is high after the background value is superposed.

Table 7.2-31 Summary of Maximum PM₁₀ Concentration Values of Concerned Points after the Project (Phase I Project) is Superposed to Comprehensive Solid Wastes Utilization Project under Construction (Phase I Project)

Description	Type of concentration	Concentration increment (mg/m ³)	Occurrence time (YYMMDDHH)	Background concentration (mg/m ³)	Background superposed concentration (mg/m ³)	Assessment criterion (mg/m ³)	Standard share ratio, % (after the background is superposed)	Whether to exceed standard
1	Daily mean	0.02555	120413	0.113	0.13855	0.15	92.37	Meet the standard
	Annual average	0.000837	Mean	0.03767	0.038507	0.07	55.01	Meet the standard
2	Daily mean	0.036178	120901	0.113	0.149178	0.15	81.68	Meet the standard
	Annual average	0.001492	Mean	0.03767	0.039162	0.07	55.95	Meet the standard
3	Daily mean	0.028257	120127	0.112	0.140257	0.15	93.5	Meet the standard
	Annual average	0.001866	Mean	0.03733	0.039196	0.07	55.99	Meet the standard
4	Daily mean	0.029095	120923	0.113	0.142095	0.15	94.73	Meet the standard
	Annual average	0.001452	Mean	0.03767	0.039122	0.07	55.89	Meet the standard
5	Daily mean	0.015275	121026	0.119	0.134275	0.15	89.52	Meet the standard
	Annual average	0.000292	Mean	0.03967	0.039962	0.07	57.09	Meet the standard
6	Daily mean	0.018895	120718	0.105	0.123895	0.15	82.6	Meet the standard
	Annual average	0.000575	Mean	0.035	0.035575	0.07	50.82	Meet the standard
Grid	Daily mean	0.06589	120104	0.1125	0.17839	0.15	118.93	Over limit
	Annual average	0.009031	Mean	0.037502	0.046533	0.07	66.48	Meet the standard

Table 7.2-32 Summary of Maximum PM₁₀ Concentration Values of Concerned Points after the Project (Phase II Project) is Superposed to Comprehensive Solid Wastes Utilization Project under Construction (Phase II Project)

Description	Type of concentration	Concentration increment (mg/m ³)	Occurrence time (YYMMDDHH)	Background concentration (mg/m ³)	Background superposed concentration (mg/m ³)	Assessment criterion (mg/m ³)	Standard share ratio, % (after the background is superposed)	Whether to exceed standard
1	Daily mean	0.051099	120413	0.113	0.164099	0.15	109.4	Over limit
	Annual average	0.001654	Mean	0.03767	0.039324	0.07	56.18	Meet the standard
2	Daily mean	0.072356	120901	0.113	0.185356	0.15	123.57	Over limit
	Annual average	0.002949	Mean	0.03767	0.040619	0.07	58.03	Meet the standard
3	Daily mean	0.056473	120127	0.112	0.168473	0.15	112.32	Over limit
	Annual average	0.003651	Mean	0.03733	0.040981	0.07	58.54	Meet the standard
4	Daily mean	0.058145	120923	0.113	0.171145	0.15	114.1	Over limit
	Annual average	0.002807	Mean	0.03767	0.040477	0.07	57.82	Meet the standard
5	Daily mean	0.030562	121026	0.119	0.149562	0.15	99.71	Meet the standard
	Annual average	0.000572	Mean	0.03967	0.040242	0.07	57.49	Meet the standard
6	Daily mean	0.037789	120718	0.105	0.142789	0.15	95.19	Meet the standard
	Annual average	0.001126	Mean	0.035	0.036126	0.07	51.61	Meet the standard
Grid	Daily mean	0.131312	120104	0.1125	0.243812	0.15	162.54	Over limit
	Annual average	0.017758	Mean	0.037502	0.055259	0.07	78.94	Meet the standard

7.2.1.5 Analysis for PM₁₀ prediction result and influence after the small boiler is weeded out within the heat supply scope

For centralized heat supply operated in the Project, the small boiler is weeded out to cut down the pollution source, so as to improve the ambient air quality. See prediction of cut-down contribution concentrations in table below. The PM₁₀ prediction result deducts the cut-down value and then adds the background value based on the concentration value. According to the prediction results, concentration values and prediction results can meet the standards.

Table 7.2-33 Analysis for Maximum PM₁₀ Concentration Prediction Results of Concerned Points when the Project (Phase I project) is Superposed to the Project under Construction after Medium and Small Boilers are Eliminated

Description	Type of concentration	Concentration increment (mg/m ³)	Concentration decrement (mg/m ³)	Background concentration (mg/m ³)	Background superposed concentration (mg/m ³)	Assessment criterion (mg/m ³)	Standard share ratio, % (after the background is superposed)	Whether to exceed standard
1	Daily mean	0.0256	0.0436	0.113	0.0949	0.15	63.28	Meet the standard
	Annual average	0.0008	0.0014	0.03767	0.0371	0.07	52.97	Meet the standard
2	Daily mean	0.0362	0.0618	0.113	0.0874	0.15	58.27	Meet the standard
	Annual average	0.0015	0.0025	0.03767	0.0366	0.07	52.31	Meet the standard
3	Daily mean	0.0283	0.0483	0.112	0.0920	0.15	61.34	Meet the standard

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	Annual average	0.0019	0.0032	0.03733	0.0360	0.07	51.44	Meet the standard
4	Daily mean	0.0291	0.0497	0.113	0.0924	0.15	61.61	Meet the standard
	Annual average	0.0015	0.0025	0.03767	0.0366	0.07	52.35	Meet the standard
5	Daily mean	0.0153	0.0261	0.119	0.1082	0.15	72.13	Meet the standard
	Annual average	0.0003	0.0005	0.03967	0.0395	0.07	56.38	Meet the standard
6	Daily mean	0.0189	0.0323	0.105	0.0916	0.15	61.09	Meet the standard
	Annual average	0.0006	0.0010	0.035	0.0346	0.07	49.42	Meet the standard
Grid	Daily mean	0.0659	0.1125	0.1125	0.0659	0.15	43.92	Meet the standard
	Annual average	0.0090	0.0154	0.037502	0.0311	0.07	44.45	Meet the standard

Table 7.2-34 Analysis for Maximum PM₁₀ Concentration Prediction Results of Concerned Points when the Project (Phase II project) is Superposed to the Project under Construction after Medium and Small Boilers are Eliminated

Description	Type of concentration	Concentration increment (mg/m ³)	Concentration decrement (mg/m ³)	Background concentration (mg/m ³)	Background superposed concentration (mg/m ³)	Assessment criterion (mg/m ³)	Standard share ratio, % (after the background is superposed)	Whether to exceed standard
1	Daily mean	0.0511	0.0873	0.113	0.0768	0.15	51.23	Meet the standard
	Annual average	0.0017	0.0028	0.03767	0.0365	0.07	52.14	Meet the standard
2	Daily mean	0.0724	0.1236	0.113	0.0618	0.15	41.20	Meet the standard
	Annual average	0.0029	0.0050	0.03767	0.0356	0.07	50.83	Meet the standard
3	Daily mean	0.0565	0.0964	0.112	0.0720	0.15	48.03	Meet the standard
	Annual average	0.0037	0.0062	0.03733	0.0347	0.07	49.64	Meet the standard
4	Daily mean	0.0581	0.0993	0.113	0.0719	0.15	47.91	Meet the standard
	Annual average	0.0028	0.0048	0.03767	0.0357	0.07	50.98	Meet the standard
5	Daily mean	0.0306	0.0522	0.119	0.0974	0.15	64.92	Meet the standard
	Annual average	0.0006	0.0010	0.03967	0.0393	0.07	56.09	Meet the standard
6	Daily mean	0.0378	0.0645	0.105	0.0783	0.15	52.17	Meet the standard
	Annual average	0.0011	0.0019	0.035	0.0342	0.07	48.86	Meet the standard
Grid	Daily mean	0.1313	0.2242	0.1125	0.0196	0.15	13.06	Meet the standard
	Annual average	0.0178	0.0303	0.037502	0.0249	0.07	35.62	Meet the standard

7.2.1.6 Calculation for environment protection distance

(1) Environment protection distance

Estimation shall be made based on the recommended mode of *Technical Guidelines for Environmental Impact Assessment - Atmospheric Environment* (HJ2.2-2008).

Main ash silo, slag silo and dry coal shed proposed project have large-area unorganized

discharge. See unorganized discharge in Table 7.2-35. In accordance with calculation results of protection distance recommendation mode of the atmospheric environment of *Technical Guidelines for Environmental Impact Assessment - Atmospheric Environment* (HJ2.2-2008), no over-standard distance and protection distance of atmospheric environment are found.

Table 7.2-35 List of Surface Source Intensities of Proposed Project

Name of pollution source		Central position	Near round semi-diameter / L x W	Effective height, He	PM ₁₀ (kg/h)
Slag silo	Phase I	115, -67	Circular diameter, 8m	10m	0.036
	Phase II	87,56	Circular diameter, 8m	10m	0.036
Ash silo	Phase I	-32,14	2 × circular diameter, 9m	10m	0.072
	Phase II	-36,20	Circular diameter, 9m	10m	0.036
Dry coal shed	Phase I	-4,194	198m×103m	5m	0.3675
	Phase II	-4,194	198m×103m	5m	0.3675

(2) Health protection distance

According to provisions of Article 7.4 in *Technical Principles and Methods for Making Local Emission Standards of Air Pollutants* (GB/T13201-91): the health protection distances of various industries and enterprises shall be calculated by the formula below:

$$\frac{Q_c}{C_m} = \frac{1}{A} (BL^C + 0.25r^2)^{0.50} L^D$$

Where: C_m - standard concentration limit, mg/Nm³;

L - health protection distance required by industrial enterprises, m;

r - equivalent radius of production unit where the unorganized discharge source of harmful gas is, m. Calculation is made according to the floor area S (m²) of the production unit, $r = (S/\pi)^{0.5}$;

A, B, C and D - calculation number of health protection distance and zero dimension are acquired in Table 5 specified by Article 7 of *Technical Principles and Methods for Making Local Emission Standards of Air Pollutants* (GB/T13201-91) according to the recent 5-year average wind velocities of the industrial enterprise location and atmospheric pollution sources of the industrial enterprise;

Q_c - the unorganized discharge of harmful gas of industrial enterprise could reach the control level, kg/h.

This assessment takes into account calculation for unorganized discharge sanitation distances of ash silo, slag silo and dry coal shed of the proposed works. The calculation results are as follows: ash silo L (dust) of Phase I Project = 39m; slag silo L (dust) = 24m; dry coal shed L (dust) = 15m. Ash silo L (dust) of Phase I Project = 52m; slag silo L(dust) = 40m; dry coal shed L (dust) =35m.

Table 7.2-36 List of Protection Distance Calculation Results of Proposed Project

Item	Source of Pollution	Atmospheric environment protection distance (m)	Health protection distance (m)	Final determination value of protection distance (m)	
The Project	Slag silo	Phase I	No over-standard point	24	50
		Phase II	No over-standard point	40	50
	Ash silo	Phase I	No over-standard point	39	50
		Phase II	No over-standard point	52	100
	Dry coal shed	Phase I	No over-standard point	15	50
		Phase II	No over-standard point	35	50

According to provisions of Article 7.3 in *Technical Principles and Methods for Making Local Emission Standards of Air Pollutants* (GB/T13201-91): when the health protection distance is within 100m, the differential is 50m; when the health protection distance is more than 100m but less than or equal to 1,000m, the differential is 100m. As a result of this, the health protection distance of the proposed works is determined as follows: within 100m of the ash silo, slag silo and dry coal shed of Phase I; 100m outside the slag silo of Phase II, and 200m outside the ash silo and dry coal shed.

In the light of the project under construction (High-grade Packaging Board Project), the ammoniacal odor health protection distance of the wastewater treatment plant is set to be 100m; besides, the protection distance of the project under construction Comprehensive Solid Wastes Utilization Project) is 100m outside the dump pit of Phase I and 200m outside the inspection workshop, as well as 100m outside the dump pit of phase II.

Besides, the health protection distance checked by the inspection workshop of Comprehensive Solid Wastes Utilization Project is 400m. For this, see Figure 7.2-25 for environment protection distance of finally determined project in details. According to the protection distance diagram, the residential area in Group 5, Lvhuo Village is located within the protection distance, needing relocation.

The assessment suggests adjusting the plane layout, and moving up Comprehensive Solid Wastes Utilization Project to the north of the CHP Project (the adjustment layout is "layout plan II" for short), see Figure 7.2-26 for protection distance distribution.

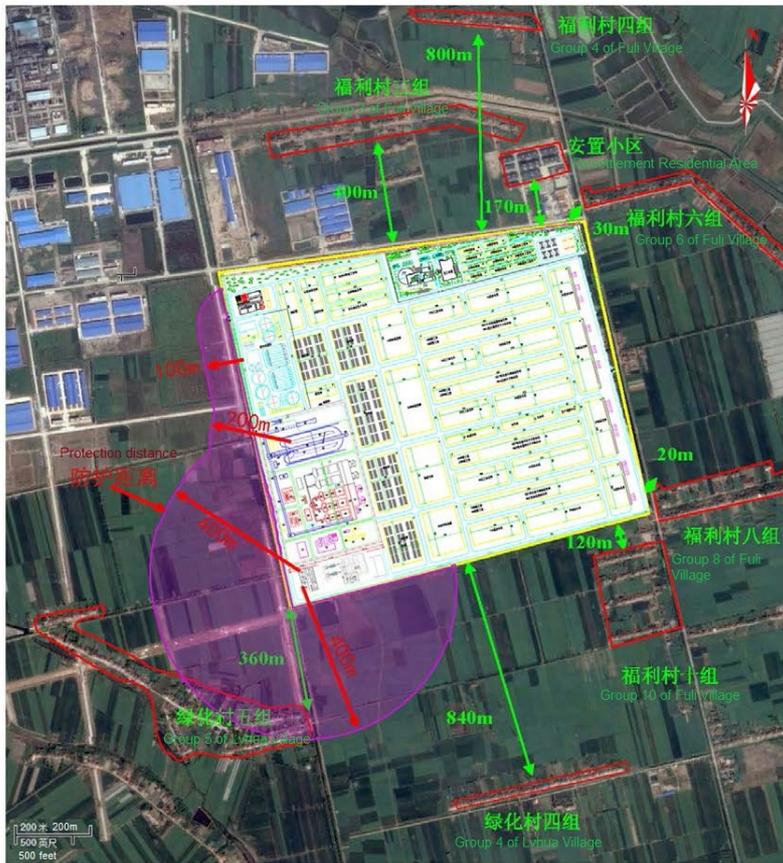


Figure 7.2-25 health protection distance of Proposed Project (Scheme I: Layout of Original Plant Area)



Figure 7.2-26 health protection distance of Proposed Project (Scheme II: Adjustment Layout of Plant Area Layout)

Upon adjustment of general layout of Comprehensive Solid Wastes Utilization Project, there is no residential area in the atmospheric and health protection distances of the CHP Project and Comprehensive Solid Wastes Utilization Project. Relocation of the residential area is not required.

Upon setting of atmospheric distance and health protection distance, such environmental sensitive target as residential area shall not be planned within the distance scope.

7.2.2 Prediction and analysis for water environmental impact

7.2.2.1 Analysis for surface water environment impact

In accordance with water utilization and feasibility study report, wastewater generated from the Project mainly includes percolate from garbage storage pit, washing wastewater from the transport system, wastewater from laboratory and machine maintenance, sewage from the boiler and back washing water from the chemical water workshop. Its main pollution factors include pH, COD, BOD₅, SS and ammonia nitrogen. The total drainage of wastewater of the two phases of the Project is 55.36m³/d.

It is planned to build a wastewater treatment station for the packaging board served by the proposed project. For the effluent segregation system is applied for the drainage system of the proposed works, the wastewater of the Project treats the wastewater depending on the wastewater treatment station. According to the approved *EIA Report on 2.20Mt/a High-grade Packaging Board Project by Changtai Paper Industry (Wuhan) Co., Ltd.*, the process of wastewater treatment station is "grille + primary sedimentation tank + anaerobic reactor + aeration tank + secondary sedimentation tank + Fenton reaction tank + third sedimentation tank + filter tank". The design shall be divided into two stages, the wastewater treatment capacity is 27,500m³/d both in phases I and II, and the total wastewater treatment capacity of two phases is 55,000m³/d. Only if the effluent from the wastewater treatment station meets Table 3: Standards for Pulp and Paper Making Joint Production Enterprise in *Discharge Standard of Water Pollutants for Pulp and Paper-making Industry (GB3544-2008)* and Standard Class 1-B of *Discharge Standard of Pollutants for Municipal Sewage Treatment Plants (GB18918-2002)*, it can be drained into the Yangtze River by virtue of the special drain pipe for river.

The wastewater treatment station takes into account the wastewater from the CHP Project and Comprehensive Solid Wastes Utilization Project at the demonstration phase for treatment capacity and process. The wastewater volume to be drained in the Project is only 55.36m³/d, accounting for 0.1% of the wastewater treatment capacity of the entire plant. In the approved *Environmental Impact Report on 2.20Mt/a High-grade Packaging Board Project by Changtai Paper Industry (Wuhan) Co., Ltd.*, the comprehensive compliance feasibility assessment is made for wastewater treatment compliance of the entire plant. Extreme low wastewater amount of the Project and the wastewater treatment capacity of the entire plant will not affect treatment efficiency of the wastewater treatment station, and have few influences on the surface water after the wastewater from the project affects compliance feasibility of the wastewater treatment standard of the entire plant and is treated by the wastewater treatment station.

7.2.2.2 Analysis for groundwater environment impact

(1) Areal Geology

The project field region is located on the first terrace in the south bank of the Yangtze River, which is an alluvial-diluvial terrace unit. With no great height difference in the field, it is flat. Engineering construction is applicable to the site without such adverse geologic phenomena as karst and landslide. According to survey and investigation, the strata in the field could be divided into four layers within the scope of the exploration depth:

Layer ① is plain fill with unstable mechanical property, including humus, plant roots and other sundries; it is distributed in the entire site, with layer thickness of 0.6~0.7m and average thickness of 0.62m;

Layer ② is silty clay with general mechanical property; it is distributed in the site mostly, with layer thickness of 1.0~1.6m and average thickness of 1.35m;

Layer ③ is muddy silty clay with poor mechanical property; it is intercalated with silty soil partially, and distributed in the full site, with layer thickness of 3.4~4.3m and average layer thickness of 3.92m;

Layer ④ is silty clay with general mechanical property; it is distributed fully; and the exposed layer of this survey is 1.6~2.4m thick.

(2) Hydrogeological conditions of groundwater

The groundwater measured in this survey is 0.52m deep. It is stagnant water in the upper gap occurred in Layer ① plain fill, with small water yield. It is mainly supplemented by atmospheric precipitation infiltration and drained by vertical runoff infiltration. Also, it is the main source of ground water during foundation pit excavation. However, the general

centralized drainage method is applied for its small water yield. With weak water permeability, Layers ②~④ are relative impervious layers.

(3) Impact analysis

This assessment excludes the ash pond. Comprehensive hardening will be conducted for the coal storage yard that may affect the groundwater. Also, the rain shed shall be provided, and rain gutters shall be provided around it. Rain water in the initial period is drained after precipitated. Under normal circumstances, it has few influences on the ground water. Only the flood diversion and storage area is used for flood storage, raw coal in the coal storage yard will produce certain influences on the surrounding the coal storage yard after the flood water recedes if they are soaked with the flood for there is no enough time to transfer.

7.2.3 Prediction and analysis for noise environmental impact

See Table 7.2-35 for main noise source intensities based on engineering analysis.

Table 7.2-35 List of Main Noise Source Intensities

SN	Equipment	Acoustics	Noise level	Location	Treatment measures and effects	Upon treatment
1	Electric generator	Continuous	100	Steam turbine room	Noise isolation hood, power house sound insulation, 20	80
2	Steam turbines	Continuous	90		Noise isolation hood, power house sound insulation, 20	70
3	Induced draft fan	Continuous	100	Steam turbine room	Power house sound insulation, micropole diffusor, 25	75
4	Blower	Continuous	98	Incinerator room	Power house sound insulation, micropole diffusor, 25	63
5	Feed pump	Continuous	92	Steam turbine room	Pump house sound insulation, noise insulation hood, 20	72
6	Circulating water pump	Continuous	80	Circulating water pump house	Pump house sound insulation, noise insulation hood, 20	60
7	Cooling tower	Continuous	85	Cooling tower	—	85
8	Air compressor	Continuous	90	Steam turbine room	Power house sound insulation, 15	75
9	Boiler exhaust	Intermittent	110	—	Silencer, 30	80

7.2.3.1 Prediction mode

① Method for calculation of sound power levels of indoor sound source and equivalent outdoor sound source

For the sound source indoors, the sound power level method of equivalent outdoor sound source could be applied for calculation of the indoor sound source. Sound pressure levels of certain indoor and outdoor octave frequency bands nearby the opening (or the window) are L_{p1} and L_{p2} . If the indoor sound field of the sound source is approximate to the diffusion sound field, the sound pressure level nearby the outdoor enclosure structure is calculated by the following formula:

$$L_{p2i}(T) = L_{p1i}(T) - (TL_i + 6)$$

where: $L_{p2i}(T)$ - superposed sound pressure level of i times octave frequency band of the N^{th} sound source nearby the enclosure structure outdoors, dB.

According to the following formula, the sound pressure level of the outdoor sound source and the transmission area are converted into the equivalent outdoor sound source for calculation of the sound power level of the octave frequency band of the equivalent sound source whose central position is located in the acoustic transmission area (S).

$$L_w = L_{p2}(T) + 10 \lg s$$

The sound level A at the prediction point is calculated by the outdoor sound source prediction method.

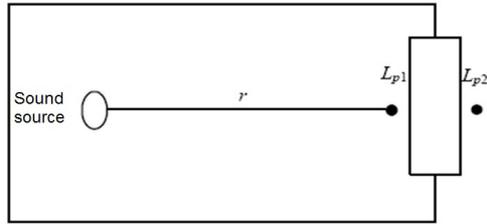


Figure 7.2-27 Legend of Indoor Sound Source Equivalent to Outdoor Sound Source

② Calculation for outdoor noise propagation and attenuation

The formula of sound level A is:

$$L_p(r) = L_p(r_0) - (A_{div} + A_{atm} + A_{gr} + A_{bar} + A_{misc})$$

$L_p(r)$ - sound level A at the sound source r , dB; $L_p(r_0)$ - sound level A at the reference position r_0 , dB; A_{div} - attenuation of octave frequency band caused by geometric divergence, dB; A_{atm} - attenuation of octave frequency band caused by atmospheric absorption, dB; A_{gr} - attenuation of octave frequency band caused by ground effect; A_{bar} - attenuation of octave frequency band caused by sound barrier, dB; A_{misc} - attenuation of octave frequency band caused by other effects, dB; according to the field survey, the location of the proposed project is flat, low trees are mainly used for surrounding greening, the prediction point is mainly concentrated at 1m outside the boundary, so this assessment does not take A_{atm} , A_{gr} and A_{misc} into account.

③ Geometric divergence and attenuation of outdoor point sound source

It is supposed that the sound field is a half free field when the sound source located on the ground:

$$L_p(r) = L_p(r_0) - 20 \lg \left(\frac{r}{r_0} \right) - 8$$

④ Geometric divergence and attenuation of sound area source

Vibration surface of large machine equipment and sound transparent wall of the workshop could be served as the sound area source. If the sound power of the unit area of the known sound area source is W , the phase of each surface element noise is random. The sound area source could be formed by continuous distribution and combination of countless point sound sources, and its synthetic sound level is obtained by the energy superposition method.

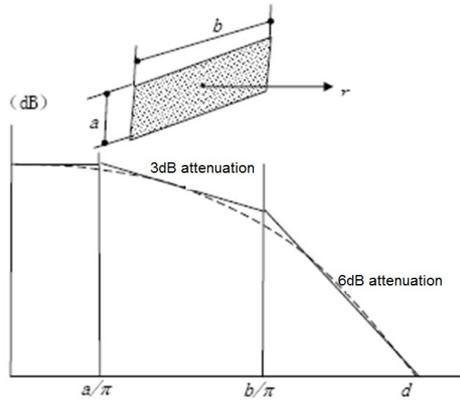


Figure 7.2-28 Attenuation Characteristics of Central Axis of Rectangular Surface Sound Source

When the distance r between the prediction point and the center of the sound area source is in the following conditions, it can be calculated approximately by the following method: when $r < a/\pi$, there is almost no attenuation ($A_{div} \approx 0$); when $a/\pi < r < b/\pi$, distance attenuation is doubled for about 3dB, it is similar to the linear sound attenuation characteristic (

$A_{div} \approx 10 \lg\left(\frac{r}{r_0}\right)$); when $b/\pi < r$, distance attenuation is doubled for about 6dB, it is similar to

point sound attenuation characteristic ($A_{div} \approx 20 \lg\left(\frac{r}{r_0}\right)$). b of the surface sound source is greater than a , the dotted line in the figure is actual amount of attenuation.

⑤ Attenuation caused by the barrier

Considering calculation of attenuation of the power house, double diffraction calculation shall be applied.

Path difference δ between diffraction sound and direct sound:

$$\delta = \left[(d_{ss} + d_{sr} + e)^2 + a^2 \right]^{1/2} - d$$

where: a - projection length of the distance between the sound source and the receiving point parallel to the upper boundary of the barrier, m ; d_{ss} - distance between the sound source and the first diffraction side, m ; d_{sr} - distance between the second diffraction side and the receiving point, m ; e - distance between two diffraction boundaries under double diffraction, m ; for sound barrier diffraction on the double diffraction (namely thick barrier), diffraction is 25dB maximally.

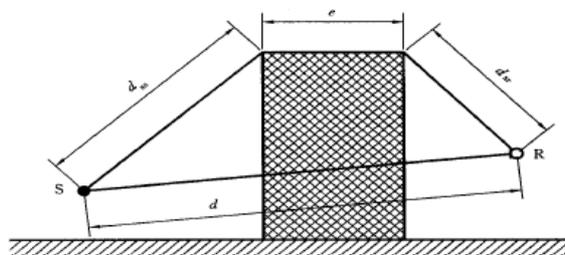


Figure 7.2-29 Double Attenuation Diffraction of Power House

7.2.3.2 Forecast result

(1) Evaluation criterion

Noise standard shall comply with Type II Standard in *Environmental Quality Standard for Noise* (GB3096-2008).

(2) Analysis for the prediction results

When the project operates, see prediction results of boundary noise by noise equipment of Phase I Project in Table 7.2-35 below, and noise contour distribution in Figure 7.2-30; see prediction results of boundary noise by noise equipment of Phase II Project in Table 7.2-36, and noise contour distribution in Figure 7.2-31.

Table 7.2-35 List of Noise Environment Impact Prediction Results upon Operation of Phase I Project

SN	Name	Actual value		Contribution value	Forecast result		Executive standard		Condition of meeting standards
		Day time	Night		Day time	Night	Day time	Night	
1#	At 1m outside north boundary	50.1	43.1	20.1	50.10	43.12	65	55	Meet the standard
2#	At 1m outside the east boundary	50.1	43.1	20.2	52.33	43.31	65	55	Meet the standard
3#	At 1m outside the south boundary	44.2	43.8	26.1	51.73	42.58	65	55	Meet the standard
4#	At 1m outside the south boundary	44.2	43.8	28.3	54.42	42.84	65	55	Meet the standard
5#	At 1m outside the west boundary	49.1	42.8	22.5	52.51	42.44	65	55	Meet the standard
6#	At 1m outside the west boundary	49.1	42.8	21.4	53.31	42.44	65	55	Meet the standard

Table 7.2-36 List of Prediction Results of Noise Environment Impact upon Operation of Phase II Project

SN	Name	Actual value		Contribution value	Forecast result		Executive standard		Condition of meeting standards
		Day time	Night		Day time	Night	Day time	Night	
1#	At 1m outside north boundary	50.1	43.1	24.5	50.11	43.16	65	55	Meet the standard
2#	At 1m outside the east boundary	50.1	43.1	22.6	52.33	43.31	65	55	Meet the standard
3#	At 1m outside the south boundary	44.2	43.8	26.8	51.73	42.58	65	55	Meet the standard
4#	At 1m outside the south boundary	44.2	43.8	30.0	54.42	42.84	65	55	Meet the standard
5#	At 1m outside the west boundary	49.1	42.8	23.9	52.51	42.44	65	55	Meet the standard
6#	At 1m outside the	49.1	42.8	22.7	53.31	42.44	65	55	Meet the

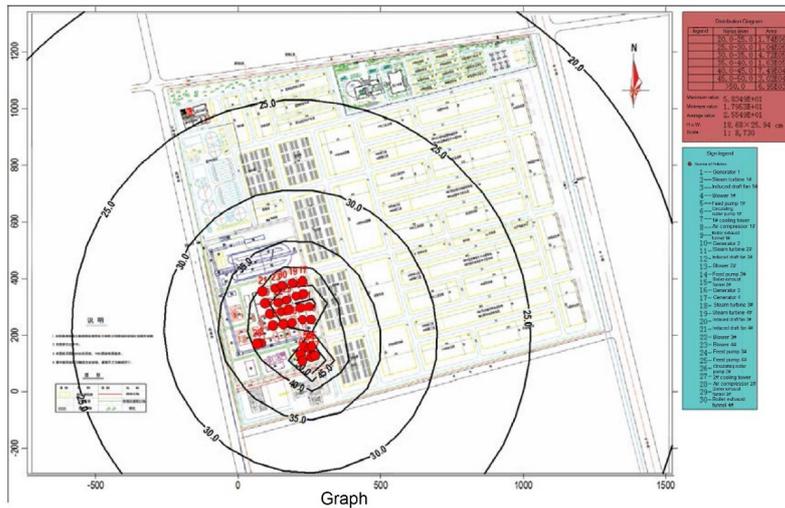


Figure 7.2-31 Distribution of Noise Contribution Value Contour of Phase II Project

7.2.4 Analysis for solid waste

7.2.4.1 Solid waste source and disposal

The solid wastes of the proposed project include boiler ash and slag, desulfurization gypsum and household garbage.

According to division of *Notice on Declaration and Registration of Solid Wastes in the Nationwide* ([1994] No. 345) and *Guidelines for Declaration and Registration of Solid Wastes*, see Table 7.2-37 for output volume of solid wastes and types in the proposed project. It can be seen from the table that the total amount of solid wastes of the entire plant of the proposed works is 940,900t/a, including 839,000t/a of boiler ash and slag, 102,900t/a of gypsum and about 564,400t/a of household garbage.

Various solid wastes could be used and disposed properly. Ash and slag shall be transported for comprehensive use under common conditions, and can be piled on the emergency ash yard in case it cannot be used for accident during comprehensive use; gypsum generated from desulfurization of the Project shall be also transported for comprehensive use; household garbage shall be transported to the local environmental sanitation department for use regularly.

Table 7.2-37 Solid Waste Category, Output Volume and Disposal Direction

SN	Production device	Source and name	Discharge amount (t/a)	Composition of pollutants	Solid waste category	Discharge direction
1	Boiler	Coal ash	838675	Coal ash and slag	General industrial solid wastes	It is transported for comprehensive use by Gong'an Huifeng Energy Development Co., Ltd., Gong'an Ruifeng New Wall Materials Co., Ltd. and Gong'an Jinsha Commerce Limited Liability Company.
2	Flue gas desulfurization device	Desulphurization by-product	102160	Plaster	General industrial solid wastes	
3	Whole plant	Domestic garbage	56.44	—	Other wastes 99#	Transported regularly by local environmental sanitation department
Subtotal	General industrial wastes		940835			Entrustment to dispose / comprehensive utilization

Domestic garbage	56.44			Transported regularly by environmental sanitation department
Total	940891.44			Failure to discharge outside

7.2.4.2 Analysis for solid waste utilization and disposal

(1) Analysis for boiler ash and slag disposal

The policies of combination of storage and use and active use will be applied for ash and slag disposal. Except for the schemes of ash and slag separation and dry ash handling in the plant, the plant is internally provided with the intermediate ash (slag) transport storage and vehicle bulk machine and sealed tanker. Slag is transported to the ash yard by the sealed tanker, and the dried ash humidified is transported to the ash yard or delivered to the user by virtue of the sealed tanker. Ash is stored in the ash yard by humidifying and rolling the stored ash in a dried manner.

Ash and slag, the general industrial solid waste, shall be transported for comprehensive utilization under normal conditions. When ash and slag cannot be used in case of any accident, ash and slag could be piled on the alternate emergency ash yard. The emergency ash yard, could meet the fly ash residue of about 2-3 days when operating in the full load under the condition of piling 4x410t/h boiler design fuel. This assessment does not include the ash yard. The Employer will entrust the qualified Environmental Impact Assessment Organization to make an assessment on environmental impact of the ash yard.

Solid wastes of the proposed project are stored temporarily, planned uniformly, and classified and piled. Ash and slag are respectively provided with intermediate ash (slag) transport storage and gypsum silo, so as to prevent secondary pollution for improper disposal. The ash and slag silo shall be rainproof and impermeable to avoid influences on the groundwater by the wastes in the silo.

(2) Gypsum disposal analysis

Each furnace of the Project is provided with a gypsum dehydration plant. One vacuum belt dehydrator is provided on each gypsum dewatering system. Each vacuum belt dehydrator is provided with one water-ring vacuum pump and one cloth washing equipment. The gypsum with maximum water content of 10% is conveyed to the gypsum stacking room for storage by the belt conveyor after filtered in vacuum.

Desulphurization by-product gypsum belongs to general industrial solid wastes. With rather mature comprehensive use, desulfurization gypsum is mainly used for building products and cement retarder and is extensively applied in building and cement industries. After gypsum of the Project passes through the gypsum dewatering system, the quality of gypsum meets requirements of industrial application, so as to create conditions for comprehensive use of the desulfurization gypsum. It can thus be seen that the desulphurization by-product gypsum could be reasonably processed without harm to the external environment.

(3) Household garbage collection

The output of household garbage of the proposed works is 56.44t/a, which shall be collected and disposed by the environmental sanitation department in the local area.

In a conclusion, disposal measures for solid wastes from Yangjiachang Town Industrial Park CHP Project in Gong'an County are feasible. Solid wastes from the Project will be comprehensively used and properly disposed. Its environment impact could be effectively controlled to lead to small harm to the surrounding environment.

7.2.5 Ecological impact analysis

Although the Project belongs to environmental protection project, it still has certain influences on ecological environment during construction and operation. Its influences are caused by waste gas, waste slag, wastewater and noise discharged during the construction and after Changtai Paper Industry (Wuhan) Co., Ltd. disposes solid wastes.

7.2.5.1 Analysis for water and soil loss

During the construction of the Project, damage for original surface configuration, ground vegetation and soil structure leads to increasing of the bare area, so that resistance to corrode and impact of surface soil could be weakened. Moreover, soil and earth are moved to generate a certain amount of spoil. For instance, severe water and soil loss will be caused if no corresponding control measures are taken in stormy days, so as to aggravate water and soil loss in the surrounding areas of the Project.

The proposed works aims to control water and soil loss, restore vegetation, improve the ecological environment around the Project, and protect normal safety operation of the body engineer; takes surrounding environment and safety without negative influences as the starting point; focuses on construction of the control area in this phase, cooperates the existing water and soil conservation facilities in the body engineering design to comprehensively plan and distribute water and soil loss control measure system, in which the water and soil loss control measure system consists of building and structure control area, road in the site and hardening control area, and plant area afforestation control area.

Upon control for buildings and structures, roads in the site and hardening and plant area afforestation, water and soil loss artificially caused by the project area can be effectively controlled and governed. Surface soil excavated from the project is utilized and governed to effectively prevent loss during temporary piling, so that water and soil conversion can be effectively controlled.

7.2.5.2 Influences on agricultural plants

Pollutants discharged by garbage burning mainly include dust, SO₂, NO₂ and other atmospheric pollutants. Atmospheric pollutants may damage leaf tissues, destroy its normal functions, weaken photosynthesis and affect growth and development as well as output by virtue of intruding or sticking plant leaves. For recombination action on plants from various atmospheric pollutants discharged by garbage burning, joint action between SO₂ and NO_x causes high dangers than single gas.

The harm concentration value of SO₂ for crops has been specified in *Maximum Allowable Concentration of Pollutants in Atmosphere for Protection Crops* (GB9137-88). NO₂ only has study achievements on biological reference values. For details, see Tables 7.2-38 and 7.2-39.

Table 7.2-38 Harm Concentration Limit of SO₂ for Crops (Unit: mg/m³)

Level of sensitivity to crop	Average concentration in the growing season	Daily average concentration	Any once	Typical crop
Sensitive crop	0.05	0.15	0.50	Winter wheat, spring wheat, soybean, spinach, clover, Chinese cabbage, cucumber, etc.
Moderate sensitive crop	0.08	0.25	0.70	Rice, corn, tomato, oat, sorghum, cotton, tobacco, eggplant, carrot, etc.
Resistant crop	0.12	0.30	0.80	Broad bean, rapeseed, sunflower, strawberry, taro and cabbage

Table 7.2-39 NO₂ Threshold Predicted to Affect 5% Plant Leaves (Unit: mg/m³)

Time (h)	Sensitive crop	Moderate sensitive crop	Resistant crop
0.5	11.28-18.8	16.92-31.96	≥30.8
1.0	0.087-52-15.04	13.16-26.32	≥24.44
2.0	0.125-64-13.16	11.18-22.56	≥20.68
4.0	4.76-11.28	9.40-18.8	≥16.92
8.0	4.76-9.40	7.52-16.92	≥15.04

After the Project is put into operation, maximum hourly concentrations of SO₂ and NO₂ are

respectively $0.0813\text{mg}/\text{m}^3$ and $0.0586\text{mg}/\text{m}^3$ under normal operating conditions, and the maximum ground level concentration occurrence distance is 953m. Regardless of most adverse meteorological conditions or general meteorological conditions, the predicted concentration value of SO_2 is far lower than the standard limit value specified in *Maximum Allowable Concentration of Pollutants in Atmosphere for Protection Crops* (GB9137-88). Moreover, the prediction concentration value of NO_2 is far lower than the threshold which affects 5% of plant leaves.

Rice is the main crop around site of the plant of the proposed works, belonging to the moderate sensitive crop. Also, the pollutant discharge is greatly reduced after the polluted flue gas is treated. 180m-high chimney is applied for discharge. The standard waste gas discharge has small influences on the nearby crops for the ground level concentration of pollutants is low.

7.2.6 Analysis for transportation environment impact

Numerous raw materials and solid wastes go in and out of the plant area. Coal, light diesel oil and ammonia are mainly transported into the plant, and boiler ash and slag, by-product gypsum and household garbage are transported from the plant. With highway transportation for the proposed project, the total annual highway freight volume is 2,804,100t. 1,863,200t/a of raw and auxiliary materials are purchased and transported into the plant; 940,900t/a of ash and slag, gypsum and household garbage are carried away by highway.

