Environmental Management Plan

of

Kunming Konggang Municipal Solid Waste Incineration Power Plant

(2018 edition)

November 2018

Abbreviations

APC	air pollution control
Bank	World Bank
BAT	best available techniques
BEP	best environmental practices
CFB	circulating fluidized bed
DongJiao	DongJiao MSW Power Plant
EA	environmental assessment
EHS Guidelines	World Bank Group Environmental, Health and Safety Guidelines
EPB	environmental protection bureau
EMP	environmental management plan
FECO	Foreign Economic Cooperation Office, Ministry of Environmental Protection
Konggang	Konggang MSW Power Plant
MEP	Ministry of Environmental Protection, PRC
MSW	municipal solid wastes
NIP	National Implementation Plan
POPs	persistent organic pollutants
Stockholm Convention	SC
UMB	urban management bureau
WuHua	WuHua MSW Power Plant
XiShan	XiShan MSW Power Plant

Content

1 Introduction

1.1 Project background

The National Implementation Plan of the People's Republic of China for the Stockholm Convention on Persistent Organic Pollutants (POPs) lists the municipal solid waste (MSW) disposal sector as one the country's six priority industries for POPs reduction. In order to help China implement its responsibility under the Convention, achieve reduction of dioxin emissions from MSW incineration, the Ministry of Environmental Protection (MEP) and the World Bank work together to apply for using the GEF grants to implement the China Municipal Solid Waste Management Project (the Project) to promote best available techniques (BAT) and best environmental practices (BEP) in accordance with the Stockholm Convention (SC) in the pilot of the MSW incinerators in Kunming City .

The project implementation, by design, will consist two phases. In the first phase (2014-2017) an intensive operating and environmental performance audit at the four candidate incinerators was carried out by the international consortium of consultants procured by the Foreign Economic Cooperation Office (FECO) of MEP. Based on the audit, technical improvement recommendations were provided to each of the incinerators. Incinerators that commit to implementing these programs and fulfill financial eligibility conditions would be supported during the remainder of the project, including through grand funding for necessary upgrades of equipment relevant for dioxin emission reduction.

Kunming Sanfeng Renewable Energy Power Generation Company, Ltd (Konggang Incinerator) has been identified as one of the demonstration incinerators in Kunming. During the Project preparation, Konggang prepared an environmental audit report. Based on the findings and recommendations of the environmental audit, a standalone EMP was also prepared (the edition of July, 2014). The EMP has been implemented for 4 years and Konggang also made certain technical improvements during the period. At the same time, with the continuous strengthening of environmental management requirements in China, the relevant standards, norms and management requirements have been improved to varying degrees. Therefore, according to the latest national requirements, combined with the actual operation and management status of Konggang, the July 2014 edition of the EMP has been updated and supplemented based on the findings of the operation and environmental performance audit of the project. The updated EMP incorporates relevant costs, which will be part of the operational improvement programme of Konggang at the second phase, in order to further improve its environmental management level.

This updated Environment Management Plan (EMP) has incorporated the latest applicable domestic environmental requirements, Stockholm Convention Best Available Techniques and Best Environmental Practices (BAT/BEP), and World Bank Group Environmental, Health and Safety Guidelines (WBG EHS Guidelines). The EMP is remaining valid for the technical improvement implementation that funded by the GEF grants.

1.2 Project profile

1.2.1 Project location

Kunming Konggang Municipal Solid Waste Incineration Power Plant (Konggang Incinerator) is located in northwestern rural area of Kunming city (see figure 1-1)

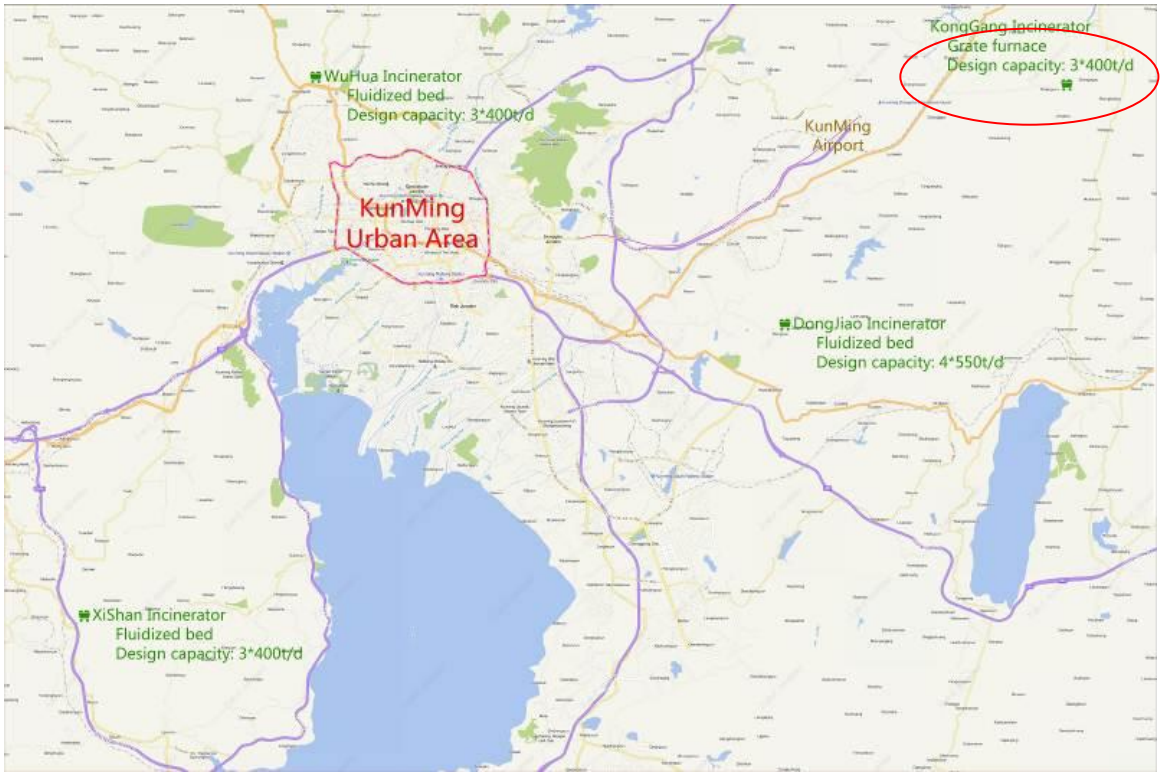


Figure 1-1 Location of Konggang

1.2.2 Project owner

Kunming Konggang Incinerator will be responsible for implementation of the EMP. The Konggang Incinerator was built in March 2011, and entered into official operation in August 2013 after obtaining environmental acceptance issued by Yunnan Provincial Environmental Protection Department.

1.2.3 Current Status of Process Operation and Technological Transformation in the First Phase

The Konggang facility comprises 2 combustion trains each of 500 TPD (550 maximum) for total of 1,000TPD. The facility utilizes grate (mass burn) technology and has been in operation since August 2013. Electricity is generated using one turbine generator with a total generating capacity of 18 megawatts. Municipal solid waste, pre-processed at the transfer stations by fermentation (reported to effect 15% weight reduction as “leachate”) for water removal is delivered to the plant, stored in their pit and, over a period of time, additional water is drained off (reported as an additional 15%). Waste is fed to the furnace using a conventional bridge crane, clamshell bucket and chute. If combustion temperatures fall below 850°C, diesel is used as an auxiliary fuel. After leaving the economizer, acidic flue gases are removed using a slurry of Ca(OH)2 (slaked lime) in a semi-dry scrubber. Activated carbon is added for dioxin and mercury control. Particulate collection is effected using a bag house with Teflon bags with Teflon membrane technology. Bag house integrity is monitored using a laser optical system on the combined flue gas. Overall, Konggang incinerator is a relatively new plant, which has good operation and maintenance, professional personnel quality, and has also established an effective environmental management system. At the same time, the hardware and personnel conditions also ensure the effective implementation of the original EMP. During the implementation of the EMP of the 2014 edition, the environmental management level of Konggang has been upgraded according to the plan.

After the promulgation and implementation of the Environmental Management Plan for Waste Incineration Power Plant in Kunming Airport Economic Zone in 2014, Konggang Incinerator, with the support of the Project, has carried out relevant environmental governance and improvement

of facilities. At the same time, enterprises have also carried out corresponding technological transformation of environmental governance and management facilities based on their own environmental management needs. For example:

A. The monitoring equipment has been reformed, the temperature monitoring in the furnace has been strengthened, several temperature monitoring points have been set up, and the monitoring results in the furnace have been directly reported to the local environmental protection and housing departments through the network.

B. Setting up automatic metering and feeding facilities for activated carbon to ensure that the added amount of activated carbon meets the requirements of design standards and to avoid non-automatic metering and feeding affecting the effect of flue gas treatment.

C. The reverse osmosis device was added and the anaerobic reactor was technologically modified to improve the quality of effluent from sewage treatment facilities and further enhance the feasibility and reliability of leachate treatment and reuse.

D. According to the requirement of "installation, setup and Networking" in "Notice on Installation of Automatic Monitoring Equipment for Pollutant Discharge in Domestic Waste Incineration Plant and Related Matters Related to Networking", automatic monitoring equipment for pollutant discharge has been installed according to law, and a display screen has been set up at the entrance of the plant to publish real-time data of pollutant discharge and operation of the incinerator, thus realizing automatic monitoring. Networking of Measuring Equipment with Environmental Protection Departments.

E. Biological deodorization devices have been installed on floor weights and trestles to reduce the emission of odorous pollutants.

F. The pretreatment and solidification facilities of fly ash were optimized to reduce the secondary environmental impact of fly ash.