7.2.6.1 Analysis for transportation noise impact

The annual freight volume of raw and auxiliary materials and solid wastes of the proposed project is 2,804,100t, including 1,863,200t/a to the plant area and 940,900t/a out of the plant area. The daily mean freight volume of highway is about 7,682t. By 30t of the rated load capacity by virtue of vehicle transportation, the daily amount of vehicles is 256; by 12h of daily transportation, the mean traffic flow is 21/h.

With good traffic conditions of the proposed project site, the existing arterial traffics of Gong'an City are applied for material transportation. Through predictive analysis for analogy of noise movement sources of similar projects, the traffic volume generated by the proposed project cannot constitute the linear sound source for material transportation, leading to small contribution values on the traffic noise. Under the precondition of strengthening management and reasonably arranging transportation time, transportation of the Project leads to small noise influence on the sensitive points along the route.

7.2.6.2 Analysis for transported dust impact

Dust caused by vehicle transportation is mainly from: on the one hand, road dust caused in vehicle driving; on the other hand, dust caused by scattering of materials during material transportation. Road dust from vehicle transportation has small influences on the surrounding environment; for highway transportation of the proposed project, materials easy to produce dust mainly include fuel coal and boiler ash and slag. For this, dust control measures shall be strengthened when such materials are transported, for instance, applying sealed compartment, spraying incoming roads whenever necessary, sweeping the pavement regularly, and minimizing environment impact of the sensitive points along the route.

8 Assessment on Pollution Control Measures

8.1 Measures for Prevention of Atmospheric Pollution

8.1.1 Analysis for height rationality of the chimney

According to the provisions of *Technical Principles and Methods for Making Local Emission Standards of Air Pollutants* (GB/T3840-91), the point source exhaust funnel for industrial and mining enterprises shall not be twice lower than that of its dependent building, and shall not directly pollute the neighboring buildings. The chimney of the proposed works is 180m high, and the surrounding building is 90m below, meeting the requirements specified by GB/T3840-91; besides, according to *Integrated Emission Standard of Air Pollutants* (GB16297-1996), the exhaust funnel of the new pollution source shall not be lower than 15m, and shall be more than 5m higher than the surrounding buildings within the semi-diameter scope of 200m. Exhaust funnels that cannot reach the requirement shall be strictly conducted by 50% according to the tabulated discharge speed corresponding to its height.

In accordance to the design height of the building in the plant area in the engineering feasibility report, the flue gas exhaust funnel of the boiler shall be 180m high, meeting the requirements of *Technical Principles and Methods for Making Local Emission Standards of Air Pollutants* (GB/T3840-91) and *Integrated Emission Standard of Air Pollutants* (GB16297-1996).

8.1.2 Analysis for standard flue gas speed at the outlet of chimney

Based on provisions of *Technical Principles and Methods for Making Local Emission Standards of Air Pollutants* (GB/T13201-91), the flue gas velocity V_s at the outlet of the exhaust funnel shall not be less than the calculated wind velocity V_c by 1.5 times.

The calculation formula of wind velocity V_s is as follows:

$$V_c = \frac{\bar{V} \cdot (2.303)^{1/k}}{\Gamma(\lambda)} \quad (1)$$

$$K = 0.74 + 0.19\bar{V} \quad (2)$$

$$\lambda = 1 + \frac{1}{K} \quad (3)$$

where: \bar{V} - annual mean wind velocity of environmental wind velocity at the outlet of chimney, m/s; k - Weber slope.

It is known that the local ground mean wind velocity is 1.41m/s, the logarithmic law formula in which the wind velocity varies along the height is applied

$$\bar{V} = \bar{V}_{10} \left(\frac{Z}{Z_{10}} \right)^P \quad (4)$$

where: Z - height of the exhaust funnel, m; P - wind profile index, 0.25.

It can be obtained that the annual mean wind velocity of the environmental wind velocity at the outlet of the chimney of the boiler: $\bar{V}=2.9\text{m/s}$.

Through calculation: $K=1.29$, $\lambda=1.775$, and $V_c=5.99\text{m/s}$.

Based on the feasibility report, the inner diameter of the chimney outlet is designed to be 4m, the exhaust rate is 210.68m³/h (one chimney in Phase I, and new additional chimney in Phase II, with the same emission parameters). Through calculation based on the chimney structure, $V_s=16.77\text{m/s}$. When V_s is greater than 1.5 V_c , no flue gas underwashing is caused. The flue gas velocity of the chimney outlet shall meet the provisions of *Technical Principles and Methods for Making Local Emission Standards of Air Pollutants* (GB/T13201-91).

8.1.3 Analysis for fuel usage

Five new 410t/h circulating fluidized bedboilers are built in the proposed works, including 4 for operation and one for spare. Fuels are mainly coals from "Three Wests" (namely Shanxi, West of Inner Mongolia and Shaanxi). The quality of coal is designed as follows: the net calorific value as received basis is 19.867MJ/kg, the total moisture is less than or equal to 8.3%, the sulfur content is less than or equal to 1.0%, the ash content is less than or equal to 36.87%, and the annual supply is about 179.84×10^4 t; the net calorific value as received basis is 18.880MJ/kg, the total moisture is less than or equal to 6.77%, the sulfur content is less than or equal to 1.2%, the ash content is less than or equal to 34.23%, and the annual supply is about 189.96×10^4 t.

The CHP Project of Yangjiachang Town Industrial Park and Jingzhou Zhongnan Coal Investment Co., Ltd. signed *Intentional Contract on Coal Purchase and Sales*, in which coal supply and coal quality requirements are specifically agreed. From the perspective of the above coal source supply, the coal source and supply of the Project are reliable.

8.1.4 Pollution control measures and standard discharge analysis

8.1.4.1 SO₂ pollution control measures and standard discharge analysis

(1) Measure feasibility analysis

Desulfurization by wet process outside the furnace is applied for boiler waste gas of the proposed project.

At present, the desulfurization technologies extensively applied include: wet limestone/gypsum process, desulphurization with ammonia, rotary spray semidry method, spraying calcium inside furnace - tail humidification and activation process, etc. Through comparison for various desulfurization measures, desulfurization efficiencies of wet limestone/gypsum process and ammonia process of desulfurization are rather high. Moreover, there are related mature operating cases at home and aboard. Wet desulfurization is mature and most widely applied desulfurization process; the desulfurizer is used fully, with the desulphurization efficiency of more than 90%. Limestone flour required by the proposed wet process desulfurization is supplied by Songzi Huiyou Novel Environmental Protection Materials Co., Ltd. Raw materials are supplied fully and conveniently. The desulfurization by-product gypsum is high in quality and is free from harmful impurities, and its free moisture content is about 10%. With extensive application ways, the desulfurization gypsum will not cause secondary environment impact, but bring economic benefits. For this purpose, it is feasible to apply wet desulfurization for the proposed boiler waste gas.

At present, see comparison of general desulfurization measures in China in Table 8.1-1 below.

Table 8.1-1 List of Comparison of Desulfurization Measures

Description	Process features
Wet limestone/gypsum process	Mature and most widely applied desulfurization process The desulfurizer is used fully, with the desulphurization efficiency of more than 90%; The source of desulfurizer is abundant, and the development foreground of by-product gypsum is good; Complicated system, large floor area, high initial investment and power consumption
Desulphurization with ammonia	The green desulfurization process is applicable to building and transformation projects of flue gas desulfurization of power plant boiler and industrial furnace of fuel coal with high sulfur content; taking liquid ammonia or ammonia water as the raw material, the desulfurization by-product ammonia sulfate can be sold, and the desulfurization efficiency is greater than 95%; with small floor area, there are successful operating cases on large generator sets at home and aboard.
Rotary spray semidry process desulfurization technology	Require lime with high performance; have disadvantages of complicated adjustment of the flue gas system, absorption tower scaling, high price than other dry methods, equivalent desulphurization efficiency compared with other dry methods, and poor comprehensive technical economic performance; With low use ratio of desulfurizer, the desulphurization efficiency is generally about 70%.
Spraying calcium inside furnace - tail	For the process, limestone flour is served as the absorbent, with the desulphurization

humidification and activation process desulfurization technology	efficiency of about 75%; it is applicable to small and medium desulfurization with not high requirements.
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Depending on desulfurization of the Project, the circulating fluidized bedboiler + external limestone - gypsum wet flue gas desulfurization system is applied to allow the total desulfurization efficiency to be greater than or equal to 96.5%. This meets "the design desulphurization efficiency of the desulfurization system shall not be less than 95%" specified in *General Technical Specification of Flue Gas Limestone/Lime-Gypsum Wet Desulfurization of Thermal Power Plant* (HJ/T179-2005). The measure of circulating fluidized bedboiler + wet process desulfurization is feasible.

(2) Analysis for standard emission

The SO₂ concentration of the designed coal is 2,858mg/m³, the SO₂ concentration of the verified coal is 3,313mg/m³. After the aforesaid wet process desulfurization is applied, the SO₂ emission concentration is 81.68mg/m³. It can be thus seen that the SO₂ emission concentration can meet the requirements on limit value (100mg/m³) of SO₂ emission concentration specified in *Emission Standard of Air Pollutants for Thermal Power Plants* (GB13223-2011) upon limestone - gypsum desulfurization.

8.1.4.2 NOx pollution control measures and standard discharge analysis

(1) Measure feasibility analysis

It is implemented according to *Thermal Power Plant's NOx Emission Prevention and Control Policy* (HF [2010] No. 10, January 27, 2010):

2.3 The low-nitrogen combustion technology shall be the first choice to control NOx of the fuel coal power plant. When the NOx emission concentration fails to meet the standard or does not meet the total amount control requirement after the low-nitrogen combustion technology is applied, the flue gas denitration facilities shall be built;

4.3 The flue gas denitration technologies mainly include: selective catalytic reduction (SCR), selective non-catalytic reduction (SNCR), selective non-catalytic reduction - selective catalytic reduction (SNCR-SCR) and other flue gas denitration technologies;

4.3.1 SCR shall be selected for new, transformed and expanded coal-fired units; SNCR-SCR can be applied in case of less than or equal to 600MW;

4.3.2 SCR or SNCR-SCR shall be selected for burning anthracite or lean coal and units in service with operation time of less than 20 years;

4.3.3 SNCR or other flue gas denitration technologies shall be selected for burning anthracite or lignite and units in service with operation time of less than 20 years;

For description for several kinds of denitration technologies extensively applied below, see comparison and analysis for various denitration technologies in Table 8.1-2.

Table 8.1-2 List of Comparison and Analysis for Various Denitration Technologies

Main process characteristics	SCR method	SNCR method	SNCR+SCR mixed method
Reductant	NH ₃ or urea	Ammonia or urea	NH ₃ or urea
Reaction temperature / °C	320~400	850~1250	Front section: 850~1,250; rear section: 320~400
Catalyst and ingredient	Mainly TiO ₂ and V ₂ O ₅	Inapplicable to the catalyst	Adding a small amount of catalyst at the rear section
Denitration efficiency / %	70~90	Large unit 25-40, small units matched with LNB and OFA reaching 80	40~90
SO ₂ /SO ₃ oxidation	V, Mn, Fe and other metals in the catalyst catalyze SO ₂ oxidation, leading to high SO ₂ /SO ₃ oxidation efficiency	Not lead to SO ₂ /SO ₃ oxidation	SO ₂ /SO ₃ oxidation is lower than SCR oxidation
NH ₃ escape /μL·L ⁻¹	3~5	5~10	3~5

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Influences on air preheater	NH ₃ and SO ₃ easily form NH ₄ HSO ₄ to result in blockage or corrosion	The probability to result in blockage or corrosion is minimum	The probability to result in blockage or corrosion is lower than that of SCR
System pressure loss	The catalyst results in high pressure loss, generally greater than 980Pa	None	The consumption of catalyst is lower than that of SCR, and the pressure loss is rather low, generally 392-588Pa

① Low NOx combustion technology

Low NOx combustion is a preferential technology to control NOx emission of the fuel coal boiler at home and aboard. Considering such technologies as coal quality, coal pulverizing system, burner, secondary air and over fire air as a whole in the modern NOx combustion technology, the early and strong rapid pulverized coal firing burning without oxygen is formed during the standing time at the organized combustion temperature in the furnace by taking NOx burner and air classifier as a core. Moreover, ammonia intermediates generated from the burning process can be used for inhibiting or reducing the generated NOx.

② SCR

For the SCR technology, ammonia, the reducing agent, is sprayed into the flue at 300~400°C in the downstream of the boiler economizer; under an action of the catalyst, NOx in the flue gas is reduced to be harmful N₂ and H₂O. The SCR process needs an additional reactor on the flue. Subject to such factors as boiler flue gas parameter, flying ash characteristic and spatial layout, the SCR process is mainly divided into high-ash, low-ash and tail. The high-ash SC is mainly provided for proper flue gas temperature (300~400°C) and high economy although working environment is relatively severe and the activity of the catalyst is inerting quickly. The option of low-ash SCR and tail SCR mainly aims at flue gas conditions to purify catalyst operation or is subject to spatial layout limit. Since the flue gas needs to be heated to more than 300°C, so it is only applicable to the specific environment.

③ SNCR

For the SNCR technology, the ammonia reducing agent (such as ammonia gas, ammonia and urea) solution is atomized into liquid drops by the mechanical spray gun and then sprayed into the hearth to generate gaseous NH₃ through pyrolysis; SNCR is applied for NH₃ and NOx to reduce NOx into N₂ and H₂O in the presence of the catalyst in the region at 950~1,050°C (generally the boiler heat convection area). The gaseous NH₃ sprayed into the hearth participates in such competing reactions as reduction and oxidation: NH₃ is oxidized to be NOx at more than 1,050°C, and oxidation is dominant; reduction of NH₃ and NOx is dominant at less than 1,050°C, but the reaction speed is reduced. This is a mature denitration technology, the denitration efficiency of which is limited relative to SCR. However, it is especially applicable to use of small-capacity boiler for low investment and low operating cost; the small-capacity boiler could be high in efficiency because the comprehensive cost performance is good. Through combination of the SNCR technology with the LNA/OFA technology, the NOx treatment rate could reach up to 80%.

According to *Emission Standard of Air Pollutants for Thermal Power Plants*, the low NOx combustion technology is applied for the boiler of the proposed project. In the meanwhile, with the SNCR denitration technology, the denitration efficiency of SNCR could reach 70%. For this, the low NOx combustion technology + SNCR denitration technology of the Project is feasible in technical economy.

Besides, some operating cases in connection with the coal-fired power plant show that the denitration effect is more than 77.5% basically by combining low NOx combustion with SNCR. According to calculation, the concentration of NOx could be reduced to below 100mg/m₃ upon low NOx combustion and SNCR or SCR escape. This assessment collects related operating cases for some thermal power plants applying SNCR process for denitration:

★ 3x130t/h Circulating Fluidized Bed SNCR Denitration Project of Suzhou Dongwu Cogeneration Co., Ltd.: with initial concentration of NO_x of 200~250mg/Nm³, the denitrated NO_x emission concentration is within 90mg/Nm³.

★ 5x55t/h Circulating Fluidized Bed SNCR Denitration Project of Jiangyin Shenghui Cogeneration Co., Ltd.: with initial concentration of NO_x of 200~270mg/Nm³, the denitrated NO_x emission concentration is within 100mg/Nm³.

★ 2x75t/h Circulating Fluidized Bed SNCR Denitration Project of Huzhou Golden Concord Environmental Protection Cogen-Power Co., Ltd.: with initial concentration of NO_x of 180~230mg/Nm³, the denitrated NO_x emission concentration is within 100mg/Nm³.

Through analogy and investigation, the NO_x emission concentration of the boiler of the CHP Project could stably reach up to 250~300mg/Nm³, the denitration efficiency of low NO_x combustion of the 410t/h boiler is designed to be greater than or equal to 25%, the denitration efficiency of SNCR is designed to be greater than or equal to 70%. It can be thus seen that it meets the standard limit value requirements of 100mg/m³ required in *Emission Standard of Air Pollutants for Thermal Power Plants* (GB13223-2011).

(2) Analysis for standard emission

With low NO_x combustion technology + SNCR denitration technology in the Project, the flue gas denitration efficiency is calculated by 70%. With NO₂ concentration of 300mg/m³, the NO₂ emission concentration is declined to 90mg/m³ upon the aforesaid denitration measures. As can be seen, it could meet the requirements of NO₂ emission concentration limit value (100mg/m³) specified in *Emission Standard of Air Pollutants for Thermal Power Plants* (GB13223-2011).

8.1.4.3 Dust pollution control measures and analysis for standard emission

(1) Measure feasibility analysis

The high temperature flue gas generated by boiler combustion is first separated by high-efficiency cyclone separator, and big flying ash particles in the flue gas are separated to return to the hearth, while the flue gas with small flying ash particles flows via the heating surface at the tail of the boiler, collected by electric bag deduster (three electric fields + bag filter), and then discharged to the atmosphere by the induced draft fan. Fine ash below the deduster is delivered to the ash bin for storage by virtue of the pneumatic conveying system. Through comparison for performance features of the dedusters (for details, see Table 8.1-2), flue gas exhausted by the boiler features high temperature and dust content, and fine granularity. On this basis, the proposed dedusting process idea is reasonable by applying the three electric fields + bag filter technology.

Table 8.1-2 List of Advantages and Disadvantages of Deduster

Description	Advantage	Disadvantage
Wet process dust collector (venturi scrubber)	Small investment, high flue gas treatment volume and ordinary dust control effect	Large floor area, high operating expense, large power consumption, equipment corrosion, failure to treat sludge, and possibility to generate secondary pollution.
Electric precipitator (electrostatic precipitator)	Large flue gas treatment volume applicable to treatment of high temperature flue gas	High floor area, difficulty to control ferroalloy flue gas, and high investment and operating expense
Dry process dust collector (bag-type dust collector)	Good dust treatment effect for particles less than 5μm, ordinary investment, power consumption of 1/5~1/3 wet process dust collector, high flue gas treatment volume, and comprehensive use of treated fly ash.	Flue gas temperature required to be low, and strict requirement on filter material

Through analysis for analogy of advantages and disadvantages of dust collectors, the dust removing measure treatment efficiency applied by the proposed works could reach 99.9% or higher. The dust remover is stable and reliable in performance, good in load change adaptability and convenient to operate and manage. Especially, it applicable to gathering of

fine and dried dust, and the collected dried dust is convenient to process and recycle. With mature selected dedusting technology, strong adaptability and moderate investment, automatic dedusting can be realized for equipment operation and management. There are many mature operating management experiences in China. Under such abnormal operating conditions as bag removal or breaking, the dedusting efficiency of the bag dust collector is reduced. In an attempt to lower adverse influences on the surrounding environment under the abnormal or accident conditions, the reasonable bag-type dust collector shall be selected, and the spare bag shall be prepared for any accident.

(2) Analysis for standard emission

Upon application of the aforesaid measures, the flue gas dedusting efficiency of flue gas could reach 99.76%. With flue gas concentration of 14,364mg/m³, the flue gas emission concentration is declined to 28mg/m³ upon treatment by the electric bag deduster. It can be seen that the flue gas emission concentration meets the requirements of flue gas emission concentration limit value (30mg/m³) specified in *Emission Standard of Air Pollutants for Thermal Power Plants* (GB13223-2011) upon application of the electric bag dedusting measures in the proposed project.

8.1.5 Suggestion for atmospheric pollution control measures

According to *Emission Standard of Air Pollutants for Thermal Power Plants* (GB13223-2011), the automatic continuous flue gas monitoring system of the proposed works shall be networked with the competent environmental protection department, so as to control the total pollutant discharge. The detection items shall at least include flue gas, SO₂, NO₂, O₂, temperature, flow, etc.

Besides, the desulfurization system is provided with 100% capacity bypass flue gas. The baffle system is provided on the flue gas to make sure "zero" leakage. The baffle system shall meet the requirements on "guaranteeing the inlet and outlet of desulfurization device and the bypass baffle door to have good operating and sealing performances" specified in *General Technical Specification of Flue Gas Limestone/Lime-Gypsum Wet Desulfurization of Thermal Power Plant* (HJ/T179-2005). The outlet of the absorption tower should be equipped with the ammonia detector. The sampling and analysis detection frequency shall be increased if the ammonia emission concentration of flue gas is monitored difficultly online; analysis and detection means shall be provided for incoming absorbent and desulphurization by-product; the sealed tank shall be applied to the ammonia tank in the denitration system to reduce ammonia volatilization.

To strengthen quantitative management on environmental protection during power plant operation and improve the employee's operating technology and management level, the production operation procedures shall be implemented strictly. Employees on post shall attend post training frequency. On this basis, production systems operate normally by virtue of improving employee's operating technology and management level, strictly implementing production and operation regulations and putting an end to abnormal discharge (inclusive of accident discharge), so as to develop advancement of the production process in environmental protection.

8.2 Prevention and Control Measures for Water Pollution

8.2.1 Fundamental principles for water pollution control

Under the premise of strictly following *Integrated Wastewater Discharge Standard* (GB8978-1996), economically reasonable treatment measure shall be applied for various kinds of wastewater drained by the power plant depending on water quality features of wastewater. The treatment measures include combination of distributed and centralized treatment, diverting wastewater from clean water and integrated water management. This could realize multiple use and recycling, water conversation, minimization of discharge, and reduction of environmental pollution caused by drainage.

8.2.2 Pollution control measures about wastewater discharge

8.2.2.1 Water pollution control measures applied

The wastewater generated by the power plant includes water drained from the chemical water treatment system, domestic sewage, flushing water from the coal handling system, oily sewage, wastewater from the desulfurization system, sewage from the cooling tower and other wastewater. The corresponding treatment facilities shall be taken based on the generation place and water quality and quantity. Various pollutant indexes upon treatment shall meet the requirements of standard A of *Integrated Wastewater Discharge Standard* (GB8978-1996). Main control measures to be taken are as follows:

(1) Water drained from the chemical water treatment system

Backwashing drained water and regenerated wastewater are generated by the boiler feedwater treatment system at the speed of about 50t/h, and then drained to Wastewater Treatment Station of Changtai Paper Industry (Wuhan) Co., Ltd. after its pH value is adjusted in the neutralization tank.

(2) Domestic sewage

The treated domestic sewage is drained to the Wastewater Treatment Station of Changtai Paper Industry (Wuhan) Co., Ltd.

(3) Washing water from the coal handling system

Washing water drained from the coal handling system flows into the coal-water settling pond; water drained from the coal yard flows into the coal-water settling pond through drainage ditches around the coal yard; and finally the treated drained water is recycled. Its treatment process flow is as follows: wastewater washing → settling pond → filter plant → clean water tank → recycling

Coal water treatment station shall be built for disposing flushing water and initial rainwater at the coal yard. PAC (poly aluminum chloride) and PAM (polyacrylamide) with the flocculant as the main original auxiliary materials shall be used to coagulate and precipitate the wastewater containing coal. PAC and PAM consumed annually are 1t respectively. Drugs are stored within the Coal water treatment station in the plant.

PAC is a kind of inorganic polymer coagulant. Through mechanism, like double layer compression, adsorption neutralization, adsorption bridging, net capture of sediment, fine suspended particles and colloid ion in the water are destabilized, gathered, flocculated, coagulated and precipitated to achieve purification treatment effect.

Molecule of PAM, able to absorb the suspended particles scattered in the solution through bridging, has pretty strong flocculation. Density = 1.3

Main equipment needed for treating the coal water are as follows: two coal water lift pumps (flow: 50m³/h, lift: 15m); two driving mud scrapers (gauge: 15m); one set of dosing device (120L/h); one electric single beam crane (hoisting weight: 5t)

(4) Oily wastewater

The oily wastewater mainly includes: flushing water from the steam engine room and wastewater for flushing boiler room and grounds of other oily places, which are drained to the Wastewater Treatment Station of Changtai Paper Industry (Wuhan) Co., Ltd. after being collected by pipes and treated by mechanical gravity type or multi-stage combined efficient oil-water separator.

(5) Wastewater from the desulfurization system

The desulfurization wastewater enters the desulfurization wastewater treatment device for neutralization (alkalization) and flocculation treatment, and then delivered to the settling/concentration tank, and the effluent is recycled after its pH value is adjusted in the clear water tank. It is used for spraying the ash yard after being treated by the desulfurization wastewater treatment system. The treatment process is as follows: wastewater desulfurization → buffer tank → wastewater pump → neutralization tank → reaction tank →

flocculation tank → settling/concentration tank → clear water tank → clear water pump → filter → reuse point; desulfurization residue treatment way: mud → filter press → mud bucket → transportation by truck.

(6) Wastewater from the cooling tower

Wastewater from the cooling tower of the power plant flows into the reusing water tank for recycling.

Based on the principles of water conservation, when designing the Project, various kinds of treated wastewater generated by the power plant enter the reusing water tank for afforesting in the plant, road washing, dry ash humidifying, and makeup water for flushing from coal handling system and dust removal system.

8.2.3.2 Wastewater treatment relying on feasibility analysis

The wastewater output of the CHP Project is 285.4m³/h. After it is being reused by most of the wastewater treatment plants, the emission is only 55.36m³/h, with the main pollution factors of SS, COD, petroleum, etc. See the water balance Table 4.2-4 for the reuse of wastewater. The wastewater volume of proposed project discharged to Wastewater Treatment Station of Changtai Paper Industry (Wuhan) Co., Ltd. is 1,328.64t/d, which accounts for 4.83% of the Phase I in the wastewater treatment station. It can be seen from this that the wastewater volume and quality of the Project meet the incoming water requirements of wastewater treatment station.

The process for the Wastewater Treatment Station of Changtai Paper Industry (Wuhan) Co., Ltd. is "grille + primary sedimentation tank + anaerobic reactor + aeration tank + secondary sedimentation tank + Fenton reaction tank + third sedimentation tank + filter tank". It is planned and designed that the wastewater treatment scale for the Phases I and II is 27,500m³/d by the wastewater treatment station. The scale for both phases is 55,000m³/d in total.

8.2.3 Basic consideration, measure and effect about water saving by the power plant

(1) Adopt the dry ash handling system, make comprehensive use of ash and slag and reduce the amount of water consumption.

(2) Provide metering devices on inlet pipe and outlet main pipe of each main process system, supervise and manage each main process system to prevent various phenomena from happening, like water running, spraying, dripping, leaking and overflowing.

(3) Reuse the acid-alkali wastewater after it is treated up to standard.

(4) Strengthen the water consumption management and educate the employees on water saving to control the goal;

(5) Provide the main buildings with metering devices for domestic water, and establish a system of limiting excess water consumption.

(6) Recovery of condensed water: The recent thermal load of the Project is industrial load. Part of processes of each chemical enterprise within the scope of heat supply is direct heating, so the recovery rate of the condensed water is low. Even if the recovery treatment is difficult, the recovery of the condensed water of this part shall not be taken into account; the process of some enterprises is steam surface heat transfer. Since the condensed water is featured with recovery conditions, part of recovery shall be taken into account. The recovery rate of condensed water is 60%.

(7) Make overall planning and management on water source, water consumption and water drainage of the whole plant by the power plant, select the optimal water consumption distribution scheme for the whole plant, treat all wastewater economically and reasonably, and provide the reuse rate of wastewater maximally.

8.3 Measures for Prevention of Noise Pollution

8.3.1 Basic principles for controlling noise

Noise control shall be treated comprehensively from sound source and route of transmission, firstly, controlling the noise from the sound source. For the sound source that can't be removed, measures such as sound insulation, noise elimination, sound absorption and vibration isolation shall be taken. According to the features of power plant noise source, prevention scheme, namely "taking prevention as the primary, combining it with control", shall be applied for the Project, and measures from three aspects, namely noise source, route of transmission and receptor shall be taken, hence, the noise emissions may comply with the local environmental noise standards.

8.3.2 Pollution control measures applied

- (1) Strictly control the major noise source, select the equipment with the lowest noise among the same type of equipment, and put forward to the manufacturer the equipment noise limit that shall be an important factor for assessing the equipment when signing the technical agreement of equipment supply.
- (2) The manufacturer shall be required to provide the heat shield lined with the acoustic panel absorber to the steam turbine generator unit to lower noise, meeting the state-specified standards.
- (3) Install high-efficiency silencers at the steam exhaust ports of boilers. Additionally, strengthen the management when the power plant is at the operation, reduce the times of steam exhaust of boilers as possible, and avoid steam exhaust at nights as possible so as to reduce the influence of steam exhaust noise on surrounding environment.
- (4) Silencer shall be provided at the exhaust inlet of the blower to lower aerodynamic noise.
- (5) Install silencers for all safety valves and power control valves (PCV).
- (6) Pay attention to vibration control and striking resistance to reduce the vibration noise when designing pipes. Pay attention to improve the flow field for duct and fluid transporting to reduce the aerodynamic noise.
- (7) Set up duty rooms for workshops with strong noise source in the design of the power house so as to insulate the workplace from the strong noise environment and protect the health of working personnel. Provide the centralized control room with a foyer and soundproof double-pane windows and doors, use sound absorption and sound insulation materials for inner walls and use sound-absorbing ceiling for the roof.
- (8) On the premise of proper process, optimize the general layout, centralize the arrangement of high-noise equipment and workshop, keep away from noise sensitive area as possible and make full use of floor space to attenuate and cut off noise.
- (9) Influences on the outside by the noise shall be lowered generally by taking into account the green belt in the greening design of the plant area and making the best of noise reduction of the plants.
- (10) Follow the principle of primary sound insulation and supplementary sound absorption to control the noise for the centralized control room of main power house.
- (11) Strengthen the greening within the plant to increase the shielding from the noise and minimize the influence on the surrounding.
- (12) Give out labor protection appliances (ear plugs, earmuffs) for workers working nearby the high noise source, and implement the working time system to guarantee the health of employees.

8.4 Measures for Prevention of Solid Waste Pollution

8.4.1 Principle of solid waste treatment

The solid wastes of the proposed project include ash and slag, gypsum and household

garbage. The disposal of ash and slag and desulphurization by-product gypsum creates conditions for the comprehensive use in the engineering design, the development of comprehensive utilization projects shall be conducted actively, and they shall be sent to ash yard for separate storage when the comprehensive utilization can't be done. During the process of transporting and storing, prevention of secondary blowing dust pollution of fine ash shall be paid attention to.

8.4.2 Analysis on treatment measures for solid wastes

(1) Analysis on comprehensive utilization of ash and slag

The annual fuel consumption of 4×410t/h circulating fluidized bedboilers designed for the Project at this Phase is around 1.8 million t (annual operating hours: 8,160h, 4 boilers at operation), and annually generated ash and slag amount of 4 boilers is about 838,700t.

Fly ash is the solid waste generated by the coal-fired power plant. Because of its volcanic ash effect, it makes the concrete have water-reducing property, workability, increased impermeability, reduced creep deformation and high strength in late period upon mixing with the fly ash, as well as many other advantages, so that it is preferred by building materials, construction engineering, construction and other industries. The utilization may bring about pretty desirable economic effect. Fly ash is widely used in construction, cement production, road construction, backfilling, production of composite materials and filling materials and others, and the application prospects are very broad.

In recent years, with continuous release of comprehensive utilization research results of dry ash, as a new type of building materials, it has been widely used, especially the comprehensive utilization prospects of fine ash market are very optimistic. Grade-I ash as high quality admixture of the building concrete may be used to be the mixture for the dam cement and highway cement; while Grade-II ash may be directly used as the cement admixture, which is also popular in the market.

(2) Analysis on comprehensive utilization of desulphurization by-product

The proposed project takes the limestone-gypsum method for desulphurization. By-product through flue gas desulfurization of limestone-gypsum wet method is the gypsum with the surface water content less than 10% (namely $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$). The annual output of the designed coal type gypsum and the checked coal type gypsum is 102,160t and 129,920t respectively. The desulphurization gypsum of the Project is for comprehensive utilization. These that are not utilized on time shall be transported to the ash yard for separate stacking by a sealed autodumper.

The desulphurization gypsum is in good quality without detrimental impurity and with free water content of about 10%. It can be widely used and mainly applied to: cement industry, gypsum board of building wall paper and decorative paper, functional materials of special gypsum, fire-proof plate of special gypsum, plastering anhydrite and unburned gypsum ceramics, paper spraying materials, production of self-leveling ground materials and mortar for mines, production various filling materials in place of kaolin and calcite, as well as base materials of road construction.

(3) Analysis on disposing household garbage

The fixed number for the proposed works is 166 persons. The assessment is calculated in accordance with 1kg/d·person, so the household garbage output is about 56.44t/a, which shall be collected and disposed by the environmental sanitation department in the park.

(4) Comprehensive utilization feasibility of the Project's solid wastes

According to the actual operation currently in thermal power plants in Hubei Province, the comprehensive utilization of ash and slag is good, and the market application prospect is broad. According to the site survey, Gong'an Huifeng Energy Development Co., Ltd., Gong'an Ruifeng New Wall Materials Co., Ltd., Gong'an Jinsha Commerce Limited Liability Company and other enterprises currently in Gong'an County have a great demand for ash,

gypsum and pebble coal. With the rapid development of local economy in Gong'an County, Jingzhou, the demand will increase considerably. The design adopts the separate handling ash and slag and dry emission system of dry ash, which will provide conditions for comprehensive utilization of the ash and slag of the Project.

At present, Changtai Paper Industry (Wuhan) Co., Ltd. has negotiated with relevant enterprises about the comprehensive utilization of ash, and signed the *General Disposal Agreement on Industrial Solid Waste* with the above three enterprises, so the annual ash, slag and gypsum discharges of the units in the power plant can be comprehensively utilized.

8.4.3 Pollution control measures for secondary blowing dust

(1) Pollution control measures for blowing dust of ash bucket in the slag silo

In terms of the ash and slag handling system, the proposed project handles the ash and slag through separate handling and storing.

Fly ash handling system in the plant takes the handling measure of pressurized dense phase pneumatic conveying + storage and transportation of ash silo. See Figure 8.4-1 for detailed technological process of dense phase positive pressure pneumatic ash conveying system.

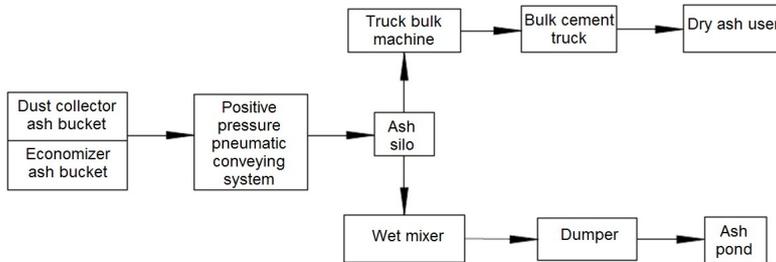


Figure 8.4-1 Technological Process of Dense Phase Positive Pressure Pneumatic Ash Conveying System

At present, the pneumatic conveying technology develops quickly, and it is widely applied to thermal power plants of China; in addition to various vessel type pneumatic conveying system self-developed in China, negative pressure pneumatic ash conveying systems, low positive pressure pneumatic ash conveying system, dense phase positive pressure pneumatic ash conveying system, double-tube positive pressure pneumatic ash conveying system, and so on are introduced abroad. The dense phase positive pressure pneumatic ash conveying system is one of internationally advanced pneumatic conveying technologies at present. It adopts the pneumatic conveying principle of gas-solid two-phase flows to convey materials by dynamic pressure of compressed air, and it is safe, reliable, efficient and energy-saving pneumatic conveying system, featured by low conveying air pressure, low conveying speed, long conveying distance, high ash and gas proportion, small diameter in conveying pipeline, no wear-resistant material for conveying pipe (wear-resistant material only for elbow), small maintenance work, etc.

The dense phase positive pressure pneumatic ash conveying system is proposed in the Project. Under the ash buckets of each electric bag deduster and economizer, one pneumatic ash conveyor shall be installed respectively. Continuous operating mode shall be used to convey the fly ash to the ash silo for storing. The bag type deduster is provided on top of the ash silo, for discharging the ash conveying air to the atmosphere upon cleaning and filtering. The system is provided with three ash silos, and each ash is $\Phi 9\text{m}$ in diameter and 900m^3 in volume. Three ash silos can store the ash discharge volume of the burning designed coal species of four boilers for about 35h.

Two sets of ash unloading devices are provided under each ash silo: one set of humidifying

mixer and one set of truck bulk machine. Dry ash shall be put in the tank truck for ash through truck bulk machine, and then transported to users for comprehensive utilization; dry ash shall be discharged into the ash truck after humidified and mixed through the humidifying mixer, and then transported to the ash yard for storing.

For slag handling system, there are two drum-type slag coolers respectively at the both sides of boiler hearth, with the slag handling temperature of slag cooler of less than 200°C. The bottom ash cooler outlet is connected with one-stage bucket chain conveyor, and then slag is delivered to the transfer slag bin via the two-stage bucket elevator. Two sets of slag unloading devices are provided under the slag warehouse: one set of humidifying mixer and one set of truck bulk machine. Dry slag shall be put in the tank truck for ash through truck bulk machine, and then transported to users for comprehensive utilization; dry slag shall be discharged into the ash truck after humidified and mixed through the humidifying mixer, and then transported to the ash yard for storing. The slag silo comes with a bag-type deduster, through which dust generated by the slag warehouse is handled and collected, then disposed as the fly ash.

(2) Pollution control measures for blowing dust at the coal storage yard

Steel structural dry coal shed and semi-closed coal yard are used as the coal yards for the proposed project. Fuel coal is mainly stacked in the fully-closed dry coal shed while the semi-closed coal yard is used as the standby. Spray dust suppression devices are provided around the coal yard; dedusters are provided at the transfer stations, coal crusher houses, transfer points at the coal bunker floor and each blanking point at top of the original coal bucket. Dry coal shed and coal unloading yard are provided with water spray and dust suppression system. Vacuum cleaning system is provided in the boiler room to clean the coal ash, and manages the regular cleaning of the coal bunker bay.

8.5 Prevention Measures for Groundwater Pollution

The pollution control measures for the groundwater shall follow the principle of "source control, zoning treatment, pollution monitoring and emergency response", and the pollution shall be controlled from the aspects of pollution's generation, infiltration, diffusion and emergency response. In accordance with the standards and norms referred to by the impermeability, in combination with the operability and technology during the current construction process, and in terms of the typical impermeability measures for different impermeability areas, necessary adjustment shall be made in the concrete design on the basis of the actual situations and on the premise of satisfying the impermeability standards.

8.5.1 Major pollution control area

(1) Impermeability of desulfurized wastewater area: the ground shall be hardened with the cement, and collecting ditches for wastewater and initial rainwater shall be built around for reusing the water.

Impermeability of sludge, slag slurry repository, ammonia tank field, oil depot and others: Hardening of cement, strict impermeability, anti-corrosion and explosion-proof measures shall be applied to the ground at the tank field, and strong impermeable cofferdams and catch drains shall be built around the tank field.

The above areas are "major pollution control areas", for example, tank foundation impermeability of ring walls at the tank field shall be in the impermeability form of "asphalt sand insulation layer + sand cushion + HDPE impermeable membrane with the thickness of 2mm + filament non-woven fabric + clay or original soil with the thickness of 1.0m for compaction" from top to bottom.

(2) Impermeability of accident tank and wastewater treatment station: Impermeable reinforced concrete shall be applied to the concrete tank body, whose surface shall be brushed with cementitious infiltration crystalline impermeable coatings (permeability coefficient shall be no more than 1.0×10^{-10} cm/s).

(3) Impermeability of laying sewage pipes: Sewage pipes shall be laid in the open channel as possible. In case of using underground pipes, the solidification and sealing of underground pipes and facilities shall be strengthened. Anti-corrosion and explosion-proof materials shall be used to prevent the subsidence, which would cause permeability. Impermeability of buried pipes (plant area): The structure of "backfilling with medium-coarse sand + filament non-woven fabric + HDPE impermeable membrane with the thickness of 2mm + filament non-woven fabric + medium sand cushion + compaction with original soil" shall be applied for impermeability.

(4) Impermeability of coal shed: Fully-closed. The ground is cast integrally with C30 impermeable concrete. The bottom clay is impermeable with the permeability coefficient of no more than 1.0×10^{-10} cm/s. The requirements of *Standards for Pollution Control on the Storage and Disposal Site for General Industrial Solid Wastes* (GB18599-2001) shall be met.

(5) Impermeability of ash (slag) silo: Measures for the bottom of the slag silo shall be taken, like laying impermeable geomembrane, with the permeability coefficient of no more than 1.0×10^{-10} cm/s.

8.5.2 General pollution control area

For other building areas except major pollution control areas, cementitious infiltration crystalline waterproof agent shall be added in the impermeable steel fiber concrete surface, under which sand-gravel base course shall be laid, and the original soil shall be compacted for the purpose of impermeability. For the expansion joint between the concrete and the gap with the solid foundation, flexible material shall be used for backfilling for the purpose of impermeability (permeability coefficient shall be no more than 1.0×10^{-7} cm/s).

See the attached figure for impermeable zoning.

8.6 Pollution Control Measures during Construction

8.6.1 Air pollution prevention during construction

Main ambient air influences during the construction are from blowing dust caused by the construction. For this, following strengthening measures shall be taken to minimize the effect:

(1) For the operation periods when the blowing dust is easily caused, regular watering shall be conducted for the transportation roads and operation sites to reduce the blowing dust;

(2) Cover boards shall be used for the construction transport vehicles so as to control the falling of sandy soil and building stones and reduce the blowing dust during the transportation.

(3) A shallow tank shall be built at the exit of the construction site, and high pressure flushing device shall be provided to clean the dirt on the tires of the transport vehicles so as to reduce the dirt that would be taken out from the construction site by the vehicles.

(4) Environment-friendly decoration materials shall be used to reduce the emission of harmful gas during the construction of operation.

8.6.2 Water pollution control measures during construction

Requirements of wastewater pollution control measures during construction are as follows:

(1) After the mobilization for construction, accident emergency tanks for wastewater treatment, which are temporarily used as collecting tanks for rainwater and subsurface filtration at the construction site during construction, shall be built first. After the sediment of rainwater and subsurface filtration in the collecting tanks, they can be reused for maintenance of construction concrete, road surface cleaning, dust spraying and vehicle washing. Temporary stacking yards for silt shall be established at the accident emergency tanks. The precipitated silt in the collecting tank shall be excavated to the stacking yards on a regular basis. The silt dried shall be used as backfilling in the plant area or greening and

planting soil;

(2) Oil separation tank shall be built at the construction site. The wastewater after flushing the construction vehicles and machinery is discharged to the accident emergency tank for treatment and reuse after being treated through the oil separation tank; the waste engine oil collected by the oil separation tank shall be treated by a qualified company.

(3) The overflow water of construction accident emergency tanks may be discharged to the Qingluo Canal through temporary drainage pipes for construction;

(4) Only when the domestic sewage generated during construction is up to the standard via integrated wastewater treatment can it be discharged to Qingluo Canal.

8.6.3 Noise pollution control measures during construction

Requirements of noise pollution control measures during construction are as follows:

(1) The construction has a great influence on residential areas close to the boundary, especially more obvious at nights. For the construction noise, effective control measures shall be taken, and prevention primary and housekeeping shall be followed;

(2) Construction machinery with low noise emission shall be selected; the inlets and outlets of fixed equipment, excavator, transport truck and other machineries shall be provided with silencers; the equipment with great vibration shall be provided with vibration dampers, or damping materials may be used; care and maintenance shall be strengthened for the equipment.

(3) The construction time at nights shall be strictly controlled. Except the specially necessary construction process, construction at night shall not be arranged, and the time for construction shall be during 8:00~12:00 and 14:00~22:00; for the continuous operation and construction from 22:00pm - 6:00am, it shall be reported to the local environment protection authority for approval, and surrounding villagers shall be notified with the reason, time and duration of construction at nights in written.

8.6.4 Solid waste control measures during construction

Requirements of solid waste control measures during construction are as follows:

(1) Before construction, the disposition approval shall be handled at the department concerned as stipulated. The construction waste shall be disposed at the places stipulated on the disposition approval. The waste shall not be stacked at the farmland, forest land, riverway and other places casually. Protection around the stipulated disposal site shall be made. Casual stacking and throwing are not allowed. At the same time, drainage protection shall be well made to avoid the water and soil loss.

(2) The household garbage from personnel at the construction site shall be collected on the current day, and transported to the urban garbage disposal plant for treatment by the municipal environmental sanitation department to avoid affecting the environment surrounding the construction site;

(3) Construction waste caused during construction may be used as the backfilling of road subgrade and foundation of structures within the plant. If there is more left, it shall be handled by the urban construction department of Gong'an County for laying the municipal roads.

8.6.5 Soil and water conservation measures during construction

In order to prevent the water and soil loss caused by the project construction, decrease the damage on the environment, water and soil measures applied to the project are as follows: During the plant area formation period, topsoil stripping protection shall be carried out, and during construction, temporary protection for the excavated earth from the base of buildings shall be conducted and it shall be covered with raincloth; for the excavated earth due to the construction of water diversion pipes, it shall be covered with raincloth for temporary protection, and after the construction, vegetation shall be restored or reclamation shall be carried out at the construction places; land occupation scope for the project shall be reduced

as possible during construction, excavation, backfilling and grinding shall be conducted at the same time, and prevention measures shall be taken for slopes during construction; construction period shall be shortened as possible to reduce the exposure time of loose ground, and construction time shall be arranged properly to avoid rain and flood seasons as possible; site leveling shall be carried out for construction production and living areas, and temporary drainage measures shall be taken during construction; construction materials stacking at the area shall be blocked temporarily for protection; roads outside the plant shall be blocked temporarily during construction; temporary spoil excavated due to the installation of discharge pipe lines shall be protected; after completing the project construction, the ground in the plant area shall be leveled, and drainage and greening measures shall be taken; the land occupied temporarily for construction shall be consolidated, and vegetation shall be restored or reclamation shall be carried out.

8.7 Ecological and Greening Measures

Current lands of the proposed project are scattered resident areas and farmland. The original natural landscape and ecological environment would no longer exist after the project is completed. In order to minimize the effect of project construction on the original landscape and ecological environment, greening was given a full play in general layout and design in the plant area. The greening in the plant area aims to beautify the environment, prevent the corrosion, follow the principle of adjusting measures to differing conditions and planting proper trees and grasses at the proper places, do well in combination of dot, line and surface as well as arbor, bush, flower and tree. According to the different functional zoning in the power plant area, greening is focused on for the sake of difference.

(1) Office area & living quarter

Office area & living quarter are the focuses of the greening in the plant. The beautification shall be concentrated on, and lawns shall be laid around the buildings, grass types that are aesthetic, cut-resistant and trampling resistant shall be selected. The grass is interspersed with ornamental trees, bushes and flowers.

(2) Main power house area

Herbaceous plants and low bushes with shallow roots shall be used for greening in the main power house area so as to minimize the effect of arbors on the underground pipelines. Lawns shall be planted mainly at the vacant lands of the main power house area. For the relatively broad buildings, they can be interspersed with trees around.

(3) Coal storage yard and ash and slag treatment area

Low bushes are mainly selected for the both areas, and other plants suitable are also selected.

(4) Road area within the plant

Trees that have straight trunks and are aesthetic shall be selected for both sides of main access roads and ring roads within the plant. Traveling sight distance shall be taken into account at the turning of the roads. Within 20m of the crossing, arbors shall not be planted and the height shall be no more than 1m.

8.8 Pollution Control Measures for Transportation

There are 3 national highways around the project, namely north-south 207 National Highway, and east-west 351 and 318 National Highways. 1 provincial highway, namely Gong'an-Shishou highway. The raw materials transportation for the Project mainly relies on the road transportation. The primary transportation route is the truck transportation, crossing the Jingzhou Yangtze River Bridge and passing through 207 National Highway.

A large amount of materials for the project production are transported in the form of road transportation. The main environmental effects of transporting raw and auxiliary materials are dust, noise and transportation risk. The sensitive points influenced by those are the residents

along the route. In order to minimize the environmental effect caused by the transportation of raw and auxiliary materials, it is proposed to take following measures for the Project:

- (1) According to the actual production, truck transportation shall be soundly dispatched and transport at nights shall be reduced.
- (2) All emissions of transport vehicles shall be up to the emission standard as stipulated;
- (3) Transport vehicles must transport in accordance with the rated weight, and overload transport shall be prohibited;
- (4) When the vehicles transport raw coal, the top shall be covered with canvas or plastic sheet to prevent falling of materials or blowing with the wind.
- (5) Vehicles shall slow down when passing through the centralized resident areas, and sounding horns shall not be allowed in order to minimize the influence of transportation noise on surrounding residents.
- (6) Roads within the park shall be watered on time for dust suppression, and transport vehicles entering and leaving the plant shall be flushed on time to minimize the effect of the dust.
- (7) Limestone powder, ash and slag shall be transported with tank trucks to avoid scattering and blowing dust along the transport route.

8.9 Environment Management Measures and Supervision Scheme

(1) Environment Management Measures

- ① Environmental protection leading group, made up of the main responsible persons of the company and the Construction Contractor, shall be responsible for the environmental protection during the project construction.
- ② During construction, the company shall put forward to the construction side the environment terms in the design of the project environmental protection, environmental protection measures of each project and construction contract agreement, and the environmental protection leading group shall supervise and urge the construction side to carry them out.
- ③ Environmental protection leading group shall check and supervise the construction site at any time, and call a special meeting regularly (once a month) so as to detect (or prevent) environmental problems (including potential problems) on time, prevent on time and handle properly, therefore, that the project construction is in line with environmental protection act and relevant environmental quality standards and meets the requirements of environmental protection special acceptance of the project can be ensured.
- ④ The company shall entrust to a qualified company the design and construction of all environmental protection facilities, such as the wastewater, waste gas treatment, noise prevention, and strictly implement the "three simultaneities" system of environmental management.

(2) Supervision scheme

Environmental supervision, a derivative branch of project (construction) supervision, emphasizes the environmental protection during the project construction. Therefore, it is one aspect of the environmental protection and an important constituent part of project supervision, at the same time, it is featured with relatively socialized and specialized independence.

The implementation of environmental supervision aims to clear the environmental supervision and management responsibility at the construction site and specify goals through the whole project construction implementation process, so as to guarantee that the all

environmental protection measures in the design of the environmental protection can be carried out successfully and contract terms related to the environmental protection in the construction contract can be implemented practically.

The supervision tasks at the project construction stage are: Management on relevant supervision, environment, quality as well as collection, classification, processing, feedback and storage of information; coordination between the Owner and contractors, the Owner and designers & all departments of project construction; control on quality, schedule and investment.

Project environmental supervision scheme is as follows:

- ① Regarding to the project environmental supervision organization, the qualified company and the Engineer may be entrusted to organize and implement.
- ② The environmental protection during the Project construction period includes: noise control, pollution prevention of environment and air dust, production and domestic wastewater treatment, spoil disposal, recovery and greening of construction places and other relevant environmental protection, while the main contents of environmental supervision are environment control (environmental quality, relevant schedule and investment control) suggestions, organization and coordination of environmental protection at all aspects, as well as management of related environmental protection contract and information.

8.10 Summary of Pollution Control Measures

Proposed pollution control measures for the construction project are shown in the Table 8.10-1.

Table 8.10-1 Summary of Pollution Control Measures for the Proposed Project

Category	Source of Pollution	Governance solution or measure	Governance effect
Waste gas	Boiler flue gas	The circulating fluidized bed boiler + external limestone - gypsum wet flue gas desulfurization system shall be applied to desulfurization with the total desulfurization efficiency greater than or equal to 96.5%; regarding to dust handling, electric bag dedusting system shall be applied with the total dust handling efficiency greater than or equal to 99.93% (electric bag deduster 99.85% + desulfurization system 50%); SNCR denitration technology shall be applied and denitrifying agent is ammonia, with the denitration efficiency greater than or equal to ≥70%; chimney with the height of 180m shall be used for emission.	The concentration of pollutants shall meet the standards for coal-fired boilers of the Table 1 in the <i>Emission Standard of Air Pollutants for Thermal Power Plants</i> (GB13223-2011) Integrated Emission Standard of Air Pollutants (GB16297-1996), unorganized emission concentration limit
	Transfer of broken dust	Mechanical dust removal systems for transfer stations, coal crusher houses and transfer points at the coal bunker floor. One set of system for each point, eight sets in total.	
	Dust in ash silo	Three ash silos (Φ9m, volume: 900m ³) One set of bag-type deduster for each point, three sets in total.	
	Dust in slag silo	Two slag silos (Φ9m, volume: 500m ³) One set of bag-type deduster for each slag silo, two sets in total.	
	Coal storage yard	Steel structure dry coal shed (store fuel coal for about 4 days), watering the plant area on time during the process of loading and unloading to suppress the blowing dust pollution; ground hardening treatment; water spray and dust suppression system for dry coal shed and coal unloading yard.	
Waste water	Wastewater drained from the chemical water treatment system	Reuse part of the wastewater after the treatment in the neutralization station (volume of neutralization tank: 700m ³), and part discharging to the company's wastewater treatment plant in	The wastewater discharging to the wastewater treatment plant shall be up to the three-level emission standard of <i>Integrated Wastewater</i>

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	and for washing the boiler	the park	Discharge Standard (GB13223-2003).
	Water for washing ash handling system of washer of coal handling system	Flow into the coal-water settling pond and be treated, then reuse to the coal handling system for water supplementation	
	Wastewater from the desulfurization system	After treated by the desulfurization wastewater treatment system, it is applied as water spraying roads in the plant area	
	Oily wastewater	Treatment via the oil-water separation device	
	Domestic sewage	Collect and transport to the company's wastewater treatment plant after being treated by the septic-tank	
	In-plant rainwater	Collect in the drainage ditches, then enter into the rainwater system of the development area.	
Noise	Steam turbine and electric generator	Acoustic shield + sound insulation of the power house	The noise contribution at boundary shall meet the Category-3 standards of <i>Emission Standard for Industrial Enterprises Noise at Boundary</i> (GB12348-2008).
	Boiler noise	Silencer	
	Other high-noise equipment	Sound insulation and vibration reduction	
Solid waste	Boiler ash and slag	Transport by truck transportation company for comprehensive utilization under normal working conditions	No external emissions of ash and slag
		Fully-closed 100m ² accident temporary ash slag yard via the ground impermeability treatment, provided for storing ash and slag; humidifying facilities for ash and slag provided	Meet the requirements of category-II yard standard in <i>Pollution Control Standards for General Industrial Solid Waste Storage and Disposal Site</i> (GB18599-2001)
	Desulphurization by-product gypsum	Transport by truck transportation company for comprehensive utilization	No external emissions
	Domestic garbage	Collect and handle by the local environmental sanitation department	
Accident prevention	Ignition oil tank	Catch drains provided around the oil pump room	Prevent external discharging of accident wastewater without being treated
	Ammonia tank	Provide sealed ammonia tank, cofferdam, alarm system, etc.	Prevent ammonia from volatilization
	Accident wastewater collection and risk emergency system relying on the wastewater treatment plant of the company under construction		
Greening	Arrange green belt at the west plant boundary and around the ash slag yard		
Environmental management	Establish an environmental protection management organization and environment protection personnel training system		
	Formulate the environmental risk emergency plan and provide supporting risk emergency facilities		
	Set up a detection system: coal-burning sulfur detection system; ammonia escape concentration monitoring system		
	Set up online monitoring facilities for boiler flue gas, and connect the network with the environmental protection agency to monitor smoke, NOx and SO ₂ in the flue gas; provide ammonia escape concentration monitoring system for boiler flue gas		
	Draw up environment monitoring schemes, rely on in-plant monitoring facilities or Gong'an County environmental monitoring station, and form regular monitoring record for all in-plant pollutants		
	Establish environmental management archives		
	Handle pollutant discharging licenses		
Handle operating licenses for environmental protection facilities and establish operating record system			

9. Environment Risk Assessment

9.1 Environment Risk Assessment Purpose and Assessment Keys

9.1.1 Environment risk assessment purpose

According to the relevant requirements of *Notice on Enhancing Environmental Impact Assessment Management in Prevention of Environmental Risks* (HF[2005] No. 152) and *Technical Guidelines for Environmental Risk Assessment on Projects* (HJ/T169-2004) promulgated by the Ministry of Environmental Protection, environment risk assessment aims to analyze and predict the potential dangers and harmful factors existing in the construction project, leaking of toxic, harmful, flammable and combustible materials, as well as personal safety, environmental influence and damages caused by the sudden events or accidents that might happen during the construction and operation of the project, also put forward reasonable and feasible prevention, economical and mitigation measures so as to reduce the accident rate, damages and environmental influence of the construction project to the acceptable level.

9.1.2 Environment risk assessment focus

The assessment analyzes potential environmental risks of the Project from process system, raw and auxiliary material, product, garbage, etc., meanwhile, identification of risk sources are conducted on main production devices, coal storage and transportation system, utilities system and environmental protection facility system that are divided by functional units. Material risks about the fuels, auxiliary materials, products, three wastes (waste gas, wastewater and industrial residue) of the Project shall be identified. According to the source analysis results, the most reliable accident shall be determined.

In combination with the risk accident type of the Project, the influence of risk accidents on the surrounding environment shall be analyzed, at the same time, corresponding prevention measures for environmental risks shall be put forward so as to provide the project design of enterprises and environmental management with reliable evidence.

9.2 Identification of Environmental Risk

9.2.1 Risk identification during production

The assessment analyzes potential environmental risks of the Project from process system, raw and auxiliary material, product, garbage, etc. The analysis on main environmental risk factors and reasons are as follows:

The Project can be divided into main production devices, coal storage and transportation system, ammonia storage and transportation system, fuel storage and transportation system, utilities system and environmental protection facility system by functional units. See Table 9.2-1 for accident and risk that might exist for each functional unit.

Among all accidents that might happen during the Project, some only have an influence within the plant, which would not affect the environment; while some would have a small effect on the environment without constituting the environmental risk, such as coal yard, coal conveying belt and cable fire accidents. The occurrence of some accidents would have an influence on the environment to some extent, which would constitute the environmental risks for the Project. This kind of environmental risk accidents include: failures of bag-type deduster, desulfurization system, denitration system, wastewater leakage, ammonia transport leakage, ammonia leakage in the ammonia workshop, and light diesel oil leakage.

Table 9.2-1 Risk Identification of Production Facilities

Project Composition	Functional unit	Possible accident	Accident consequence	Environmental influence of accident	Environment risks
Main production device	Boiler	Explosion of boiler furnace	Casualties and property losses in the plant	Water vapor leaking into the ambient air	None
		Explosive leakage of steam-water pipes	Casualties and property losses in the plant	Water vapor leaking into the ambient air	None
Coal storage and transportation system	Coal yard	Fire	Environment and property losses	Few flue gas getting into the ambient air	None
	Coal conveying belt	Fire	Environment and property losses	Few flue gas getting into the ambient air	None
	Coal bucket	Collapse	Casualties and property losses	None	None
Fuel storage and transportation system	Light diesel oil tank	Fire	Casualties, environment and property losses	Flue gas getting into the ambient air	Available
Utilities system	Auxiliary power system	Plant power outage	Shutdown and property losses	None	None
		Cable fire	Environment and property losses	Few flue gas getting into the ambient air	None
	Access road and front area of the plant	Vehicle injury	Casualties and property losses	None	None
	Office building	Fires	Casualties, environment and property losses	Few flue gas getting into the ambient air	None
Environmental protection facilities of the project	Chimney	Falling from high	Casualties	None	None
	Denitration facility (after the establishment of denitration device)	Ammonia transport leakage	Casualties, environment and property losses	Ammonia escaping into the ambient air	Available
		Leakage in the ammonia workshop	Casualties, environment and property losses	Ammonia escaping into the ambient air	Available
		Ammonia leakage in the gas duct	Casualties, environment and property losses	Ammonia escaping into the ambient air	Available
		Failure	Environment losses	Increase in the concentration of NO _x in flue gas	Available
	Desulfurization facilities	Failure	Environment losses	Increase in the concentration of SO ₂ in flue gas	Available
	Bag-type dust collector	Failure	Environment losses	Increase in the concentration of smoke in flue gas	Available

9.2.2 Identification of risk materials

2×500m³ steel diesel oil tanks, having the volume are set up for the project with the storing capacity of 900t, and the volume of the ammonia tank for the project is 100m³ with the storing capacity of 90t. See Table 9.2-2 and Table 9.2-3 for physicochemical properties of diesel oil and ammonia.

Table 9.2-2 Physicochemical Properties of Diesel Oil and Hazardous Characteristics

Identification	Chinese name: diesel 10#, 0#, -10# and -20#;
	UN No.: 2924
	Dangerous goods code: Classification of dangerous goods: Class-C flammable liquid
Physicochemical properties	Main components: C15-C23 aliphatic hydrocarbon and naphthenic hydrocarbon
	Physical state: colorless or light yellow liquid
	Condensation point (°C): ≤10, 0, -10 and -20 Relative density (water = 1): 0.85
	Boiling point (°C): 200~365
	Solubility: insoluble in water, but soluble with organic solvent.
Hazardous characteristics of combustion and explosion	Combustibility: flammable
	Flashing point (°C): ≥55
	Ignition temperature (°C): 350~380
	Explosion limit (V%): 1.5~6.5
	Hazard characteristics: the combination of vapor and air can form the explosive mixture. Flammable and explosive when meeting with fire.
	Combustion products: CO, CO ₂ and H ₂ O Taboo object: strong oxidant
Storage & Transportation	Containers shall keep sealed for storage, and fireproof and explosion-proof technical measures shall be taken. It is forbidden to use mechanical equipment and tools that can cause spark easily. Flow rate shall be paid attention to during the filling, and grounding device is required to prevent the accumulation of static electricity.

Table 9.2-3 Description on Physicochemical Properties of Ammonia and Hazardous Characteristics

Item	Ammonia (20%-30%)	Ammonia
Appearance and physical state	Colorless and clear liquid with pungent odor	Colorless gas with pungent odor
Classification of hazards	Classification 8.2 corrosives presenting alkalinous properties	Classification 2.3 poisonous gas
Invasion approach	Inhalation and ingestion	Inhalation
Health hazard	The inhalation can cause cough, hard breath, asthma and others due to the irritation to the nose, throat and lung; for the serious, laryngeal edema, pulmonary edema would happen and damages would cause to heart, liver and liver. A splash in the eyes may cause burns. Skin contact may cause burns. Oral administration may burn digestive tract. Chronic influence: Repeated contact with low-concentration ammonia can cause bronchitis; dermatitis might occur.	Low-concentration ammonia can irritate the mucosa, while the high-concentration one can give rise to lytic necrosis of tissue. Acute toxicity: For mild cases, tears, sore throat, hoarse voice, cough and others would appear; eye conjunctiva, nasal mucosa, congestion of throat and edema; chest X-ray sign is consistent with the pneumonia or peribronchitis. Above symptoms aggravate for moderate toxicity, and hard breath and cyanosis would appear; chest X-ray sign is consistent with the pneumonia or interstitial pneumonia. For serious cases, toxic pulmonary edema or respiratory distress syndrome would appear. Patients would cough intensely, cough up lots of pink foam phlegm, breathe poorly, be in a coma, shock, etc. Laryngeal edema or tunica mucosa bronchiorum necrosis and asphyxia might happen. High-concentration ammonia may cause reflex respiratory arrest. Liquid ammonia or high-concentration ammonia may cause eye burns; liquid ammonia may cause skin burns.
Toxicology information	None	Acute toxicity: LD50: 350mg/kg (through the mouths of rats) LC50: 1390mg/m ³ , 4h (inhale by rats)
Inflammability and	Non-inflammable and non-explosive	Flammable, explosion limit (volume fraction) /%: lower

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explosivity	Hazard characteristics: decompose easily and release ammonia. The higher the temperature is, the faster the decomposition speed is. Explosion atmosphere forms easily.	limit: 15.7 upper limit: 27.4. Hazard characteristics: the combination with air can form the explosive mixture. Flammable and explosive when meeting with fire and high heat. Violent chemical reactions upon the contact with fluorine, chlorine, etc. Cracking and explosive when the internal pressure of the container increases due to the high heat.
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9.2.3 Environment risk assessment rating and scope

2×500m³ steel diesel oil tanks, having the volume are set up for the project with the storing capacity of 900t, and the volume of the ammonia tank for the project is 100m³ with the storing capacity of 90t. In combination with the provisions of Table 2 in *Identification of Major Hazard Installations for Dangerous Chemicals* (GB18218-2009), diesel oil is flammable liquid with the flashing point of more than or equal to 55°C and critical quantity of 5,000t, and is non-major hazard source; ammonia doesn't belong to major hazard source, also its toxicity is lower than that of general toxic hazardous substances. And the site selection of the Project is located in a non-sensitive area.

Table 9.2-4 Identification of Major Hazard Sources

SN	Name of substance	Substance property	Storage capacity	Critical quantity
1	Diesel oil	Flammable liquid: 23°C flashing point ≤ ≤61°C	900t	5000t
2	Ammonia	Corrosive substance	90t	-

According to the assessment rating classification table in the Technical Guidelines for Environmental Risk Assessment on Projects (HJ/T169-2004), the risk assessment rating is mainly classified according to the hazard of the risk factor, size of hazard source, environmental sensitivity level in the assessment project. The risk assessment rating is determined as the Class 2.

Table 9.2-5 Environmental Risk Assessment Rating Classification

Item	Highly toxic hazardous substance	General Toxic Hazardous Substance	Combustible and Inflammable Hazardous Substance	Explosive Hazardous substance
Major hazard source	1.	2.	1.	1.
Non-major hazard source	2.	2.	2.	2.
Environmentally sensitive areas	1.	1.	1.	1.

Table 2.7-1 List of Main Environmental Sensitive Points around the Project and Environmental Protection Objectives

SN	Objective name	Relative orientation	Distance	Scale	Class of protection	
1	Centralized drinking water intake within the assessment range	Drinking water intake in Douhudi Town	Right of the river at the upstream of the drain outlet	6900	Providing domestic water for about 60,000 people in Douhudi Town	Surface water: Class II
2		Majiangzhai drinking water intake in Jiangling County	Left of the river at the upstream of the drain outlet	2500	Intake scale 0.2 million m ³ /d, served for domestic water in the county city	Surface water: Class II

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3		Water intake of Brewery in Yangjiachang Town	Right of the river at the upstream of the drain outlet	500	Intake scale 10,000 m ³ /d, providing production water for this plant and domestic water for about 15,000 people in Yangjiachang Town	Surface water: Class II
4		Drinking water intake in Haoxue Town, Jiangling County	Left of the river at the downstream of the drain outlet	10200	Providing drinking water source for 81,000 people in Haoxue Town	Surface water: Class II
5	Yangtze River (Gong'an section)		N	2200	Great river	Surface water: Class II
6	Sensitive point	Group 5 of Lvhuo Village	SW	360~700	60 households	Ambient air: Level II Sound environment: Class 2
7		Group 4 of Lvhuo Village	S	840	42 persons	
8		Group 6, Lvhuo Village	SW	750~1200	70 households	
9		Group 10 of Fuli Village	S	550~900	50 households	
10		Group 8 of Fuli Village	E	750~1500	54 households	
11		Resettlement Residential Area	NE	850~1100	140 households	
12		Group 3 of Fuli Village	N	770~1200	15 households	

9.3 Analysis on Environmental Risk Accident

Environmental accident risks that might exist in the Project include: denitration with ammonia, tank field and acid-base storage tank accident risks.

9.3.1 Accident risk of denitration with ammonia

It is recommended to apply the SNCR denitration process for the Project with the ammonia consumption of around 100kg/h. The ammonia used is from outsourcing. Ammonia doesn't belong to toxic, flammable or explosive substance, however, volatile matter of ammonia, ammonia gas, is the general toxic substance, which is flammable and can form explosive mixture upon combination with air.

9.3.1.1 Accident analysis

- (1) During transporting the ammonia, car accident might happen due to various reasons, which would cause the damages of tank body and valve, then a large amount of ammonia would leak;
- (2) During transportation and operation, the valve would open and ammonia would leak due to the misoperation of personnel.
- (3) Due to wearout, corrosion, abrasion, weld failure and others of tank body and valve, the completeness of tank body and valve would be damaged, then ammonia would leak;
- (4) According to the physical property of ammonia, certain space in the tank must be in the gas phase as stipulated in the operating instructions when filling. In case of too much filling, a little bit increase in temperature during transportation may cause the acute rise of pressure in the tank, which would give rise to the explosion of tank body and a huge amount of leakage of ammonia;
- (5) If the prevention measures are ineffective or cooling system breaks down during the

summer with high temperatures, the tank body would explode and a great quantity of ammonia would leak;

(6) Accessories of storage tank, such as failure of safety valve, blocking of flame arrester, blocking of discharge hole, leakage, blow-by of pressure gage and liquidometer and others, would pose a serious threat for the safe storage of flammable liquid and cause a large amount of leakage, hence, explosive accident is given rise to.

9.3.1.2 Preventive Measures

(1) Transport vehicles must be special vehicles or carrying vehicles that are approved by the relevant departments and comply with safety regulations and relevant requirements; regular maintenance and check shall be conducted on transport vehicles, storage tanks and pipes, also, tank cars, storage tanks and pipes shall maintain in a good working condition and normal grounding shall be ensured.

(2) Once an accident is discovered, drivers and escort personnel shall report to the police and emergency response team the place and situation of the accident, name of the dangerous goods, harm and emergency measures, take all possible warning measures on site, and cooperate with relevant departments actively for the response.

(3) After a driving accident happens, drivers must protect the accident site, wait the traffic management department of the police for disposal, cut off the car engine and turn off the power immediately, tighten hand braking and make sure that the tank cars can't move. Escort personnel and drivers can't leave the tank cars at the same time.

(4) Once storage tank cracks, emergency cut-off valve of tank car shall be closed immediately to prevent leakage, if any. If the above measure fails to prevent leakage, it shall be reported to the local police, departments of traffic and fire protection and others, and the emergency plan leading group of the company. The company shall initiate the emergency plan immediately.

(5) Within the scope of traffic permission, deserted area shall be selected as possible for emergency parking road.

(6) Safety cofferdam with the height of 1.0m shall be built for the storage tank area;

(7) Ammonia escape amount monitoring alarm system and automatic water sprinkler shall be installed through making use of high solubility of ammonia. When ammonia leaks by accident and gets into the air, ammonia leakage detector would alarm automatically and water sprinkler would open; drainage ditches shall be set up in the cofferdam. Ammonia after flushing shall flow into the accident tank through the drainage ditch, and be discharged to the industrial wastewater tank of the power plant for disposal, then shall be used for spraying the coal yard, instead of discharging externally;

(8) Ammonia shall be stored in cool, dry and well-ventilated warehouse. The storage place shall be a safe area, sufficient fire protection accesses shall be reserved, and the place shall avoid the kindling, heat source and direct sunlight. Fireproof and explosion-proof measures shall be taken for the storage of ammonia tanks, at the same time, fire protection equipment of corresponding types and quantities shall be equipped. Safety signal indicators and dilute acid spraying facilities shall be established for ammonia storage tank area;

(9) Personnel operating the ammonia system must wear protective equipment. When there is a fire in ammonia system, fire fighters must wear protective suit for the whole body. First, fire source must be cut off, and containers in the fire shall keep cool with water.

Therefore, the probability of ammonia leakage accident is slim through taking above prevention measures.

9.3.2 Analysis on tank field accident risk

(1) Ignition diesel oil irrigated area

Oil tank field is arranged in the middle of the west side of the plant. There are 2x500m³ steel

diesel oil tanks for the Project.

Due to the small amount of oil, the influence of fire and explosion accident is limited, which would not exceed the scope of the plant area, so the influence on the environment outside the plant area is less.

If there is a fire in the oil tank field, a large amount of fire-fighting water would be used. Under the normal circumstance, fire-fighting water and the leaked oil shall be collected in the fire dike of oil tank field, so they won't leak externally and affect the surrounding environment. If the water amount is too much and spills from the fire dike, rainwater and wastewater pipes in the plant area shall be sealed immediately, and fire-fighting wastewater containing oil shall be prevented from flowing to the outside plant and entering into the wastewater treatment plant within the plant area. Therefore, the probability of surface water accident caused due to the reason of oil tank field of the Project is slim after taking emergency measures.

In order to effectively prevent the river pollution accident caused by the oil leakage, once the fuel oil leakage and external discharging wastewater accident occurs in the oil tank field, emergency measures must be initiated immediately, and the leaked oil is not allowed to discharge into the rivers.

Fixed low-expansion foam fire extinguishing system and cooling water system shall be applied to the oil tanks, and cooling water for foam fire extinguishing system and oil tanks are all from fire-fighting water network outside the plant area. Mobile fire extinguishers and fire blankets are provided in the ignition oil tank field. Cooling water for oil tanks can be provided either by fixed cooling water system, or fire hydrants or fire trucks at the oil tank field.

Foam pipes and fire-prevention water supply pipes shall be provided next to the roads of oil tank field. SS100 aboveground fire hydrants shall be installed on the foam pipes at the oil tank field, with the spacing of no more than 50m; while SS100 aboveground fire hydrants shall be installed on the fire-prevention water supply pipes, with the spacing of no more than 3m.

Heat detector shall be provided at the oil tank. Foam fire extinguishing system can be started in the distance or on the spot in the control room once receiving the fire alarm.

(2) Chemical water acid-base irrigated area

The annual amounts of regenerated acid and alkali of the Project in the chemical treatment room are: acid: 3,277t and alkali: 1,657t respectively. Two 50m³ storage tanks shall be used for acid-base storage respectively. 700m³ wastewater neutralization tank (concurrently used as accident tank) shall be built near the acid-base storage area. At the same time, cofferdams with the volume more than that of tank body shall be established at the tank field, so as to guarantee the capacity of accident emissions when the tank body is at the accident state.

9.3.3 Analysis on desulfurization and denitration accident risk

The report is mainly to consider the influence on the water environment under the situation of leakage of acid-base storage tank.

Anti-corrosion materials or lining anti-corrosion materials are used for acid and alkali storage tanks of the Project and other chemical facilities, and cofferdams are established around the storage tanks. Normally, there would be no external leakage and no influence on the surrounding water environment. Even if there is leakage of acid and alkali storage tanks, acid-alkali liquid would be blocked in the cofferdam so as to prevent from spreading when the accident happens and introduce it into the wastewater tank for the disposal; also, the rainwater and wastewater pipes shall be sealed in the plant area to prevent the leaked liquid from flowing to the outside plant area.

According to the survey, the project land are located at the flood diversion and storage area, which is in a low place, in addition, there is a levee for blocking near Yangtze River. Normally, it is impossible for the project accident wastewater to either flow into Yangtze River

or have any influence on the sensitive targets of Yangtze River. Acid-base storage tank leakage accident wouldn't affect the safety of drinking water and breeding at lower reaches of Yangtze River. In order to effectively prevent the river pollution accident caused by the acid-base storage tank leakage, once the leakage and external discharging accident of acid-alkali liquid occurs in the chemical water workshop, emergency measures must be initiated immediately, and the acid-alkali liquid shall not be allowed to discharge into the surrounding waters.

9.3.4 Maximum credible accident and occurrence probability

9.3.4.1 Determination of maximum credible accident

Maximum credible accident refers to the harm caused by the accident is the most severe among all the predicted accidents and the probability of this accident is not zero. Based on the above risk identification, analysis and accident analysis, the setting of maximum credible accidents for the risk assessment of the Project are listed in the Table 9.3-1.

Table 9.3-1 Setting of Maximum Credible Accidents

SN	Device and equipment	Risk factor	Maximum credible accident
1	Tank	Light diesel oil and ammonia	The cracking of light diesel oil storage tank would cause the leakage, fire and explosion would happen when meeting with the open fire, and as risk substances scatter, the fire and explosion would happen; the leakage of ammonia would give rise to personal injuries and environmental harm.
2	Transport Vehicles	Light diesel oil	Traffic accident

With the advance of the technology and the constant improvement of production and management, the occurrence of various accidents decreases, and also the ability in disaster prevention and disaster resistance improves, however, risk accidents are unavoidable, and the zero probability of accident is impossible. Hence, the risk accident shall be highly valued.

On the basis of above analysis and historical accident types having a risk influence on the environment and in combination with types of hazardous chemicals for the proposed project and distribution of production area and storage area, the maximum credible accident is determined as the ammonia tank leakage accident by the assessment.

9.3.4.2 Probability of maximum credible accident

(1) Analysis on storage tank area and pipe leakage accident

Both domestic and foreign statistical information shows that the probability of major accidents, like false weld burst or big crack leakage, caused by the failure of the explosion-proof devices, is around $6.9 \times 10^{-7} \sim 6.9 \times 10^{-8}$ /year. Generally, the leakage accident occurred is mainly the leakage at the joints of the feed and discharge pipes. According to incomplete statistics of our country, the probability of general cracking leakage accident of the equipment and containers is 1×10^{-5} times/year. Additionally, according to the storage tank accident analysis report, the probability of major accidents occurring to the storage system, like fire and explosion, is less than 1×10^{-6} times/year. With the improvement of disaster prevention in recent years, the probability is in decline.

In combination with the features of the Project, the probability of maximum credible accidents for the Project, leakage of the storage tank area and pipe, is 1×10^{-5} times/year.

(2) Probability analysis on fire and explosion accident

According to the above analysis, regarding to the occurrence probability of storage tank accident, it is determined that the probability of fire and explosion accident for storage tank of the Project is 1×10^{-6} times/year by reference to the probability of major accidents for the storage system, like fire and explosion (1×10^{-6} /year). The probability of light diesel oil storage tank shall refer to that of this accident for implementation.

(3) Probability analysis on desulfurization and denitration accident

In combination with the features of the Project, the probability of desulfurization and denitration accident for the Project is 1×10^{-5} /year.

Above all, referring to the relevant information's introduction on the probability of risk accident, in the Project, the probability setting of maximum credible accident that has a significant influence on the environment is listed in the Table 9.3-2. It can be seen from the Table 9.3-2 that the maximum credible accident of the Project is ammonia storage tank leakage risk, which may cause environmental risk to some extent.