The details of the above technical transformation and costs have been listed in figure 1.2-1 as following:

No.	Technical Transformation	Details	Costs (10000YUAN)
1	Leachate Treatment System	1. Leachate treatment system adds STRO water treatment equipment with the latest technology to recycle wastewater after reaching reuse standard, so as to reduce wastewater discharge and save industrial water 2. The UASB anaerobic reactor of leachate treatment system was modified to improve the output and stability of the anaerobic reactor by applying the latest technology 3. Leachate treatment station isolation	497.78
2	Odor and Biogas Control	1. Biogas reused; 2. Harmless disposal of odor produced by leachate system	181.62
3	Modification of Fly Ash Solidification System	1. Improve fly ash solidification process to ensure qualified curing and standard treatment； 2. Adding Fly Ash Crushing Treatment System。	181.22
4	Relevant investment	Perfecting flue gas monitoring, publicity and data	64.99

	for required Installation, Setup and Networking by EPB	transmission system	
5	Adding Standby Temporary Substitution Facilities to Flue Gas Processing System	Adding atomizer maintenance to de-acidification tower instead of spray gun	9.50
6	Environmental Education Base and Opening to the Public	1. Actively Promote the Opening of Waste Incineration Power Generation and Build Environmental Protection Education Base 2. Construction of visiting elevators and roof lighting	180.54
7	Adding Shock Wave Soot Blower for Boiler	1. Optimizing the way of ash removal of waste heat boiler and increasing the shock wave soot blowing device of boiler 2. Increasing Anti-wear Facilities for Heating Surface Pipelines	104.33
8	Improve the environment and beautify the plant	1. Paint of floor and wall in factory area 2. Chimney Paint in Factory Area	118.02
9	Increase sewage reuse system	Installation of the waste water collection and recycle facility	28.62
10	Further improve the surrounding environment of the plant	Slope greening in factory area	115.70
11	Technical Reform of RCCS Condenser	Condenser increases RCCS, heat transfer and efficiency	27.00
12	Odor control in the whole plant	1. Isolation and blockade of odor sources 2. Installation of biological deodorization devices in floor weights and Trestles	63.30
13	Improvement of Incinerator by Further Energy Saving and Emission Reduction	1. Reform of the feeding system of incinerator; 2. Improvement of Fire Protection Belt of Incinerator Wall	185.50
14	Ensuring the normal operation of environmental protection facilities and increasing water supply system	Increase reserve water supply	70.20

15	Adding on-line sampling device for steam water monitoring	1. Adding on-line sampling device for steam water monitoring to guarantee the water quality in the furnace	23.84
16	Energy-saving Technical Reform of Cooling Tower	1. Hydrodynamic Energy-saving Retrofit of Cooling Tower Fan	98.00
17	Adding Standby Power Supply to Environmental Protection System	Improvement of 10kV security power supply to ensure safe operation of plant equipment and environmental protection	44.30
18	SISMIS Plant-level Monitoring and Management Information System	Increase production operation monitoring and information management system	154.23
	Total		2148.69

Improvement of Pollutant Emission:

a. Emissions of Pollutants from Exhaust Gas

According to the monitoring data analysis results from 2016 to 2018, the emission levels of NOX and Pb remained stable; the particulate matter, SO2, CO and HCl were in general a downward trend. It shows that the overall implementation of Konggang Incinerator at the first phase is good and plays a better role in controlling the total discharge of pollutants.

Figure 1.2-1 Exhaust Gas Monitoring Data of Konggang in Recent Years

Pollutants	Monitoring Results of 2016	Monitoring Results of 2017	Monitoring Results of the first half of 2018
Dioxin (ng TEQ/$m^{3)}$	0.079	0.053	
Particulate (mg/m^3)	7.78~13.33	11.14	7.99
SO_2 (mg/m^3)	56	41.42	15.3
CO (mg/m^3)	54.92	34.8	20.06
NOx (mg/m^3)	182	147	150.6
Pb (mg/m^3)	0.011	0.0037	0.0104
Cd (mg/m^3)	0.013	0.00125	0.00021
Hg (mg/m^3)	0.000035	0.000022	0.000081
HCl (mg/m^3)	15.47	16	6.83

Although the pollutants in the waste gas of the Konggang meet the *Standard for Pollution Control of Domestic Waste Incineration* (GB18485-2014), and the emission level is decreasing year by year, there is still room for improvement in particulate matter and HCl compared with the advanced emission level in the world.

b、Monitoring of Toxicity of Fly Ash Leaching

Figure 1.2-2 Leaching Toxicity of Fly Ash of Konggang Incinerator in Recent Years

Monitoring Time	Cu	Zn	Pb	Cd	Cr6	Be	As	Hg	Total Cr	Ni	Ba
2016	0.045	0.0755	0.1	0.0103	0.006	L	0.2855	L	0.465	0.105	L
2017	0.5313	0.2085	0.1938	0.0705		12.7667	0.2503		1.5169	0.3394	L
First Half of 2018	0.0500	0.0650	0.1500	0.1220	0.0260	0.0002	0.0047	0.0006	0.0700	0.3000	1.5665
Standard Limit	**40**	**100**	**0.25**	**0.15**	**1.5**	**0.02**	**0.3**	**0.05**	**4.5**	**0.5**	**25**

According to the monitoring results of leaching toxicity of fly ash in recent three years, the leaching toxicity of fly ash meets the requirements of pollution control standards for landfills, but the overall change trend of pollutant content in leaching solution of fly ash is not obvious.

1.2.4 The Main Basis for Updating the EMP

The EMP updating is based on the follows:
First, according to the findings and technical improvement recommendations of the environmental performance audit, Konggang Incinerator will continue the relevant technical retrofit engineering works funded by the Project. The main content of the technical transformation includes upgrading of the flue gas control equipment for 2# furnace, upgrading the DCS system, and increase SIS, MIS and historical data base and so on. 。
Secondly, a series of technical improvements have been implemented by Konggang Incinerator and the original EMP is no longer in line with actual conditions of the incinerator.
Thirdly, the requirement of national environmental management is becoming more rigorous and the latest national environmental requirements must be implemented through the formulation and update of EMP.

1.3 Basis for the EMP

1.3.1 Domestic environmental protection laws, regulations & policies

Ever since the year of 1979 when the *Environmental Protection Law of the People's Republic of China (Trail)* was issued, multiple environmental protection laws and regulations have ensued, including the *Water Pollution Prevention and Control Law of the People's Republic of China*, the *Atmospheric Pollution Prevention Law of the People's Republic of China* and the *Marine Environment Protection Law of the People's Republic of China*, etc. An environmental protection legislation system has taking shape by integrating the components of comprehensive laws, pollution control laws, and resource and eco-protection laws, etc. Currently an environmental law system has been derived from the *Environmental Protection Law of the People's Republic of China* on basis of the *Constitution of the People's Republic of China*. The legislation efforts on environmental protection have provided power thrusts to the development of environmental protection in China. The requirements for environmental management in China have been intensified ever since the implementation of Kunming pilot. Therefore the updating has been made at the basis of the previous EMP, The current environmental laws and regulations are updated and the latest editions are shown in bold fonts.
The environmental protection laws and regulation concerning this project include:

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

(2) The Noise Pollution Prevention Law of the People's Republic of China revised on October 29,

1996;

(3) The Atmospheric Pollution Prevention Law of the People's Republic of China revised on April 29, 2000;

(4) The Solid Waste Pollution Prevention Law of the People's Republic of China revised on December 29, 2004;

(5) The Water Pollution Prevention Law of the People's Republic of China effective on June 1 2008;

(6) The Cleaner Production Promotion Law of the People's Republic of China effective on July 1, 2012;

(7) The *National Hazardous Waste Inventory* issued by *Instruction No.1* of the Ministry of Environmental Protection and the National Development and Reform Commission, taking effect on August 1, 2008;

(8) The Renewable Energy Law of the People's Republic of China (February 28, 2005);

(9) The Circular Economy Promotion Law of the People's Republic of China (August 29, 2008);

(10) CZ [2000] No.120 *Technical Policy on Urban Domestic Waste Disposal and Pollution Prevention* jointly issued by the Ministry of Construction, the Ministry of Science and Technology and the State Environmental Protection Administration;

(11) HF (2008) No.82 Circular on Improving the Environmental Impact Assessing Management for Biomass Power Generation Projects issued on September 4, 2008;

(12) The *Technical Guidance on Domestic Waste Disposal* jointly issued by the Ministry of Housing and Urban-Rural Construction, the National Development and Reform Commission and the Ministry of Environmental Protection on April 22, 2010;

(13) HF [2010] No. 123 Guidance on Strengthening Dioxin Pollution Prevention;

(14) Measures for the Automatic Monitoring and Management of Pollution Sources (Decree No. 28 of the State Environmental Protection Administration);

(15) HF [2008] No.6 Operational Management Measures for Automatic Monitoring Facilities of Pollution Sources;

(16) Management Measures for Environment Monitoring (Decree No.39 of the State Environmental Protection Administration);

(17) Circular of the Ministry of Environmental Protection on the Issuance of Measures for Self-monitoring and Information Disclosure of State Key Monitoring Enterprises (Trial Implementation) and Measures for Supervisory Monitoring and Information Disclosure of Pollution Sources of State Key Monitoring Enterprises (Trial Implementation). (HF [2013]81);

(18) Measures for Environmental Information Disclosure (Trial Implementation) (Decree No.35 of the State Environmental Protection Administration);

(19) Environmental Information Disclosure Measures for the Entrepreneurs and Institutions (Decree No.31 of MEP).

1.3.2 Environmental and social policies of the Work Bank:

Table 1-2 Compliance with the Bank's safeguards policies

Table 1.3-1 Compliance with the Bank's safeguards policies

Safeguard Policies	Applicability	Compliance
OP/BP 4.01 Environmental assessment	Yes	Category A project, full assessment, and environmental audit report and environmental management plan prepared. Public participation and information disclosure carried out.
OP/BP 4.04 Natural habitat	No	The Project does not involve any natural habitats
OP 4.09 Pest management	No	The project would incur neither purchase of any pesticide nor additional pesticide application. No action is required according to the Policy.
OP 4.37 Dam safety	No	There are no dams in the project area.
OP4.11 Physical cultural resources	No	Not any cultural heritage or other physical cultural resource has been found.
OP/BP4.36 Forest	No	This project will not result in material changes or deterioration of important forest areas or relevant natural habitats as defined in such policies.
OP/BP 4.12 Involuntary resettlement	No	This project will out activities in existing waste Incineration Power Plant, so no land acquisition and resettlement are involved.
OD 4.20 Indigenous Peoples	No	There're no indigenous residents living in the project area or no indigenous residents will be affected by the project.
OP 7.50 International Waterways	No	There are no international waterways in the project area.
OP/BP 7.60 Disputed area	No	There're no disputed areas in the project area.