Table 9.3-2 Summary on Occurrence Probability of Maximum Credible Accident

SN	Name of accident	Occurrence probability (time/year)	Frequency	Response strategy
1	Storage tank leakage	10^{-5}	Rare	Take prevention measures
2	Fire and explosion accidents	10^{-6}	Rare	Strengthen the management and take precautions for elimination
3	Liquid ammonia leakage accident of desulfurization and denitration devices	10^{-6}	Rare	Take prevention measures
4	Pollutant accident emission	10^{-5}	Rare	Strengthen the management and take precautions for elimination

9.4 Risk Prevention Measures

9.4.1 Risk prevention measures for transportation

Risk prevention during transportation includes prevention of traffic accident and equipment failure leakage during transportation as well as emergency processing after the occurrence of accidents. The transportation of diesel oil for the Project is mainly through tank trucks.

Risk prevention during transportation shall start from the packaging. Detailed requirements related to the packaging may refer to *List of Dangerous Goods* (GB12268-2005), *Packing Symbol of Dangerous Goods* (GB190-90), *General Specifications for Transport Packages of Dangerous Goods* (GB12463-90), *Supervision Regulation on Safety for Gas Cylinder* and other rules and regulations. The packaging shall be made in strict accordance with properties and relevant intensity of related dangerous goods, regular inspection shall be conducted according to the inspection standards, such as tests of stacking, fall-down, gas tight and air pressure. Reminder symbols shall be printed strictly on the transport packages as stipulated, and category, name, size and color of dangerous goods shall be indicated.

Transportation, loading and unloading shall be implemented in strict accordance with relevant national provisions, including *Regulation of Automobile Transportation of Dangerous Goods* (JT3130-88), *Rules of Transportation Loading and Unloading of Dangerous Goods by Automobile* (JT3145-91), *Safety Specifications for Power-driven Vehicles Operating on Roads* (GB7258-87), *Transport Rules of Dangerous Goods* (TY [1987] No. 802), etc. Regarding to the vehicles transporting flammable and explosive dangerous chemicals for the Project, "three certificates for flammable and explosive hazardous chemicals" must be handled, corresponding fire protection equipment shall be equipped, qualified drivers and escort personnel shall be trained on fire safety, also, the conduction of the third party's modern logistics transportation shall be advocated in future. Before and after the loading and unloading of hazardous chemicals, vehicles and warehouse must be ventilated necessarily and cleaned up. Tools used for loading and unloading must be able to prevent the generation of spark, and there must be various protective devices.

9.4.2 Risk prevention measures for storage

The Project involves the storage and use of ammonia and diesel oil. In accordance with the disposal principles on liquid ammonia in the *Notice on Issuing the Safety Measures and Emergency Disposal Principles for the First Batch of Hazardous Chemicals under the Key Supervision* (AJZTGS [2011] No.142), safety measures for storing and using ammonia shall be well prepared. Therefore, following measures are taken: Around the ammonia tanks shall be provided with cofferdams, of which the height shall be determined by the capacity and

position of tank units; ammonia escape amount monitoring and automatic water sprinkler shall be installed through making use of high solubility of ammonia; when ammonia leaks by accident and gets into the air, ammonia leakage detector would alarm automatically and water sprinkler would open; ammonia shall be stored in cool, dry and well-ventilated storage tanks; the storage place shall be a safe area, sufficient fire protection accesses shall be reserved, and the place shall avoid the kindling, heat source and direct sunlight; fireproof and explosion-proof measures shall be taken for the ammonia tanks, at the same time, fire protection equipment of corresponding types and quantities shall be equipped; safety signal indicators and dilute acid spraying facilities shall be established; personnel operating the ammonia system must wear protective equipment. When there is a fire in ammonia system, fire fighters must wear protective suit for the whole body; first, fire source must be cut off, and containers in the fire shall keep cool with water; waste ammonia dilution system and nitrogen replacement system shall be provided; waste ammonia must be delivered to a qualified company for treatment as hazardous chemicals after diluted through waste ammonia dilution system and shall not be discarded and disposed at random; when ammonia pipe and tank body are not operated for a long time or are checked on a regular basis, the residual ammonia shall be replaced by the nitrogen replacement system, the nitrogen containing ammonia replaced shall be cleaned with water, and the scouring water shall be disposed as hazardous chemicals.

Ammonia tank shall set up in the denitration system, in which cofferdams, collecting tanks and emergency pumps shall be provided around the ammonia tank, and accident discharge pipes shall be placed. Once there is liquid leakage, rainwater valve shall be closed immediately, and materials shall be prevented from getting into the rainwater tank along with the rainwater. Fire trenches and spray facilities shall be set up around the light diesel oil and ammonia tank.

9.4.3 Risk prevention measures for flue gas treatment system accident

Online monitoring system and real time monitoring for flue gas shall be established to monitor the SO₂, NO₂ and smoke in the flue gas on line.

According to *Guide for Operation and the Maintenance of Electrostatic Precipitators for Coal-fired Power Plants* (DL/T461-2004), the power plant shall strengthen the operation and maintenance of electrostatic precipitators. When the concentration of smoke in flue gas monitored by the flue gas continuous monitoring device is abnormal and it is determined that the reason is the reduction in efficiency of dust collection, overhaul shall be organized at once, and shutdown for overhaul for a short time shall be considered if necessary.

When there is a major fault on desulfurization and denitration system equipment, the unit processing efficiency is zero. The power plant shall conduct the overhaul at once, and reduce the unit working time as possible when the desulfurization system is not put into the operation. When the concentration of SO₂ and NO₂ in flue gas monitored by the flue gas continuous monitoring device is abnormal and it is determined that the reason is the fault of desulfurization system, overhaul shall be carried out at once and flue gas bypass system shall be used temporarily to make sure the operation of units.

9.4.4 Site selection, general layout and safety prevention measures for buildings

(1) The natural and social environment around the plant shall be taken into full account when selecting the plant site for the Project, basic information on topographic survey, engineering geology, hydrology, weather, regional planning and others shall be collected, and the scheme that is technically reliable, economical and reasonable, convenient in traffic, consistent with the requirements of health, safety and environment and matches with the public works shall be selected.

(2) Geological factors, like earthquake, soft foundation, etc., and weather hazards, like hurricane, thunderstorm, etc., shall be taken into full account when selecting the plant site. A reliable technical scheme shall be taken to avoid disadvantageous geological conditions.

(3) The design of site elevation shall be in line with the relevant provisions of *Standard*

for flood control GB50201-1994, and effective measures for flood control and flood drainage shall be taken.

(4) The spacing, among all buildings (structures), between buildings (structures) and environmental sensitive points/enterprises, etc., shall meet the requirements of safety protection distance and fire protection spacing, and fire resistance rating of buildings (structures) shall meet the requirements of *Code of Design on Building Fire Protection and Prevention*.

(5) Plane layout shall maintain sufficient spacing with the environmental sensitive points as required by the production types, safety and health.

(6) The general layout of the plant area shall comply with the requirements of prevention accident. Emergency rescue facilities and rescue passages as well as emergency evacuation shall be equipped. The arrangement of roads shall satisfy the requirements of fire prevention and transportation.

(7) For the plant area with more than two inlets and outlets, stream of people and freight transport shall be separately clearly. Raw materials, products, by-products and other bulk dangerous freight transport shall have an individual route, which shall not be mixed with or level crossing with stream of people and other goods flow.

(8) Roads in the plant area shall be arranged reasonably as required by the traffic, fire prevention and zoning, and roads shall be clear, ring roads shall be at the dangerous places, like warehouse area. The width of roads shall be determined according to the traffic density and safety factors and guarantee that the fire prevention and emergency vehicles can pass unimpededly. The road design, driving and loading of vehicles, and management of drivers must comply with *Safety Regulation for Railway and Road Transportation in Plants of Industrial Enterprises* (GB4387-1994) and signs shall be set up.

(9) The place with more persons shall be set at the front area of the plant so as to avoid that a large stream of people frequently passes through the whole plant or the production area.

9.4.5 Safety prevention measures for process technology design

(1) Chemical product tank areas shall be designed in strict accordance with *Code of Design on Building Fire Protection and Prevention* (GBJ16-87) and *Electrical Installations Design Code for Explosive Atmospheres and Fire Hazard* (GB50058-92)

(2) Advanced, reasonable, safe and reliable technological process shall be applied to each set of device. The safety for the device shall be improved fundamentally so as to prevent and reduce the occurrence of accidents. In order to ensure the work safety, safety chain emergency mechanism and accident emergency shutdown measures shall be provided for the process design.

(3) Explosion-proof appliances (including switchboard, electric motor, switch, etc.) shall be used at the flammable and explosive areas, and cables shall meet the requirements of load, insulation, etc. The temporary electrical facilities at the site shall be strictly regulated.

(4) In order to guarantee the personal safety, gas protection station and medical room are established in the plant for poisoning protection, work injury rescue, etc.

(5) Lightning protection measures are provided in high buildings, structures, high equipment and storage tanks.

(6) Causeways around the storage tanks shall be built and water spray measures shall be taken to guarantee the safety and completeness.

(7) In order to strengthen the personal protection, protective counters are provided in the workshop and operating positions at each section, where gas masks, rubber boots, rubber gloves and protective glasses are prepared for urgent need.

(8) Pressure vessel and high pressure line during the design and after put into production

shall be used according to the provisions of relevant pressure vessel. 100% X-ray radiographic inspection shall be conducted on all Class 1 weld joints.

(9) There shall be sufficient explosion venting area in the power house of devices, lightning and protection shall be complete, and guard railings up to standard shall be provided for tanks and ladders at the floor platform. Lifting hole and equipment hole (referring to the backup hole after the equipment is installed) shall be sealed tight, and there shall be sufficient lighting systems both inside and outside the device room. Fire resistance rating of buildings (structures) within the scope of the project shall be no less than Class 2; the fire prevention zoning, explosion-proof measures, safe evacuation and others shall be carried out in accordance with relevant provisions of current national fire regulations.

(10) Emergency power supply shall be provided to avoid the power outage.

9.4.6 Safety prevention measures for automatic control design

(1) Enterprises shall establish a safety monitoring system. Technically, major hazard sources of the plant area shall be equipped with a remote control system. Once there is an accident, source of leakage shall be cut off immediately through the remote control system. It shall be controlled at the source. Centralized control room and operating duty room for workers shall be established and shall be separated from the process production equipment. Regarding to the production process, centralized detection, display, interlocking control and alarm shall be conducted by the operating personnel in the control room, automatic adjustment and alarm on parameters closely related to the work safety shall be conducted, and automatic shutdown can be started in case of an emergency.

(2) Automatic fire alarm and fire linkage system shall be provided in the plant area so as to monitor the fire in the major places of the plant area. The system host shall be installed in the control room.

(3) Combustible gas detector shall be set up in the storage tank area and production area; liquid level monitoring device, alarm apparatus and others shall be provided for the storage tank.

(4) Advanced DCS system shall be used as possible, and sub-control system, automatic signal system, flame detector, etc. shall be set up at the necessary places to guarantee the safety work.

9.4.7 Fire protection and fire alarm system

(1) Independent and steady high pressure fire water system shall be used to provide fire-fighting water in the plant area.

(2) Wastewater shall be treated in the wastewater treatment facilities after collected in the wastewater accident tank.

(3) Fire-fighting water is an independent and steady high pressure fire-fighting water network. Fire-fighting water pipes shall be arranged along the devices and auxiliary production facilities. Fire hydrants shall be provided on pipes as required by specifications.

(4) Fire alarm system: Telephone alarm is applied to the whole plant. Alarm shall be reported to the fire station. Through call is set up between the fire-pump room and fire station. Automatic fire alarm device shall be set up as required in the storage tank, control room, switching room and office building. Manual fire alarm call point shall be provided around the device and tank field. Major parts in the device shall be provided with smoke, heat detectors, manual alarm call point, etc. Fire alarm signal shall be reported to the central control room, then reported the master fire station of the plant through the central control room.

9.4.8 Risk management measures

(1) Formulate disposal measures for normal, abnormal or emergency situations; set up special alarm telephone number that shall be open to the public, and be on duty for 24h so

as to dispose the leakage at any time.

(2) Conduct training on technological process of production, equipment performance, use of relevant fire prevention and safety facilities for working personnel at each station and pipe inspection personnel so as they are able to dealing with urgent accident. Relevant personnel shall go on duty with certificates after the examination is qualified.

(3) Draw up emergency operation procedures, in which the operating procedures taken shall be indicated, repair schedule shall be stipulated and the influence of the accident shall be limited, in addition, safety related to the pipe operating personnel shall be indicated.

(4) Develop safety education activities every week for operating personnel, improve the personnel's safety awareness, identify the abnormal situations before the occurrence of accidents and take corresponding measures.

(5) Own complete examination procedures and maintenance methods for important instrument and equipment; conduct regular maintenance as planned; own special archives and complete documents.

(6) Establish an accident emergency system, draw up an emergency plan, allocate emergency disposal and rescue personnel and necessary emergency rescue appliances and equipment, and organize exercises on a regular basis. Report the emergency plan to the local safety production supervision and administration department for the record.

9.5 Environmental Risk Emergency Plan

9.5.1 Preparation Requirements for Emergency Plan

According to *Technical Guidelines for Environmental Risk Assessment on Projects* (HJ/T169-2004), emergency plan of major hazard sources for the Project shall be prepared as stipulated before the Project is put into production.

Leading organizations, response procedures, emergency steps, clear responsible persons and responsibilities, and corresponding protection and emergency measures shall be determined in the emergency plan. In line with the principle of continuous improvement, the emergency plan shall be exercised on a regular basis and improved continuously so as to play a practical role. The environmental losses and harm in the plant caused by accidents shall be reduced to the minimum and it shall be ensured that the surrounding environmental quality and staff in the plant shall not suffer or suffer less harm. In order to apply the new technologies and new methods to the emergency rescue and maintain the consistence with the changing circumstances, emergency plans shall be prepared once three years.

When the power plant prepares the accident emergency rescue plan, a contract or agreement shall be signed with the police, departments of fire prevention and medical treatment, government, etc. so as to make full use of emergency resources inside and outside the plant on the basis of investigating and surveying social rescue ability around the power plant. With regard to preparing the emergency rescue plan, the concrete situations during the production and operation shall be analyzed carefully, and the major hazard sources, dangers with great harm and harmful factors shall be identified.

The accident risk setting of emergency rescue plan for the Project must include the followings: liquid ammonia transport leakage, ammonia storage leakage, fire explosion, liquid ammonia leakage from desulfurization system, failure of pollution disposal facilities, hazardous article leakage during the transportation, etc.

Emergency rescue organization shall be established. Based on the full analysis of various potential environmental risks outside the plant and occupational hazards during production, working policy for emergency rescue and emergency rescue plan shall be prepared. The emergency rescue plan for the Project must be in line with the relevant requirements of *Notice on Strengthening Supervision and Management of Emergency Rescue Plan for Work Safety Accidents* (AWBZ [2005] No. 48) and *Emergency Plan Preparation Guidelines for Work Safety Accident of Production and Business Units* (AQ/T9002-2006) issued by the State

Council.

According to the features of the Project, risk emergency plan shall be established for the potential risk accidents. See Table 9.5-1 for risk emergency plan framework when there is an accident.

Table 9.5-1 Risk Emergency Plan Framework

SN	Item	Contents and requirements
1	General	The plan, an environmental risk emergency plan for Yangjiachang Town Industrial Park CHP Project in Gong'an County, stipulates the contents and requirements. It shall be implemented in the later design and construction and shall be materialized. Also, three simultaneities examination contents for accepting the environmental risk are stipulated
2	Overview of hazard sources	Detailed description in types, quantities and distribution of hazard sources
3	Emergency plan area	Plant area and neighboring area
4	Emergency organization	Risk emergency headquarter of the plant area: Responsible for the overall command on site Professional rescue team: Responsible for accident control, rescue, and sequential management Emergency headquarter: Responsible for overall command, rescue, control and evacuation of neighboring area Professional rescue team: Responsible for assistance in professional rescue team of the plant
5	Classification of emergency state and emergency response procedure	In terms of the ranking of the accident, emergency classification management procedure shall be applied
6	Emergency facilities, equipment and materials	Fireproof and explosion-proof emergency facilities, equipment and materials are mainly relevant fire protection equipment; main equipment for preventing poisonous and harmful substances from leaking is relevant sprinkler equipment and material; the prevention of discharging accident pollutants is mainly about the normal use of relevant storage equipment
7	Emergency communication, notification and traffic	Stipulate the communication mode, notification mode and traffic control measures under the accident risk Communication mode: Telephone, interphone and computer network Notification mode: Telephone, interphone and computer network Traffic management support: mainly automobile Control: Traffic roads in the plant area and neighboring area
8	Emergency environmental monitoring and assessment after the accident	Professional team shall monitor the influence caused by the accident urgently, and assess the property, parameter and consequence of the accident so as to provide policy support for the command department
9	Emergency prevention measures, leakage removal measures and equipment	Site of accident: Control the accident, prevent the spread and chain reaction of the accident, remove the leakage on site, minimize the harm and allocate corresponding facilities and equipment Neighboring area: Control fire prevention division, prevent the chain reaction of the accident, control and remove pollutants and allocate corresponding equipment
10	Control of emergency dose, evacuation plan, medical aid and public health	Site of accident: Accident handler shall control and stipulate the emergency dose of the accident, evacuation plan on site and medical aid Neighboring area: Stipulate the emergency dose of poisonous substance for surrounding people at the stricken area, evacuation plan on site and medical aid
11	Termination of emergency state and recovery measures	Accident alert release, consequential management on the accident site, and recovery measures
12	Personnel training and exercise	The plant area shall organize training and exercise for personnel on schedule after the emergency plan is made
13	Public education and information	Conduct public education and training at the area nearby the plant area, and issue relevant information
14	Record and report	Establish special records for emergency accident, set up archives and establish a special report system
15	Appendix	A variety of annexes related to the emergency accident

9.5.2 Organization and Responsibilities

The emergency plan must specify emergency organization system and the basic

requirements of command organization and responsibilities. Only when the organization is complete and the word is clearly divided can the emergency work be effectively conducted. Emergency plan leading group shall be established for the plan accordingly to conduct the corresponding work. The emergency organization system for the emergency plan is shown in the Figure 9.5-1.

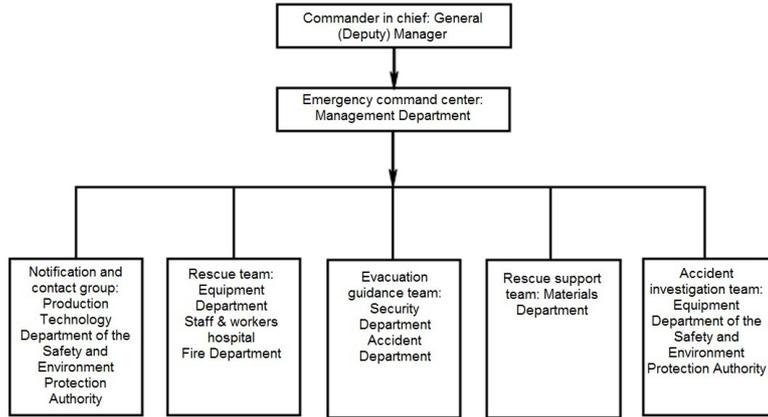


Figure 9.5-1 Organization System of Emergency Plan

Leading group established for the emergency plan shall include each technology department, of which the responsibilities are as follows:

- (1) Commander in chief: Responsible for issuing and releasing the emergency plan, and authorize the emergency command center to develop emergency rescue activities;
- (2) Production technology department: Responsible for accident alarm, report and accident treatment;
- (3) Equipment department: Responsible for assisting the commander in chief to cope with accidents, organizing and establishing emergency rescue team and commanding the repair on site.
- (4) Safety and environment protection authority: Cope with accident, arrange the safety and environment protection prevention measure, report the accident to the corresponding government agencies, and responsible for the emergency monitoring of the accident site.
- (5) Security department: Responsible for public security, alert, evacuation and site security;
- (6) Staff & workers hospital: Responsible for commanding all medical staff to rescue the injured and the poisonous;
- (7) Fire department: Responsible for finding out the property of poisonous gas and coming up with prevention measures; conduct the rescue of poisoned personnel at the poisoning area; the command staff shall evacuate and command to put out fire;
- (8) Materials department: Responsible for the provision of emergency supplies and guaranteeing the supply of the production necessities.

9.5.3 Information report and notice

Once there is a risk accident, it shall be reported to the emergency headquarter the first time obligatorily according to *National Environmental Emergency Plan, Environmental Emergencies for Environmental Protection Administration Competent Department (Trial)*, and relevant national provisions, at the same time, it shall be reported to the superior competent

department and the local people's government, and communication and contact ways with the relevant departments for 24 hours shall be determined so as to take rescue measures accordingly.

9.5.4 Emergency response and rescue measure

9.5.4.1 Contingency response

(1) Initial emergency response

In the early stage of the accident, each shift supervisor shall be responsible for initial emergency command. The monitoring room, as the startup of the emergency rescue command center, shall respond on the site of accident according to the type and location of emergencies. Meanwhile, the communication leader shall deliver the initial notice to the organization and government agencies outside the plant. Upon the manager of the company receiving the notice, it shall be graded as the site emergency response or all-personnel emergency response under the situation of emergency.

(2) All-personnel emergency response

Once the accident is graded or upgraded, the emergency rescue commander of the company shall report to the government agencies outside the plant. Then the emergency command center begins to initiate and call up relevant emergency rescue response organization immediately. The appointed communicator shall keep contact with the initial emergency team on site until the site commanders, rescue personnel and outside enterprises come to take over the site command. Security personnel on site shall be responsible for checking the number of all original personnel on site. Once the emergency is controlled, the emergency rescue commander of the company shall lower the accident grade and give instructions of re-entrance and recovery operation.

9.5.4.2 Technical proposal for emergency rescue

(1) Emergency rescue for the leakage of hazardous chemicals

Once there is poisonous and harmful media leakage accident of hazardous chemicals, it shall be dealt with according to the post operation and emergency treatment methods, and alarmed to the production dispatch center. The personal who calls the police shall make short description on accident spot, property of leaked media, leakage extent, injured people, etc. After the production dispatch center receives the alarm, correct analysis and judgment shall be made, and corresponding process scheme shall be taken, the expansion of accident shall be controlled and the company's volunteer fire brigade, environmental protection officer of mobile office shall be notified to carry out the rescue on site according to the property of the accident. Once the volunteer fire brigade receives the alarm, they shall rush to the site rapidly and carry out the rescue, evacuate the people at the leakage polluted area to the safe area, forbid the irrelevant people to get in the polluted area, cut off the fire source, wear the self-contained oxygen, air respirator and wear the protective suit, and stop the leakage when the safety is guaranteed. When the rescue is conducted at the leakage areas of poisonous and harmful media, personnel shall be equipped with necessary personal protective equipment. Independent operation is prohibited when dealing with the emergency, guardians shall be there, and water gun shall be used for cover if necessary. The hazardous chemicals shall be sheltered through collecting tank of fire-fighting water, then collected, transferred, recycled or discarded through innocent treatment. Once the environmental protection officer of mobile office receives the alarm, he shall monitor the poisonous and harmful media at the accident site or possible diffusion areas immediately, and put forward schemes and measures for personnel evacuation, pollution control and removal. After receiving the alarm, the general department shall notify the guard to set up a warning line rapidly, prohibit irrelevant people from getting into the accident site, and organizes people on the leeward to evacuate from the area that might be polluted by poisonous and harmful media to a safe area. For the leaked media that might have a social and environmental influence, it shall be reported to the local government by the general office so as to gain support and coordination. Once the mobile office receives the alarm, recuse and repair shall be organized at once, and

effective plugging measures shall be taken to control the leakage rate. The site shall be protected carefully after the occurrence of the accident. The relevant personnel of the general department shall organize relevant personnel to investigate the accident, analyze the reason, fill in "Report on Dealing with Emergencies" within 24 hours, report to the production dispatch center and the production Deputy General Manager, and report to the company's General Manager and the related superior departments if necessary.

(2) Emergency measures for the poisoning of hazardous chemicals

The company's emergency rescue center shall organize the rescue upon receiving the report. Site rescue: Wear an oxygen respirator to get into the site, evacuate the surrounding people to get away from the dangerous area, and rescue the poisoned people from the site as soon as possible; try to close the source of the poisonous substance to prevent it from constant external escape; open the windows and doors on site, enhance indoor air circulation, or make use of the ventilating device to emit the poisonous gas and water spray mist to absorb the poisonous gas. First aid on site: Transfer the poisoned people to the place with fresh air, and unbutton the tight clothes; get the oxygen for those who breathe with difficulties immediately; conduct artificial respiration (in the form of mouth to mouth generally) for those who have respiratory arrest; conduct external chest compression for those who have sudden cardiac arrest. Skin contact: Take off the polluted clothes, clean them with water for 30 minutes at least and go to a doctor; eye contact: raise the eyelid immediately, wash with the flowing water or saline for 30 minutes and go to a doctor. Ingestion: People who eat by mistake shall drink milk, egg white, etc. Vomit if possible and then go to a doctor immediately.

(3) Emergency rescue for fire and explosion accidents

Person who discovers a fire shall report to the leader of the department and the master dispatching center; the place of fire, articles on fire, fire behavior and surrounding situation shall be specified when reporting, and the person on duty shall organize the post holders to extinguish the fire with fire extinguishers, fire hydrants and water pipes; the surrounding flammable and explosive articles shall be transferred or isolated as possible; the people shall be evacuated to the safe area according to the fire behavior and extent; the person on duty in the master dispatching center shall report to the company's emergency command center and call "119" immediately once receiving the report; the volunteer fire control team shall be organized to assemble quickly to assist in fire extinction; command rescue team shall wear air respirator to rescue the stranded (injured) persons, evacuate irrelevant personnel on site, and draw a warning line; medical emergency group shall treat and cure the injured people on site who are salvaged from the fire; the contact group shall be responsible for communication and information transfer of the company's emergency rescue command group; the mobile group shall assemble and await orders, and prepare for rescue at any time; the logistics support group shall ensure that emergency rescue goods can be transported to the site in time, and assist the emergency rescue command group to complete other logistics support work well; someone shall be sent to bring the fire brigade to the fire scene at the gate of the company; the fire brigade shall be responsible for fire extinction upon arriving at the fire scene. The company's emergency rescue command group shall assist in other work.

(4) Waste gas accident emission

When there is a fault on desulfurization, denitration and dust removal facilities, the pollutants in the flue gas of boilers would emit excessively. In case of such a situation, personnel shall be organized for repair immediately. If the standard can't be reached still, boiler shutdown shall be taken into account.

9.5.4.3 Medical aid and public health

Upon the occurrence of risk accident, according to the accident extent to make a judgment, the evacuation of surrounding people shall be well done in cooperation with medical aid department. People who are poisoned and other physical injury responses shall be treated and cured so as to guarantee safety of people.

9.5.4.4 Emergency environmental monitoring

Upon the occurrence of the accident, the plant must make use of current monitoring equipment, actively cooperate with the local environmental monitoring department to monitor the pollutants accordingly, analyze the influence on the surrounding environment, and put forward feasible control measures. For atmospheric environmental impact caused by the leakage of poisonous substance, the concentration of corresponding pollutants shall be monitored, the influence scope and extent shall be analyzed, and feasible measures shall be come up with; for liquid and wastewater that are harmful to the water, they shall be controlled in the accident tank, and can be discharged after they are treated effectively in the plant and are up to the standard.

9.5.4.5 Emergency termination and recovery measure

Only by meeting the following working conditions, can emergency rescues be entirely finished: all fires are put out completely and all possible contaminant leakages receive isolation control without influence on surroundings; at this point, relevant departments of the company as well as surrounding communities and people can be informed that accident hazard has been solved and the emergency procedure is stopped.

After stopping the accident emergency, the recovery work shall be planned, organized and implemented based on the accident, including the overhaul, installation and commissioning of equipment. The accident report about its occurrence shall be prepared, which shall point out the causes of accident and losses and sum up experience to avoid the same accident happening again. People suffering the accident shall be reasonably settled and compensated for the damage caused by such accident. Assessment for the long-term environmental influence in environmental pollution accidents shall be completed by experts, and the suggestion on compensation as well as recovery of contaminated ecological environment shall be put forward.

9.5.4.6 Personnel training and exercise

Emergency headquarter of the company shall be responsible for providing emergency education for all staffs as well as safety and accident disposal training for staffs at the hazardous posts. The post appraisal system shall be implemented. Furthermore, risk emergency plan shall be exercised without delay; it is required that theoretical knowledge training shall be provided one time monthly and exercise training shall be organized one time semiannually. Additionally, leaders of professional teams for emergency rescue shall participate in the professional training organized by fire department, work safety supervision and management authority and other relevant departments.

9.5.4.7 Emergency rescue support

Once the risk accident happens, it must be guaranteed that the relevant emergency rescue plan can be launched timely, the contamination can be controlled immediately and the terrible influence can be minimized. Therefore, the support related to emergency rescue shall be prepared perfectly in daily work.

(1) Emergency communication support

Be clear about communication contact information and method of the units and staffs that are related to emergency work and provide alternative schemes. Establish information communication system and maintenance scheme to ensure the smooth information transmission during the emergency.

(2) Supporting of contingency group

Be clear about manpower resources of various emergency responses, including the organization and support schemes of professional emergency teams and part-time emergency teams.

(3) Emergency materials and equipment support

Allocate a fixed amount of fund for contamination accident which is used for the purchase, management and maintenance of daily emergency materials and equipment, especially for the inspection of fire equipment, sprinklers preventing contaminant dispersion and conditions of some supporting devices. They shall be kept by designated people.

(4) Expenditure support

Units need to ensure that a fixed amount of fund will be allocated to risk prevention which shall be cost for its specified purpose only, and the emergency expenditure can be used promptly under the emergency condition.

(5) Other supports

According to the requirements of the emergency work for the Project, there are other relevant supporting measures such as technical supports, transportation supports, security supports, medical supports and logistical supports.

9.6 Conclusion of Risk Assessment

(1) Potential hazardous accidents in the Project include the ammonia tank leakage, fire explosion, ammonia leakage from desulfurization facilities, failure of pollution disposal facilities and hazardous article leakage during the transportation. Accident of ammonia tank leakage constitutes the maximum credible accident of the Project and brings to certain environmental risk; after adopting the various risk management measures proposed by the environmental impact assessment, the environmental risk will be in the acceptable range.

(2) Although the incidence of risk accident is low, the Project has potential accident risk. Therefore, it shall actively take protective measures from various aspects like construction, production, storage and transportation for safety. When the accident happens, engineering emergency measures and social emergency measures shall be adopted to control the accident and reduce harms to environment.

10. Compliance of Industrial Policies and Plan

10.1 Compliance Analysis of Industrial Policies

(1) Compliance analysis of the *Directory Catalogue on Readjustment of Industrial Structure* (Version 2011)

Power plants of the Project use 4×60MW back-pressure CHP units. According to the Clause 3 (Adopt back-pressure "back pressure extraction" CHP units, CCHP units and CHP units of 300MW or more) of encouraged projects of first kind in electric power industry specified in *Directory Catalogue on Readjustment of Industrial Structure* (Version 2011) (Revision 2013) that is drafted by NDRC (National Development and Reform Commission), the Project belongs to the encouraged projects.

Yangjiachang Town Industrial Park CHP Project in Gong'an County synchronously constructs desulfurization and denitration facilities, in which flue gas bypass is not set for flue gas desulfurization facility; bag-type dust collectors are synchronously constructed with the Project; the comprehensive utilization of ashes and slags and desulfurized gypsum of the Project reaches to 100%; all of these comply with the *National "12th Five-year Plan" for Environmental Protection*.

The project builds up 4×60MW unit (two sets during Phase I, one of them is for standby), but if it is CHP Project, it is out of limits with generating coal consumption being 136.17g standard coal/KW hour. It synchronously constructs desulfurization facilities and online monitoring system for flue gas; the project introduces relevant water saving technology in accordance with *Guide for Water Saving of Thermal Power Plant*, and the average conversion to water consumption index of power plant all year round is 0.120m³/(s·GW). It complies with *Notice of the National Development and Reform Commission (NDRC) on Related Requirements for the Plan and Construction of Coal-fired Power Plant Project* (FGNY [2004] No.864) promulgated by NDRC.

The project constructs supporting facilities for desulfurization facilities to meet the discharge standard of SO₂ and the requirements of total amount control index, finally achieves "three simultaneities" of environmental protection equipment and the main engine. Wet limestone-gypsum process is introduced and the desulphurization efficiency shall be ensured to be over 96.5% without desulfurization flue gas bypass; online monitoring system for flue gas is established synchronously and the desulfurized gypsum generated from the project will be utilized comprehensively, in compliance with requirements of *Technical Policies for SO₂ Emission Prevention and Control* ([2002] No.26) that is issued by State Environmental Protection Administration, State Economic and Trade Commission and Ministry of Science and Technology.

(2) *Action Plan for Upgrading and Transformation of Energy Saving and Pollution Emission Reduction for Coal Power Industry* (2014-2020)

Based on the Item 4 (Strictly control atmospheric pollutant emission) of Article 2 (Strengthen control for access to new units) specified in *Action Plan for Upgrading and Transformation of Energy Saving and Pollution Emission Reduction for Coal Power Industry* (2014-2020) (FGNY [2014]). New coal-fired power generator units (including units under construction and units of the Project incorporated into national thermal power construction plan) shall be synchronously constructed with advanced as well as efficient desulfurization, denitration and dust removal facilities, but the flue gas bypass passage shall not be provided. Item 6: Actively develop CHP. "Determine power by heat" shall be insisted, thermal load shall be strictly implemented, CHP plan shall be formulated scientifically, highly efficient coal-fired thermal power units shall be provided, supporting heating pipe network shall be synchronized in the evening, and the disperse coal-fired small boilers within the centralized heat supply range shall be replaced and eliminated within a time limit. By 2020, the installed capacity of coal-fired thermal power units should try to occupy 28% of the overall installed capacity of coal-fired power units. In middle and small cities and the industrial park of concentrated thermal load, the back-pressure thermal power unit should be constructed preferentially;

CCHP development shall be encouraged.

The Project provides with CHP units in Qingji Industrial Park and Yangjiachang Town Industrial Park in which the thermal load is concentrated, meanwhile, provides with highly efficient desulfurization, denitration and dust removal facilities, which complies with relevant requirements specified in the *Action Plan for Upgrading and Transformation of Energy Saving and Pollution Emission Reduction for Coal Power Industry (2014-2020)*.

10.2 Site Selection Feasibility Analysis

10.2.1 Impact analysis with the flood diversion and storage area of Gong'an

Partial region of Gong'an County is located in Huxi reserve storage area of Jingjiang flood diversion and storage area, and the Project is implemented in this flood diversion and storage area. After finishing *Urban and Rural Master Plan of Gong'an County (2013-2030)*, Gong'an County specially entrusted Changjiang Survey, Planning, Design and Research Co., Ltd. to compile *Flood Impact Assessment Report of Urban and Rural Master Plan of Gong'an County (2013-2030)* (Draft for Review), main conclusions refer to the report in this assessment are as follows:

(1) The implementation of *Urban and Rural Master Plan of Gong'an County (2013-2030)* will be in favor of the economic development in Jingjiang flood diversion and storage area and HuXi reserve storage area; the plan conducts living area of residents in the flood storage area to avoid the unordered construction by local residents influencing its flood storage function; the traffic plan is also a supplement to safe transfer road of flood storage area, furthermore, it is shown by the computed results of flood impact assessment that after the project is built, it will not bring obviously adverse impact to discharge and retreat flood in Jingjiang flood diversion area.

(2) Comprehensive assessment conclusion of the building project's impact on flood control

In compliance with the requirements of relevant plan related to flood storage and detention area, *Urban and Rural Master Plan of Gong'an County* has a slight impact on diverting and retreating flood in Jingjiang flood diversion and storage area, and basically has no effect on safety construction facilities of flood diversion and storage area as well as river canal system of flood diversion area.

(3) Comprehensive assessment conclusion of flood impact on the building Project

Flood control standards of main buildings in the *Urban and Rural Master Plan of Gong'an County* are lower than the operation probability of flood storage area; the first floor of main buildings is generally placed under 42m of Dujiatai flood storage water level. During the flood diversion by flood storage area, the buildings located in that part will be submerged by flood. It is suggested that the design department should complete relative designs to ensure flood inundation having no effect on project safety.

The Project is located in the flood diversion and storage area. It is demonstrated from above argument conclusion that the construction of Project basically has no influence on the operation of flood diversion and storage area, while the flood impact on the Project is mainly reflected in that the building under 42m elevation will be submerged during the flood storage; therefore, the Employer shall make relevant designs for the design and construction of relevant buildings and structures to ensure that flood impact will not influence project safety.

On June 25th, 2015, Changjiang Water Resources Commission was entrusted by the Ministry of Water Resource to hold the technical review meeting of *Flood Impact Assessment Report of Urban and Rural Master Plan of Gong'an County (2013-2030)* in Wuhan, the mainly extracted technical review opinions of experts in this assessment are as follows: (1) The adopted technical routes in the report are feasible with relatively comprehensive contents and basically reasonable conclusions; (2) The implementation of the plan has no effect on the overall flood control structure of Jingjiang River section; (3) Urban and rural

master plan has few effects on flood diversion, flood retreat and safety construction in Jingjiang flood diversion area and HuXi reserve storage area; (4) The operation probability of Jingjiang flood diversion area and HuXi reserve storage area for flood diversion is extremely low, which is rarely used within 100 years. When operating the flood storage and detention area, except safe area and safety platform can ensure flood control safety, the other areas will be submerged; and partial building facilities will be influenced by flood immersion and scour. The plan and the Employer shall pay attention to such impacts. Experts also propose some suggestions, in which two items have relation with the Project that are as follows: 4. The plan department shall have further improvement in industry layout of the flood storage and detention area, forbid building plants and warehouses having severe contamination in the flood storage and detention area, and forbid producing or storing chemicals, toxic substances and other dangerous goods that may cause severe contamination. 5. During the implementation of the planning Project, it shall prepare a flood impact assessment report for the Project according to relevant regulations and combine with concrete design schemes, which shall be submitted to the competent administrative authority of water resources for approval.”

For that reason, flood impact assessment report of the Project shall be authorized to a qualified unit to prepare according to the requirements and a reply shall be obtained from the competent administrative authority of water resources before beginning the Project.

10.2.2 Water and soil conservation plan

The site of proposed project is located at the junction of Gong'an County Qingji Industrial Park and planned Yangjiachang Town Industrial Park; the Project covers 209,333.33m² (including Solid Wastes Project of 37,666.67m²), which is of permanent land. The Employer has entrusted Hubei Water Resources Research Institute to prepare the water and soil conservation plan report of the Project which has passed the examination by expert review meeting; it has been modified and reported to the superior according to procedures. The Employer shall comply with “three simultaneities” system based on water and soil, strictly execute *Water and Soil Conservation Plan Statement of the Project*, and be in compliance with approval opinions of department of water resources to put prevention plan and measures of water and soil loss into practice.

Based on the premise that various water and soil conservation measures of the plan are implemented strictly as well as soil and water conservation monitoring and supervisor work are completed, water and soil loss within the limitation of liability for prevention and treatment can be reduced.