1.3.3 Requirements of China's Environmental Protection and Guarantee Policy

In recent years, China's updated environmental protection laws and regulations mainly include the Environmental Protection Law of the People's Republic of China, the Law of the People's Republic of China on the Prevention and Control of Noise Pollution, the Law of the People's Republic of China on the Prevention and Control of Air Pollution and the Law of the People's Republic of China on the Prevention and Control of Environmental Pollution by Solid Waste. The compliance with the latest laws and regulations of China has been analyzed as following:

Table 1.3-2 Analysis of the Compliance with the Latest Laws and Regulations of China

No.	Name of the Law	Relevant Requirements by Law	Compliance with the relevant Law and Regulation
1	Environmental Protection Law of the People's Republic of China	Enterprises should give priority to the use of clean energy, adopt processes and equipment with high resource utilization and low pollutant discharge, as well as technologies for comprehensive utilization of wastes and harmless treatment of pollutants, so as to reduce the generation of pollutants.	The grate incinerator used in this project belongs to the best feasible technology, which realizing the harmlessness and reduction of municipal solid waste, the flue gas can reach the discharge standard.
2		Enterprises, institutions and other producers and operators discharging pollutants shall take measures to prevent and control environmental pollution and hazards caused by waste gases, wastewater, waste residues, medical wastes, dust, odorous gases, radioactive substances, noise, vibration, light radiation and electromagnetic radiation in production, construction or other activities.	The project incinerator waste gas, fugitive odor from the waste bunker, leachate, fly ash and slag have been reasonably disposed of, and the pollutants in the production process have been prevented and cured reasonably.
3		Enterprises and institutions discharging pollutants shall establish the environmental responsibility mechanism to specify the responsibilities of unit leaders and relevant personnel.	Enterprise has established a clear responsibility system for environmental management, and clearly defined the responsibility of the head of the unit and related personnel.
4		Key pollutant discharge units shall install and use monitoring equipment in accordance with relevant state regulations and monitoring norms, ensure the normal operation of monitoring equipment and keep original monitoring records.	The on-line monitoring equipments for the incinerators in the plants are operating regularly and the original monitoring data has been well-kept.
5		Enterprises, institutions and other producers and operators that implement the management of pollutant discharge permits shall discharge pollutants in accordance with the requirements of the pollutant discharge permits; if no pollutant discharge permit has been obtained, no pollutant shall be discharged.	Pollutant emission permits have been obtained.
6		Citizens, legal persons and other organizations have the right to access environmental information, participate in and supervise environmental protection according to law.	During the implementation period, the project has established perfect information disclosure mechanism and complaint mechanism.

7		Key pollutant discharging units shall truthfully disclose to the public the names, discharging modes, concentration and total amount of their major pollutants, the situation of over-standard discharges, and the construction and operation of pollution prevention and control facilities, and accept social supervision.	Enterprise has publicized the relevant online monitoring data through the website of the Provincial Environmental Protection Department, and set up an electronic bulletin board at the factory gate to publicize the relevant data in time.
8	the Law of the People's Republic of China on the Prevention and Control of Noise Pollution	Enterprises and institutions that produce environmental noise pollution must maintain the normal operation of facilities for the noise prevention and control; in case the noise prevention facilities dismantled or unused, it must be submitted to the administrative department of environmental protection of the local people's government at or above the county level for approval in advance.	Noise pollution prevention and control facilities have been built in strict accordance with the requirements of EIA report. Strict noise pollution prevention and control measures will continue to be taken in accordance with the requirements during the follow-up renovation period.
9	the Law of the People's Republic of China on the Prevention and Control of Air Pollution	Enterprises, institutions and other producers and operators shall carry out environmental impact assessment and publicize environmental impact assessment documents in accordance with the law for the construction of projects that have an impact on the atmospheric environment; if pollutants are discharged into the atmosphere, they shall meet the emission standards of atmospheric pollutants and comply with the requirements for the total control of the discharge of key atmospheric pollutants.	Environmental impact assessment has been carried out in accordance with the requirements; the emission of air pollutants meets the requirements of emission standards and the total amount control requirements of local environmental protection authorities.
10		Enterprises, institutions and other producers and operators that discharge pollutants into the atmosphere shall, in accordance with laws and regulations and the provisions of the competent department of ecological environment under the State Council, set up outlets for the discharge of atmospheric pollutants.	The incinerator has set up air pollutant emission outlets according to the specifications.
11		Enterprises, institutions and other producers and operators shall keep original monitoring records in accordance with the relevant regulations and monitoring norms of the State. Among them, key pollutant discharging units shall install and use automatic monitoring equipment for atmospheric pollutant discharge, connect with monitoring equipment of competent ecological and environmental departments, ensure the normal operation of	Enterprise has archived monitoring data over the years, and automatic monitoring facilities for exhaust gas have been set up at the outlet of incinerator air treatment facilities. The automatic monitoring equipment has been networked with the monitoring system of the competent department of ecological

		monitoring equipment and publicize emission information according to law. Specific measures for monitoring and conditions for key pollutant discharge units shall be stipulated by the competent department of ecological environment under the State Council.	environment, and the monitoring data have been disclosed to the public.
12		Key pollutant discharge units shall be responsible for the authenticity and accuracy of automatic monitoring data. If the competent department of ecological environment finds that the data transmitted by the automatic monitoring equipment for atmospheric pollutant discharge of key pollutant discharging units are abnormal, it shall promptly conduct an investigation.	Conformed
13	the Law of the People's Republic of China on the Prevention and Control of Environmental Pollution by Solid Waste	The State adopts economic and technological policies and measures conducive to the comprehensive utilization of solid waste, and fully recycles and rationally utilizes solid waste. The State encourages and supports the adoption of measures conducive to the centralized disposal of solid waste for environmental protection, and promotes the development of industry for the prevention and control of environmental pollution by solid waste.	Conformed
14		Units and individuals collecting, storing, transporting, utilizing and disposing of solid waste must take measures to prevent diversion, loss, leakage or other measures to prevent environmental pollution; and they must not dump, pile up, cast off or discard solid waste without authorization.	Enterprise has built temporary storage facilities for fly ash and slag, pretreated fly ash, and sent fly ash and slag to relevant units for disposal in time.
15		For the transfer of hazardous waste, a joint list of hazardous waste transfer must be filled out in accordance with the relevant provisions of the State.	The joint list of hazardous waste transfer has been filled by the enterprise.
16		Units producing, collecting, storing, transporting, utilizing and disposing of hazardous wastes shall formulate accident prevention measures and emergency plans and file them with the competent administrative department of environmental protection of the local people's government at or above the county level.	An emergency plan for environmental risk has been formulated and reported to the local environmental protection authorities for record.

1.3.4 World Bank Group Environmental Health and Safety Guidelines

The World Bank Group Guidelines applicable to this project include the applicable guidelines of General Guidelines and sub-guidelines related to municipal solid waste incineration.

The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. Application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets, with an appropriate timetable for achieving them.

The applicability of the EHS Guidelines should be tailored to the hazards and risks established for each project on the basis of the results of an environmental assessment in which site-specific variables, such as host country context, assimilative capacity of the environment, and other project factors, are taken into account. The applicability of specific technical recommendations should be based on the professional opinion of qualified and experienced persons. When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less stringent levels or measures than those provided in these EHS Guidelines are appropriate, in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as part of the site-specific environmental assessment. This justification should demonstrate that the choice for any alternate performance levels is protective of human health and the environment.

The *Environment, Health and Safety Guidelines for Waste Management Facilities* includes measures and performance levels relevant to MSW incineration, including management of air emissions, ash and other residuals, water effluents, noise, occupational health and safety, etc. These measures have been incorporated into the project EMP. The Waste Management Facilities guidelines also make reference to emissions standards for MSW incinerators from European and the United States for this sector.

1.3.5 Stockholm Convention BAT/BEP

The key relevant articles in Stockholm Convention and the BAT/BEP Guidelines on POPs are as the followings

(1) Best Environmental Practices

- Reducing the overall mass of wastes that have to be disposed of by any means serves to reduce both the releases and residues from incinerators. Diversion of biodegradables to composting and initiatives to reduce the amount of packaging materials entering the waste stream can significantly affect waste volumes. Responsibility for waste minimization lies only to a minor extent with the operator of a waste incineration plant. However, coordination and harmonization of relevant activities on different organizational levels (e.g. operator, local, regional or national level) is of major importance for protection of the environment as a whole.

- Kerbside or centralized sorting and collection of recyclable materials (for example, aluminum and other metals, glass, paper, recyclable plastics, and construction and demolition waste) also reduces waste volume, saves valuable resources and removes some non-combustibles. Responsibility for these activities must be coordinated between relevant levels.

- Operators must be able to accurately predict the heating value and other attributes of the waste being combusted in order to ensure that the design parameters of the incinerator are being met. This can be done using the results from a feed monitoring programme of key contaminants and parameters where sampling and analysis frequencies and rigor would increase as feed variability increases.

- To achieve optimal prevention of formation, and capture, of chemicals listed in Annex C,

proper care and control of both burn and exhaust parameters are necessary. In continuous feed units, the timing of waste introduction, control of burn conditions and post-burn management are important considerations

- These events are normally characterized by poor combustion, and consequently create the conditions for formation of chemicals listed in Annex C. For smaller, modular incinerators operating in batch mode, start-up and shutdown may be daily occurrences. Preheating the incinerator and initial co-firing with a clean fossil fuel will allow efficient combustion temperatures to be reached more quickly. Wherever possible, however, continuous operation should be the practice of choice. Independent of the operation mode waste should be fed into the combustion system only when the required temperature (e.g. above 850℃) is reached. Upsets can be minimized through periodic inspection and preventive maintenance. Incinerator operators should not feed the waste during filter bypass ("dump stack") operations or during severe combustion upsets.
- Routine inspections by the operator and periodic inspections by the relevant authority of the furnace and air pollution control devices should be conducted to ensure system integrity and the proper performance of the incinerator and its components.
- High-efficiency combustion is facilitated by establishing a monitoring regime of key operating parameters, such as carbon monoxide (CO), volumetric flow rate, temperature and oxygen content.
- Carbon monoxide, oxygen in the flue gas, particulate matter, hydrogen chloride (HCl), sulfur dioxide (SO_2), nitrogen oxides (NOx), hydrogen fluoride (HF), airflows and temperatures, pressure drops, and pH in the flue gas should all be routinely monitored.
- Bottom and fly ash from the incinerator must be handled, transported and disposed of in an environmentally sound manner.
- Regular training of personnel is essential for good operation of waste incinerators. Creating and maintaining public goodwill towards a waste incineration project is critical to the success of the venture.

(2) Best Available Techniques

- Environmental concerning location is the most important for a new MSW incinerator.
- Proper management of time, temperature and turbulence (the "3 Ts"), as well as oxygen (airflow), by means of incinerator design and operation will help to ensure the above conditions. The type and order of treatment processes applied to the flue gases once they leave the incineration chamber is important, both for optimal operation of the devices and for the overall cost-effectiveness of the installation. Best available techniques involve applying the most suitable combination of flue gas cleaning systems, including the dust (particulate matter) removal techniques, acid gas removal techniques, fuel gas polishing techniques, NOx removal techniques, etc.

1.3.6 Domestic technical documents

(1) Reply to the approval of waste incineration power plant project in Kunming Airport Economic Zone by Yunnan Development and Transform Commission, YFGNY [2010] No. 2426

(2) Review comments of the government-invested project review center of Yunnan Province on *Feasibility Study Report on Waste Incineration Power Plant Project in Kunming Airport Economic Zone*, YTSF [2010] No. 514

(3) Environmental impact statement of waste incineration treatment plant (power plant) project in Kunming Airport Economic Zone, Yunnan Green Environmental Engineering Technology Co.,

Ltd.

(4) Reply to environmental impact statement of waste incineration treatment plant (power plant) project in Kunming Airport Economic Zone by Yunnan Environmental Protection Department, YHS [2011] No. 26

(5) Reply letter on adjustment of auxiliary fuels of waste incineration treatment plant project in Kunming Airport Economic Zone by Yunnan Environmental Protection Department, YHH [2011] No. 48

(6) Reply letter on adjustment of treatment methods of water drainage and demineralization system of boiler in the waste incineration treatment plant in Kunming Airport Economic Zone by Yunnan Environmental Protection Department, YHH [2013] No. 30

(7) Reply to *Application for Commissioning of Waste Incineration Treatment Plant (Power Plant) Project in Kunming Airport Economic Zone* by Yunnan Environmental Protection Department, KHBF [2012] No. 369

(8) *Approval form on Application for Commissioning Delay of Waste Incineration Treatment Plant (Power Plant) Project in Kunming Airport Economic Zone* by Kunming Environmental Protection Bureau, SPB [2013] No. 049

(9) Planning permit of construction engineering of the People's Republic of China, JZ No. 530101201100255

(10) State-owned Land Use Certificate of the People's Republic of China, KGY (2012) No. 00398

(11) Reply to *Acceptance of Completion and Environmental Protection of Waste Incineration Treatment Plant (Power Plant) Project in Kunming Airport Economic Zone* by Yunnan Environmental Protection Department, YHY [2013] No. 48

(12) Proposal for Upgrading and Renovating the Flue Gas Purification System of No.2 Incineration Line of Waste Incineration Power Plant in Airport Economic Zone (Konggang WTE Incineration Plant)

(13) Proposal for Upgrading the DCS System of Waste Incineration Power Plant in Airport Economic Zone (Konggang WTE Incineration Plant)

1.4 Relevant pollutant emission standards

1.4.1 Main Standards Implemented

According to the pollution characteristics of municipal solid waste incineration plants, the relevant standards for project implementation are as follows:

(1) Standards for Pollution Control of Domestic Waste Incineration (GB18485-2014);

(2) Standard for Construction of Municipal Solid Waste Incineration Project (No. 213, 2001);

(3) Reply to the Issues Concerning the Disposal of Fly Ash from Municipal Solid Waste Incineration (EIA Letter No. 122, 2014)

(4) Technical Guidelines for Domestic Waste Disposal;

(5) Evaluation Criteria for Domestic Waste Incineration Plant (CJJ/T137-2010);

(6) Regulation Standard for the Operation of Domestic Waste Incineration Plant (CJJ/T212-2010);

(7) Technical Regulations for Operation, Maintenance and Safety of Domestic Waste Incineration Plant (CJJ128-2009);

(8) Technical Specification for Treatment of Domestic Waste Incineration Plant (CJJ90-2009);

(9) Standard for Construction of Domestic Waste Incineration Project (142-2010);

(10) Environmental Noise Emission Standards for Industrial Enterprises (GB12348-2008);

(11) Standards for the Discharge of Odor Pollutants (GB14554-1993);

(12) Standards for Pollution Control of Domestic Waste Incineration (GB18485-2014);

(13) Comprehensive Emission Standards for Atmospheric Pollutants (G16297-1996);

(14) Standards for Pollution Control of General Industrial Solid Waste Storage and Disposal Sites (GB18599-2001);

(15) Standards for Pollution Control in Hazardous Waste Storage (GB18597-2001);

(16) General Technical Specification for Bag Dust Removal Engineering (HJ 2020-2012)

1.4.2 Main Standards Values

(1) Technical Performance Control Requirements of Domestic Waste Incinerator

Standards that closely relevant to domestic waste incinerators pollution control includes:

Table 1.4-1 Main Technical Performance Indicators for Domestic Waste Incinerators

No.	Items	indicators
1	Incineration Temperature in Furnace	≥850℃
2	Retaining time of flue gas in furnace	≥2seconds
3	clinker ignition loss of incinerator slag	≤5%

(2) Waste Air emission standards of the Domestic Waste Incinerators

In May 2014, MEP issued amendment to this standard of GB18485-2001, i.e. *Standard for Pollution Control on the MSW Incineration (GB18485-2014)*. The new national standard has considerably tightened air emission limits of MSW incineration to the level of EU and US standards that are referenced by WBG EHS Guidelines. According to this new national standard, by Jan 1st, 2016, Konggang incineration plant must meet the new national standard.

Table 1.4-2 shows Chinese national standards, EU and US standards for air emissions of MSW incinerators.

Table 1.4-2 Chinese national standards, EU and US standards for air emissions of MSW incinerators

Parameter			**National Standard**	**EHS Guidelines (expanded)**		
Ref.	Pollutants	Time	mg/m3	EU mg/m3	USA	USA converted (mg/m3)
1	Total Suspended Particulates	1-hr average	30	30	20	20
		24-hr average	20	10	n/a	
2	Carbon Monoxide (CO)	1-hr average	100	50-150	50-150ppmv	62.5-187.5
		24-hr average	80			
3	Nitrogen Oxides (NOx)	1-hr average	300	400	n/a	n/a
		24-hr average	250	200-400	150ppmv	Not Convertible
4	Sulfur Dioxides (SO2)	1-hr average	100	200	30ppmv or 80% reduction, whichever is less stringent	85.7 or 80% reduction, whichever is less stringent
		24-hr average	80	50		
5	Hydrochloric Acid (HCl)	1-hr average	60	60	25ppm or 95% reduction, whichever is less stringent	40.7 or 95% reduction, whichever is less stringent
		24-hr average	50	10		
6	Mercury (Hg)	Test Average	0.05	0.05-0.1	0.05 mg/dscm or 80% reduction, whichever is less stringent	0.05 or 80% reduction, whichever is less stringent
7	Lead (Pb)	Test Average	See below Ref. 11	See below Ref. 10	0.14	0.14

8	Cadmium (Cd)	Test Average	See below Ref. 9	0.05-0.1 (0.5-8 hr average)	0.01	0.01
9	Tl+Cd	Test Average	0.1			
10	Total Metals	/	n/a	0.5-1 (0.5-8 hr average)	n/a	n/a
11	Sb+As+Pb+Cr+Co+Cu+Mn+Ni+V	Test Average	1.0	n/a	n/a	n/a
12	HF	/	n/a	1	n/a	n/a
13	Dioxins (incl. furans)	/	0.1 ngTEQ/m3 Test average	0.1 ngTEQ/m3 (6-8 hr average)	13 （ng/m3)(total mass)	0.2 ng TEQ/m3
Note			To be effective for existing MSW incinerator on Jan 1st, 2016		7%o oxygen, dscm: milligrams per dry standard cubic meter	mg/m3=ppmv*compound molecular weight/22.4

(3) Boundary standards for unorganized emission of odor pollutants

The concentration of the odor pollutants emitted by the Project is governed by the secondary expansion and transformation standards in GB14554-93 *Emission Standard for Odor Pollutants*. Details in Table 1.4-3 as follows:

Table 1.4-3 fugitive Emission Pollutants Monitoring Limits

Controlled Items	Unit	Secondary Standards
ammonia	mg/m3	1.5
Hydrogen sulfide	mg/m3	0.06
Methyl mercaptan	mg/m3	0.007
Odor concentration	Dimensionless	20
particulate matter	mg/m3	1.0

(4) Standards for reuse after sewage treatment

Wastewater emission shall be incorporated into the municipal wastewater pipe network in the Kunming Airport Economic Zone after it reaches the level-3 standard in Table 4 in *Integrated Wastewater Emission Standard* (GB8978-1996) and the water quality standard of wastewater emission into the urban sewer (CJ3082-1999).

Leachate and waste water emission from the unloading hall and vehicle cleaning are discharged into the self-built leachate treatment station. Domestic wastewater, laboratory wastewater and workshop floor washing water are collected and then entered into the domestic wastewater treatment station. According to the operation practice of four WTE incineration plants, the effluent from leachate treatment stations of Xishan, Dongjiao and Konggang WTE incineration plants is reused for recharge of open cooling system, greening of plant area and road cleaning. The effluent treated by the leachate treatment station should meet the water quality standard of the supplementary water of the open circulating cooling water system and the standard limit of "urban greening" in "the quality of municipal miscellaneous water for reuse of municipal sewage" (GB/T18920-2002). Standard values are detailed in tables 1.4-4 and 1.4-5.