10.2.3 Compliance analysis of supporting facilities

The proposed project takes advantage of the planning industrial land for construction without occupation of basic farmlands and cultivated lands, which complies with *Regulations on the Protection of Basic Farmland* issued by the State Council. The plant site has following favorable conditions:

(1) Transportation conditions

Located in the plant area of Changtai Paper Industry (Wuhan) Co., Ltd. (new construction), the Project makes use of traffic system and passageway of paper plant without additionally separate passageway towards outside. Qingji Industrial Park plans to build up a main road framework composed of “two horizontal and three longitudinal roads” and a road framework composed of “three horizontal and four longitudinal roads”. Now 30km roads and supporting facilities are completed including Chanling Avenue extension line, Chengye Road, Kaile Road, Xingye Road, Youyi East Road and Xingsheng Road. The supporting deepwater docks of the park as well as abundant power supply system are comprehensively completed. Jingzhou-Yueyang Railway and Jiangnan Expressway are under construction. Qingji Industrial Park will have a stereo-traffic network composed of railway, expressway and water shipping terminals at the scheduled time.

(2) Water supply and drainage system

1) Water supply

Water supply system of the Project relies on the water supply and drainage system of Packing Board Project to provide water. Water supply and drainage system of the whole plant under planning and construction takes water-using and drainage requirements of the Project and CHP Project into account. Therefore, the Project only needs to provide with supporting water supply and drainage pipe network within the scope of corresponding Project. The water used in the Packing Board Project sources from the Gong'an Section of the Yangtze River. This Yangtze River section is Category III water, with abundant water, generally not contaminated water quality, and good exploitation and utilization conditions.

The source of domestic water in the plant area is municipal water.

The total water consumption for the first stage and the second stage of the Project is 56,400m³/d, 28,200m³/d for each of the stages. The feedwater treatment station is planned with the daily treatment capacity of 65,000m³/d, and water after treatment is sent to each workshop by the water supply pump room. The feedwater treatment station is planned for once and constructed in steps, including a construction scale of 32,500m³/d respectively at the first stage and second stage.

2) Drainage

Drainage of the plant area in the Project is divided into production wastewater drainage system and rain drainage system. The domestic sewage is discharged into the wastewater treatment station together with other production wastewater through pipeline gravity flow after anaerobic digestion treatment by the septic-tank, then flows into the discharge pool after standard treatment, lifted by sewage pump, is discharged into the Yangtze River section in Gong'an County Qingji Industrial Park by one about 2,500m long DN800mm special steel pipe in way of diffused duck-billed discharge. Discharge points after being treated are at the downstream of the whole park.

The rainwater in the plant area is collected by open ditches or pipelines, is discharged into the channel, and finally enters into Xuzhang Canal.

(3) Power supply work

When the Project works normally, its electricity is provided mainly by thermal power station in the park.

The supporting thermal power station will be intensively built in Qingji Industrial Park, to provide steam and electricity for the setting-in enterprises in the park. This power station is separated from the Project by a wall to supply power and steam required for normal production of the Project, and the wastewater sludge, production waste residue generated in the Project are sent to the power station for incineration. The supporting general step-down station of the Project will be arranged in thermal power station.

110kV substation is planned in the park, about 1km from the Project; the rod line of its transmission line passes by the land for the Project, and the power source of the power system in the Project is proposed to be provided by this substation with dedicated double-loop overhead lines.

10.2.4 Analysis of environment restraint

(1) Analysis of predominant wind direction impact

Northeast wind and north wind are annual prevailing wind directions in Gong'an County. South wind prevails in summer. Partial area of Yangjiachang Town is located under the summer prevailing wind direction of Project, which may have influence on residents of downwind direction.

(2) Sensitive point

The distance from the Project to Gong'an County is about 2.2km, the sensitive points within the plant area surrounding of 1km are scattered. Residents' buildings that are within the

health protection distance and atmospheric protection distance need to be removed.

The site selection of the proposed project complies with requirements of overall planning for urban development and development planning for development zone; after the removal of residents within the health protection distance and atmospheric protection distance, it will have a slight impact on surrounding residents. The Project is located at the Yangjiachang Town Industrial Park in Gong'an County with quite perfect utilities. Analyze comprehensively from various aspects, the site selection of proposed project is basically reasonable.

10.3 Analysis of the Rationality of Layout Plan

The plant area of the Project is divided into four major regions: coal yard region, main power house region and auxiliary and ancillary facility region. The plant area of the Project is divided into four major regions: coal yard region, main power house region and auxiliary and ancillary facility region. The fixed end of the main power house faces south and the expansion is towards north.

The main power house region is located in the middle of the plant area, and the coal handling trestle is led in from the fixed end of the main power house region. The steam turbine house, deaerator bay, coal bunker bin, boiler room, precipitator, induced draft fan, chimney and desulfurization facilities are arranged in the main power house region from the west to the east. Main transformer, etc. are arranged out of row A.

The coal yard region includes automobile coal unloading station, coal storage yard, coal bearing wastewater treatment facility, forwarding station and trestle, etc. The automobile coal unloading station is located in the northernmost of the power plant, close to the logistics exit. A bar-shaped coal yard is arranged in the south of the automobile coal unloading station.

The auxiliary and ancillary facilities include integrated water pump house, mechanical draft cooling tower, industrial pond, reusing water tank, material depot and maintenance room, boiler feedwater treatment workshop, etc. mainly arranged on the fixed end, and located in the south of the main power house.

The land for the plant area of the Project covers an area of 171,666.67m² within the boundary line.

In consideration that the boiler layout of the Project is close to waste paper shed warehouses of 2.20Mt High-grade Packaging Board Project of the Employer, the Employer need to comply with requirements specified in code for fire protection of the paper plant to make partial adjustment and amendment to the general drawing of the Project, in order to ensure that the Project will not bring potential fire risk to waste paper sheds of Packaging Board Project.

(1) Vertical design

Construction land of the Project is relatively flat, and its 0m level is in consistence with the paper plant area with the height difference indoor and outdoor being 300mm. The site rainwater is drained via the method of open ditch and concealed pipe to the rainwater drainage system of the plant area.

(2) Greening design

Greening design in the plant area adopts the layout of combination form of points, lines and planes, takes advantage of sporadic lands to plant antifouling shrubs, plants arbors along both sides of roads and lawn in the open land to create a good external environment space.

10.4 Compliance Analysis of Environment Policies

Compliance analysis of the project and relevant environment policies can be found in the Table 10-1.

Table 10-1 Compliance Analysis of Environment Policies

SN	Policy requirements	Related contents of the Project	Compliance
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EIA Report on the Yangjiachang Town Industrial Park CHP Project in Gong'an County

1	"Twelfth Five-year Plan" for National Environmental Protection		
1.1	New coal-fired units shall be constructed synchronously with desulfurization facilities, while the serving coal-fired units without desulfurization facilities shall speed up the elimination or construction of desulfurization facilities. Flue gas desulfurization facilities shall abolish flue gas bypass according to regulations. Accelerate the transformation for low nitrogen combustion technology and the construction for flue gas denitration facilities of coal-fired units. Coal-fired units with unit capacity above 300MW (including 300MW) shall add denitration facilities. Strengthen the supervision to operation of desulfurization and denitration facilities; those unable to stably meet the discharge standard shall be transformed within a definite time.	Desulfurization and denitration facilities are proposed to be constructed for the Project synchronously. Flue gas desulfurization facilities don't provide flue gas bypass.	Consistent
1.2	Entirely complete the approval for water source conservation area of urban centralized drinking water, and ban the illegal building projects and drain outlets in the water source conservation area.	It is not concerning the water source conservation area of urban centralized drinking water; after treatment, the discharge of wastewater from the project will be discharged into wastewater treatment plant for disposal and then will be discharged via the common drain outlets of the paper plant.	Consistent
1.3	The control to industrial flue gas, powder and dust shall be strengthened; the transformation to dust removal facilities of coal-fired power plant and cement plant shall be advanced; coal-fired boiler above 20 T/h (including 20 T/h) shall be installed with high efficiency deduster.	Three-field electrostatic deduster and bag deduster shall be constructed synchronously with the project.	Consistent
1.4	Preferential policies for the utilization and disposal of industrial solid wastes shall be improved and encouraged; the technological development for comprehensive utilization and disposal of industrial solid wastes shall be intensified; pollution prevention of staple industrial solid wastes such as coal gangue, fly ash, industrial by-product gypsum and waste residues form the smelting and chemical industry shall be strengthened. By 2015, the comprehensive utilization of industrial solid wastes shall be 72%.	Based on the commitments of the Employer, ash and slag yard shall be constructed synchronously with the project, and comprehensive utilization agreement about ash and slag shall be signed with relevant enterprises. All ash and slag as well as desulphurization gypsum generated from the Project shall be comprehensively utilized with 100% comprehensive utilization.	Consistent
2	<i>Notice of the National Development and Reform Commission on Related Requirements for the Plan and Construction of Coal-fired Power Plant Project</i> (FGNY [2004] No.864) promulgated by NDRC.		
2.1	Except some special areas like Tibet, Xinjiang and Hainan, other areas shall plan to complete coal-fired power station project of high parameters, high capacity, high efficiency and environment friendly for water saving. The unit capacity of the selected units shall be 600MW or more in principle, and the generating coal consumption shall be controlled under 286g standard coal/KW hour.	The project builds up 4×60MW unit (two sets during Phase I, one of them is for standby), but if it is CHP Project, it is out of limits with generating coal consumption being 136.17g standard coal/KW hour.	Conform
2.2	Flue gas desulfurization facilities shall be constructed synchronously with the project of new or extended coal-fired power plant.	The project builds up 4×60MW unit (two sets during Phase I, one of them is for standby), and desulfurization facilities will be constructed synchronously.	Conform
2.3	Online continuous monitoring device of emission shall be constructed synchronously with all coal-fired power plants.	The project synchronously establishes online monitoring system for flue gas	Conform
2.4	All power station Projects shall strictly control the land use scale and strictly perform the approval procedures specified by the state for land use. In principle, basic farmlands shall not be occupied.	The site of the Project is located in Yangjiachang Town Industrial Park of Gong'an County, Hubei province, which is at the southwest corner of the project planning red line range of Changtai Paper Industry. It does not belong to basic farmlands. At present, preview comments on painting powder primer of the Employer are handled in Hubei Provincial Department of Land and Resources.	After obtaining approval comments on the land of the Project. Conform
2.5	Insist domestically purchasing principle. New and extended coal-fired power plants have obligation to undertake the missions of technology import and	Domestic unit is used in the project.	Conform

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	equipment domesticization. China encourages to use domestic generating equipment. Without permission of the state, the import of coal-fired generating equipment is prohibited.		
2.6	Encourage new or extended coal-fired power plant project to adopt new techniques and technologies for reducing water consumption.	The project introduces relevant water saving technology in accordance with <i>Guide for Water Saving of Thermal Power Plant</i> and the average conversion to water consumption index of power plant all year round is 0.120m ³ /(s·GW).	Conform
3	<i>Technical Policies for SO₂ Emission Prevention and Control</i> ([2002] No.26), issued by State Environmental Protection Administration, State Economic and Trade Commission and Ministry of Science and Technology.		Conform
3.1	New, extended or rebuilt coal-fired power plant shall be equipped with desulfurization facilities during the period of constructing plant to meet the discharge standard and the requirement of total amount control of SO ₂ emission. Flue gas desulfurization facilities shall be come into use at the same time of main engine goes into service.	The project constructs supporting facilities for desulfurization facilities to meet the discharge standard of SO ₂ and the requirements of total amount control index, finally achieves "three simultaneities" of environmental protection equipment and the main engine.	Conform
3.2	Boiler of the power plant with high-capacity unit (≥200MW) shall give priority to wet limestone-gypsum process when it is installed with flue gas desulfurization facilities. Desulfurization efficiency shall be ensured over 90% and operational rate shall be ensured over 95% of normal power generation time of the power plant.	Wet limestone-gypsum process is introduced in the project and the desulfurization efficiency shall be ensured to be over 96.5% without desulfurization flue gas bypass.	Conform
3.3	The online continuous monitoring devices for SO ₂ , smoke and other pollutants shall be provided for flue gas emission from the thermal power unit and networked with the management information system of competent environmental protection administration.	The project synchronously establishes online monitoring system for flue gas	Conform
3.4	When constructing flue gas desulfurization devices, the recycle and comprehensive utilization of by-product shall be taken into account at the same time to reduce the output and emission of wastes.	Desulfurization gypsum generated from the project will be comprehensively utilized.	Conform
4	<i>Notice of Related Requirements for the Plan and Construction of Coal-fired Power Plant Project</i> (FGNY [2004] No.864)		
4.1	Flue gas desulfurization facilities shall be constructed synchronously with the project of new or extended coal-fired power plant according to national environment protection standards. When expanding the power station, the operated coal-fired unit of the power station without additional desulfurization facilities shall be equipped with desulfurization devices synchronously. Encourage the power enterprises to transform the operated coal-fired power unit by dust removal and desulfurization. Online continuous monitoring device of emission shall be constructed synchronously with all coal-fired power plants.	Desulfurization facilities and online continuous monitoring device of emission will be constructed synchronously with the project.	Conform
4.2	All power station Projects shall strictly control the land use scale and strictly perform the approval procedures specified by the state for land use. In principle, basic farmlands shall not be occupied. Give priority to the power station project of occupying less land and not occupying the cultivated land at the present stage.	The site of the Project is located in Yangjiachang Town Industrial Park of Gong'an County, Hubei province, which is at the southwest corner of the project planning red line range of Changtai Paper Industry and does not occupy basic farmlands.	Conform
5	<i>Announcement on Publishing Environmental Impact Report of Thermal Power Project for Acceptance</i> (SEPA [2006] No. 39)		
5.1	It must be listed into the encouraged category and permitted category of <i>Directory Catalogue on Readjustment of Industrial Structure</i> issued by the state.	The project belongs to the encouraged projects of <i>Directory Catalogue on Readjustment of Industrial Structure</i> .	Conform
5.2	New, extended and transformed thermal power projects must comply with the requirements of "increase production without increasing pollution" or "increase production and decrease production". According to the measures like desulfurizing the serving units and shutting down small units or emissions trading or "regional reduction" method to meet the indicator of total amount of	By shutting down small boilers in some certain regions to achieve the requirements of "increase production without increasing pollution", the government of Gong'an County has committed to shut down equivalent small boilers after completing the	Conform

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	pollutants discharge from the Project and clearly point out specific emission reduction measures.	Project.	
5.3	The new, extended and transformed project belonging to six power groups then its indicator of total amount of SO ₂ discharge must be obtained from the total amount control indicator of six power groups; and it shall acquire confirmation from the power group corporation and provincial-level environment protection authority of its location.	It does not belong to six power groups.	Conform
6	<i>12th Five-Year Plan on Air Pollution Prevention and Control in Key Regions</i>		
6.1	The planning area includes Beijing-Tianjin-Hebei area, Yangtze River Delta area, Pearl River Delta area, the middle area of Liaoning, Shandong, Wuhan and its surroundings, Changsha-Zhuzhou-Xiangtan area, Chengdu-Chong area, west coast of the straits, the central and north area of Shanxi, central Shaanxi, Ganning, and new city agglomerations in Urumchi of Xinjiang (specific scope can be found in attached table), which is concerning 19 provinces, municipalities and municipalities directly under the central government.	The project is located in Gong'an County, Jingzhou City.	Not in the planning scope
7	<i>Opinion for Strengthening Construction of Monitoring Capabilities of Ambient Air Quality</i> (HF [2012] No. 33)		
7.1	Monitor the indicator of fine particles (PM _{2.5}), ozone (O ₃), carbonic oxide (CO), etc. according to the new <i>Ambient Air Quality Standards</i> . Carry out monitoring work in key regions such as Beijing-Tianjin-Hebei area, Yangtze River Delta area and Pearl River Delta area, municipalities directly under the central government and provincial capitals as well as municipalities with independent planning status (all national control point locations, similarly hereinafter) in 2012. Carry out monitoring work in 113 environmental protection key cities and model cities in 2013. Carry out monitoring work in all cities above prefecture-level in 2015. The above regions shall monitor and assess ambient air quality conditions in compliance with new standards, and real-time issue the monitoring results point-to-point to society from January 1, 2016.	Jingzhou City, in which Gong'an County is located, belonging to environmental protection key cities and model cities, has monitored and assessed ambient air quality conditions in compliance with new standards since 2013.	Conform
8	<i>Notice of Implementing the Ambient Air Quality Standards</i> (GB3095-2012) (HF [2012] No.11)		
8.1	(I) The time requirements for implementing new standards by stages: key regions such as Beijing-Tianjin-Hebei area, Yangtze River Delta area and Pearl River Delta area, as well as municipalities directly under the central government and provincial capitals shall implement new standards in 2012; 113 environmental protection key cities and national environmental protection model cities shall implement new standards in 2013; All cities above prefecture-level shall implement new standards in 2015; New standards shall be implemented throughout the country on January 1, 2016.	Jingzhou City has implemented new standards in 2013.	Consistent
9	<i>Circular of the State Council on Forwarding the Guiding Ideas of Ministry of Environmental Protection and Other Departments about Promoting Joint Prevention and Control Work of Atmospheric Pollution to Improve the Regional Air Quality</i> (GBF [2010] No.33)		
9.1	Special emission limits of atmospheric pollutants in key industries within key regions shall be formulated and implemented; the new construction and extension of thermal power plants except ones belong to "Replacing Small-capacity Units with Large-capacity Ones" and CHP project shall be strictly controlled; the construction of thermal power plants except CHP shall be forbidden in urban area of prefecture-level city.	Not belong to key regions or urban area of prefecture-level city	Consistent
10	<i>Circular of the State Council on Printing and Distributing Action Plan for Air Pollution Prevention and Control</i> (GF [2013] No.37)		
10.1	Accelerate the transformation project construction of desulfurization, denitration and dust removal in key industries. All coal-fired power plants shall be equipped with desulfurization facilities; coal-fired boiler with 20 T/h or more shall carry out desulfurization. Denitration facilities shall be installed in coal-fired units except	Desulfurization and denitration facilities are proposed to be constructed for the Project synchronously. Flue gas desulfurization facilities don't provide	Consistent

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	circulating fluidized bedboilers. Existing dust removal facilities of coal-fired boilers and industrial kilns shall be upgraded and transformed.	flue gas bypass.	
10.2	According to requirements of major functional zoning plan, reasonably make sure the development layout, structure and scale of key industry; major project shall be distributed to the optimizing development zone and key development zone in principle. All new, transformed and extended projects must be assessed about their environmental impacts; projects that do not pass the assessment and approval of environmental impact are prohibited to start construction; projects of illegal construction will receive punishments according to law.	Based on <i>Notice of the Provincial People's Government on Issuing the Major Functional Zoning Plan of Hubei Province</i> (EZF [2012] No.106), the project located in Gong'an County which belongs to Yijing state-level main producing area for agricultural products is in the restricted development zone. This zone prioritizes paddies, wheats, corns, cottons, "double low" high quality oilseed rapes, live pigs, aquatic products, tangerines, tea leaves, etc. This zone has built up a comprehensive agricultural development area which emphasizes on grain, cotton, oil, aquatic product, live pig, forest product, fowl, etc., which makes it become the important agricultural production base and commodity grain base in the country. The project carries out the environment impact assessment according to law.	Consistent
10.3	Put total amount control of pollutant emission into effect strictly. Whether the emission of SO ₂ , NO _x , flue gas, powder and dust as well as volatile organics is in accordance with total amount control requirement shall be an approval precondition by environmental impact assessment for building a project.		Consistent

10.5 Compliance Analysis of Relevant Plans

10.5.1 Compliance Analysis of Major Functional Zoning Plan of Hubei Province

10.5.1.1 Overview of major functional zoning plan of Hubei Province

Major Functional Zoning Plan of Hubei Province has been prepared on the basis of *Notice of State Council on Preparing National Major Functional Zoning Plan* (GF [2007] No.21), *National Major Functional Zoning Plan*, and *Outline of the 12th Five-Year Plan for the National Economic and Social Development of Hubei Province*, which covers all national land spaces throughout Hubei Province. By 2020, the main objectives of major functional zones shall be achieved.

(1) Guidelines

With the vigorous implementation of "Promoting Central Area to Rise" strategy by the state and the deep fulfillment of "Unitary Multilevel Strategic System" by Hubei Province, Hubei Province will have a new development period. From now to 2020, it will be a quickly changing period for the structure of national land development space of Hubei Province. Guided by *Scientific Outlook on Development*, Hubei Province shall base upon the current development situation of national land and space within the provincial area to solve prominent problems and resolve potential risks, be clear about the basic guideline of optimizing the structure of national land development space, and actively advance the construction of major functional zones of Hubei Province.

According to the guideline, the whole province shall build up a new development idea:

— Be clear about functions and draw a clear distinction between the primary and the secondary. Most of national lands and spaces in Hubei Province are adaptable to multiple developments, which are characterized by undertaking diversity functions. Proceeding from the actual conditions of national strategies and practical development of Hubei Province and based on basic rules of regional space development, Hubei shall be clear about major functions of certain zones. The major function can be the supply of industrial goods and serving products, or the supply of agricultural products and ecological products. During the

same time of giving priority to develop major functions, other auxiliary functions shall be moderately developed to form a regional division system with a clearly hierarchy. Major functions are guides for regional development while auxiliary functions are necessary supplement of regional development.

—— Bear permission and speed up development. Under the premises of defining regional major functions and knowing the carrying capacity threshold value on resource and environment by scientific measurement and based on the “weakness” of carrying capacity on resource and environment, Hubei will optimize the contents and approaches of developing national land and space and speed up the progress of industrialization and urbanization, in order to obtain a harmonious development among regional population, industries and space.

—— Use intensively and optimize development. Because of a relatively low economic and social development level of Hubei Province, Hubei has a good foundation for the intensive use and effective use of national land and space. Developing national land and space in the future shall insist sustainable concept and persevere in the intensive use of construction space. During the same time of promoting comprehensive development of economy and society, Hubei will optimize space structure, guarantee living space, enlarge green ecological space and ensure agricultural production space according to the requirements of production development, affluent life and good ecological environment.

—— Protect ecosystems and control intensity. There are various topography and landform conditions in Hubei Province, so that combination conditions of various geographic elements have conspicuous regional differences. Ecological functions in Qinling-Bashan Mountain Area at the northwest Hubei, Wuling Mountain Area at the southwest Hubei, Dabie Mountain Area at the northeast Hubei and Mufu Mountain Area at the southeast Hubei are prominent, which has an important ecological significance and should not carry out the large-scale development of industrialization and urbanization. Necessary green space in major development zones shall be maintained to meet local residents' requirements for ecological products. Therefore, all kinds of major functional zones shall strictly control the development intensity.

—— Give full play to advantages and develop together. Major development zones shall positively optimize national development space structure, vigorously promote new industrialization and urbanization, and efficiently aggregate population and industries. Restricted development zones shall give full play to their geographical advantages to develop specialty industries, supply with agricultural products and ecological products with high quality and high added-value and promote regional economic development. Meanwhile, financial departments at all levels shall increase the transfer payments to restricted development zones, and launch a pilot project of horizontal transfer payment towards restricted development zones in major development zones for promoting the equalization of fundamental public services.

(2) Division of major functional zones

From the perspective of development methods, national land and space in Hubei Province can be divided into three categories: major development zone, restricted development zone and prohibited development zone; from the perspective of developing contents, it can be divided into urbanized zone, main producing zone for agricultural products and key ecological functional zone; from the perspective of hierarchy, it can be divided into national level and provincial level.

Major development zone, restricted development zone and prohibited development zone are divided on the basis of resource and environment carrying capacity, present development intensity as well as future development potential in such zone, and on the basis that whether it is adaptable to or how to conduct industrialized development and urbanized development of large-scale and high intensity.

The division of urbanized zone, main producing zone for agricultural products and key ecological functional zone depends on the supply of major products. Urbanized zone refers

to the major function of the zone is providing industrial goods and serving products with agricultural products and ecological products as a supplement; main producing zone for agricultural products refers to the major function of the zone is providing agricultural products with ecological products, serving products and industrial goods as a supplement; key ecological functional zone refers to the major function of the zone is providing ecological products with certain agricultural products, serving products and industrial goods as a supplement.

Major development zone refers to the urbanized zone that has certain economic foundation, strong resource and environment carrying capacity, great development potential and good conditions to aggregate population and economy, which shall receive key industrialized development and urbanized development.

Restricted development zone has two types. One is main producing zone for agricultural products that has a large area of cultivated land with good agricultural development conditions. Although it is adaptable to industrialized development and urbanized development, improving the comprehensive agricultural production capacity must be taken as top priority according to the needs of ensuring the safety of agricultural products and sustainable development. Therefore, industrialized development and urbanized development of large-scale and high intensity in such zone shall be restricted. The other is key ecological functional zone which has a fragile ecological system, significant ecological functions and low resource and environment carrying capacity without conditions for industrialized development and urbanized development of large-scale and high intensity. Therefore, enhancing the production capacity of ecological products shall be taken as top priority, and industrialized development and urbanized development of large-scale and high intensity in such zone shall be restricted.

Prohibited development zone refers to the zones that belong to various reserve areas at all levels of natural and cultural resources which are built up according to law, as well as other key ecological functional zones dotted distributed in major development zone and restricted development zone in which the special protection is required and industrialized development and urbanized development are forbidden. National prohibited development zones include national nature reserve, world cultural and natural heritage, national park of China, national forest park, national geological park, national wetland park, flood storage and detention area, etc. Provincial prohibited development zones include various reserve areas at all levels of natural and cultural resources and major water source of provincial level and below, as well as other prohibited development zones that are confirmed by other provincial people's governments as required.

Despite of different major functions, development methods, top priorities for development and supporting emphases, various major functional zones have a same important status in economic and social development in Hubei Province. For the urbanized zone, it shall be mainly provided with the aggregation of economy and population; for the main producing zone for agricultural products, it shall be mainly provided with the construction of comprehensive agricultural production capacity; for the key ecological functional zone, it shall be mainly provided with the protection and renovation for ecological environment.

10.5.1.2 Compliance Analysis of Major Functional Zoning Plan of Hubei Province

The project is located in "Yijing state-level main producing area for agricultural products" of the "restricted development zone" that is specified in *Major Functional Zoning Plan of Hubei Province*. This zone prioritizes paddies, wheats, corns, cottons, "double low" high quality oilseed rapes, live pigs, aquatic products, tangerines, tea leaves, etc. This zone has built up a comprehensive agricultural development area which emphasizes on grain, cotton, oil, aquatic product, live pig, forest product, fowl, etc., which makes it become the important agricultural production base and commodity grain base in the country.

Main producing zone for agricultural products, as a restricted development zone, has a large area of cultivated land with good agricultural development conditions. Although it is adaptable

to industrialized development and urbanized development, improving the comprehensive agricultural production capacity must be taken as top priority according to the needs of ensuring the safety of agricultural products and sustainable development. Therefore, industrialized development and urbanized development of large-scale and high intensity in such zone shall be restricted. The construction site of project is located within the planning Coal-Power-Railway-Port Development Industrial Park, which occupies the planning construction area with suitable conditions. Therefore, the construction of the project is in compliance with major functional zoning plan of Hubei Province.

10.5.2 Compliance Analysis of Urban Overall Planning of Gong'an County (2005-2020)

10.5.2.1 Planning Period

Near future is 2005-2010, while far future is 2010-2020.

10.5.2.2 Planning scope

Urban planning areas of Gong'an County consist of the whole Douhudi Town, Jiazhuoyuan Town (10 villages including Gaoqiao Village, Jing'an Village, Xiangyang Village, Dongxing Village, Wachi Village, Dongzhen Village, Zhongling Village, Xiaoqiao Village, Shengli Village and Maojiatai Village), and Yangjiachang Town (6 villages including Jinghe Village, Renhe Village, Zhaojia Village, Fuli Village, Lvhua Village and Qingji Village). Total area of planning areas is 137km².

10.5.2.3 County spatial structure

The development of towns in Gong'an County focuses on aggregating population and industries in central city with all towns in the county being centralized to the center for forming a social and economic development pole in the whole county. Other major towns are distributed along the highways of main traffic axes like National Highway 207 and provincial Gongshi Highway within their borders. Export towns that get external contact by national highway and provincial highway are important for town development. Therefore, the spatial structure of the planning development of Gong'an County's town system shows the spatial form of "One-center, Two-axis and Three-exit".

One-center: One central city consists of Douhudi Town and Yangjiachang Town;

Two-axis: Two development axes. Because the exit of Xiangdong Highway coincides with the exit of National Highway 207, the cultivation and development of town system are carried out along the two traffic arteries in the county of National Highway 207 and Gongshi Highway;

Three-exit: The three exit towns are Buhe Town, Ouchi Town and Zhangzhuangpu Town. The three are exits of the two development axes with good regional development conditions. Therefore, they will be developed as key towns.

10.5.3.4 Functional structure of towns

According to the functional similarity and difference in aspects such as politics, economy, traffic and commercial service of various towns in Gong'an County, those towns can be divided into the following types: central town of the county, industry and trade oriented town, agriculture and trade oriented town, commerce and trade oriented town and comprehensive town. The center of Gong'an County is Douhudi Town. There are 4 industry and trade oriented towns: Yangjiachang Town, Ouchi Town, Mengjiayi Town and Nanping Town. There are 3 comprehensive towns: Buhe Town, Haungshantou Town and Zhangzhuangpu Town. Other towns are agriculture and trade oriented towns.

10.5.3.5 Compliance Analysis of Urban Overall Planning of Gong'an County (2005-2020)

Construction site of the project is not located in the prohibited construction zones that are specified in *Urban Overall Planning of Gong'an County (2005-2020)*; the construction site of the project is located in the Yangjiachang Town Industrial Park divided by *Urban Overall Planning of Gong'an County (2005-2020)*. The Park focuses on primary industry and

secondary industry, takes foreign capital enterprises, sole proprietorship enterprises and private enterprises as its main body, led by specialty industries through high-tech, and pays highly attention to industrial sectors like M&E and export processing. From the above analysis we can see that the project complies with the urban overall planning of Gong'an County

10.5.3 Compliance Analysis of Special Planning for Heat Supply of Gong'an County (2014-2030)

The Project is the largest heat supply user in the area. Based on *Special Planning for Heat Supply of Gong'an County (2014-2030)* and *Opinion of Provincial Energy Administration for Approval of Special Planning for Heat Supply of Gong'an County (2014-2030)*:

(1) Heat supply scheme and layout

Heat source station depending on coal fuels is being built in Qingji Industrial Park in the near future and has been completed by 2017. It is suggested the heat source station to adopt back-pressure or back pressure extraction CHP heat supply unit.

(2) Scope of heat supply: Central city of Gong'an County, Qingji Industrial Park, Chanling Industrial Park, old downtown area and new downtown area at the south shall be the planning scope of centralized heat supply.

(3) Planning period of heat supply: Near future is 2014-2020, while far future is 2021-2030.

(4) According to the measurement and calculation for the industrial steam of centralized heat supply area in the near or far future and thermal load used by civilians for heating and refrigeration, the maximum thermal load in the heating period is 1,078.81t/h, in the refrigerating period is 1,053.8t/h, in non-heating or non-refrigerating period is 1,056.4t/h in the near future; while the maximum thermal load in the heating period is 1,441.67t/h, in the refrigerating period is 1,325.67t/h, in non-heating or non-refrigerating period is 1,328.27t/h in the far future.

(5) Adopting centralized heat supply to replace inefficiently decentralized heat supply. Reasonably determine the design idea about the heat supply scale of heat source based on the current condition and development situation of thermal load within centralized heat supply area. Back-pressure CHP unit will be constructed in Qingji Industrial Park recently. Extension for thermal power plant can be considered according to the development situation of thermal load in the far future.

(6) Short-term heating gas pipe network is drawn from heat source station, along the Guanlv Road towards north to Chanling Avenue, and then is paved along the Chanling Avenue towards west to Chengye Road.

(7) Trend of heating power pipe network and layout of heating station sites shall combine with urban construction plan, and be defined in the urban construction plan as the form of planning red line which cannot be changed optionally. Small-scale (oil-) coal-fired boiler in the area covered by the pipe network shall be shut down according to relevant regulations. Under the condition of affluent heating capacity, new small-scale (oil-) coal-fired boiler shall not be constructed in principle.

2.20Mt/a High-grade Packaging Board Project of Changtai Paper Industry (Wuhan) Co., Ltd. is regarded as the largest heat supply user in the area to be planned in heat supply plan. The construction site is close to 2.20Mt/a High-grade Packaging Board Project, which takes the centralized heat supply for other projects in the industrial park into account at the same time. Gong'an County government also promises to shut down small-scale (oil-) coal-fired boiler within the scope of heat supply during the same time of the Project going into operation.

By combining with the plan and approval opinion as well as contrasting with the construction scale, supply scope and unit layout of the Project, it can be demonstrated that the construction of the Project complies with *Special Planning for Heat Supply of Gong'an*

County (2014-2030).

10.5.3 Conformity with the planning of Yangjiachang Town Industrial Park in Gong'an County

According to the EIA conclusion on the planning of Yangjiachang Town Industrial Park in Gong'an County, the planning objectives of industrial park shall be:

- (1) Planning period: The time limit of the plan is from 2014 to 2030.
- (2) Planning scope: Yangjiachang Town Industrial Park of Gong'an County is located at the east urban area of Gong'an County. Planning scope goes to Yangma Reservoir in the west, connects with Huancheng Road and Youyidong Road of Qingji Industrial Park in the north, goes to safety fence of Yangjiachang Town in the northeast and takes Shashi-Gong'an Expressway as its border in the southeast. The planning area is 23.4 Km².
- (3) The future development of Yangjiachang Town Industrial Park has an objective and specific positioning, namely be industrial development base, logistics business center and new ecological industry-appreciate area.
- (4) Functional composition: Dominant function is industrial base including traditional industries, emerging industries, technical research and development, trade and logistics; property function refers to productive service center including financial consultation, business work and education.

Pollution control measures based on EIA report: Until the near term of implementing the plan, obviously improve the air environmental quality in the whole urban area of Gong'an County (including planning park area) and sharply reduce the appearance of heavy pollution weather by speeding up the utilization ratio of clean energy like natural gas, increasing the use ratio of the centralized heat supply scope and eliminating small boilers in planning park area and Qingji Industrial Park.

Adjust the suggestion according to the EIA plan: Industrial group: Land requisition area of the secondary industry is located in the upwind direction of railway station area of the urban overall planning. With the combination of specific industrial layouts, industries located in the upwind direction include papermaking and fine chemicals. Centralized heat supply setting in the paper industrial park is also located in the upwind direction of railway station area. Based on the environmental impact prediction, although centralized heat supply can effectively reduce low and medium pollution source in planning park and Qingji Industrial Park, it also has an impact on its surroundings particularly on particulate matter. Optimizing industrial layouts in Yangjiachang Town Industrial Park and Qingji Industrial Park needs to combine with measures for slowing down air environmental impact in the parks.

The implementation of the Project is in favor of replacing small-scale (oil-) coal-fired boiler in the park (including Qingji Industrial Park), conducting centralized heat supply and improving regional development environment. Under the precondition of implementing *Letter of Peoples' Government of Gong'an County on Reporting the Scheme of Shut Down Small Boilers of the Enterprise in Qingji Industrial Park of Hubei Gong'an Economic Development Zone* (GZH [2015] No.56), the Project complies with review comments.

10.6 Analysis for Setting Rationality of Water Intake and Outlet

By taking Yangtze River as a water intaking source and intaking water from the pump room along the river side, the flow and water level of water intaking section in Gong'an section of the Yangtze River can meet the water intaking requirements of the Project. Current situation of water quality of Gong'an section of the Yangtze River is Type III, which is able to satisfy water requirements of the Project. Water resources and drain outlet setting demonstration reports of the Project has been prepared and respectively received approvals. According to *Review Opinions of Provincial Water Resources Bureau on the Water Resource Demonstration Report for 2.20Mt/a High-grade Packaging Board Project of Changtai Paper Industry (Wuhan) Co., Ltd. and Yangjiachang Town Industrial Park CHP Project in Gong'an*

County (ESXK [2015] No. 151) and *Review Opinions of Provincial Water Resources Bureau on the Demonstration Report of Drain Outlet Setting for the 2.20Mt/a High-grade Packaging Board Project of Changtai Paper Industry (Wuhan) Co., Ltd. and Yangjiachang Town Industrial Park CHP Project in Gong'an County* (ESXK [2015] No. 152), Hubei Provincial Department of Water Resources respectively has approved water intake and drain outlet setting of the Project.

The proposed daily emission volume of wastewater by Changtai Paper Industry (Wuhan) Co., Ltd. is 15,330,000m³/a (including wastewater volume of the Project). The proposed drain pipe is the DN800 pipe. The drain outlet is provided in Yangjiachang Town of Gong'an County (the corresponding Yangtze River stake number is the right stake No. 646+500 of Ejiang River). Geographical coordinates are east longitude 112°17'40" and latitude 30°04'05". The approved emission volume of wastewater of the Project contains the wastewater volume of the Project. It is practicable for discharging the wastewater of the Project after it reaches the standard by being treated in the wastewater treatment station of Changtai Paper Industry (Wuhan) Co., Ltd.

The water consumption of the whole Changtai Paper Industrial Park (including the 2.20Mt/a High-grade Packaging Board Project, CHP Project and Comprehensive Solid Wastes Utilization Project) comes from intaking Yangtze River by company. Water intake approved by Provincial Water Resources Bureau is located in the Yangjiachang Town of Gong'an County that is at the right bank of Yangtze River (the corresponding Yangtze River stake number is the right stake No. 647+300 of Ejiang River). Geographical coordinates are east longitude 112°16'39" and latitude 30°02'50". It is designed 340 annual operation days, 75,000m³ daily intake amount and 25,500,000m³ annual intake amount. Water source of the Project can be guaranteed completely.

10.7 Environmental Function Division of the Project Location

According to regional environmental function division, investigation and assessment on current status of environmental quality, the ambient air quality in proposed project area complies with secondary standard in *Ambient Air Quality Standard* (GB3095-2012), the boundary noise of proposed works is within the limiting value of Type 3 in *Environmental Quality Standard for Noise* (GB3096-2008), and pollution bearing water body of Gong'an section of the Yangtze River complies with Type III in *Environmental Quality Standards for Surface Water* (GB3838-2002). After the completed project goes into operation, waste gas, wastewater and noise generated from it will be discharged when reaching the standard by being treated through corresponding environmental protection measures, which has a slight impact on regional environment capacity and on quality requirements of regional environmental function division. It is in accordance with related requirements of regional environmental protection plan and environmental function division.

10.8 Impact Analysis of the Project on Environmental Sensitive Points

As for various pollution sources, the Project takes advantage of corresponding pollution control measures. After the treatment by pollution control measures, discharged pollutants can satisfy corresponding requirements of pollutant discharge standard and total amount control of pollutants. Therefore, pollution control measures have certain environmental feasibility.

According to the assessment on environmental impact prediction, the project under normal operation condition has a slight influence on environmental sensitive points, air pollution as environmental protection target and noise pollution without impact on environment functional requirements of environmental sensitive points. By classifying and disposing to reach the standard, the production process wastewater, domestic sewage and flushing wastewater will be discharged by the drain outlet of the Project located at Yangtze River, which is connected by self-established drain pipe.

Moreover, fugitive waste gas in non-point source of the Project is not provided with environment protection distance. After the field investigation, it is found that there are still

some residents in the Project location area. After completing relocation and settlement in such area, environmental sensitive points like long-term residents within the protective range will disappear. Environmentally sensitive buildings including residential area, school and hospital shall not be constructed within the air environment protection distance of the Project in future.

10.9 Analysis Conclusion

The proposed project, belonging to the encouraged projects specified in *Directory Catalogue on Readjustment of Industrial Structure* (2011) (revised in 2013), is in compliance with related industrial policies and management requirements.

The proposed project is in compliance with relatively regional, provincial-level and prefecture-level plans such as *Major Functional Zoning Plan of Hubei Province*, *Urban Overall Planning of Gong'an County* (2005-2020) and Yangjiachang Town Industrial Park Plan.

The proposed project meets the relevant requirements of feasible site selection, environmental function division and intake and drainage scheme setting. In general, the Project has environmental feasibility from the view of environmental protection.

11. Cleaner Production Level and Total Amount Control

11.1 Clean Production

As a new environmental protection strategy, cleaner production is a kind of transformation from merely depending on end treatment gradually to process control. The purpose of cleaner production is to reach the most optimized economic growth level by minimal environmental impact and resources utilization as well as best management mode, finally to achieve the sustainable development goal in economy. The implementation of cleaner production is a requirement of sustainable development strategy in thermal power industry and an effective method for controlling environmental pollution. It not only greatly decreases end treatment burden of thermal power plant, but also promotes enterprises to enhance their management level, lower production cost and increase economic returns. Consequently, market competitiveness of the enterprise will be improved with a good social image.

12.1.1 Cleaner production measures

Yangjiachang Town Industrial Park CHP Project in Gong'an County takes cleaner production requirements into full consideration in its design. It complies with relevant national industrial policies and *Promotion Law of Cleaner Production* by power saving, water saving, energy conservation, conservation of raw materials, pollution control and other measures.

11.1.1.1 Flue gas cleaning measures

(1) The circulating fluidized bedboiler + external limestone - gypsum wet flue gas desulfurization system shall be applied to ensure the total desulphurization efficiency to be greater than or equal to 96.5%. The flue upon reaching the standard shall be exhausted by the exhaust funnel with height of 180m and outlet diameter of 4m.

(2) Smoke dust shall be removed by the electric bag dedusting system with the total dedusting efficiency of greater than or equal to 99.93% (the electric bag deduster (99.85%) + desulfurization system (50%)), and then discharged by the exhaust funnel with height of 180m and outlet diameter of 4m upon reaching the standard.

(3) The SNCR denitration technology is applied for the boiler. The ammonia water shall be served as the denitrifying agent with the denitrifying efficiency of greater than or equal to 50%. Nox shall be exhausted by the exhaust funnel with height of 180m and outlet diameter of 4m.

11.1.1.2 Water saving measures

(1) Utilize water for multiple purposes. Backwater of industrial water can be recycled after cooling by cooling tower, which can effectively reduce new water consumption.

(2) Adopting the dry ash handling system is able to avoid evaporation loss caused by plenty of ash removal water entering into ash yard, effectively to decrease the water consumption of ash handling system, and consequently to decrease water supply of the whole plant.

(3) Coal handling system strictly calculates the flushing water volume in accordance with the procedures; coal-bearing wastewater is recycled after treatment. Consequently, flushing water volume of dust prevention for coal handling system will be reduced.

(4) Install water metering devices in the main effluent pipe and key water consumption branch pipe of water supply systems. Provide devices for regulating and controlling flow when necessary, and send the main measurement data to a fixed site for statistical analysis, so as to control the quantity of water accordingly.

11.1.1.3 Solid waste control measures

The project actively seeks comprehensive utilization method for ash and slag as well as desulfurization ash and slag of power plant in order to reduce the emission volume of solid waste of power plant to the full extent.

Construction content of ash and slag yard of the Project is out of the range of the EIA proposed assessment so that the yard will be built up at the separately site in the park. At present, site selection of ash and slag yard has been basically completed, and the Employer has provided commitments by *Commitment Letter of CHP Project on Supporting Project of Ash and Slag Yard being Synchronously Completed and Operated* which will ensure that the ash and slag yard will be synchronously used with the Project. The assessment requires the Employer to practically perform his commitments for ensuring that the ash and slag yard will be synchronously designed, constructed and operated with the Project. Once the ash and slag yard is not synchronously constructed and operated, then the Project shall not be put into operation.

Now the Owner of the project has signed the preliminary agreement about the comprehensive utilization of ash and slag (details of the agreement can be found in annex). Hence, the comprehensive utilization of ash and slag of the project has been practicable with 100% comprehensive utilization rate of ash and slag each year.

11.1.1.4 Energy saving measures

- (1) The matching parameter of generator and steam turbine can avoid insufficient or extremely large generator power.
- (2) Select main transformer with low loss and high voltage station transformer.
- (3) The buildings shall be distributed by taking consideration of reasonable orientation, and try to take advantage of natural lighting and ventilation to minimize artificial lighting and mechanical ventilation for saving power.
- (4) Reasonably select and match motor capacity. Motor with high efficiency and high power factor shall be selected to avoid wasting energy and reduce power consumption rate.
- (5) Energy-efficient fans shall be selected with frequency converter.
- (6) Electric feed pump adopts hydrodynamic coupling for speed governing, while feeder and others use frequency converter, which can increase efficiency and reduce electric consumption.
- (7) Lighting system takes advantage of energy-efficient luminaires to reduce the application amount of incandescent lamps as much as possible.

11.1.1.5 Measures to save raw materials

- (1) According to respectively medium parameters of all pipes of gas, water, oil, smoke, wind, powder, etc. at the current period to consider appropriate surplus capacity, and the principles of materials saving, system optimization and economical affordable to select optimally materials and textures. The optimal pipe diameter shall be selected on the basis of specified flow velocity and pressure loss. Consequently, it can achieve the goal of saving materials, optimizing system and improving economic performance.
- (2) Boiler ignition with combustion supporting oil system and boiler combustion system shall be designed reasonably to reduce fuel consumption.

11.1.2 Indexes on cleaner production

According to *Cleaner Production Assessment Index System of Electricity (Coal-fired Power Plants)* (NDRC [2015] No.9), the comprehensive assessment index of cleaner production in thermal power industry consists of two assessments that are quantitative assessment index and qualitative assessment index. On the basis of restrictive index reaching Level III, index grading and weighting assessment method can be used to calculate comprehensive assessment index of cleaner production in industry. Cleaner production level can be confirmed according to comprehensive assessment index.

Assessment on cleaner production level of coal-fired power plants depends on their comprehensive assessment index of cleaner production. As for enterprises that reach certainly comprehensive assessment index, they will be respectively assessed as leading

enterprise, advanced enterprise or ordinary enterprise of cleaner production.

According to the practical situation of coal-fired power industry in our country at present, the comprehensive assessment indexes of cleaner production enterprises at different levels are divided into the following levels:

(1) Level I (international leading level in cleaner production): $Y_I \geq 85$ in the meantime, and all restrictive indexes shall meet the requirement of benchmark value at Level I.

(2) Level II (domestic leading level in cleaner production): $Y_{II} \geq 85$ in the meantime, and all restrictive indexes shall meet the requirement of benchmark value at Level II.

(1) Level III (domestic ordinary level in cleaner production): $Y_{III} = 100$ in the meantime, and all restrictive indexes shall meet the requirement of benchmark value and over at Level III.

11.1.2.1 Appraisal Method of Quantitative Assessment Index Different cleaner production index has different dimension, so that it cannot be directly compared. Function of original index needs to be established.

$$Y_{g_k}(x_{ij}) = \begin{cases} 1, & x_{ij} \in g_k \\ 0, & x_{ij} \notin g_k \end{cases}$$

Where:

x_{ij} represents the j^{th} Grade 2 index under the i^{th} Grade 1 index; g_k represents the benchmark value of Grade 2 index, with g_1 , g_2 and g_3 being the Level I, II and III respectively; $Y_{g_k}(x_{ij})$ is the function of Grade 2 index x_{ij} corresponding to the Level g_k . As shown in formula (1), if the index x_{ij} belongs to the Level g_k , the function value is 1 then, otherwise 0.

The comprehensive assessment index is a comprehensive index that evaluates the overall cleaner production level of the enterprise being evaluated in the evaluation year. The difference between the comprehensive assessment indexes reflects the gap of the cleaner production levels between enterprises. The comprehensive assessment index of cleaner production is calculated by formula (2):

$$Y_{g_k} = \sum_{i=1}^m (w_i \sum_{j=1}^{n_i} \omega_{ij} Y_{g_k}(x_{ij}))$$

where, w_i is the weight under the i^{th} Grade 1 index, ω_{ij} is the weight of the j^{th} Grade 2 index

$$\sum_{i=1}^m w_i = 1, \quad \sum_{j=1}^{n_i} \omega_{ij} = 1$$

under the i^{th} Grade 1 index, wherein m is the number of Grade 1 indexes; n_i is the number of the Grade 2 indexes under the i^{th} Grade 1 index. In addition, Y_{g_1} , Y_{g_2} and Y_{g_3} equal to Y_I , Y_{II} , and Y_{III} respectively. The cleaner production evaluation indexes aim at the assessment of the cleaner production level of the plant. When different types of generator units are involved, the indexes will be separately determined to employ the weighted average method for the yearly generated energy.

(2) Results of quantitative evaluation index

The cleaner production indexes of the Yangjiachang Town Industrial Park CHP Project in Gong'an County are checked by the final phase project. See Table 11.1-1 for the assessment results of the quantitative evaluation indexes.

Table 11.1-1 Referential Evaluation Indexes of the Project

SN	Grade 1 index	Weight of Grade 1 index	Grade 2 index	Unit	Weight of Grade 2 index	Level I benchmark value	Level II benchmark value	Level III benchmark value	The Project			
1	Indexes on production technology and facility	0.10	Turbine equipment		15	With efficient, energy-saving and advanced design techniques or subject to technical transformation for efficiency and energy saving			Level I			
			Boiler equipment		15	With efficient, energy-saving and advanced design techniques, or subject to technical transformation for efficiency and energy saving			Level I			
			Optimization of unit operation mode		15	Optimized the overall unit operation, and equipped with the real-time online operation optimization system	Optimized the overall unit operation		Level I			
			National and industrial key cleaner production technologies		20	Employ the national and industrial key cleaner production technologies, or subject to the technical transformation for cleaner production			Level I			
			Technology and energy efficiency of pump and fan systems		15	Adopt the capacity matching and shift technology of pump and fan, and reach the Grade 1 of energy efficiency	Adopt the capacity matching and shift technology of pump and fan, and reach the national energy efficiency standards		Level I			
			Removal process of mercury and its compounds		10	With combined cooperative control technology for flue gas control			Level I			
			Wastewater recycling		10	With complete wastewater recycling system			Level I			
2	Indexes on resource and energy consumption	0.36	*Power supply coal consumption of straight condensing wet cooling unit	Ultra-supercritical 1,000MW	g/(KW·h)	70	282	286	290	Level II		
				Ultra-supercritical 600MW	g/(KW·h)		287	292	298			
				Supercritical 600MW	g/(KW·h)		296	302	306			
				Supercritical 300MW	g/(KW·h)		312	316	319			
				Subcritical 600MW	g/(KW·h)		312	316	320			
				Subcritical 300MW	g/(KW·h)		318	323	331			
				Ultrahigh pressure 200MW	g/(KW·h)		336	346	355			
			*Power supply coal consumption of straight condensing air cooling unit	Direct air cooling unit	g/(KW·h)	Wet cooling+16		Wet cooling+16			Wet cooling+18	
				Indirect air cooling unit	g/(KW·h)	Wet cooling+10		Wet cooling+10			Wet cooling+12	
			*Power supply coal consumption of straight condensing circulating fluidized bed unit	g/(KW·h)	Wet cooling+7		Wet cooling+8		Wet cooling+10			
			*Power supply coal consumption of heating unit	g/(KW·h)	The benchmark value of the power supply coal consumption rate of non-heating working condition is the same as that of the straight condensing turbine unit, and the heating working condition is assessed by combining the actual heating load with reference to the straight condensing unit.							
			*Water consumption	600MW and above	m3/(MW·h)	30	1.49	1.56	1.68		Level II	
				300MW	m3/(MW·h)		1.55	1.63	1.71			

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			of unit generated energy of circulating cooler unit	<300MW	m3/(MW·h)		1.70	1.78	1.85	
			*Water consumption of unit generated energy of once-through cooler unit	600MW and above	m3/(MW·h)		0.29	0.31	0.33	
				300MW	m3/(MW·h)		0.30	0.32	0.34	
			*Water consumption of unit generated energy of air cooling unit	<300MW	m3/(MW·h)		0.36	0.39	0.41	
				600MW and above	m3/(MW·h)		0.31	0.34	0.37	
			300MW	m3/(MW·h)		0.32	0.35	0.38		
			<300MW	m3/(MW·h)		0.39	0.41	0.45		
			3	Indexes on resource utilization	0.15	Comprehensive utilization rate of fly ash	%	30	90	80
Comprehensive utilization rate of desulfurization by-products	%	30				90	80	70	Level I	
Recycling rate of wastewater	%	40				90	88	85	Level III	
4	Indexes on pollutant emission	0.25	*Dust emission of unit generated energy	g/(KW·h)	20	0.06	0.09	0.13	Level I	
			*SO ₂ emission of unit generated energy	g/(KW·h)	20	0.15	0.22	0.43	Level I	
			*NO _x emission of unit generated energy	g/(KW·h)	20	0.22	0.43	0.43	Level I	
			*Wastewater discharge of unit generated energy	Kg/(KW·h)	15	0.15	0.18	0.23	Level I	
			Emission concentration of mercury and its compounds		15	Relevant standards are reached in line with the Standard GB 13223.			Level I	
			Boundary noise emission intensity	dB(A)	10	Standards are reached at boundary and sensitive points.			Level I	
5	Indexes on cleaner production management	0.14	*Industrial policy compliance		8	The related national and local industrial policies are observed, and no production technology and equipment prohibited or obsolete by national order are used.			Level I	
			*Total amount control		8	The total pollutant emission and energy consumption meet the relevant national and local government provisions.			Level I	
			*Up-to-standard emission		8	The pollutant emission concentration meets the relevant national and local government provisions.			Level I	
			*Cleaner production review		12	The cleaner production is reviewed in the light of national and local provisions.			Level I	
			Supervision and management system of cleaner production		10	Regarding cleaner production, management department and special management personnel are configured, sound management system and incentives management methods are provided, and work plan and annual working program are formulated.			Level I	
			Fuel balance		5	It is enabled based on the Standard DL/T606.2.			Level I	
			Heat balance		5	It is enabled based on the Standard DL/T606.3.			Level I	

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		Electrical energy balance	5	It is enabled based on the Standard DL/T606.4.			Level I
		Water balance test	5	It is enabled based on the Standard DL/T606.5.			Level I
		Pollutant emission monitoring and information disclosure	6	According to the regulations of national and industrial standards, the automatic pollutant emission monitoring equipment are installed and networked with the monitoring equipment of the competent environmental protection and electricity departments, and the normal operation of the equipment is ensured.	According to the regulations of national and industrial standards, the pollutant emission is monitored regularly.	Level I	
		Establishment of hazardous chemical and solid waste management system and the environmental emergency plan for hazardous waste	6	Such system and plan are in place completely.			Level I
		*No environmental pollution accident during the review period	6	During the review period, no relevant laws and regulations on cleaner production are violated and no environmental pollution accident happens.			Level I
		Equipping rate of measuring instruments for energy and water use equipment	8	The equipping rate is 100% with reference to Standards GB/T21369 and GB24789.	The equipping rate is 95% with reference to Standards GB/T21369 and GB24789.	The equipping rate is 90% with reference to Standards GB/T21369 and GB24789.	Level II
		Energy-saving management	8	In accordance with national regulations, the energy-saving assessment and energy audit are performed, the energy-saving potentials are discovered, and the completion rate of energy-saving reform project is 100%.	In accordance with national regulations, the energy-saving assessment and energy audit are performed, the energy-saving potentials are discovered, and the completion rate of energy-saving reform project is 80%.	In accordance with national regulations, the energy-saving assessment and energy audit are performed, the energy-saving potentials are discovered, and the completion rate of energy-saving reform project is 60%.	Level II
Note: The indexes with * are the restrictive indexes.							

11.1.2.2 Conclusion on cleaner production

Based on the results of index assessment in Table 11.3-1, the comprehensive assessment index YII of the cleaner production of the Project is 94. Therefore, the cleaner production level of Yangjiachang Town Industrial Park CHP Project of Changtai Paper Industry (Wuhan) Co., Ltd. is the domestic advanced level.

11.2 Total Mount Control**11.2.1 Total amount control factors**

In line with the requirements of the Ministry of Environmental Protection on the total amount control of pollutant emission, by considering the process and discharge characteristics of the engineering project, environment quantity status of the region located and the requirements of the environmental management authorities of Hubei province, the pollutant subject to the total amount control determined in this evaluation are as follows:

Atmospheric pollutants: SO₂ and NO_x.

Water pollutant: COD and NH₃-N.

Solid Waste.

11.2.2 Analysis of total pollutant amount control

The wastewater production of the proposed project is 242.36t/h, and the final treated discharge amount is 55.36t/h, which is pre-treated and further treated in the wastewater treatment station of the packaging board project prior to discharge, and the respective amounts of COD and NH₃-N in the up-to-standard discharge are 14.53t/a and 0.163t/a. In the environmental impact assessment of the packaging board project, the wastewater and pollutants from Project are not taken into account, then, the total amount control indexes of the COD and NH₃-N checked need to be verified and applied separately in this assessment.

According to the computation of this assessment, the main total waste gas control indexes of the Project are SO₂ and NO_x with a flue gas amount of 4×379,230m³/h and a respective emission concentration of 81.68mg/m³ and 81.92mg/m³. Therefore, in waste gas, the respective amount of SO₂, NO_x, smoke, dust and mercury is 1,011t/a, 1,014t/a, 346.59t/a, 23.052t/a and 0.037t/a.

But currently, the calculation shall be done as per the methods stipulated in the *Technical Methods for the Verification of the Total Emission Indexes of Major Pollutants in Construction Project* in the *Circular on Printing and Issuing the Interim Measures on the Review and Management of Total Emission Indexes of Major Pollutants in Construction Project* (HF [2014] No. 197) promulgated by the Ministry of Environmental Protection (December 30, 2014). The calculation is as follows:

Power supply coal consumption:

$$151.3\text{g/kwh} \times 13.54 \times 10^8 \text{kwh/a} = 2,048,602 \times 10^8 \text{g/a} = 204,860.2 \text{t/a};$$

Heating coal consumption: $39.33\text{kg/GJ} \times 2,650.48 \times 10^4$

$$\text{GJ/a} = 104,243.3784 \times 10^4 \text{kg/a} = 1,042,433.784 \text{t/a};$$

Ratio of coal consumption for heating and power supply: $1,042,433.784/204,860.2 = 5.088:1$

The formula regulated in the *Technical Methods for the Verification of the Total Emission Indexes of Major Pollutants in Construction Project* is as follows:

$$M_i = (\text{CAPI} \times 5500 + D_i / 1000) \times \text{GPS}_i \times 10^{-3}$$

where, M_i is the total emission index of the major atmospheric pollutants the i^{th} unit required for replacement, t/a;

CAPI is the installed capacity of the i^{th} unit, MW;

GPS_i is the emission performance value of the i^{th} unit, g/kW h. See Tables 11.2-1 and 11.2-2

for the performance values.

The heat supply of the CHP unit is converted into the generated energy, presented by equivalent generated energy. The formula is $D_i = H_i \times 0.278 \times 0.3$,

where, D_i is the equivalent generated energy converted from the heating capacity of the i^{th} unit, kW·h;

H_i is the heating capacity of the i^{th} unit, MJ.

Table 11.2-1 Emission Performance Value of SO₂ of Coal-fired Unit

Region	Performance value (kg/kW h)
High-sulfur coal regions	0.70
Key regions	0.175
Other regions	0.35

Note: High-sulfur coal regions refer to Guangxi, Chongqing, Sichuan and Guizhou; key regions refer to the 47 cities of prefecture level and above defined in the *Announcement on the Implementation of Special Emission Limits for Atmospheric Pollutants* (MEP [2013] No. 14 Notice), which are adjusted with the scope adjustment of the special emission limits for atmospheric pollutants made by the Ministry of Environmental Protection.

Table 12-2 Emission Performance Value of NO_x of Coal-fired Unit

Region	Type of boiler/unit	Performance value (kg/kW h)
Key regions	Total	0.35
	W-flame boiler	0.70
Other regions	Other boilers	0.35

Note: See Table 11.2-1 for the scope of key areas. The emission performance values of SO₂ and NO_x of oil- and gas-fired units are verified based on the flue gas emission of unit generated energy corresponding to the fuel the project uses and the allowable emission concentration limits.

According to the above formula, the total amount control index of SO₂ calculated is 1,042.26t/a, and that of NO_x is 1,042.26t/a.

In combination with the ratio of the heating coal consumption and power supply coal consumption, the emission of SO₂ for heating and power supply is 871.06t/a and 171.20t/a respectively; the emission of NO_x for heating and power supply is 871.06t/a and 171.20t/a respectively; in addition, the respective emission of smoke and dust is 346.59t/a and 23.052t/a, and the emission of mercury and its compounds in flue gas is 0.037t/a.

See Table 12.2-3 for the calculation and the recommended total amount index in the assessment.

Table 12.2-3 Details of the Total Mount Control Indexes of Pollutants from the Project (Final Phase)

Classification	Pollutant name	Initially calculated emission (t/a)		Recommended total amount index (t/a)	Recommended solution	
Waste gas	SO ₂	104 2.26	Power supply	171.20	172.0	Internal adjustment of local thermal power industry
			Heat supply	871.06	872.0	Intra-regional adjustment of local environment protection authority
	NO _x	104 2.26	Power supply	171.20	172.0	Internal adjustment of local thermal power industry
			Heat supply	871.06	872.0	Intra-regional adjustment of local environment protection authority
	Soot		346.59	347.0	Intra-regional adjustment and supply of local environment protection authority	
	Dust		23.052	24.0		
Mercury		0.037	0.037			
Waste	COD _{cr}		14.53	15.0		

water	NH ₃ -N	0.163	0.2	
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11.2.3 Total amount control source and feasibility analysis

According to the provision, “qualified regions and units can implement the pollution right trading of SO₂”, in the *Decision of the State Council on Implementing Scientific Viewpoint of Development and Strengthening Environmental Protection* (GF [2005] No. 39), the Article 17 of the *Decision on Implementing Scientific Viewpoint of Development and Strengthening Environmental Protection* of the provincial people’s government required the “implementation of pilot pollution right trading”. On September 4, 2014, the *Circular on Printing and Issuing the ‘Implementing Rules on the Methods of Pollution Right Trading of Major Pollutants in Hubei Province’* (EHB [2014] No. 277) of the provincial government office clearly stipulated the qualification of the transferor and transferee of trading and the trading scope. The pollution rights of major pollutants from shutting down and technical transformation are reclaimed without charge by competent provincial administrative department of environmental protection, and are traded or reserved by such department.

In the course of pollution right trading, the provisions of the *Methods of Pollution Right Trading of Major Pollutants in Hubei Province* (EZF [2012] No. 64) shall be strictly observed.

In the *On the Request of Changtai Paper Industry (Wuhan) Co., Ltd. for Total Emission Indexes of Major Pollutants of the CHP Project* (JHH [2015] No. 170) issued by Jingzhou Environmental Protection Bureau, the source of the total amount indexes of conventional pollutants of the Project is illustrated:

In terms of the COD and ammonia nitrogen indexes required by the Project, Jingzhou Environmental Protection Bureau proposes to adjust from the 802.79 tons of COD emission reduction and 929.6 tons of ammonia nitrogen emission reduction of Hubei Datian Chemical Co., Ltd. confirmed by the Ministry of Environmental Protection in 2013.

For the SO₂ index, it is proposed to be adjusted from the 8,035.22 tons of full emission reduction of SO₂ of Hubei Songyuan Gangue Power Co., Ltd. confirmed by the Ministry of Environmental Protection in 2014, 534.8 tons of which were adjusted for Songzi Long Chen Paper Co., Ltd., and the remained 7,500.42 tons can satisfy the Project.

The total emission index of NO_x required is proposed to be adjusted from the 1,380.23 tons of full emission reduction of NO_x of Guodian Changyuan Jingzhou Thermal Power Co., Ltd. confirmed in 2014 by the Ministry of Environmental Protection.

11.3 Standardized Management Scheme for Drain Outlet

Based on the documents HF [1999] No. 24 of State Environmental Protection Administration and EHJ [1999] No. 17 of Hubei Environmental Protection Bureau, in order to further enhancing the site supervision and management of pollution source, and better implement the total pollutant control objective put forward by the State council, all the pollution emission organizations which are new, expanded, transformed and subject to control within a limit period shall be provided with standardized drain outlets while building pollution control facilities, and be accepted as a necessary component and works of the environmental protection three simultaneities. Therefore, enterprises shall ensure that:

- (1) The drain outlets of wastewater and waste gas are standard for easy measurement, and wastewater and waste gas flowmeters are installed.
- (2) Sign board at drain outlet is provided, which shall be produced under supervision at the places designated by the State Environmental Protection Administration and meet the provisions of the *Graphical Signs for Environmental Protection* (GB15562.1-2--1995).
- (3) Online monitor is installed to monitor the operation state of the pollution control facilities of the company, and to enable the online monitoring and remote data transmission of the flow, pollutant concentration and other indexes. The online continuous monitoring devices for SO₂, NO_x, smoke and other pollutants are equipped and networked with the

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management information system of competent environmental protection administration.

12 Analysis of Environmental Economic Profit and Loss

12.1 Environmental protection investment

In order to pursue interests and avoid risks in the construction and operation periods of the Project, and obtain good economic, social and environmental benefits, the Employer invests a lot in the construction of environmental protection facilities. With the high environmental investment, the environmental influence brought by the Project can be effectively controlled, so as to minimize the impact of the construction on the surroundings to achieve the integration of economic, social and environmental benefits.

The estimated total environmental investment of the Project is about CNY 57.60 million, accounting for 3.62% of the total project investment CNY 1,589.32 million. See Table 12.1-1 for the detailed environmental investment.

Table 12.1-1 Estimated Environmental Investment

SN	Item	Cost (CNY 10,000)	Remarks
1	Flue gas and dust removal system	4700	Including the cost of complete facility, such as facility and equipment, support, foundation, flue and supporting device
2	Desulfurization facilities		
3	Denitration facility		
4	Chimney		
5	Other waste gas control measures		
6	Noise control	100	Excluding the price difference of low-noise equipment
7	Industrial wastewater treatment system	100	Including the construction costs of the collection, pre-treatment, temporary storage and transmission systems of industrial wastewater
8	Coal-contained wastewater treatment system		
9	Oily wastewater treatment system		
10	Sewage treatment system		
11	Emergency pool		
12	Continuous flue gas emission monitoring system	500	Including equipment cost
14	Greening and revegetation	200	Mainly the greening cost for plant area as per requirements
15	Household garbage collection	10	Training expense for disposal by the local environmental sanitation department
16	Temporary storage of hazardous waste	50	Cost for the construction of temporary storage site
18	Environmental investment in construction period	100	Sewage treatment facilities (pit latrine), industrial wastewater treatment facilities (grit chamber and temporary drainage ditch), dust suppression measures (tarpaulin), household garbage collection, etc.
	Total	5760	The construction investment for the ash and slag silo for the temporary storage and disposal of ash and slag as well as the coal shed in the project plan is not involved.

12.2 Environmental Economic Benefit Analysis

12.2.1 Social Benefits

The Project is located at the Gong'an Qingji Industrial Park and the Yangjiachang Town Industrial Park under planning. Currently, the construction of development zone is rapidly developed, and the major industrial heat consumers with larger demand in the parks are COFCO Cereals and Oils Industry (Jingzhou) Co., Ltd., Hubei Zhencheng Paper Co., Ltd.,

Shine Star (Hubei) Biological Engineering Co., Ltd., Hubei Isolane Agricultural Science and Technology Co., Ltd., Hubei Huaye Aquatic Product Co., Ltd., Hubei Fuyi Building Materials Co., Ltd., Hubei Kaile Science & Technology Co., Ltd., etc. The existing industrial heat consumers in the central city of Gong'an County are mainly concentrated in Qingji Industrial Park, with a small amount in old and new towns; since the central city of Gong'an County has no unified planning on centralized heating, the heat demand of the settled enterprises cannot be solved in a centralized manner, as a result, the settled enterprises build internal boilers on their own to solve respective heat supply problems. According to investigation, the capacity of the existing boiler in Gong'an County is 0.3~35t/h, while the actual load of the enterprise in short term is only 30%~40% of the installed capacity, thus the energy, equipment utilization rates are low, the initial cost is high, and the environmental pollution is very serious.

By making scientific heat supply plan, in a mode dominated by centralized heat supply, the Yangjiachang Town Industrial Park CHP Project in Gong'an County plans the heat supply status of the entire development zone as a whole, reasonably provides heating systems, centrally and effectively controls the pollution source and promotes the sustainable economic development, being favorable to the perfection of supporting infrastructure, energy saving, relief of environmental pollution pressure and the improvement of atmospheric pollution, thus to provide environmentally friendly, energy-saving and clean energy as well as good investment environment for the enterprises in the development zone.

At the same time, the construction of the Project will proactively advance the sustainable regional industrial development, further meet the power demand of local pillar industries and residents, and offer jobs to this area to promote the re-employment and the transfer of rural surplus labor, playing a positive role in the local economic development and the entire social progress and development. The Project integrates the cleaner production, comprehensive resource utilization, ecological design and sustainable consumption as well, and accelerates the overall regional economy development, which will not increase environmental risks and is the concrete implementation of the concept of building a "resource-saving and environment-friendly society".

12.2.2 Environmental benefit

The construction and operation of the Project will consume coal and water resources inevitably, occupy land resource and discharge environmental pollutants, which will have certain negative environmental impact on the area the plant is located.

However, the cleaner production guideline which controls pollution from source is carried out throughout all stages of the Project, including design, construction and operation. The main principles are as follows:

- 1) Use high-capacity high-parameter boiler and power generation equipment to increase the energy utilization rate and reduce the consumption of coal and water.
- 2) Employ advanced flue gas cleaning technology to practically decrease the emission of SO₂, NO_x and smoke and ease the impact on environment.
- 3) Treat all kinds of wastewater up to standard and recycle.
- 4) Seek for the methods of expanding the comprehensive utilization of fly ash and desulfurization gypsum with efforts to increase the utilization rate.

For the pollutant emission, the advanced flue gas dedusting, desulfurization and denitration measures as well as the wastewater treatment and recycle measures are taken to control the emission. Many energy-saving measures are taken during the process system design and the selection of main and auxiliary equipment, such as use no equipment with high energy consumption and low efficiency and no obsoleted products; the unit system is adopted for the thermodynamic system with unit slip parameter started up and deaerator sliding pressure operated to reduce the heat consumption of unit.

Numerous water conservation measures are taken for the water supply and drainage

system; requirement for water quality of the intermission-draining cooling water of boiler, make-up water of slag handling system, spraying water for coal yard, make-up water for dedusting and of flushing water of coal conveying system, and the make-up water of flushing water for main power house ground is not high, the up-to-standard wastewater is considered to be utilized then with the water management of the entire plant taken into account.

During operation, the coal with high calorific value and low sulfur content is used to control the output of pollutants; considering the coal quality variation, the coal blending schemes and the engineering measures ensuring coal quality are optimized; the online continuous monitoring system of flue gas pollutants are installed to control the pollutant emission.

Accordingly, in terms of increasing the coal utilization rate, reducing the energy consumption ratio, saving and decreasing the water and coal consumption and taking practical effective measures to cut the pollutant emission, the Project owns a comparative advanced level in China.

China's economy is experiencing rapid growth, so is the closely related electric power. There is only one planet in the world. The Project's power generation with high efficiency, low energy consumption and low and blowdown rate will gradually replace the contrary power generation, which is of great significance to the saving and optimal configuration of important strategic resources and the sustainable development.

12.2.3 Estimation of environmental protection cost

The operation cost of environmental protection facility includes:

(1) Depreciation cost

Calculated by 20 years of engineering service without scrap value, during the operation period, the annual depreciation cost of environmental protection facility is about CNY 24.4545 million.

(2) Operation cost

Calculated by 5% of the environmental investment, the operation cost of environmental protection facility of the Project during the operation period is about CNY 24.4545 million.

(3) Maintenance cost

Calculated by 2% of the environmental investment, the annual maintenance cost of environmental protection facility is around CNY 9.7818 million.

(4) Total

The total annual environmental protection cost of the Project is CNY 58.6908 million, which is shown in Table 12.2-1.

Table 12.2-1 Estimated Operation Cost of Environmental Protection Facility

SN	Item	Environmental protection cost (CNY 10,000/year)
1	Depreciation cost	2445.45
2	Operation cost	2445.45
3	Maintenance cost	978.18
	Total	5869.08

12.2.4 Estimation of environmental investment income

The implementation of the environmental protection and control measures of the project can effectively control pollution, protect environment and can bring certain economic and environmental benefits through the comprehensive waste utilization. Based on the production technology analysis of the proposed project, direct economic benefit and indirect environmental benefit can be brought through the environmental protection and control of the Project. The direct economic benefit is consisted of the reduced pollution charge due to

pollution control and the economic benefit gained from the comprehensive waste utilization.

In order to cut the expenditure of pollution charge, according to the regulation of the *Administrative Measures of Collection Standard of Pollutant Discharge Fee* of the Decree No. 31 of the State Development Planning Commission, Ministry of Finance, State Environmental Protection Administration and State Economic and Trade Commission, the *Pollution Charge Standards of Hubei Province*, and the *Notice on the Adjustment of Pollution Charge Standards and Relevant Issues* of Hubei Provincial Finance Department that "by the end of June 2015, the pricing, finance and environment protection authorities of each province (district/city) shall adjust the collection standards of SO₂ and NO_x emission in waste gas to no less than CNY 1.2 for each pollution equivalent, and adjust the collection standards of the chemical oxygen demand, ammonia nitrogen and five major heavy metals (lead, mercury, chromium, cadmium and metalloid arsenic) discharge in wastewater to no less than CNY 1.4 for each pollution equivalent", the pollution charge is calculated.

① Reduced pollution charge estimation of atmospheric pollutant

The design guaranteed efficiency of desulfurization and denitration systems of the Project is 96.5% and 50% respectively, and the respective amounts of SO₂ and NO_x removed are 33,940t/a and 1,113t/a. In line with the *Pollution Charge Standards*, it is estimated that CNY 42.063 million can be saved annually.

② Reduced pollution charge estimation of solid waste

According to the engineering analysis, the main solid wastes generated after the operation of the Project are ash & slag and desulphurization gypsum, the respective annual output of which is 310,992t/a and 129,920t/a.

The approximate yearly pollution charge reduced from the solid waste control is 20×(310,992+129,920)=CNY 8.818 million/a.

③ Economic benefit gained from comprehensive solid waste utilization

The benefit gained from the ash & slag and desulphurization gypsum sales, calculated by CNY 50 per ton, is 50×(310,992+129,920)=CNY 22.046 million/a.

Above all, the pollution charge reduced due to the atmospheric pollution control is CNY 42.063 million and that due to the solid waste recycle is CNY 8.818 million, and the benefits gained from the comprehensive solid waste utilization is CNY 22.046 million. The total sum is CNY 72.927 million with calculation results shown in Table 12.2-2.

Table 12.2-2 Estimation of environmental investment income

Item	Estimated reduced charge (CNY 10,000)
Reduced charge of atmospheric pollution	4206.3
Reduced charge of solid waste pollution	881.8
Benefit of comprehensive solid waste utilization	2204.6
Total	7292.7

12.2.5 Analysis of Environmental Economic Profit and Loss

The environmental economic profit and loss coefficient is determined as per the following formula, based on the estimation of environmental protection cost and benefit.

$$P = \frac{X}{Y}$$

Where:

P-environmental economic profit and loss coefficient;

X-environmental protection benefit;

Y-environmental protection cost.

The annual environmental protection benefit is CNY 72.977 million and the annual environmental protection cost is CNY 58.6908 million, then the environmental economic profit and loss coefficient of the Project is:

$$P=7297.7/5869.08\approx 1.243>1$$

From the above formula, it can be seen that the ratio of benefit to cost is 1.243, indicating that the environmental investment of the Project can obtain significant environmental benefit. Therefore, the environmental investment of the Project is feasible from the perspective of environmental economic profit and loss analysis.

13 Environmental Management and Monitoring Plan

13.1 Environmental management

Strengthening environmental management is a necessary means to ensure the up-to-standard emission of pollution sources and the normal operation of pollution control facilities, and the environmental management of an enterprise is directly related to the regional environmental quality. Since there are many pollution sources, great waste gas and pollutant emission, as well as the environmental risks caused by abnormal and accident pollutant discharge, the environmental protection organ and personnel of the Project shall be in place to strengthen the environmental management and effectively control and manage the environmental pollution.

13.1.1 Environmental management system

The Project Owner, Changtai Paper Industry (Wuhan) Co., Ltd., is generally responsible for the environmental protection, organizing the project planning, environmental impact assessment and feasibility research, drafting environmental protection plan, coordinating the environmental management between departments and the Employer, and organizing the execution of environmental management measures.

Changtai Paper Industry (Wuhan) Co., Ltd. may set a Safety and Environmental Protection Department or a Safety and Environmental Protection Division which is under the administrative leadership of the General Manager and the Division Manager to take charge of the environmental management of the entire plant. The Safety and Environmental Protection Department shall set an environmental monitoring station under its administrative leadership and under the technical guidance of the environmental monitoring station of Gong'an County or Jingzhou to test and record the emission of "three wastes". The Environmental Protection Division shall routinely fill in and submit the monthly statement to local environmental protection authority in the specific format.

13.1.2 Responsibilities of environmental management organ

The Safety and Environmental Protection Department is the comprehensive environmental management department of the company, supervising and managing the environmental protection within the company as a whole, being responsible for the environment quality of the area the company is located, and accepting the supervision, inspection and guidance of superior environmental protection administrations. The specific responsibilities include:

- (1) Execute environmental protection laws, regulations, policies and standards;
- (2) Prepare and organize the implementation of environmental protection scheme and plan of the company;
- (3) Supervise and check the operation condition of environmental protection facility;
- (4) Organize the preparation of the rules and regulations of environmental protection management and the operation specifications of main posts producing pollutants, and supervise the implementation;
- (5) Periodically educate and publicize the environmental protection knowledge to all employees, to increase their environmental awareness and enhance their active fulfillment of environmental protection obligations;
- (6) Lead and organize the environmental monitoring of the company;
- (7) Publicize the application of advanced technology and experience in environmental protection;
- (8) Accept the inspection and supervision of the environmental protection departments of Gong'an County and Jingzhou, and report the execution of management work as required, besides the internal work on environmental protection.