Table 1.4-4 Water Quality Standards of Industrial Water for Urban Sewage Recycling and Utilization

NO.	ITEMS CONTROLED	SUPPLEMENTARY WATER FOR OPEN CIRCULATING COOLING WATER SYSTEM
1	PH value	6.5—8.5
2	Suspended Substance（SS）（mg/L） ≤	—
3	turbidity（NTU）≤	5
4	Chromaticity (degree)≤	30
5	Biochemical Oxygen Demand（BOD_5）（mg/L）≤	10
6	Chemical Oxygen Demand（COD）（mg/L）≤	60
7	Iron（mg/L）≤	0.3

8	Manganese（mg/L）≤	0.1
9	Chloridion（mg/L）≤	250
10	Silicon dioxide（SiO_2）≤	50
11	Total Hardness (Calculated by $CaCO_3$/mg/L)≤	450
12	Total alkalinity(Calculated by $CaCO_3$ mg/L)≤	350
13	sulfate（mg/L）≤	250
14	ammonia nitrogen（Calculated by N mg/L）≤	10①
15	Total Phosphorus（Calculated by P mg/L）≤	1
16	Total Dissolved Solids (mg/L)≤	1000
17	Petroleum（mg/L）≤	1
18	Anionic Surface Active Agents（mg/L）≤	0.5
19	Residual Chlorine②（mg/L）≥	0.05
20	Fecal coliform bacteria（No. /L）≤	2000
Note: ①When the heat exchanger of open circulating cooling water system is copper; the ammonia nitrogen index of circulating water in circulating cooling water system should be less than 1 mg/L. ②End Value of Tube in Chlorine Disinfection.		

Table 1.4-5 Water Quality of Municipal Miscellaneous Water for Urban Sewage Recycling and Utilization

NO.	ITEMS CONTROLED	THE GREENING OF THE CITY
1	pH Value	6~9
2	Chromaticity (degree)≤	30
3	Smell	pleasant
4	turbidity（NTU）≤	10
5	Total Dissolved Solids (mg/L) ≤	1000
6	Biochemical Oxygen Demand（BOD_5）（mg/L）≤	20
7	Ammonia Nitrogen（mg/L）≤	20
8	Anionic Surface Active Agents（mg/L）≤	1
9	Dissolved Oxygen ≥	1

10	Total residual chlorine（mg/L）	30 minutes after contact≥1.0，End of pipe network≥0.2
11	Total coliform bacteria（No. /L）≤	2000

(5) Standards on Noise Emission & Control

Noise at *Emission Standards for Boundary of Industrial Companies* (GB12348-2008) Class II shall be applied to the noise pollution at boundary of industrial enterprises.

The pollutant emission standards used in the follow-up implementation phase of the project are consistent with those implemented in the first stage.

1.5 Important environmentally sensitive targets

The sensitive receptors in the vicinity of Konggang incineration plant are shown in Table 1.5-1 and Figure 1.5-1.

Table 1.5-1 List of Environmental Protection Object and Distance Scale

S/N	Protection object	Relative to the project direction	Distance to the project boundary (m)	Population	Executive standard
1	Zhangzigou	Southeast	1000	107	Level-2 standard in *Ambient air quality standard* (GB3095-1996) and maximum allowable concentration of hazardous substances in the air in the residence zone in Table 1 in *Design Hygienic Standard of Industrial Companies* (TJ36-79)
2	Shajing	South	1500	461	
3	Individual Household	North	50	1	

Figure 1.5-1 Konggang incinerator and nearby village/community

Figure 1.5-1 Distribution of individual household around Konggang incinerator

The local planning authorities and airport factories need to pay attention to the fact that after the completion of the factory area, a new residential building 50 meters north of the factory boundary has not met the requirements of environmental impact assessment at that time to set 500 meters of health protection distance around the factory boundary, which will increase the risk of enterprise environmental management.

2 Technical Retrofit and Environmental Mitigation Measures of Konggang Incinerator at the 2nd Period

2.1 Technical Retrofit of Konggang Incinerator at the 2nd Period

According to the improvement recommendations by the Operation and Emission Audit and the final scheme of technical retrofit of Konggang incinerator, the technical improvements measures which will be implemented by Konggang incinerator includes the follows:

Table 2.1-1 Technical Renovation Scheme of Konggang Incinerator

No.	Technical Renovation		Targets of the Renovation
1	Flue Gas Purification System Upgrading for Incineration Line 2#	Replacement of flue gas purification facilities spray tower, equipment is made by Danish NIRO company NIRO F100 nebulizer, technical parameters are shown in table 2-2.	The SO2 and HCl pollutants in flue gas are expected to be reduced by 30%, and the pollutant emission is better than the national pollutant control standard. Reducing Consumption of Cooked Lime by 1800 tons per year.
2	DCS system upgrading	Increase enterprise servers to collect, analyze and store DCS and DEH data permanently	Improve the automatic control function of production process, improve the hardware environment in the factory, achieve the production process to meet the standards and management specifications, permanent storage and analysis of environmental protection parameters to be checked, accept supervision from the competent authorities and the public, and more importantly, further ensure the standardized operation of incineration and reduce the emissions of pollutants from incineration.
3		Operating system upgraded to WIN7; DCS remote station and display screen added in fly ash solidification workshop	
4		Increasing Automatic Control System for Waste Incineration and Flue Gas Treatment (ACC)	
5		DEH Control System Upgrading, Perfecting Historical Trend Analysis Function	

Table 2.1-2 Main Technical Parameters of the Atomizer for Konggang Incinerator

No.	Parameter	Before Renovation	After Renovation
1	Speed of atomizer	5000RPM	13500RPM
2	particle size	＜200μm	＜50μm
3	Maintenance cycle	120h	＞2000h
4	Alkali liquor treatment capacity of atomizer	4.3t/h	6.3t/h
5	Atomizer Protection and Monitoring	Vibration and rotational speed	Oil flow rate, oil level, oil temperature, cooling fan tripping, atomizer tripping, alkali overflow, vibration, protective water flow, etc.

2.2 Environmental impact and mitigation measures

2.2.1 Environmental Impact

In the first stage, the Konggang has completed the civil engineering work. The follow-up technical renovation mainly focuses on equipment replacement and software system upgrade. There is no environmental impact problem relating the civil engineering construction. All environmental impact will be focused in the installation and operation period of equipment.

Because the equipment may also cause certain environmental impact during replacement and upgrading, the environmental impact mitigation measures during operation period can be divided into equipment replacement period and normal production period. The environmental impacts

during the operation period include the requirements of the Stockholm Convention BAT/BEP Guidelines and the World Bank EHS Guidelines on MSW incineration, as well as the relevant technical improvements of Konggang. See Table 2.2-1 for details.

Table 2.2-1 Main Environmental Impacts

Implementation Stage	Production Stage	Main Environmental Impact
Equipment Replacement	——	During the renovation of the flue gas purification system of the 2# line incinerator and the replacement of the sprayer, the flue gas treatment facilities will be invalid. Starting the incinerator will cause the abnormal emission of incinerator flue gas.
Normal Operation	Waste Receiving and Environmental Material Receiving	● Heavy metals and chloride ions from plastic products, batteries and industrial solid wastes mixed with garbage increase the production of dioxin precursors and the emission of dioxins and other pollutants. ● The construction waste mixed in waste will reduce the calorific value of domestic garbage into the incinerator and reduce the stability of incinerator operation. ● High moisture content in waste will lead to lower calorific value of municipal solid waste and reduce the stability of incinerator operation. ● In the case of incomplete discharge of leachate in the process of entry, unload and departure, leachate dripping from garbage truck will cause non-point source pollution.
	Pre-treatment	● The leachate with extremely high pollution load will be produced during the process of storage in the waste pit. ● A large number of odorous pollutants will be produced during the operation of garbage storage pit
	Flue Gas	The waste incineration process will produce dioxins, CO, HCl, SO2, NOX, heavy metals and other pollutants. The composition of the flue gas is complex, which has a greater impact on the external environment.
	Fly Ash and other Solid Waste	● The residue of municipal solid waste incineration is non-hazardous waste. ● The fly ash in the flue gas treatment facility of MSW incinerator is hazardous waste and must be disposed of safely.

2.2.2 Environmental Mitigation Measures

In order to control the above environmental impacts, the environmental impact protections measures will be implemented as follows in Table 2.2-2.

Table 2.2-2 Main Environmental Mitigation Measures in the Operational Stage

Stages		Mitigation Measures	Implemented by	Monitored by
Equipment Replacement	——	Ensure that the emission of pollutants will not be increased during the installation and upgrading of equipment. Specific requirements are as follows: ● During the planned shutdown of 2# line incineration, the flue gas purification system will be converted into a flue gas purification system (and spray replacement). ● Importing historical databases that have been formed in history into new databases can avoid data loss and facilitate the follow-up trend analysis of data, and accurately identify the problems in the operation process of enterprises. ● Electronic monitoring data formed in the past can be added to the newly built database to avoid data loss and facilitate the follow-up trend analysis of data and accurate identification of problems in the operation process of enterprises.	Konggang	EPB
Normal Operation	Waste Receiving and Environmental Material Receiving	Pretreatment of incoming garbage to control the production of HCl, CuO, CuCl2 and dioxin precursors. ● Refuse reception of the waste that does not meet the entry requirements of waste incineration plant, such as construction waste, hazardous waste and other non-combustible materials, and return waste that does not meet the entry requirements if found; ● Regular monitoring of waste calorific value and composition to ensure that waste calorific value meets the requirements of incinerator; ● Good management of waste collection and transportation trucks. If the waste or leachate are not discharged completely, the garbage trucks are not allowed to leave the plant to reduce non-point source	Konggang	EPB

		pollution caused by leachate dripping; ● To measure the incoming garbage, the measurement results should be imported into the enterprise DCS system and related databases, forming a unified database with garbage treatment and flue gas treatment, avoiding data dispersion and improving the integrity of data collection and application in the plant. ● Establish a perfect environmental protection material receipt account, the account data should be imported into the enterprise database, and form a unified database with waste disposal and flue gas treatment, so as to avoid data dispersion and improve the integrity of data acquisition and application in the plant		
	Pre-treatment	Pretreatment of incoming waste to control the production of HCl, CuO, CuCl2 and dioxin precursors： ● Non-combustible waste, such as large non-combustible metal parts and construction waste are sorted out in the waste reception hall. ● Set up the homogenization process and pre-dewatering, ensure that waste stays in the waste pit for not less than 3-5 days to reduce the moisture content and increase the calorific value, and ensure that its calorific value is within the range of the combustion chart formulated by the plant. ● Regular monitoring of waste calorific value and composition to ensure that waste calorific value meets the requirements of incinerator; ● To manage the garbage storage well, to ensure the negative pressure of the garbage storage, to ensure the normal condition of the air curtain system at the inlet and outlet, and to reduce the unorganized odor discharge from the garbage storage. ● Good management of waste collection and transportation trucks, if the waste and leachate are not unloaded completely, the garbage trucks are not allowed to leave the plant to reduce non-point source pollution caused by leachate dripping;		