13.1.3 Environmental management system

(1) Implementation of the "three simultaneities" system

The "three simultaneities" guideline shall be implemented in the course of project construction. The Employer of the Project shall ensure that the facilities for controlling pollution and other public nuisances are simultaneously built and put into operation together with main works, and shall submit the completion acceptance report or special completion acceptance report on environmental protection for the approval of competent environmental protection authority after the Project is completed prior to official operation.

(2) Execution of registration of pollution discharge application

In the light of national and local environmental protection regulations, the company shall register the pollutant discharge application at local environment protection authority in a timely manner, and shall discharge as the allocated indexes only after the approval of the authority.

(3) System of environmental protection facility operation and management

The periodic inspection system for environmental protection facility and the post responsibility system for pollution control measures shall be established, and the operation record system for pollution control post shall be employed, to ensure the stable and efficient operation of pollution control facilities. In the case of pollution control facility failure, timely repair shall be organized and corresponding measures shall be taken regarding production facility based on the practical situation to prevent any pollution accident.

(4) Establishment of corporate environmental protection archives

The routine monitoring system shall be carried out for key pollution sources with the pollution source archives established; in the case of abnormal emission of pollutants, causes shall be analyzed with corresponding measures taken in time to control the scope and extent of pollution.

(5) Reward and punishment system

The reward and punishment system shall be established for the environmental protection. Those workshops and persons doing well in protecting and improving the environment of the plant area shall be praised and rewarded. And those violating the environmental protection clauses and causing pollution accidents shall be educated and punished as appropriate.

13.2 Environmental Monitoring

Environmental monitoring is an important component of the corporate environmental management, and provides bases for the implementation of national and local policies, laws, regulations and standards on environmental protection by monitoring and grasping the pollution discharge rule of production equipment, evaluating the performance of cleaning facility and formulating plans for pollution control.

13.2.1 Responsibilities of environmental monitoring organization

The environmental monitoring organization shall be under the charge of the Safety and Environmental Protection Committee; separate environmental monitoring organization could not be set according to the corporate condition, with the monitoring work entrusted to the qualified monitoring station of Gong'an County. The major monitoring responsibilities of the Safety and Environmental Protection Committee are as follows:

(1) Formulate the rules and regulations on environmental monitoring and the annual monitoring plan of the company.

(2) Regularly monitor whether the pollutants discharged during the operation period of the Project are in compliance with the stipulated discharge standards; establish monitoring archives for major pollution sources to provide basis for the environmental protection planning.

- (3) Analyze the variation rules of pollutants to provide basis for formulating pollutant control measures.
- (4) Take part in the "three wastes" control with production workshops.
- (5) Responsible for the investigation and monitoring of pollution accident, and timely report the findings to relevant competent authority.
- (6) Carry out scientific research on environmental monitoring to increasingly improve the monitoring level.

13.2.2 Environmental monitoring

The environmental monitoring organization shall proactively create conditions for the regular monitoring of pollution sources and cooperate with local monitoring department in the annual examination and monitoring of such sources. See Table 13.2-1 for major monitoring items, frequency and point locations.

Table 13.2-1 Pollution Source Monitoring Plan

Category	Monitoring Points	Monitoring items	Monitoring Frequency
Boiler flue gas	Chimney outlet	Smoke, SO ₂ , NO ₂ and Pb	1day/quarter, 3 times/day
Fugitive emission of dust	Western and southern boundary	TSP, H ₂ S, NH ₃	1day/quarter, 3 times/day
Wastewater in plant area	Outlet of wastewater pipe network	COD, ammonia nitrogen, SS and petroleum	1day/quarter, 3 times/day
Noise	Eastern, southern, western and northern boundary	Leq	4 times / year

13.2.3 Monitoring reporting system

The combination of annual statement and text report can be adopted to report the results of environmental management and monitoring. Generally, the data from a complete monitoring shall be timely sorted and prepared into a report to save as the environmental monitoring archive, and the quarterly and yearly analysis statement shall be reported to the Environmental Protection Bureau as per the requirements of superior competent authorities.

In the case of an emergency, when, where and why the accident happens as well as the consequences and handling results shall be promptly submitted to superior competent authorities, Gong'an County Environmental Protection Bureau, Jingzhou Environmental Protection Bureau and Environmental Protection Department of Hubei Province in a text report.

13.3 Environmental Supervision

The environmental supervision of engineering construction is an important component of project supervision. Entrusted by a company, the Environmental Engineer carries out the environmental supervision of the implementation of the environmental protection measures proposed by this report during the construction and operation periods, and supervises, inspects and manages the environmental protection work of the professional departments related to environmental protection items and the Contractor, so as to protect the environment of the influenced area.

During the construction period, the Contractor of the project is supervised for environment according to national and local laws and regulations on environmental protection, engineering design documents and project contracting contract. On the basis of the project features and the environmental conditions of the construction area, inspection, site supervision, instruction file and other modes can be applied in environmental supervision. The main tasks are as follows:

- (1) Supervise and inspect the environmental protection work on construction site and camp, to reduce or ease the environmental pollution and ecological damage caused by construction.

- (2) Send supervisors to the construction and living areas of the Contractor for site inspection and monitoring, to fully monitor and inspect the execution of environmental protection measures, request the limited rectification of those unqualified and prepare the environmental supervision log of engineering construction.
- (3) Assist environmental management organization and relevant authorities in handling the environment pollution, ecological damage and environmental dispute in accordance with laws and regulations on environmental protection, engineering design documents and project contracting contract.
- (4) Prepare weekly, monthly and yearly on environmental supervision with existed significant environmental problems figured out and solutions put forward.
- (5) Participate in the intermediate and completion acceptance of the Project.

13.3.1 Determination and project supervision scheme

The Project is subject to the environmental supervision during the construction period. Based on the environmental protection specifications and standards, project design drawings, design description and other design documents, project construction contract and bidding/bid documents, environmental supervision contract and bidding documents, the supervision unit shall, prior to the actual environmental supervision, prepare the project supervision scheme, including the project overview, supervision basis and the following content.

- (1) Scope, stage and duration of environmental supervision

Scope: the area the Project located and the influenced area of the Project.

Working range: construction site, campus, construction load and ancillary facilities, and the areas with environmental pollution and ecological damage brought by the construction at above sites; areas having environment influenced by the Project operation, and thus with environmental protection measures taken.

Working stage: construction preparation stage and construction stage.

Duration: from construction preparation stage to the completion of the Project.

- (2) Objectives

The objectives of environmental supervision are as follows: abide by the relevant laws, regulations, policies, technical standards formulated and promulgated by the state and competent authorities, as well as the approved design documents, bid documents, and the lawfully signed supervision and construction contracting contracts. In the light of the scope and content of environmental supervision, perform the environmental supervision obligations, independently, justly, scientifically and effectively serve the Project, and carry out the overall environmental supervision, to help the Project meet the environmental protection requirements in both design and construction. Supervise as per the requirements of the measures in management plan proposed in this report.

Supervise the water and soil loss caused by main and temporary works, and inspect whether all facilities for water and soil conservation meet the requirements of design and environmental assessment.

Environmental supervision on treatment measures for industrial wastewater and sewage: Supervise the source, discharge amount and quality index of wastewater and sewage as well as the construction process and treatment effect of treatment facilities; inspect and monitor whether the approved discharge requests are met.

Environmental supervision on atmospheric pollution control measures: The atmospheric pollution in construction area is mainly caused by the waste gas and dust generated in the course of construction and production. The pollution source emission shall meet standards, and the required environmental quality standards shall be met in construction area and its influenced areas.

Environmental supervision on noise control measures: Control the sources that produce strong noise or vibration as per the design requirements to prevent noise hazard.

Environmental supervision on solid waste treatment measures: Ensure that the solid waste treatment, including the treatment of production and household garbage and slag from production, meets the demand of a clean and tidy project site.

Environmental supervision on population health measures: Ensure safe and reliable drinking water to prevent infectious diseases; provide necessary measures on welfare and sanitary conditions.

Environmental monitoring and supervision: Supervise and carry out the environmental monitoring as per the monitoring content of this report.

(3) Supervision organization and personnel responsibility

In accordance with the work plan of engineering environmental supervision, the leading group of such supervision shall be made clear to lead the supervision. The Chief Engineer responsibility system shall be applied; the Environmental Engineering Supervision Department shall independently take charge of the environmental supervision of the Project and be directly answerable to the leading group and the Engineering Director.

(4) Working system

The system shall be consisted of the job logging system, personnel training system, reporting system and correspondence system, as well as the regular meeting system that the environmental protection supervision meeting shall be hold each month. In the regular meeting, the Contractor shall retrospectively summarize the recent environmental protection work; the Environmental Engineer shall comprehensively discuss the targeted environmental protection work of that month, affirm the achievements of work and put forward existing questions and the rectification requests. Meeting minutes shall be taken for all meetings.

(5) Mobilization/Demobilization plan and preparation of personnel and equipment

In combination with the duration, schedule, technical features and other practical demand of the Project, the manpower resources invested into the Project shall be properly allocated, and the on-site supervisors (technical personnel) shall be determined to undertake the environmental supervision of the construction. The on-site supervisors shall possess abundant practical experience and theoretical knowledge of engineering environmental management. The Engineer shall be qualified with a technical title of engineer in environmental engineering; the supervisors for monitoring and test and on site shall be qualified with the title of assistant engineer (and above) (in environmental engineering), and are trained on professional skill and supervision.

The environmental supervision plan shall be prepared; the Environmental Supervision Department shall be established; the composition of environmental supervision organization with the list of supervisors and clarified post responsibilities shall be submitted to the leading group and the Owner before mobilizing to the site; the sound and strict supervising rules and regulations shall be established; all supervisors shall be familiar with contract conditions and corresponding technical specifications under organization.

On the basis of environmental supervision scheme and construction drawings, the environmental supervision plan shall be submitted and its implementation rules shall be prepared prior to the environmental supervision mobilization.

The environmental supervision plan and the implementation rules shall be prepared by the Engineer and submitted to the Owner for approval.

(6) Quality control

Principles

Carry out all-round thorough inspection, supervision and management of construction. Lay

emphasis on pre-control and timely prevent and stop adverse factors that may cause environmental impact; rigorously enforce in-process control to, at any time, eliminate hidden dangers that may cause environmental impact; perfect post-control to ensure that the project the Contractor delivered complies with design drawings and technical specifications as well as the environmental protection requirements of contract.

Main methods and measures

The Environmental Supervision Department shall establish a complete quality monitoring system led by the Director, to thoroughly supervise and inspect the construction methods and process of the Contractor.

(7) Coordination, information aggregation, transmission and management

The Environmental Supervision Department will coordinate and manage in the main form of meeting.

The information aggregation, filing and management will be sorted, classified, compiled and filed as required by the Owner, with reference to the regulations of national and local departments and combining the features of the Project; thematic meetings will be regularly held to check and urge the Contractor to timely sorted contract documents and technical files, ensuring that the project information and archives are clearly classified, and that the technical files and drawings are the same as the material objects.

13.3.2 Work content and methods of environmental supervision

(1) Work content

① Pre-construction environmental supervision

Review of pollution control scheme: In line with the construction process, the emission of "three wastes" and whether the design control measures for major pollutants are feasible shall be reviewed. Regarding the ultimate treatment methods and whereabouts of pollutants, relevant plan shall be made according to the provisions and treatment requirements of related documents at early stage of the Project, and be concretely executed after reported to competent environmental protection authority.

Review of special environmental protection clauses in construction contracting contract: The Construction Contractor shall observe the environmental protection requirements and follow the methods provided in the contract to strengthen supervision, management, inspection and monitoring during construction, so as to reduce pollution brought to the environment, and shall review the housekeeping quality and environmental management level of construction units.

② Environmental supervision during construction

Supervise and inspect whether the environmental protection countermeasure are implemented for the conservation of water and soil, as well as the implementation status and effect; whether mechanical equipment is subject to noise pollution control during construction as per relevant regulations; whether sewage and household garbage from construction site are properly disposed as per relevant regulations.

Supervise and inspect the daily collection, classified storage and disposal of construction and household garbage; supervise and inspect that wastewater from flushing is discharged after being treated in settling pond and reaching standard, and that whether the road on construction site are clear, whether the drainage system is in good service condition and whether there is ponding on construction site; train constructors on environmental protection to develop their sense of environmental protection and pollution prevention; carry out the environmental monitoring, inspection and examination of pollutant emission; participate in the investigation and handling of environmental pollution accident and dispute.

(2) Methods

Patrol and side supervision shall be the modes of site supervision. The regular monitoring of water, gas and sound on construction site shall be reminded and performed. Once any environmental pollution problem is found, the environmental supervisor shall promptly inform the site officer of the Contractor for rectification. The letter of notice shall be also copied to the Supervision Department and the representative of the Owner. The Contractor shall rectify the existing problems after receiving the notice from the Environmental Engineer.

13.4 List of “Three Simultaneities” Completion Acceptance

See Tables 13.4-1 and 13.4-2 for the list of “three simultaneities” completion acceptance for the environmental protection of the proposed project.

Table 13.4-1 List of Environmental Protection Measures in Construction Period

SN	Category	Source of Pollution	Pollution prevention and control measures	
			Contents of the Measures	
1	Waste gas	Construction dust	Equip with sprinkler vehicle for construction site and pavement	
			Provide guardrail on construction site	
			Provide cleaning pool with high-pressure cleaning equipment for outbound vehicle	
			Add cover plate or dust-proof waterproof cloth to transport vehicle	
2	Waste water	Wastewater, sewage and initial rainwater	Equip with temporary rainwater and wastewater collection system	
			Equip with sewage collection system and treatment equipment	
			Pre-treat and separate oil from vehicle flushing wastewater	
			Add coagulant dosing device, increase sedimentation efficiency	
3	Solid waste	Abandoned earthwork	Get treated by municipal muck office	
		Construction and household garbage	Have household garbage treated by environmental sanitation department	
4	Noise	Mechanical, working and vehicle noise	Adopt low-noise equipment, formulate reasonable construction plan	
5	Ecology	vegetation deterioration	Restore vegetation and repair greening	

13.4-2 List of Environmental Protection Acceptance at Project Completion

Category	Object	Content	Effect
Documents	Relevant replied and approved documents	Whether the Project is approved by National Development and Reform Commission; whether relevant replied and approved documents (including those of EIA approval, land use approval, water and soil conservation approval, cultural relics and mineral resource) are complete; whether the Project meets commencing requirement; whether the environmental protection files are complete.	With complete documents, the Project meets commencing conditions.
Waste gas	Flue gas denitrification	Low-nitrogen combustion technology + SNCR denitration device	The concentration of pollutants shall meet the standards for coal-fired boilers of the Table 1 in the <i>Emission Standard of Air Pollutants for Thermal Power Plants</i> (GB13223-2011)
	Flue gas desulfurization	Circulating fluidized bedboiler + external limestone-gypsum wet flue gas desulfurization system	
	Dust removal system	Electric bag dedusting system	
	Chimney	Two 180m chimneys are provided.	
	Continuous emission monitoring system	Automatic continuous flue gas monitoring system (CEMS) which monitors SO ₂ , smoke, NO _x , fume temperature, flow, etc. is provided.	
	Coal yard	Windproof and dust suppression net	Corresponding limits in the <i>Integrated Emission Standard of Air Pollutants</i> (GB16297-1996) was observed before 2016. Corresponding limits in the <i>Integrated Emission Standard of Air Pollutants</i> (GB16297-2012) is observed after 2016.
Waste water	Wastewater from	It is drained to the treatment plant of Changtai Paper	The externally discharged

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	chemical treatment	Industry (Wuhan) Co., Ltd.	wastewater meets the stricter standard limits of Standard B, Class I of the <i>Discharge Standard of Pollutants for Municipal Sewage Treatment Plant</i> (GB18918-2002).
	Washing water from the coal handling system	Washing water drained from the coal handling system flows into the coal-water settling pond; water drained from the coal yard flows into the coal-water settling pond through drainage ditches around the coal yard; the treated drained water is recycled.	
	Domestic sewage	It is drained to the wastewater treatment plant of Changtai Paper Industry (Wuhan) Co., Ltd. after treatment.	
	Oily wastewater	It is drained to the wastewater treatment plant of Changtai Paper Industry (Wuhan) Co., Ltd. after being collected by pipes, treated by mechanical gravity type or multi-stage combined efficient oil-water separator and reaching standards.	
	Wastewater from the desulfurization system	The desulfurization wastewater flows into the desulfurization wastewater treatment device for neutralization (alkalization) and flocculation, and then is delivered to the settling/concentration tank, and the effluent is recycled after its pH value is regulated in the clear water tank.	Recycling
	Wastewater from the cooling tower	Sewage from the cooling tower of power plant flows into the reusing water tank for recycling.	
Noise	Steam turbine and electric generator	Acoustic shield + sound insulation of the power house	The noise contribution at boundary shall meet the Category-3 standards of <i>Emission Standard for Industrial Enterprises Noise at Boundary</i> (GB12348-2008).
	Boiler noise	Silencer	
	Other high-noise equipment	Sound insulation and vibration reduction	
Solid waste	Ash and slag of boiler (in a storage-use combination and positive utilization approach)	The plant is internally provided with an intermediate ash (slag) transport warehouse which keeps ash and slag from soil with anti-seepage measures. Those which can be immediately used can be directly conveyed to users through the ash & slag warehouse.	Meet the requirements of category-II yard standard in <i>Pollution Control Standards for General Industrial Solid Waste Storage and Disposal Site</i> (GB18599-2001)
		Truck bulk machine and sealed tanker are equipped, and those which cannot be used right away are transported external ash yard via the sealed truck. The external ash yard is built and accepted synchronously.	No external emissions of ash and slag
		These ash and slag go to Gong'an Huifeng Energy Development Co., Ltd., Gong'an Ruifeng New Wall Materials Co., Ltd. and Gong'an Jinsha Commerce Limited Liability Company for comprehensive utilization.	No external emissions of ash and slag
	Desulphurization gypsum	It is comprehensively used by Gong'an Huifeng Energy Development Co., Ltd., Gong'an Ruifeng New Wall Materials Co., Ltd. and Gong'an Jinsha Commerce Limited Liability Company.	No external emissions
	Domestic garbage	Collect and handle by the local environmental sanitation department	
Accident prevention	Ignition oil tank	Fire trench and spraying facility are configured.	Prevent external discharging of accident wastewater without being treated
	Ammonia tank	Cofferdam, gathering tank and emergency pump are provided; emergent discharge pipes are laid out.	Prevent ammonia from volatilization
Greening	Beside the trunk road in the plant area, evergreen trees and shrubs are planted with alternate ornamental trees. Both sides of the ring road around the main power house is planted with short trees and hedgerow that suit local climate, without affecting the work safety.		
Environmental management	Establish an environmental protection management organization and environment protection personnel training system		
	Formulate the environmental risk emergency plan and provide supporting risk emergency facilities		
	Detecting systems for the quality of desulphurization by-product (ammonium sulphate) and the sulfur content of fire coal are provided; monitoring systems for ammonia escape concentration and boiler exhaust funnel are configured and networked with the local environmental protection department for real-time monitoring.		
	Draw up environment monitoring schemes, rely on in-plant monitoring facilities or Gong'an County		

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	environmental monitoring station, and form regular monitoring record for all in-plant pollutants
	Establish environmental management archives
	Handle pollutant discharging licenses
	Handle operating licenses for environmental protection facilities and establish operating record system

14 Public Participation

Public participation constitutes an important part of environmental impact assessment, being crucial to improve the decision making. Public participation enables the public to know the Project and bring forward opinions, comments and requests, so as to provide reference for the management and decision making of the Employer and competent departments, and to perfect and rationalize the operation and development schemes of the Project.

14.1 Content and Methods of Survey

14.1.1 Principles

Based on the *Interim Measures on Public Participation in Environmental Impact Assessment*, the project which may cause significant environmental impact and which shall have an EIA report prepared shall adopt the public participation. The principles of publicity, equality, wide range and convenience shall be observed to enable a scientific, objective, fair and comprehensive public participation.

The work content of public participation at different stages is as follows:

- (1) The Employer shall make the first publicity of environmental impact assessment within 7 days after determining to be the EIA institution to undertake such assessment;
- (2) The Employer or its delegated EIA institution shall publicize the abridged EIA report before submitting to the competent environmental protection department for approval or re-examination;
- (3) The Employer or its delegated EIA institution shall seek for public opinions in the form of investigating public opinion, consulting experts, forum, demonstration meeting and hearing after issuing the information bulletin and publicizing the abridged EIA report.

Based on the above survey principles of public participation, at this assessment stage, the Employer and the EIA organization have conducted to following work:

- (1) First publicity of project overview;
- (2) Publicity of the abridged EIA report;
- (3) Issuance of public participation questionnaire survey, that is, after the publicity of the abridged report, the Project Owner timely instigates the opinions of its employees and the residents within the project area, issues the public participation questionnaires, collects the opinions of companies and organizations concerned and the opinions of surrounding residents on the proposed project.

14.1.2 Methods

Based on the above survey principles of public participation, the main forms and content of public participation in the assessment are as follows:

- (1) Publicity on government website

Within 7 days after the Project Owner delegates Hubei Academy of Environmental Sciences for the environmental impact assessment of the Project, the Employer and the EIA institution jointly publicize the assessment and other basic situations of the Project on the websites of the Environmental Protection Department of Hubei Province and Peoples' Government of Gong'an County.

- (2) Publicity of abridged report

After the well preparation of the EIA report of the Project, the abridged report is publicized on the websites of the Environmental Protection Department of Hubei Province and Peoples' Government of Gong'an County for 10 days.

- (3) Issuance of public participation questionnaire

After the publicity of the abridged report, the public around the project location is issued with the public participation questionnaire for soliciting opinions, and the proposed project overview, scope and extent of impact on environment in the construction and operation periods as well as main adverse and favorable impact are introduced at the same time.

14.1.3 Investigation content

The main content of the public participation survey includes:

- (1) The public's understanding of the proposed works;
- (2) The public's attitude to the proposed works;
- (3) The most prominent negative impact of the proposed works on the surroundings in the public's opinions;
- (4) Favorable effects of the proposed works on the local in the public's opinions;
- (5) Major existing environmental problem in the area the proposed works located in the public's opinions;
- (6) Effects of the proposed project on the public's work and life;
- (7) Other opinions and suggestions.

14.2 Publicity of EIA Information and Abridged EIA Report

14.2.1 Publicity of EIA information

On March 18, 2015, we publicized the project information on the website of Peoples' Government of Gong'an County for the first time, including the main construction content and contact info of the Project, which can be viewed on http://www.hbepb.gov.cn/wsbs/gsgg/hpqs/hpdwhp/201503/t20150320_75970.html. See Figure 14.2-1 for the publicity screenshot.



Figure 14.2-1 Screenshot of the First Publicity on the Website of Peoples' Government of Gong'an County

In the meantime, we made the first EIA publicity of the Project on the website of the Environmental Protection Department of Hubei Province on March 19, 2015. It can be viewed

on http://www.hbepb.gov.cn/wbs/gsgg/hpgs/hpdwhp/201503/t20150320_75970.html. See Figure 14.2-2 for the publicity screenshot.



Figure 14.2-2 Screenshot of the First Publicity on the Website of Environmental Protection Department of Hubei Province

No opinion or suggestion from the public was received during the publicity on both websites.

14.2.2 Publicity of Abridged EIA Report

The abridged EIA report was publicized on the website of Peoples' Government of Gong'an County: <http://www.gongan.gov.cn/jzgax/infodetail/?infoId=8b497a0b-cfc9-4eb8-88ed-66326b0e99db&categoryNum=001001>. See Figure 14.2-3 for the screenshot.



Figure 14.2-3 Publicity Screenshot of Abridged EIA Report on the Website of Peoples' Government of Gong'an County

On May 27, 2015, the abridged EIA report of the Project is publicized on the website of the Environmental Protection Department of Hubei Province: http://www.hbepb.gov.cn/wsb/gsgg/hpgs/hpdwhp/201505/t20150527_77474.html. See Figure 14.2-4 for the screenshot.



Figure 14.2-4 Publicity Screenshot of Abridged EIA Report on the Website of Environmental Protection Department of Hubei Province

In the abridged EIA report, the Project was introduced in detail, the generation and emission of pollutants were illustrated, the potential impact on environment after the completion of the Project was analyzed, countermeasures for preventing and reducing adverse environmental impact were brought forward, and the EIA conclusion in the EIA report was clarified.

By the well preparation of the report (for review), no opinion and suggestion with relation to the Project was received during the publicity period.

14.3 Details of Public Participation Questionnaire

14.3.1 Issuance of questionnaire

On the third day of publicizing the abridged report, the EIA institute and the Employer jointly

conducted the on-site questionnaire survey around the Project. In the course of on-site survey, the project overview, potential environmental impact and the initial EIA conclusion were introduced to the public involved, and the public participation questionnaires were issued and collected. The official seals of the companies/organizations involved in the company/organization survey were required. A total of 100 individual questionnaire and 3 organization questionnaires were issued and collected.

14.3.2 Questionnaire

The objects of survey mainly include the following types:

- (1) Groups and individuals directly affected by the construction of the proposed project, i.e., residents around the proposed plant site.
- (2) Individuals indirectly affected by the construction of the proposed project, i.e., individuals involved in the Project.

See Annex for the details of the objects in public participation survey.

See Tables 14.3-1 and 14.3-2 respectively for the individual and organization questionnaires.

Individual Questionnaire on the Environmental Impact Assessment of Yangjiachang Town Industrial Park CHP Project in Gong'an County

To meet the needs of construction of central city and economic development of Gong'an County, perfect infrastructure construction, improve ecological environment, reduce atmospheric pollution and meanwhile to attract more industrial users to settle, it is badly in need of centralized heat supply in the industrial park with more centralized heat demand. Therefore, it is planned to build one CHP Project with coal as fuel and the back-pressure or back pressure extraction-type CHP heating unit applied in Qingji Industrial Park.

The proposed plant site of the Project is in Gong'an County Qingji Industrial Park, Jingzhou, Hubei. The planning capacity of power plant is 5x410t/hCFB+4xCB60MW (including 1 boiler for standby for the plant), HTHP coal-fired generator units are equipped, and the flue gas desulfurization and denitration device are built synchronously. The coal source of the power plant is transported from the coal yard at Gong'an Station of Jingzhou-Yueyang Railway to the coal yard of the power station via motor highway, relying on the coal transportation passage of Western Inner Mongolia-Central China Railway; the water source of the power plant is from Changtai Paper Industry Water Center; the outgoing line is the 110kV outgoing line. All industrial wastewater of the plant, including chemical acid and alkali, oily, desulfurization and workshop flushing wastewater and initial rainwater from coal yard, flow into the industrial wastewater treatment station for treatment. For the ash and slag from the Project, the Employer is required to commission a qualified organization to conduct a special study for the comprehensive utilization of ash and slag; according to the features of the noise source of power plant, a prevention scheme, namely "prevention first, prevention & treatment combination", is applied to the Project, and measures regarding source, transmission route and bearer of noise are taken to ensure that the noise emission meets local ambient noise standards.

In line with the *Law of the People's Republic of China on Environmental Impact Assessment* and the *Interim Measures on Public Participation in Environmental Impact Assessment*, we are surveying the public around the Project area and seeking for public opinions and suggestions on the project construction. Please fill in the questionnaire in an objective and impartial manner. Thank you for your cooperation!

Name		Gender		ID No.	
Contact		Age		Domicile	

1. Do you know Qingji Industrial Park CHP Project in Gong'an County?
Know Know partially Unfamiliar
2. What is your understanding of the environmental impact of a project of such type?
Know well Know partially Unfamiliar
3. What is your attitude to the project construction under the premise of meeting relevant national pollutant emission standards?
Support Oppose Doesn't matter
4. What is your attitude to the site selection of the Project?
Support Oppose Doesn't matter
5. What is your attitude to the present local environment?
Satisfy Comparatively satisfy Dissatisfy (reason: _____)
6. What do you think are the most prominent environmental problems that the Project will bring?
Atmospheric pollution Water pollution Noise pollution Water and soil loss Ecology Solid waste
Others
7. What impact do you think the Project will have on the regional economic and social development?
Positive impact Bearable negative impact Unbearable negative impact No impact
8. What impact do you think the Project will have on your life, study and work?
Positive impact Bearable negative impact Unbearable negative impact No impact
9. If you object to the construction of the Project, please explain why (describe truthfully):
10. Please give your opinion and suggestion on what you're concerned:

Table 14.3-2 Public Group Questionnaire on the Environmental Impact Assessment of Yangjiachang Town Industrial Park CHP Project in Gong'an County

To meet the needs of construction of central city and economic development of Gong'an County, perfect infrastructure construction, improve ecological environment, reduce atmospheric pollution and meanwhile to attract more industrial users to settle, it is badly in need of centralized heat supply in the industrial park with more centralized heat demand. Therefore, it is planned to build one CHP Project with coal as fuel and the back-pressure or back pressure extraction-type CHP heating unit applied in Qingji Industrial Park.

The proposed plant site of the Project is in Gong'an County Qingji Industrial Park, Jingzhou, Hubei. The planning capacity of power plant is 5x410t/hCFB+4xCB60MW (including 1 boiler for standby for the plant), HTHP coal-fired generator units are equipped, and the flue gas desulfurization and denitration device are built synchronously. The coal source of the power plant is transported from the coal yard at Gong'an Station of Jingzhou-Yueyang Railway to the coal yard of the power station via motor highway, relying on the coal transportation passage of Western Inner Mongolia-Central China Railway; the water source of the power plant is from Changtai Paper Industry Water Center; the outgoing line is the 110kV outgoing line. All industrial wastewater of the plant, including chemical acid and alkali, oily, desulfurization and workshop flushing wastewater and initial rainwater from coal yard, flow into the industrial wastewater treatment station for treatment. For the ash and slag from the Project, the Employer is required to commission a qualified organization to conduct a special study for the comprehensive utilization of ash and slag; according to the features of the noise source of power plant, a prevention scheme, namely "prevention first, prevention & treatment combination", is applied to the Project, and measures regarding source, transmission route and bearer of noise are taken to ensure that the noise emission meets local ambient noise standards.

In line with the *Law of the People's Republic of China on Environmental Impact Assessment* and the *Interim Measures on Public Participation in Environmental Impact Assessment*, we are surveying the organizations around the Project area and seeking for the opinions and suggestions of surrounding major enterprises, public institutions and social organizations on the project construction. Please fill in the questionnaire in an objective and impartial manner. Thank you for your cooperation!

Name of employer		Contact
Company Name (Seal)		Address

1. Do you know Qingji Industrial Park CHP Project in Gong'an County?
Know Know partially Unfamiliar

2. Do you know the environmental impact of CHP Project?
Know well Know partially Unfamiliar

3. What is your attitude to the project construction under the premise of meeting relevant national pollutant emission standards?
Support Oppose Doesn't matter

4. What is your attitude to the site selection of the Project?
Support Oppose Doesn't matter

5. What is your attitude to the present local environment?
Satisfy Comparatively satisfy Dissatisfy (reason: _____)

6. What do you think are the most prominent environmental problems that the Project will bring?
Atmospheric pollution Water pollution Noise pollution Water and soil loss Ecology Solid waste
Others

7. What impact do you think the Project will have on the regional economic and social development?
Positive impact Bearable negative impact Unbearable negative impact No impact

8. What impact do you think the Project will have on your production, operation and economic benefit?
Positive impact Bearable negative impact Unbearable negative impact No impact

9. If you object to the construction of the Project, please explain why (describe truthfully):

10. Please give your opinion and suggestion on what you're concerned:

14.4 Result Statistics of Public Survey

14.4.1 Result statistics of individual survey

See Table 14.4-1 for the age and gender of objects; see Table 14.4-2 for individuals' information.

Table 14.4-1 Age and Gender of Objects of Public Participation Survey

	Composition	Number of objects	Proportion
Gender	Male	79	48.8%
	Female	21	51.2%
Age	Below 30	6	16.3%
	30~40	21	32.3%
	40~50	22	27.6%
	Above 50	51	25%

Table 14.4-2 List of Public Information

	Name	Gender	Tel.	ID Card
1	Wu Xiuyun	Male	13972103451	421022195412103000
2	Li Guosheng	Male	15571636851	422423194805043011
3	Luo Yijun	Male	13593844989	42102219650205301x
4	Liu Bangguo	Male	15027146189	421022197908163053
5	Xiao Guanghua	Male	13165603116	422423196005153019
6	Wang Fuyun	Male	13986739736	421022196911273152
7	He Jiguang	Male	670661	421022198110283050
8	Hu Xuejun	Male	693273	422423197022203011
9	Zhang Lin	Female	13797360871	42102219810401302x
10	Gao Guorong	Female		421022197501063149
11	Mo Xiang	Female	13669063553	42242319641128302x
12	Yang Changfu	Male	68290	421022194307233016
13	He Shanghua	Male	15971587688	421022197709263019
14	Xu Feng	Male	64998	421022198407133010
15	Song Shigui	Female	15572090640	421022195005153103
16	Zhu Shihao	Male	13177026943	422423196511253055
17	Chen MUYOU	Male	685334	421022195110163119
18	Chen Mujun	Male	13593871971	421022196402123017
19	Zhang Dingxiang	Female	13797346719	422423196501233026
20	Luo Leiyun	Male	18872290954	421022196412053032
21	Peng Aibin	Male	15826513028	42102219800615307x
22	Zhu Dianmei	Female	15971581787	421022196707213064
23	Xiao Hailong	Male	5393796	42102219760719303x
24	Xiao Yong	Male	15027055725	421022198210253131
25	Zhang Yongyu	Male	15926502284	422423196209243016
26	Meng Qingwu	Male	13972440423	421022196303123070
27	Yang Changwen	Male	13593833232	422423196302093016
28	Zhang Qingping	Female	15171146335	422423197909123925
29	Zhang Dingmei	Male	15926606966	422423196910133018

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30	Hu Yacai	Male	15826516468	422423195907173014
31	He Yongxin	Male	15927784118	422423195604133015
32	Wang Mei	Female	13476992857	421022198212123023
33	Xiao Jinhong	Male	68217	421022197001063134
34	Gao Huaxiang	Male	15927855384	421022196902013017
35	Zheng Minghua	Male	15027082586	421022195710113019
36	Yang Tianwu	Male	15926566803	421022196401083017
37	Lei Tiankun	Male	15671395766	422423195710130336
38	Wang Yinghai	Male	15927803945	421022196808033134
39	Tao Xilin	Female	15827720086	421022196507230315
40	Yang Li	Female	15272340116	421022198205023024
41	Gan Lu	Female	15671411298	421021198612220527
42	Zhang Yongqiang	Male	13972381869	422423194512133056
43	Yang Ping	Male	15671360128	422423196408293016
44	Zhu Anmin	Male	15090757423	422423195706083012
45	Lin Yaoming	Male	13797417028	421022197703243033
46	Chen Da	Male	18627261653	421022198510191536
47	Luo Lixiong	Male	13593839853	421022198802244837
48	Chen Delong	Male	13277316563	422423196202153050
49	Liu Dayun	Male	15272380042	421022196912213012
50	Deng Hongbing	Male	13697198500	421022197603073030
51	Liu Ning	Female	1388634986	422423197212113022
52	Yin Shibing	Male	13986732897	422423196304153019
53	Xie Ruihong	Male	13896593326	42102219540801305x
54	Liu Fu	Male	13872427057	421022195607083077
55	Zhang Min	Male	15822606155	421022198510223014
56	He Quanxiang	Female	13972381869	422423196408153021
57	Ouyang Yong	Male	13377983858	42102219720514303x
58	Lin Jijun	Male	13593832408	422423195905303030
59	Tan Min	Female	13627179575	421022198209207568
60	Duan Hongqiang	Male	15927767168	421022197108043010
61	Duan Shibiao	Male	13545822220	422423195609183011
62	Chen Xinjiang	Male	15926518543	422423195210123033
63	Chen Li	Female	13997576020	421022197911023043
64	Wang Wenxue	Male	15826655630	422423195601073010
65	Dong Guangbing	Male	72664	42102219821120311x
66	Fu Zuohong	Male	15927922837	422423196909223016
67	Xu Changxiong	Male	13593832066	422423196206213014
68	Huang Fazhang	Male	13797330673	422423195504263015
69	Chen Yong	Male	7771	421022197501133039
70	Zhu Zhonglan	Female	15927814161	42242319581014302x
71	Zhu Yefa	Male	13476976630	42102219570125301x
72	Zhang Dingquan	Male	13972381869	42242319610504301x

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73	Zhang Ling	Female	67462	421022198001263026
74	Li Wanming	Male	15927905043	421022195803183059
75	Chen Xiang	Male	13669063911	421022198202103614
76	Li Ping	Male	13277316585	421022196909013079
77	Zhu Shibing	Male	15027026996	42102219670315313x
78	Xiong Zujun	Male	13986726957	421022197901081530
79	Gong Hongzheng	Male	13554600951	422423195007280017
80	Sun Qixian	Female	13669063911	421022196812103764
81	Li Guoyin	Male	13797324821	421022198502050010
82	Luo Yi	Male	13638694552	421022198607144830
83	Chen Youlan	Female	15926567508	421081195902230025
84	Xu Zhenhong	Male	13697300198	42242319630804301x
85	Zhang Xiancai	Male	13476972818	422423196805193019
86	Zhang Xianhua	Male	13554589788	42242319630521301x
87	Xie Sheng'an	Female	1872415060	422423196207183128
88	Qin Wen	Male	15027036996	421022196307173112
89	Zhao Botao	Male	15571680660	422423195103193052
90	Xie Shenggao	Male	13697195757	422423195611253015
91	Chen Xin	Male	13277317156	422423196503263050
92	Yang Kui	Male	15927738933	422423196304263073
93	Hu Xuebin	Male	13872212456	421022195612101133
94	Tang Huqiong	Female	15272494918	421022196802066008
95	Wang Dingping	Male	13872328550	42102219640124001x
96	Lin Yaoxiong	Male	15272642949	422423195805082018
97	Yun Chengzhong	Male	13797517689	42102219480210303x
98	He Yongxia	Male	13476963417	421022196109293017
99	Wang Shengqian	Male	15972757737	421022196109183096
100	Guo Liangcheng	Male	13593883857	42102219640120327x

Table 14.4-3 Statistical Results of Individual Public Participation Survey of the Proposed Project

Investigation content	Results	Number of selections	Scale
1. Do you know the Project?	Know	85	85%
	Know partially	14	14%
	Unfamiliar	1	1%
2. What is your understanding of the environmental impact of a project of such type?	Know well	12	12%
	Know partially	87	87%
	Unfamiliar	1	1%
3. What is your attitude to the Project under the premise of meeting relevant national pollutant emission standards?	Support	95	95%
	Oppose	1	1%
	Doesn't matter	4	4%
4. What is your attitude to the site selection of the Project?	Support	99	97%
	Oppose	0	2%
	Doesn't matter	1	1%

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5.	What is your attitude to the present local environment?	Satisfactory	18	18%
		Comparatively satisfy	80	80%
		Dissatisfy	2	2%
6.	What environmental problems do you think the Project will bring?	Atmospheric pollution	85	85%
		Water pollution	67	67%
		Noise pollution	4	4%
		Water and soil loss	1	1%
		Ecology	3	3%
		Solid waste	0	0
		Others	3	3%
7.	What impact do you think will be imposed on the regional economic and social development?	Positive impact	61	61%
		Bearable negative impact	36	36%
		Unbearable negative impact	0	0
		No impact	3	3%
8.	What impact do you think the Project will have on your study, life and work?	Positive impact	36	36%
		Bearable negative impact	42	42%
		Unbearable negative impact	0	0
		No impact	22	22%

(1) Understanding of the Project

It can be found from the survey results that the surrounding public representatives basically know the construction information of the Project; those who know the Project account for a high proportion, which is 84%, and those who are unfamiliar with the Project account for 1%.