		● Leachate produced in the pretreatment process should be collected and processed at the leachate treatment station in time. Leachate treated after meeting the standards should be returned to production and use, and should not be discharged.		
	Flue Gas	To ensure the 3T principle of incineration process, i.e. temperature, time, disturbance, and control of oxygen content, specifically ● Stay above 850 ℃for no less than 2 seconds ● Optimizing and controlling air combustion conditions (oxygen) , distribution and temperature, including mixing of gas and oxidant; control of combustion temperature level and temperature distribution; residence time and control of raw gas	Konggang	EPB
		Avoiding Dioxin-like Re-synthesis ● The flue gas from the combustion chamber should be quenched before entering the particulate matter treatment facility. ● After high-power traction, the flue gas temperature drops sharply to about 300 ℃ in 1 second, such as super water heater, evaporator convection tube, economizer and air pre-heater.。	Konggang	EPB
		Reducing Emissions under Abnormal Conditions such as Shutdown ● Strengthen maintenance to reduce planned and unplanned downtime accidents. ● The waste feeding system should be interconnected with temperature monitoring and control system to avoid feeding when the operating temperature is below the lower limit.。	Konggang	EPB
		Do a good job in the management of waste gas treatment system to ensure that pollutants discharge up to standard ● To ensure that the bag filter system does not operate in the temperature range above 200 degrees Celsius; to determine and	Konggang	EPB

		control the composition of waste entering; to carry out basic (combustion-related) control; to use operating conditions that limit the formation of dioxins and furans and their precursors; and to control exhaust gas; ● Using SNCR+Semi-dry Purification Tower+Activated Carbon Jet+Bag Dust Collector to Purify Flue Gas ● Guarantee the normal operation of automatic feeding facilities for lime powder and activated carbon, ensure that the amount of environmental protection materials can meet the design requirements, and avoid the generation of pollutants. ● Use PTFE bag filter to ensure the purification efficiency of particulate matter		
		By means of equipment, operating conditions and environmental monitoring, the incineration conditions can meet the design values and emission standards. ● To upgrade the DCS system, upgrade the automatic control function of the production process, improve the hardware environment in the factory, achieve the production process standards, management specifications, permanent storage and analysis of environmental protection parameters and to be checked; ● Maintain and ensure the effectiveness and stability of the existing online monitoring equipment	Konggang	EPB
		Control of odorous pollutants ● The storage pit must maintain a steady state of micro-negative pressure for a long time. ● All kinds of pollutants produced by the collection of odorous gases must be incinerated and the incineration and auxiliary facilities can meet the corresponding emission standard limits.	Konggang	EPB

	Waste Water	The leachate in the waste storage pit and the waste water from the production process are collected and disposed separately. The process adopts UASB+MBR+NF+RO. The tail water should meet the *Water Quality Standard for Urban Miscellaneous Water (GB/T18920-2002)* and be reused without being discharged.。	Konggang	EPB
	Fly Ash and Other Solid Waste	The bottom slag and fly ash should be managed according to the classification of harmful or harmless materials. Harmful ashes should be managed and treated as hazardous wastes. Harmless slag can be disposed of in MSW landfills or recycled in building materials. ● Slag residues are non-hazardous waste and can be reused, such as building materials. ● Fly ash is hazardous waste and must be disposed of safely.	Konggang	EPB
		The bottom slag and other waste gas treatment residues are managed separately, so as to avoid polluting the bottom slag and affecting its recovery and utilization.	Konggang	EPB
		On-site or off-site treatment of bottom slag (e.g. screening and extrusion) to meet the requirements of utilization or delivery to the treatment site for treatment	Konggang	EPB
		The leaching toxicity, dioxin and water content of fly ash and fly ash solidified body reached the requirement of *"Standard for Pollution Control of Domestic Waste Landfill" (GB16889-2008) 6.3*, and can be treated in landfill.	Konggang	EPB
	Noise	The noise control measures are as follows: ● Low noise equipment should be considered as far as possible in equipment selection. ● Use structures as far as possible for sound insulation	Konggang	EPB

		● Install shock absorber pad ● Install muffler		
	Environmental Monitoring	Environmental monitoring plans should also include ● Supervisory Monitoring of Local Environmental Protection Bureau ● Environmental Quality Survey ● Online monitoring, data transmission to local environmental protection bureaus ● Additional dioxin monitoring required by other projects ● On-line monitoring of emission data and operating conditions proposed by other projects ● The above contents can be found in Chapter IV of this report.		
	Public Participation	See the details in Chapter 8 of the report.		
	Others	500 m environmental protection distance has been applied in Konggang. After the Konggang plant has been built and operated, a new environmental sensitive target moved into the area. In the follow-up, we must strengthen the planning and control of the surrounding areas of the plant, avoid the re-entry of environmental protection distance to residents, and avoid environmental disputes.	Konggang	EPB
		Total control index: flue gas and dust 134.03 t/a, SO_2 248.04t/a, NOx275.52 t/a	Konggang	EPB

3 Responsibilities of Environmental Management

FECO of MEP, as the national GEF project execution unit, takes overall responsibility for project implementation, including environmental safeguards. Yunnan Provincial Environmental Protection Department, as local PIU, will supervise Xishan incineration plant in implementing the project. The incineration plant's environmental management responsibility in implementing the project and operating the incineration plant is summarized in below.

3.1 Management organization and responsibilities assignment

The company has set up an organization for environmental protection management, where general manager responsibility system is adopted; one full-time staff for environmental protection is employed, who takes charge of the company's environmental protection and environmental protection coordination with other organizations and fulfills environmental management and supervision, consisting of the following responsibilities:

(1) To implement environmental regulations and standards;

(2) To set up environmental management system and often conduct inspection and supervision;

(3) To compile environmental protection plans for the project and organize the implementation;

(4) To lead and organize the implementation of project's environmental inspection, and establish monitoring files;

(5) To well cover environmental education and technological training and improve the quality of staffs;

(6) To build up rules and regulations on project-related pollutant emissions and the operation of environmentally protective facilities;

(7) To take charge of daily environmental management and support the department of environmental protection management to coordinate with other social sectors on environmental protection;

(8) To formulate the emergency response plans for sudden accidents and participate in the emergency treatment for sudden accidents;

(9) To regularly inspect and supervise the implementation of environmentally protective laws and regulations and timely contact related department to implement environmentally protective measures in all aspects to ensure the normal implementation of the measures.

Responsibilities for Environmental Monitoring

(1) To formulated annual plans on environmental monitoring and implementation plans as well as build up regulations and carry out the regulations;

(2) To complete the monitoring assignments regulated in the environmental monitoring plan related to project on schedule and compile reports according to related regulations and take charge of submitting reports;

(3) To actively participate in the investigation and treatment of accidents when sudden pollution accidents related to project occur;

(4) To take charge of the maintenance and inspection of monitoring devices to ensure normal monitoring;

(5) To organize and supervise the implementation of environmental monitoring plans;

3.2 Environmental management

The environmental management of the company mainly includes:

(1) Management of rubbish towards the factory

It shall enhance the management of rubbish towards to the factory, including formulating regulations on the traveling of waste trucks in the factory, operating instruction on how to prevent foul smell and percolate leakage, especially the management on the waste towards to factory during peak hours and high-temperature seasons;

(2) Formulate pollutant emission related post operation procedures according to the incineration process and equipment requirements, strictly implement the process operating rules.

(3) Formulate flue gas online monitoring operation procedures to ensure the normal operation of on-line monitoring instrument.

(4) Formulate pollutant emission equipment repair and maintenance work operation rules.

(5) It shall formulate monitoring plan for pollutant emissions and organize the implementation of monitoring.

(6) Make operation rules to control secondary pollution in fly ash melting, slag temporary storage in plant and transport process.

(7) It shall, according to national control regulations on dangerous chemical management, clearly specify the building structure of storehouse, safe distance, emergency facilities, notes for fire controlling, etc.

(8) It shall, according to regulations on managing the transportation of dangerous goods, formulate regulations on transportation management, explicit transportation routes and time, make related records, and build up management machine account.

(9) It shall enhance the company’s resources and energy management, further reduce the energy consumption, and improve cleaner production to minimize the affect left by the project on the environment.

(10) It shall follow the national and local policies, orders, and regulations on environmental protection, regularly train the staffs for environmental protection, strengthen the safety and environmental protection sense of the staffs, and intensify their responsibility sense of pollution control.

(11) The constructing organization shall, according to the requirements of industrial authority, meet the requirements of the third-party independent supervisory organization for monitoring the whole of the manufacturing process.

4 Environmental Monitoring Plan

4.1 Requirements for Enterprise Environmental Monitoring in China's Relevant Systems

Environmental monitoring refers to that, during the construction period and operation period of the GEF project, the monitoring organization shall collect and test environmental samples, deal with data, compile related reports, and proactively respond to environmental problems related to the project. The formulation and implementation of environmental monitoring plan is the basis of environmental management. It provides environmental statistics and environmental quantitative evaluation with scientific basis to ensure the implementation of pollution controls and timely find the problems in environmental protection measures and correct and improve.

Enterprise environmental monitoring is divided into self-monitoring and supervisory monitoring, in which self-monitoring is divided into manual monitoring and online continuous monitoring.

According to the requirements of *"Measures for Self-monitoring and Information Disclosure of State Key Monitoring Enterprises (Trial Implementation)"* and *"Measures for Supervisory Monitoring and Information Disclosure of Pollution Sources of State Key Monitoring Enterprises (Trial Implementation)" (No. 81 of Environmental Development [2013]),* the relevant requirements for self-monitoring and supervisory monitoring are as follows:

1. *Measures for Self-monitoring and Information Disclosure of State Key Monitoring Enterprises (Trial Implementation)*

   (1) Enterprises are responsible for the authenticity, accuracy and integrity of their own monitoring results and information disclosure content;

   (2) Enterprises shall implement self-monitoring schemes in accordance with the requirements of national or local pollutant discharge (control) standard environmental impact reports, their approval and technical specifications for environmental monitoring;

   (3) The content of the self-monitoring scheme should include the basic situation of the enterprise, monitoring points, monitoring frequency, monitoring indicators, emission standards and their limits, monitoring methods and instruments, monitoring quality control, monitoring points schematic diagram, time limit for monitoring results to be made public, etc.

   (4) Environmental monitoring includes pollutant emission monitoring and surrounding environmental quality monitoring. Among them, pollutant self-monitoring includes water-containing pollutant emission monitoring, air pollutant emission monitoring, plant boundary noise monitoring, etc.

   (5) The requirement of monitoring frequency is to use automatic monitoring and continuous monitoring throughout the day. With manual monitoring, COD and NH3-N are monitored daily, other pollutants in wastewater are monitored at least once a month, sulfur dioxide and nitrogen oxides are monitored at least once a week, particulate matter is monitored at least once a month, and other pollutants are monitored at least once a month.

   (6) If monitoring is carried out by means of automatic monitoring, it must be connected with the competent department of environmental protection.

2. *Measures for Supervisory Monitoring and Information Disclosure of Pollution Sources in State Key Monitoring Enterprises (Trial Implementation) (No. 81, 2013)*

   Supervisory monitoring is carried out by the local environmental protection department, and the monitoring factors and frequency are determined by the local monitoring department.

3. *Notice on Further Strengthening the Management of Environmental Impact Assessment of Biomass Power Generation Projects (No. 82, 2008)*

   After the operation of the waste incineration power plant, at least one dioxin monitoring should be carried out in the atmosphere and soil every year. The monitoring points of atmospheric environmental quality are the nearest sensitive point of the downwind direction of the dominant wind and the maximum concentration point of pollutants. The monitoring points of soil environment are one in the upwind direction and one in the downwind direction of the dominant wind direction in the site area, and the monitoring factor is dioxin in the soil. British monitoring points in order to timely understand the situation of dioxins in waste incineration power generation projects and their surrounding environment.

4.2 Environmental monitoring plan

According to the interpretation of the relevant documents, the requirements of environmental monitoring in the follow-up implementation of the project are consistent with the requirements

of the first stage (Table 4.2-1). However, in order to better reflect the relationship between monitoring results and incinerator production conditions, according to long-term analysis of monitoring data, the operation parameters of incinerator production conditions and flue gas treatment facilities should be optimized. The operation conditions should be recorded synchronously in the monitoring process, as shown in Table 4.2-2.

Table 4.2-1 List of Monitoring Plans for Konggang Waste Incinerator

Monitoring Category	Monitoring Methods	Pollutant Types	Monitoring Location	Monitoring Factors	Frequency	Data Management	Monitoring Unit
Pollutant Source Monitoring	Automatic Monitoring **(CEMS)**	Air Pollution Source-Incinerator	After each incinerator treatment facility (no monitoring at the main outlet)	Flue Gas Flow and Temperature、O_2、CO、SO_2、NOx、HCl、particulate	Monitoring on time	The data are kept for at least three years. Long-term preservation after database expansion	Enterprises, but must entrust third parties to carry out operation, maintenance and verification
	Manual Monitoring			Flue Gas Flow and Temperature、O_2、CO、SO_2、NOx、HCl、Particulate matter, mercury, cadmium, thallium, nickel, lead, chromium, manganese, arsenic, antimony, copper and cobalt	Once per month	Data should be electronic and stored for a long time	Third-party monitoring agencies entrusted by enterprises
				Dioxin	Quarterly	Data should be electronic and stored for a long time	monitoring agencies entrusted by enterprises
		Unorganized pollution sources in factory boundaries	There are two monitoring points in the downwind direction of the	Odor Concentration, Ammonia, Hydrogen Sulfide, Trimethylamine,	Quarterly	Data should be electronic and stored for a long time	monitoring agencies entrusted by enterprises

			factory boundary, one monitoring point on the other side and a 50-meter residential area in the factory boundary. There are six monitoring points in total.	Carbon Disulfide			
		Water Pollution Source	Leachate treatment station outlet	Chemical oxygen demand, ammonia nitrogen, total hardness, total phosphorus, total residual chlorine	Once per day	Data should be electronic and stored for a long time	Enterprise Laboratory Monitoring
		Noise	Around the factory boundary	**Leq(dB(A))**	Quarterly	Data should be electronic and stored for a long time	monitoring agencies entrusted by enterprises
		Fly Ash	Fly ash after solidification	Mercury, copper, zinc, lead, cadmium, beryllium, barium, nickel, arsenic, selenium, total chromium, hexavalent chromium, water content	Once per month	Data should be electronic and stored for a long time	monitoring agencies entrusted by enterprises
				Dioxin	Quarterly	Data should be electronic and stored for a long time	monitoring agencies entrusted by enterprises

		Slag	Each incinerator line	slag reduction rate	Once per month	Data should be electronic and stored for a long time	monitoring agencies entrusted by enterprises
Environmental quality monitoring around Konggang	Manual Monitoring	Ambient Air	The leading downwind direction, the nearer ambient air sensitive area (Zhangzi Valley) and the individual household 50m to the Plant	**SO_2**、NOx、**PM_{10}**、Dioxin	Annually	Data should be electronic and stored for a long time	monitoring agencies entrusted by enterprises
		Soil	Correspondence with Environmental Air Monitoring Points	Dioxin	Annually	Data should be electronic and stored for a long time	monitoring agencies entrusted by enterprises
		Noise	An individual household 50m to the Plant	L_A	Quarterly	Data should be electronic and stored for a long time	monitoring agencies entrusted by enterprises

Table 4.2-2 Record Table of Production Conditions during Monitoring of Konggang Waste Incineration Plant

Incinerator / Production Conditions	1# Incinerator	2#Incinerator
Production Load of the Incinerator		
Temperature of the Combustion Chamber(℃)		
Activated Carbon Addition （kg/d）		
Lime consumption（kg/d）		
Fly Ash Production（t/d）		
Slag Production（t/d）		
Oxygen Content（%）		

4.3 Safeguard Measures for Environmental Monitoring

4.3.1 Standardized sampling port

Wastewater: Although wastewater is not discharged from Konggang incinerator, in order to ensure that the quality of leachate treated wastewater meets the requirements of reuse, the effluent of sewage treatment station should be monitored regularly, and the monitoring point is the effluent outlet of sewage treatment system.

Exhaust Gas: On-line monitoring of incineration waste gas should be based on the requirements of *"Technical Specification for Continuous Monitoring System of Flue Gas Emission from Fixed Pollution Sources"* issued by the Ministry of Environmental Protection, and the sampling point should be set after the bag filter of each incinerator; CEMS of fixed pollution source flue gas should be installed in representative locations that can reliably and continuously monitor the emission status of fixed pollution source flue gas; According to *HJ/T 212-2005 "Data Transmission Standard for On-line Automatic Monitoring (Monitoring) System of Pollution Sources*".

The method of monitoring hole setting and sampling can be according to *GB/T 16157-1996 "Method for determination of particulate matter and sampling of gaseous pollutants in exhaust gas from fixed pollution sources*". Sampling platform and hole size should be standardized. Monitoring holes should be set up at the inlet and outlet of treatment devices, and the aperture should be greater than 80 mm.

4.3.2 Plant monitoring staff

There are 5 water quality testing personnel working for water workshop in Konggang Incinerator. Lab facilities include equipped with electronic balance and ultraviolet spectrophotometer, responsible for the company's waste water detection. To ensure the accuracy of monitoring data, the monitoring shall be strictly implemented according to monitoring standards.

4.4 Environmental Monitoring Enhancement

The GEF project will support monitoring enhancement in addition to the environmental monitoring programs required by domestic regulatory requirements. The monitoring

enhancement includes operating and environmental monitoring in the first year of project implementation, and improved monitoring of MSW incinerators during operation.

4.4.1 Operational and environmental performance monitoring

The project has fund consultants to evaluate the collected data together with Kunming UMB and EPB, and to determine weaknesses and areas for improvements in the incinerators' operations. Jointly with the companies, UMB and EPB, the consultants would develop customized operational improvement programs. The program would define baselines, targets and milestones for the improvement of operating procedures in the facility.

In the follow-up implementation of the project, the baseline monitoring of enterprises and the comparative monitoring after technological transformation will be carried out to compare the data of four pilot enterprises in Kunming before and after technological transformation, and to test the improvement of environmental benefits before and after technological transformation. The monitoring project contains data of incineration conditions, such as incinerator production load, combustion chamber temperature, activated carbon addition, lime consumption, fly ash production, slag production, oxygen content, and pollutant emission data, such as exhaust gas, CO, HCl, SO2, NOx, mercury and other heavy metals, smoke and dust, dioxins and so on.

At the same time, in order to verify the emission of different stages of incinerator, the baseline monitoring and comparative monitoring of pollutant emission should be subdivided into three stages: start-up, normal and shutdown.

The additional monitoring scheme is carried out according to Table 4.4-1.

4.4.2 Improved monitoring of MSW incinerators during operation

The Project would support environmental monitoring for operation, including (i) enabling continuous access by regulators to incinerator operating and emission data; and (ii) additional stack emission testing for dioxin.

i. Enabling Continuous Access by Regulators to Incinerator Operating and Emission Data

The Project has supported investments in monitoring equipment at the incinerator needed to enable the monitoring of the above parameters (i.e. operating and emission parameters, including notably combustion temperature, residual oxygen, carbon monoxide, flue gas flow rate; emission of HCl, SO2, NOx, mercury and other heavy metals, and total suspended particulates; incoming waste characteristics; and combustion residuals, including bottom and fly ash.) and IT systems to transmit real time and continuously data from MSW incinerators to the environmental protection bureaus (EPBs) and urban management bureaus (UMBs) in Kunming. Kunming UMB's existing state-of-the-art Digital Urban Management Platform would be used to publicize real-time operating performance and (non-dioxin) emission data.

Dioxin Stack Testing following Standards

In Kunming, the Project would fund one more stack test annually at each selected demonstration incinerator in addition to the one test per year that facilities are required to carry out by domestic regulatory requirement, in order to gauge the impact of improved operations and investments on dioxin emissions. The baseline tests would be carried out during the initial period of operational and environmental performance audit. All tests, regardless of funding source, would be carried out by the same facility, following a set of sampling procedures. Kunming UMB and EPB will jointly ensure that normal operating conditions prevail at the time of sampling (Such as start-up, normal and shutdown period).