(2) Understanding of the environmental impact of a project of such type

Most of the public know partially of a project of such type, accounting for 87%; those who are unfamiliar to such project account for 1%.

(3) What is your attitude to the Project under the premise of meeting relevant national pollutant emission standards?

An overwhelming majority of the public supports the construction of the Project, accounting for 95%; only one person opposes. Since the contact number and ID number of that person is not true, a return visit cannot be paid to. The reasons for opposition shown on the questionnaire are that the land expropriation price is low and the water pollution would be serious.

(4) What is your attitude to the site selection of the Project?

An overwhelming majority of the public supports the site selection of the Project, accounting for 99%; no one opposes.

(5) What is your attitude to the present local environment?

The public who comparatively satisfy with the environment in this area account for a maximum proportion, which is 80%; those who satisfy and dissatisfy account for 18% and 2% respectively.

(6) What environmental problems do you think the Project will bring?

The proportion of public who think the atmospheric pollution would be caused by the Project is 85%, and the proportion of public in terms of water pollution is 67%, followed by noise pollution (4%), ecological damage (3%), others (3%) and water and soil loss (1%).

(7) What impact do you think will be imposed on the regional economic and social development?

61% of the public think that positive impact the Project will have on the regional economic

and social development, 36% think that bearable negative impact will be brought and 3% think that there will be no impact.

(8) What impact do you think the Project will have on your study, life and work?

36% of the public think that positive impact the Project will have on their life, 42% think that bearable negative impact will be brought and 22% think that there will be no impact.

14.4.2 Result statistics of group survey

Opinions from Fuli Village Committee and Lvhua Village Committee in Yangjiachang Town, Gong'an County as well as Gong'an Economic Development Zone are solicited. See Table 14.4-4 for the result statistics of public group survey in this environmental impact assessment.

Table 14.4-4 Result Statistics of Group Survey

SN	Organization	Support or not	Other suggestions
1	Fuli Village Committee	Support	None
2	Lvhua Village Committee	Support	None
3	Gong'an Economic Development Zone	Support	None

It can be learnt that, with concrete implementation of environmental protection measures, the surrounding organizations support the Project and are willing to cooperate.

14.5 Analysis of Public Survey Results

The comprehensive analysis based on the summary of public opinions is as follows:

(1) The findings of the public participation survey indicate that the public has a basic understanding of the Project. During the construction of the Project, publicity will be strengthened to closely contact the Project with the public, so as to deeper their understanding of the progress. The public's opinions on the Project will be acquired and fed back to better serve the public.

(2) The public involved has a relatively deep understanding of the present environmental problems of the area, and anyhow, has expressed their opinions, indicating that the environmental status of the area needs enhanced improvement.

(3) Some think that the construction of the Project will impose adverse impact on the ambient environment, but the majority accept such impact and show their supportive attitude. However, opposition appears as well. Those who oppose are not satisfactory with the land expropriation of the paper plant project instead of directly opposing the construction of the Project. So, adjustment shall be well made by the Employer in the next construction period.

(4) The public cares about the impact the Project may impose on the economic development and on their work and life. The Employer shall enhance publicity and ensure the economic benefit after the completion of the Project, bringing positive actual effects of the Project to the public whilst protecting environment.

14.6 Adoption of Public Opinions and Suggestions

The ways of soliciting public opinions in this public participation include the first publicity on website, publicity of abridged report on website and issuance of questionnaire, through which, it is learnt that the public concerns about the environment in this area, the site selection of the Project, the impact on the economic development and on their life, etc.

In the meanwhile, the public suggests the Project Owner to practice cleaner production, recycle resources, take complete pollution control measures to reduce pollutant emission, apply the most advanced production technology to ensure safety and minimize pollution while maximizing profits, enhance monitoring, publicize environmental protection, protect environment and pay attention to work safety.

In this regard, the Employer replies that the Project will employ the international advanced production technology which meets the demand of cleaner production; various pollution control measures will be taken to meet the emission standards and minimize the emission of pollutants; the "three simultaneousities" system will be strictly followed, the control measures will be executed seriously to ensure the up-to-standard emission of pollutants, and the supervision of representatives of different fields and environment protection authorities is welcome; the management measures for work safety during production in the plant area will be strictly implemented to prevent hidden dangers from happening.

14.7 Conclusion of Public Participation

In accordance with the *Interim Measures on Public Participation in Environmental Impact Assessment* (HF [2006] No. 28), the public participation is conducted through the EIA information publicity and the abridged EIA report on website, during which, no feedback is received by the Employer and the EIA institute. On this basis, public participation questionnaires are issued to the surrounding public for the solicitation of individual and organization opinions.

In individual survey, 100 valid questionnaires are collected with a proportion of 99% supporting the construction of the Project and one person holding an indifferent attitude. Even though, the Employer shall do the mass work well in the following construction period.

In organization survey, opinions from Fuli Village Committee and Lvhua Village Committee in Yangjiachang Town, Gong'an County as well as Gong'an Economic Development Zone are solicited. All of them support the Project without objection.

In summary, the construction of the Project is supported by majority of residents and local government and social organizations, and will positively promote local social and economic development. The Project shall, at the same time, adopt advanced equipment, process and technology, take feasible pollution control and risk prevention measures and enhance daily supervision to at least maintain the environmental quality of the area the Project located and to ensure public safety.

15 Assessment Results

15.1 Project Overview

Qingji Industrial Park and Yangjiachang Town Industrial Park under planning are located between Douhudi Town and Yangjiachang Town, Gong'an County. By now, many projects have been settled in Gong'an County Qingji Industrial Park; Yangjiachang Town Industrial Park, which connects with the south boundary of Qingji Industrial Park in the north and reaches Jinjimiao Village, Douhudi Town in the south, is still under planning. The junction of southeastern Qingji Industrial Park and northwestern Yangjiachang Town Industrial Park is planned with a paper making industrial park.

Changtai Paper Industry (Wuhan) Co., Ltd. is to build a 2.20Mt/a High-grade Packaging Board Project in the Paper Making Cycle Industrial Park at the junction of Gong'an County Qingji Industrial Park and Yangjiachang Town Industrial Park, at the same time, build the Yangjiachang Town Industrial Park CHP Project at the southwest of Packaging Board Project, which supplies power and heat to paper making project and supplies the surplus steam to other industrial enterprises in the industrial park.

The proposed Yangjiachang Town Industrial Park CHP Project is to be equipped with 3×60MW units (1 for standby) with a total capacity of 120MW in Phase I and 2×60MW units with a capacity of 120MW in Phase II, reaching an ultimate scale of 240MW; the boiler scale will be 4×410t/h and one 410t/h circulating fluidized bed boiler for standby. Turbine generator unit and boiler, ignition, thermodynamic, coal handling, combustion, circulating water, chemical water, ash and slag handling and flue gas treatment systems will be mainly provided.

The total investment of the Project is CNY 1,589.32 million, including CNY 57.60 million for environmental protection; the Project covers an area of 171,666.67m², extending 648m in SN and about 323m in EW.

15.2 Environmental Feasibility of Project Construction

15.2.1 Industrial policy conformity

(1) Catalogue for Guiding Industry Restructuring (2011 edition) (2013 revision)

It is indicated in the *Directory Catalogue on Readjustment of Industrial Structure* (2011) (revised in 2013) of National Development and Reform Commission that the "conventional coal-fired thermal power equipment manufacturing project of 300MW and below (excluding the comprehensive utilization and CHP units)" belongs to the restricted type; the proposed project is equipped with 4×60MW back-pressure steam turbine generator units with 4×410t/h HTHP circulating fluidized bed boilers to be the CHP unit for supplying heat to the enterprises in industrial park, therefore, the Project belongs to the "allowed type" stipulated in the *Directory Catalogue on Readjustment of Industrial Structure* (2011) and meets the development requirements of national industrial policies.

(2) *Action Plan for Upgrading and Transformation of Energy Saving and Pollution Emission Reduction for Coal Power Industry* (2014-2020)

Based on the Item 4 (Strictly control atmospheric pollutant emission) of Article 2 (Strengthen control for access to new units) specified in *Action Plan for Upgrading and Transformation of Energy Saving and Pollution Emission Reduction for Coal Power Industry* (2014-2020) (FGNY [2014]). New coal-fired power generator units (including units under construction and units of the Project incorporated into national thermal power construction plan) shall be synchronously constructed with advanced as well as efficient desulfurization, denitration and dust removal facilities, but the flue gas bypass passage shall not be provided. Item 6: Actively develop CHP. "Determine power by heat" shall be insisted, thermal load shall be strictly implemented, CHP plan shall be formulated scientifically, highly efficient coal-fired thermal power units shall be provided, supporting heating pipe network shall be synchronized in the evening, and the disperse coal-fired small boilers within the centralized heat supply

range shall be replaced and eliminated within a time limit. By 2020, the installed capacity of coal-fired thermal power units should try to occupy 28% of the overall installed capacity of coal-fired power units. In middle and small cities and the industrial park of concentrated thermal load, the back-pressure thermal power unit should be constructed preferentially; CCHP development shall be encouraged.

The Project provides with CHP units in Qingji Industrial Park and Yangjiachang Town Industrial Park in which the thermal load is concentrated, meanwhile, provides with highly efficient desulfurization, denitration and dust removal facilities, which complies with relevant requirements specified in the *Action Plan for Upgrading and Transformation of Energy Saving and Pollution Emission Reduction for Coal Power Industry (2014-2020)*.

15.2.2 Site feasibility assessment

(1) Analysis of planning conformity

1) Conformity with *Urban Overall Planning of Gong'an County (2005-2020)*

Construction site of the project is not located in the prohibited construction zones that are specified in *Urban Overall Planning of Gong'an County (2005-2020)*; the construction site of the project is located in the Yangjiachang Town Industrial Park divided by *Urban Overall Planning of Gong'an County (2005-2020)*. The Park focuses on primary industry and secondary industry, takes foreign capital enterprises, sole proprietorship enterprises and private enterprises as its main body, led by specialty industries through high-tech, and pays highly attention to industrial sectors like M&E and export processing. From the above analysis we can see that the project complies with the urban overall planning of Gong'an County

2) Conformity with *Special Planning for Heat Supply of Gong'an County (2014-2030)*

2.20Mt/a High-grade Packaging Board Project of Changtai Paper Industry (Wuhan) Co., Ltd. is regarded as the largest heat supply user in the area to be planned in heat supply plan. The construction site is close to 2.20Mt/a High-grade Packaging Board Project, which takes the centralized heat supply for other projects in the industrial park into account at the same time. Gong'an County government also promises to shut down small-scale (oil-) coal-fired boiler within the scope of heat supply during the same time of the Project going into operation.

By combining with the plan and approval opinion as well as contrasting with the construction scale, supply scope and unit layout of the Project, it can be demonstrated that the construction of the Project complies with *Special Planning for Heat Supply of Gong'an County (2014-2030)*.

3) Conformity with the planning of Qingji Industrial Park and Yangjiachang Town Industrial Park

The construction of the Project will address the steam supply problem of the 2.20Mt/a High-grade Packaging Board Project in paper making industrial park, and will supply heat to the heat consumers in industrial park in a centralized manner, which expands the development space of industrial park and is in favor of environmental protection and management. And a foundation will be laid for the follow-up development of Qingji Industrial Park and Yangjiachang Town Industrial Park.

Yangjiachang Town Industrial Park CHP Project doesn't belong to the restricted and prohibited entry project of Qingji Industrial Park and Yangjiachang Town Industrial Park. Hence, the Project complies with the planning requirements of both parks.

(2) Environmental condition conformity

1) Weather Conditions

North wind prevails in the Project area; Gong'an County and Yangjiachang Town are located about 2.2km to the west and about 1.7km to the northeast of the Project respectively, which means that the Project has a minor impact on these two residential areas in terms of

predominant wind direction. Yangjiachang Town Industrial Park under planning is mainly located in the downwind direction, and residents in this park agree to move and resettle as per the planning. After the implementation of Yangjiachang Town planning, the impact of waste gas from the Project on the surroundings will be slight.

2) Environmental sensitive points

The Project is about 2.2km to Gong'an County in the west and about 1.7km to Yangjiachang Town in the northeast. Sensitive points are scattered within 1km around the plant area. Residents within the sanitary protection zone and atmospheric protection zone need to be resettled (see Annex for demolition commitment).

The site selection of the proposed project complies with requirements of overall planning for urban development and development planning for development zone; after the removal of residents within the health protection distance and atmospheric protection distance, it will have a slight impact on surrounding residents. The Project is located at the Yangjiachang Town Industrial Park in Gong'an County with quite perfect utilities. Analyze comprehensively from various aspects, the site selection of proposed project is basically reasonable.

(3) Impact on Jingjiang River's flood diversion and storage area

The Project is located in Jingjiang River's flood diversion and storage area, and the mutual impact of the Project and the flood diversion area during the flood diversion is mainly taken into account in the site feasibility. The expert group of technical review meeting of the *Flood Impact Assessment Report of Urban and Rural Master Plan of Gong'an County (2013-2030)* think that the technical route in the report is feasible with comprehensive content and basically reasonable conclusion; the basic conclusion of the report indicates that, based on the computation of flood impact assessment, the Project after construction will not impose significant adverse impact on the flood discharge and fall. The *Urban and Rural Master Plan of Gong'an County* is consistent with the requirements of relevant flood storage and detention area planning, having slight impact on the flood discharge and fall of Jingjiang River's flood diversion and storage area and little impact on the safety facilities of flood diversion and storage area as well as the canal systems of flood diversion area. In the *Urban and Rural Master Plan of Gong'an County*, the flood control standards of the main buildings are lower than the operation probability of flood storage area; the first floor of main buildings is generally lower than Dujiatai flood storage level of 42m. During flood diversion in flood storage area, these buildings will be overwhelmed, then, the Designer is suggested to fulfill the design to ensure that the project safety will not be influenced by flood.

The Project is located in the flood diversion and storage area. It is demonstrated from above argument conclusion that the construction of Project basically has no influence on the operation of flood diversion and storage area, while the flood impact on the Project is mainly reflected in that the building under 42m elevation will be submerged during the flood storage; therefore, the Employer shall make relevant designs for the design and construction of relevant buildings and structures to ensure that flood impact will not influence project safety.

In addition, according to the expert group, a flood impact assessment prepared by a delegated qualified organization is necessary for the project located in flood diversion area as per relevant requirements, and corresponding approval from competent water administrative department is a must.

15.2.3 Compliance analysis of supporting facilities

The proposed project takes advantage of the planning industrial land for construction without occupation of basic farmlands and cultivated lands, which complies with *Regulations on the Protection of Basic Farmland* issued by the State Council. The plant site has following favorable conditions:

(1) Transportation conditions

Located with the plant area (new) of Changtai Paper Industry (Wuhan) Co., Ltd. in Gong'an

County Qingji Industrial Park and the Yangjiachang Town Industrial Park under planning, the Project takes advantage of the internal transport system and passageways; additional passageway will not be provided. In Qingji Industrial Park, it is planned to build up a trunk road composed of "two horizontal and three longitudinal roads" and a road network composed of "three horizontal and four longitudinal roads". Currently, 30km roads and supporting facilities have been completed, including extension line of Chanling Avenue, Chengye Road, Kaile Road, Xingye Road, Youyi East Road and Xingsheng Road. Deepwater wharf and abundant power supply system are comprehensively completed in the park. Jingzhou-Yueyang Railway and Jiangnan Expressway are under construction. Qingji Industrial Park and the Yangjiachang Town Industrial Park under planning will then possess a stereo-traffic network composed of railway, expressway and water transport terminal.

(2) Water supply and drainage system

1) Water supply

Water supply system of the Project relies on the water supply and drainage system of Packing Board Project to provide water. Water supply and drainage system of the whole plant under planning and construction takes water-using and drainage requirements of the Project and CHP Project into account. Therefore, the Project only needs to provide with supporting water supply and drainage pipe network within the scope of corresponding Project. The water used in the Packing Board Project sources from the Gong'an Section of the Yangtze River. This Yangtze River section is Category III water, with abundant water, generally not contaminated water quality, and good exploitation and utilization conditions.

The source of domestic water in the plant area is municipal water.

The total water consumption for the first stage and the second stage of the Project is 56,400m³/d, 28,200m³/d for each of the stages. The feedwater treatment station is planned with the daily treatment capacity of 65,000m³/d, and water after treatment is sent to each workshop by the water supply pump room. The feedwater treatment station is planned for once and constructed in steps, including a construction scale of 32,500m³/d respectively at the first stage and second stage.

Currently, the Employer has obtained the review comment of Hubei Provincial Department of Water Resources on water resource demonstration report on taking water from Yangtze River; the intake amount proposed in the report is 75,000m³ per day, so that the industrial water resource of the Project is guaranteed.

2) Drainage

Drainage of the plant area in the Project is divided into production wastewater drainage system and rain drainage system. The domestic sewage is discharged into the wastewater treatment station together with other production wastewater through pipeline gravity flow after anaerobic digestion treatment by the septic-tank, then flows into the discharge pool after standard treatment, lifted by sewage pump, is discharged into the Yangtze River section in Gong'an County Qingji Industrial Park by one about 2,500m long DN800mm special steel pipe in way of diffused duck-billed discharge. Currently, the Employer has obtained the review comment of Hubei Provincial Department of Water Resources on the estuarine (Yangtze River) drain outlet demonstration report of the Project, which clarifies that wastewater water from paper making industrial park shall be treated in the wastewater treatment plant of Changtai Paper Industry (Wuhan) Co., Ltd. to reach standards and drained into river via the DN800 pipeline. The annual emission of up-to-standard wastewater is 15.33 million m³, and the up-to-standard wastewater has a minor impact on Gong'an section of the Yangtze River.

The rainwater in the plant area is collected by open ditches or pipelines, is discharged into the channel, and finally enters into Xuzhang Canal.

(3) Power supply work

When the Project works normally, its electricity is provided mainly by thermal power station in the park.

The supporting thermal power station will be intensively built in Qingji Industrial Park, to provide steam and electricity for the setting-in enterprises in the park. This power station is separated from the Project by a wall to supply power and steam required for normal production of the Project, and the wastewater sludge, production waste residue generated in the Project are sent to the power station for incineration. The supporting general step-down station of the Project will be arranged in thermal power station.

110kV substation is planned in the park, about 1km from the Project; the rod line of its transmission line passes by the land for the Project, and the power source of the power system in the Project is proposed to be provided by this substation with dedicated double-loop overhead lines.

15.2.4 Environmental Quality Status

(1) Atmospheric environmental quality

According to the comparison of standard values and the monitoring results of ambient air quality around the selected project site, the concentrations of SO₂, NO₂, PM₁₀, PM_{2.5} and Hg at monitoring points do not exceed standards, but the standard share ratios of PM₁₀ and PM_{2.5} are relatively high, which reach up to 75.3% and 92.0% respectively. Local environmental protection department shall enhance the monitoring on the surrounding construction sites to reduce PM₁₀ and PM_{2.5} in the ambient air.

(2) Acoustic environment quality

It is found from the monitoring and evaluation results that the noise at sensitive points around the Project's boundary meets the standards for Type III area specified in the *Environmental Quality Standard for Noise* (GB3095-2008). Besides, another organization was authorized to monitor the current situations of environment noise quality of several residential areas closer to the Project, findings of which show that the noise environment quality of residential areas meets the function division requirements of Type II noise environment. The noise environment quality is good.

(3) Surface water environment quality

It can be seen from assessment results that the standard index of each monitoring factor of Gong'an section of the Yangtze River in normal season is less than 1, meeting the water quality standard requirements for the functions of water areas corresponding to Type II and Type III areas specified in the *Environmental Quality Standards for Surface Water* (GB3838-2002). But ammonia nitrogen in water in dry season exceeds standards, indicating that the water quality in Gong'an section of the Yangtze River cannot meet the function division requirements of water environment quality.

(4) Groundwater quality

All the monitoring factors meet the concentration limit specified by Type III standards of *Quality Standard for Ground Water* (GB/T14848-93).

(5) Soil environment quality

All monitoring factors of monitoring sections meet the Level II standard of *Environmental Quality Standard for Soils* (GB15618-1995).

15.3 Environmental Impact Prediction and Impact Analysis

15.3.1 Surface water environment impact

The total drainage of wastewater of the two phases of the Project is 55.36m³/d, and main pollution factors involved in wastewater are pH, COD, BOD₅, SS, ammonia nitrogen, etc. The wastewater of the Project is treated in the wastewater treatment station of Changtai Paper Industry (Wuhan) Co., Ltd. The process of the wastewater treatment station is "grille +

primary sedimentation tank + anaerobic reactor + aeration tank + secondary sedimentation tank + Fenton reaction tank + third sedimentation tank + filter tank". The design is divided into two phases, the wastewater treatment scale is 27,500m³/d both in phases I and II, and the total wastewater treatment scale in two phases is 55,000m³/d. Only if the effluent from the wastewater treatment station meets Table 3: Standards for Pulp and Paper Making Joint Production Enterprise in *Discharge Standard of Water Pollutants for Pulp and Paper-making Industry* (GB3544-2008), it can be drained into the Yangtze River by virtue of enterprise dedicated drain pipe.

The wastewater treatment station takes into account the wastewater from the CHP Project and Comprehensive Solid Wastes Utilization Project at the demonstration phase for treatment capacity and process. The wastewater to be drained in the Project is only 55.36m³/d, accounting for 0.1% of the wastewater treatment capacity of the entire plant. In the approved EIA report prepared by Hubei Jingzhou Environmental Protection Technology Co., Ltd. on the 2.20Mt/a High-grade Packaging Board Project, the comprehensive standard compliance feasibility assessment is made for wastewater treatment of the entire plant. The extremely low wastewater amount of the Project and the wastewater treatment capacity of the entire plant will neither affect the treatment efficiency of wastewater treatment station, nor affect the wastewater treatment standard compliance feasibility of the entire plant. The wastewater from the Project will have less influence on surface water after being treated in the wastewater treatment station.

15.3.2 Acoustic Environment Impact

It can be seen from the table and figure above that prediction results after Phase I Project and Phase II Project description and prediction noise values of boundary points in the daytime and at night meet the standard required limit values specified in *Environmental Quality Standard for Noise* (GB3096-2008), leading to small influences on the surrounding noise environment. The Project has small influence on the noise environment of the surrounding sensitive points for the surrounding residential areas are far away from the plant area.

Prediction shows that the noise of sound source achieves the requirements in Type II of *Environmental Quality Standard for Noise* (GB3096-2008) after it reaches the boundary noise value and then is overlapped with the current value upon noise reduction measures and sound isolation of buildings and distance attenuation. Therefore, it is feasible to build the Project according to noise control measures based on noise influence.

15.3.3 Atmospheric environment impact

Standards are not exceeded for once at the concerned points of the Phase I Project of the proposed project under current meteorological conditions. Therefore, the completed proposed project has few influences on environmental sensitive points within the impact scope.

In the light of the prediction results, the predictive contribution values of SO₂, NO₂, PM_{2.5} and Hg of Phase II Project of the proposed project and concentration upon background superposition do not exceed standards; while the concentration of the superposed PM₁₀ exceeds standards for the background value is high, and the maximum standard share ratio reaches 162.52%; the long-term annual prediction result of PM₁₀ does not exceed standards.

15.3.4 Solid Wastes Impact

The policies of combination of storage and use and active use will be applied for ash and slag disposal. Except for the schemes of ash and slag separation and dry ash handling, the plant is internally provided with intermediate ash (slag) transportation warehouse, truck bulk machine and sealed tanker; slag is transported to ash yard by sealed tanker. A commitment that an external ash yard will be built and put into production synchronously has been made by the Project and the Employer. Ash & slag and desulfurization residue from boiler are the general industrial solid wastes, which are temporarily stored in the ash/slag warehouse in

plant; those which can be immediately used are directly transported to consumers from the ash/slag warehouse, otherwise, can be directly transported to the proposed ash yard for storage and batch utilization. The disposal measures for solid wastes from Yangjiachang Town Industrial Park CHP Project in Gong'an County are feasible. All of the solid wastes from the Project will be comprehensively used and properly disposed, the environmental impact of which can be effectively controlled to enable less harm to surroundings.

Solid wastes, ash & slag and desulphurization gypsum of the Project are stored temporarily by classification and planned uniformly. Ash and slag are respectively provided with intermediate ash (slag) transport storage, and cannot be piled with gypsum residue, so as to prevent secondary pollution in case of improper disposal. The ash and slag silo shall be rainproof and impermeable to avoid influences on the groundwater by the wastes in silo. Household garbage is to be collected and disposed by local environmental sanitation department, which will have less influence on environment.

15.3.5 Analysis of potential environmental risk impact

Potential accidents of the Project include ammonia tank leakage, fire explosion, ammonia leakage from desulfurization facilities, failure of pollution treatment facilities and hazardous article leakage during transportation. Accident of ammonia tank leakage constitutes the maximum credible accident of the Project and brings to certain environmental risk; after adopting the various risk management measures proposed by the environmental impact assessment, the environmental risk will be in the acceptable range. Although the incidence of risk accident is low, the Project has potential accident risk. Therefore, it shall actively take protective measures from various aspects like construction, production, storage and transportation for safety. When the accident happens, engineering emergency measures and social emergency measures shall be adopted to control the accident and reduce harms to environment.

15.4 Pollution Prevention and Control Measures

15.4.1 Pollution control measures during construction

(1) Control measures for atmospheric pollution: regularly spray transportation road and working place to reduce flying dust in the working period that flying dust is easily generated; provide additional cover to transport vehicles to prevent sandy soil and stone from falling down, so as to reduce flying dust; provide wading pond equipped with high-pressure flushing device at the gate out the construction site to clean the soil on tires, reducing the soil brought out; apply environment-friendly decoration materials to reduce the emission of harmful gas from operation.

(2) Control measures for noise pollution: construction equipment and process with low noise shall be selected as possible; high noise mechanical equipment, like mixer, air compressor, etc., shall be placed away from the residential area; construction transport vehicles shall try not to sound the horn as possible; construction machinery operation time shall be arranged reasonably, and construction machinery with high noise is prohibited to use at night; personnel who work in a strong noise environment shall be equipped with noise protective equipment and shall work during the limited period as stipulated.

(3) Control measures for water environmental pollution: Since the construction of the production line is centralized, simple sedimentation tank shall be designed for settling various production wastewater preliminarily, after which the wastewater shall be discharged externally, such as flushing water of machinery and vehicles, ground flushing water. Domestic sewage from the constructors shall be transported to environmental sanitation department for treatment after being treated by the environment-friendly mobile toilets.

(4) Disposal measures for solid waste: Household garbage and construction waste from the constructors during the construction period shall be stacked together and transported to the urban garbage disposal plant for treatment through construction vehicles.

15.4.2 Control measures for pollution during the operation

(1) Prevention and control measures for water pollution

The proposed project at the plant area shall discharge the water in the form of separation of clean water and sewage. The deposited slag washing wastewater and part of desulfurization wastewater shall be discharged after they are treated by the wastewater treatment station of 2.20Mt/a High-grade Packaging Board Project in Changtai Paper Industry (Wuhan) Co., Ltd., while the domestic sewage shall be discharged to the wastewater treatment station of the company via the septic-tank, then discharged externally. After the concentrated water from chemical water workshop and part of the water drained from cooling tower are recycled, part of the water drained from cooling tower shall be used for coal yard spraying, and the initial rainwater in coal yard shall be recycled for such spraying as well after being collected, deposited and treated.

(2) Measures for Prevention of Atmospheric Pollution

① Flue gas denitrification

SNCR desulfurization treatment process shall be applied to the 410t/h high temperature and high pressure circulating fluidized bedboiler of the proposed works. Ammonia with the concentration of 20% shall be used as the SNCR denitrifying agent, of which the denitration rate may reach 60~70% at most when applied to the circulating fluidized bedboiler. The denitration efficiency for this time is designed as over 55% so that the emission concentration of NO_x can be below $100\text{mg}/\text{Nm}^3$, and meet *Emission Standard of Air Pollutants for Thermal Power Plants* (GB13223-2011).

② Flue gas dust removal

The electric bag deduster shall be applied to the boiler to remove the dust in the flue gas. In combination with wet desulfurization system, the emission concentration of the smoke may reach below $30\text{mg}/\text{Nm}^3$, and satisfy *Emission Standard of Air Pollutants for Thermal Power Plants* (GB13223-2011).

③ Flue gas desulfurization

The limestone wet desulfurization process shall be applied to the proposed works so that the emission concentration of SO_2 in the 410t/h boiler can be less than $100\text{mg}/\text{m}^3$, and satisfy the requirements of *Emission Standard of Air Pollutants for Thermal Power Plants* (GB13223-2011). At the same time, hydrogen chloride gas in the boiler flue gas can be removed through limestone wet desulfurization, with the removal rate of over 90%.

④ Other dust removal measures

Dust and waste gas generated by fuel coal transport system, crushed coal, disintegrating slag, coal bunker, ash silo and slag silo shall be led to the bag-type dedusting device through the draught fan. The concentration of externally discharged dust shall meet the requirement of $120\text{mg}/\text{m}^3$ in *Integrated Emission Standard of Air Pollutants* (GB16297-1996) after the treatment through the bag-type deduster.

(3) Measures for Prevention of Noise Pollution

Main noise sources of the proposed works are from the steam turbine generator unit, induced wind of the boiler, blower, coal crusher, pulper, cooling tower, various pumps, boiler steam exhaust, etc. According to the mechanism of the noise generation, equipment noise is mainly from the machinery and air power. Usually, one sound equipment may have several different noises. Measures shall be taken to control the noise from three aspects, namely noise source, route of transmission and receptor (namely noise control and noise reduction). From the general layout, the arrangement shall be optimized on the premise of proper process, even arrangement of the key noise sources shall be fully taken into account,

structures where the key noise sources centralize shall be arranged in the center of the plant area, and other auxiliary buildings shall be used to play the shielding role; low noise equipment shall be applied; the measure of vibration reduction shall be taken for the foundation of equipment, the measure of sound insulation shall be taken for main power house, desulfurization building, circulating water pump house, etc., and totally enclosed measure and soundproof double-layer windows and doors shall be applied to steam engine house and other power houses. Silencer shall be installed on the inlet of the blower. Greening shall be strengthened in the plant area so as to minimize the influence of noise on the environment.

(4) Control measures for solid waste pollution

As a new type of building materials, dry ash has been widely used, especially the comprehensive utilization prospects of fine ash market are very optimistic. Grade-I ash as high quality admixture of the building concrete may be used to be the mixture for the dam cement and highway cement; while Grade-II ash may be directly used as the cement admixture, which is also popular in the market. The proposed project takes the limestone-gypsum method for desulphurization. By-product through flue gas desulfurization of limestone-gypsum wet method is the gypsum with the surface water content less than 10% (namely $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$). The annual output of the designed coal type gypsum and the checked coal type gypsum is 102,160t and 129,920t respectively. The desulphurization gypsum of the Project is for comprehensive utilization. These that are not utilized on time shall be transported to the ash yard for separate stacking by a sealed autodumper.

The slag silo of the project outside the plant is not included in the assessment, but as the necessary environmental protection facilities for the Project, the slag silo and the Project must be completed at the same time and put into use. Also, the Employer promises to complete the slag silo synchronously (see the Annex). The completion of the slag silo can guarantee the temporary storage of the slag in a short time.

At present, Changtai Paper Industry (Wuhan) Co., Ltd. has negotiated with relevant enterprises about the comprehensive utilization of ash, and signed the General Disposal Agreement on Industrial Solid Waste with three enterprises, namely Gong'an Huifeng Energy Development Co., Ltd., Gong'an Ruifeng New Wall Materials Co., Ltd., and Gong'an Jinsha Commerce Limited Liability Company, so the annual ash, slag and gypsum discharges of the units in the power plant can be comprehensively utilized. The output of household garbage is around 56.44t/a, which shall be disposed by the environmental sanitation department in the park area.

15.5 Cleaner Production Level and Total Amount Control

15.5.1 Cleaner production level

Coal, sludge, pulp residue and biogas are used for the proposed works. CHP is applied for centralized heat supply, which effectively improves the utilization of resources and energy and reduces the generation of pollutants. Through improving the reclamation of wastes, the cleaner production goals of efficiency increase, energy saving, consumption reduction and pollution reduction are achieved basically, therefore, the goal of protecting the environment is achieved when improving the economic benefit. Referring to the cleaner production indicator in *Cleaner Production Evaluation Index System for Thermal Power Industry* (trial), the Project belongs to the cleaner production enterprise, with a high level in cleaner production.

15.5.2 Total pollutant amount control

The indicators for total pollutant amount control of the Project include SO_2 , NO_x and smoke in the waste gas as well as COD and $\text{NH}_3\text{-N}$ in the wastewater.

The total amount control of SO_2 for the assessment calculated according to *Technical Methods for the Verification of the Total Emission Indexes of Major Pollutants in Construction Project* is 1042.26t/a, and that of NO_x is 1042.26t/a. In combination with the ratio of the

heating coal consumption and power supply coal consumption, the emission of SO₂ for heating and power supply is 871.06t/a and 171.20t/a respectively; the emission of NO_x for heating and power supply is 871.06t/a and 871.06t/a respectively; in addition, the respective emission of smoke and dust is 346.59t/a and 23.052t/a, and the emission of mercury and its compounds in flue gas is 0.037t/a.

For 14.53t/a of COD_{Cr} and 0.163t/a of ammonia nitrogen in the wastewater, the wastewater volume of the Project was not taken into account when the Employer made an EIA Report on 2.20Mt/a High-grade Packaging Board Project.

For four emission indexes for SO₂ and NO_x in the waste gas and COD and NH₃-N in flue gas and wastewater in this assessment check, *On the Request of Changtai Paper Industry (Wuhan) Co., Ltd. for Total Emission Indexes of Major Pollutants of the CHP Project* (JHH [2015] No. 170) issued by Jingzhou Environmental Protection Bureau depicts sources from total amount indexes of main normal pollutants of the Project as follows:

- (1) Jingzhou Environmental Protection Bureau plans to adjust COD emission reduction (802.79t) and ammonia nitrogen emission reduction (929.6t) approved by the Ministry of Environmental Protection in 2013 in Hubei Datian Chemical Co., Ltd.
- (2) For the SO₂ index, it is proposed to be adjusted from the 8,035.22 tons of full emission reduction of SO₂ of Hubei Songyuan Gangue Power Co., Ltd. confirmed by the Ministry of Environmental Protection in 2014, 534.8 tons of which were adjusted for Songzi Long Chen Paper Co., Ltd., and the remained 7,500.42 tons can satisfy the Project.
- (3) The total emission index of NO_x required is proposed to be adjusted from the 1,380.23 tons of full emission reduction of NO_x of Guodian Changyuan Jingzhou Thermal Power Co., Ltd. confirmed in 2014 by the Ministry of Environmental Protection.

15.6 Public Participation

Public participation of the Project is conducted in such a manner of media publicity and filling Public Opinion Survey, from which the related personnel's public opinions are collected within the scope of the assessment area. Construction of the Project is not opposed by personnel and units participating in this Survey. This assessment demands to build environmental protection facilities first during construction of the enterprise project, and take care of local farmers for construction and labor service; ensures no influences on normal life of the surrounding residents during the construction; strengthen management on construction activities, personnel and operation during construction and operation of the project, so as to alleviate influences on the surrounding environment. According to this assessment, it is suggested that enterprises shall strengthen promotion of the Project to let the publics fully understand construction of the Project, know influences on the surrounding environment by construction of the Project, and efforts on environmental protection by the enterprises; the Employer must actively cooperate with the government to do a good job of relocation of residents within the occupation scope, and cannot lower the living quality of the local residents for construction of the Project. As a result of this, construction of the Project could be promoted for more extensive support.

15.7 Comprehensive Assessment Conclusion and Suggestions

15.7.1 Comprehensive assessment conclusion

The Yangjiachang Town Industrial Park CHP Project in Gong'an County of Hubei Changtai Paper Industry (Wuhan) Co., Ltd. conforms to the provisions of *Directory Catalogue on Readjustment of Industrial Structure* (2011) (Revised in 2013) and *Action Plan for Upgrading and Transformation of Energy Saving and Pollution Emission Reduction for Coal Power Industry (2014-2020)*. The plant site is in accordance with the requirements of *Urban Overall Planning of Gong'an County (2005-2020)* and *Special Planning for Heat Supply of Gong'an County (2014-2030)*, and simultaneously meets planning, industrial layout and land planning of Gong'an County Qingji Industrial Park and Yangjiachang Town Industrial Park.

The Project has gained permission for water resource utilization and drain outlet setting. The Employer makes a promise that the supporting ash yard and the Project will be built and completed at the same time. Moreover, the flood influence assessment report on urban general layout of Gong'an County of the project has passed review by the expert group. Besides, land pre-review suggestions, planning EIA review suggestions and source files of total amount control of pollutant discharge are being gone through. This assessment believes that the Employer needs to complete the related argumentations closely associated with environmental compliance and obtain such complete procedures as feasibility approval, and make sure that construction of the Project has the environmental feasibility under the premise of fully implementing pollution control measures and environmental protection investments determined in the Report.

15.7.2 Suggestions

The Employer of the Project needs to complete the following work, in addition to fully implementing measures required by this assessment:

- (1) complete land approval procedures as soon as possible, and allow the occupation scope red line of final approval to be consistent with this assessment;
- (2) take the lead to complete flood influence argumentation report on the project area as soon as possible by Gong'an County Government, and specify influences on flood diversion and storage area and the project when the flood diversion and storage area stores flood water by construction of the Project, so as to further demonstrate environmental feasibility of the Project;
- (3) complete permission for water resource argumentation and drain outlet argumentation of 2.20Mt/a High-grade Packaging Board Project by Changtai Paper Industry (Wuhan) Co., Ltd. supporting the Project; make sure synchronous completion and operation of the Project;
- (4) in the light of high total amount control index quantity of waste gas pollutants after the project is put into operation, actively apply for the local environmental protection department to make sure total amount control index of the pollutants upon putting into operation by the Employer.
- (5) In the light of excluding supporting ash yard contents of the Project in this assessment, complete ash yard report and construction based on the promise by the Employer, so as to make sure that the Project and it are put into operation simultaneously.