Table 4.4-1 List of Monitoring Plans for Konggang Waste Incineration Plant

Incinerator / Production	1# incinerator						2# incinerator					
Monitoring Stages	Before the Technical Transformation			After the Technical Transformation			Before the Technical Transformation			After the Technical Transformation		
Production	Start-up	Normal	Shutdown	Normal	Shutdown	Startup	Normal	Shutdown	Startup	Start-up	Normal	Shutdown
Production load of the incinerator												
Duration		——		——			——				——	
Temperature of the Combustion Chamber (℃)												
Active Carbon Addition （kg/d）												
Lime Consumption （kg/d）												
Fly Ash Production （t/d）												
Slag												

Production（t/d）												
Oxygen Content（%）												
SO_2 emission concentration（mg/Nm³）												
NO_x emission concentration（mg/Nm³）												
CO emission concentration（mg/Nm³）												
HCl emission concentration（mg/Nm³）												
Particulate emission concentration（mg/Nm³）												
Dioxin emission concentration（mg/Nm³）												

5 Risk control and emergency management

Since the implementation of environmental management technology in the first phase of the project, SNCR flue gas de-nitrification system has been added to the project, and urea is needed as de-nitrifying agent, which leads to the increase of environmental risk sources in Konggang. Therefore, some changes have taken place in risk control and emergency management in the factory area.

5.1 Major risk factors

Analyses on the identification of hazardous materials and the production procedures of the Company suggest the existence of toxic gases like the hydrochloric acid, sulfureted hydrogen and methane during the production procedure, and the incineration process may create certain amount of dioxin with considerable environmental impact. HCl and NaOH are separately stored in acid and alkali storage tank of 5 tons. The minimum everyday storage of HCl is 1 ton, and the daily reserve of NaOH is 1 ton. In addition, light diesel is used to ignite combustion in the boiler. There is one 30-ton light diesel steal storage tank in the plant with daily reserve at about 50 tons.
The risk factor analysis is shown in Table 5.1-1.

Table 5.1-1 Risk Factor Analysis for Proposed Works

S/N	Place/Equipment position/Activity	Section	Source & Nature of Risk	3 Tenses			3 Situations			Pattern	Danger Source Grading	Management Approach
				Past	**Present**	**Future**	**Normal**	**Abnormal**	**Emergency**			
1	Municipal solid waste incineration produced fly ash storage tank (two 150M^3 fly ash storage tanks)	Production Department	Potential Risk of Leakage & Fly Ash Pollution			√			√	Solid	A	Strengthen the supervision, take preventive measures and deploy more emergency facilities
2	Alkali tank (Storage capacity 5T)	Production Department	Potential Risk of Leakage, Personal Injury and Environmental Pollution			√			√	Liquid	A	
	Acid tank (storage capacity of 5T)		Potential Risk of Leakage, Personal Injury and Environmental Pollution			√			√	Liquid	A	
3	Boiler Room (Excessive dioxin and smoke, etc.)	Production Department	Potential risk of fire and secondary gas pollution			√			√	Gas	A	
4	Leachate treatment station	Production Department	Potential Risk of Leakage, Personal Poisoning and Environmental Pollution			√			√	Liquid	A	

Note: The ordinary environmental risk sources are rated as Grade B, and the critical ones are rated as Grade A.

5.2 Environmental risk accidents

5.2.1 Fire and explosion

(1) Environmental accidents due to boil or pipe explosions

The boiler as a steam-generating devise is one of the major equipment in the plant. Subjected to the high-temperature flame and smokes that contain large volume of dusts and highly corrosive gases, the heating surface of the boiler is always under the high temperature and pressure load of the heated media (i.e. water) from inside, and the impact and corrosion of the high-temperature smoke from outside; any leakage, explosion or fire happened on the boiler may result in severe personal injury and equipment damage. The boiler and pipe explosion can be easily triggered by the overpressure, component flaw or severe shortage of water in the boiler due to the equipment malfunction, automatic device failure, mal-operation or poor management, posing great threat to the security and environmental safety of the boiler operators, plant staff and the surrounding environment.

(2) Environmental Accidents due to the Fire and Explosion of the Fuel System and the Diesel Tanks

The waster furnace is fueled by 0# diesel, for which a 30t steel tank for light diesel will be built in the plant. Diesel is a combustible material, which is highly inflammable when contacted with oxidants, or exposed to high temperature, open fire or static sparks.

(3) Waste storage fire

The domestic wastes in storage are prone to generate methane and similar gases, which, without being expelled timely, may cause fire or explosion when reaching the explosion limits and exposed to the ignition source.

5.2.2 Environmental risk monitoring and preventive measures

Necessary safety and environment monitoring facilities should be set up company-wide for contingency, making sure these facilities work in emergency cases and send the alarming signals timely.

5.2.3 Monitoring method

(1) The company shall set up special organizations and assign personnel take in charge of safety and environment works, establish daily patrol inspection systems, and inspect records and corrective actions .The revealed potential risks should be corrected immediately for production safety.

(2) It shall strengthen the management, it shall define responsibilities for each relevant body such as production, storage and transportation, waste disposal and other procedures, and establish corresponding management system to make each work of the company conduct in accordance with regulations and all the operations are under control.

5.2.4 Preventive measures

(1) Establishment and Completion of Rules and Regulations: Including the monitoring of critical risk sources, safety operation procedures of major equipment, positional operation guidance, watch system, routine inspections, approval for special operations and various performance-based rewards and punishments.

(2) It shall assess the safety and environmental risk on regular basis; establish all kinds of safety and environmental management files for major risk source, and do a good job of report and registration to the local security and environmental protection departments.

(3) Act by the rules to prevent any breaching activities. Strengthen the trainings and examinations for employees, requiring all employees to receive the specific training courses, and to pass the tests on such courses before taking position. Special operation undertakers are required to hold the qualification certificates. Process parameters should be controlled and recorded as per the requirements of each individual position.

(4) Safety and environmental protection facilities are complete and valid. The pressure vessels, fire equipment and safety equipment shall be well-equipped and their functions shall be guaranteed through the regular inspection.

(5) The lighting-proof facilities should be checked each year to make sure they are intact and functioning.

(6) Strengthen the management of special operations. Operation licenses should be acquired for temporary line operations, fire-involved works, high-altitude works and operations entering the tanks, with necessary safety provisions being deployed. The operators should receive the corresponding safety training courses, and be specified with supervisors in operation.
(7) It shall try to prevent the occurrences of natural disaster. The company shall do well in dealing with all kinds of natural events based on the weather report.

That disaster preparedness includes flood and typhoon prevention. The procedure of production suspension should be prepared for extreme weather conditions, and inspections on tanks, outdoor production facilities and environmental protection facilities should be strengthened, with all revealed problems being corrected immediately.

5.3 Accident response plan

5.3.1 Early warning procedure

The early warning of emergent environmental pollution accidents should be graded according to the severity, emergent level and potential extensiveness of the accidents, establishing the warning system with the progressive grades at company level, workshop level and team level, represented by the color of orange, yellow and blue respectively. The warning can be upgraded, down rated or cancelled as per the progression of situations and the feedback of the countermeasures being taking against the warning cases. To those emergency cases beyond the emergency response at the company level, the government’s grading on early warning of emergent environmental incidents should be adopted. Measures to be taken in early warning situations:

Grade I: Equipment malfunction or micro-leakage with no threat to the production, which can be handled by checking the equipment or replacing the pipes. The operators should follow the uniformed command of the team to solve the problem immediately.

Grade II: Part of the auxiliary facilities in the plant is affected, and the risk of fire emerges in the workshop. Emergency response procedures should be initiated to evacuate the personnel from the warning zone, and the emergency response team should be gathered up in such zone, following the command of the directorate to take responses.

Grade III: The grade III alarm should be sounded in case of leakage in the plant beyond the alarming level, ordinary fire or explosion. In such case, the emergency directorate of the Company should alarm the surrounding entities with phone, and report the situation to the government of the Economic Development Zone, requesting and providing guidance for the neighboring entities to initiate their emergency responses. Meanwhile, the plant should initiate the emergency procedure to evacuate its personnel to the specified safety zones, allowing for the Company’s emergency salvage operations, conducting the rescue missions, buying time for the efforts to reduce the accidental loss.

5.3.2 Emergency plan initiation procedure

(1) The first witness of the accident should report the situation to the production supervisor of the Company immediately, and take necessary measures to stop the situation from escalating. The accidents of grade II (or above) should be reported immediately to the government of the zone (town), the local environmental protection agency, the local safety production supervision administration and the local police, etc.

(2) The production supervisor should make emergency arrangements as per the nature and pollution intensity of the accident immediately after receiving the accident report.

(3) Upon the breakup of the accident, the section where the accident occurs should immediately investigate the cause to such accident, and to make sure the situation is under control; otherwise the situation should be reported to its superior-level office immediately. The production technical department should join in the accident section and other relevant sections to make the decision of partial of total suspension of production as necessary.

(4) After the situation is under control, preventive measures should be prepared immediately, salvage teams should be organized, and salvage plans should be prepared to resume the production as soon as possible.

(5) The salvage works should be completed by the accident section independently as much as possible, with corresponding measures being discussed and determined, salvage teams being organized, and salvage plans being prepared, in order to resume the production as soon as possible.

5.3.3 Organization & responsibilities

In order to prevent and handle emergent environmental incident, the company has set up an emergency headquarters on environmental incident (hereinafter referred to as Emergency Headquarters), in which the general manager acts as commander in chief, vice general manager on production as deputy commander in chief, and managers of all departments as assistant to commander.
Emergency Headquarters is composed of company leadership, production technology department and operation branch, maintenance branch, safety supervision office, general affairs department and finance department. Manager of the General Affairs Dept. is appointed as director of the directorate office, and heads of other departs as assistant directors of the office.

The field executive mechanism of the Directorate is formed by its Environmental Protection Team, the Production Control Team, the Fire Control Team, the General Team, the Salvage Team and the Communication and Press Team. The Directorate operates und the command of:

(1) General Director

- Execute the guidelines, policies and regulations of the state and the local authorities and the superior offices on environmental safety, and organize the preparation of emergency plans for emergent environmental incident;
- Build the emergency rescue team for emergent environmental incidents;
- Keep surveillance on the progression of the accidents, appoint the field commanders, and support the work of the emergency response team;
- Determine whether it is necessary to call for external supports or salvages, according to the incident profile and the possible development of the situation. Accept the instructions and mobilizations from the superior emergency commanding authorities, and provide assistance for the handling of the incidents;
- Approve the initiation and termination of the emergency plan;

- Prepare the internal accident report and the report to the government, and provide assistance for the efforts of environmental recovery, accident investigation and the summary of experiences and lessons by relevant authorities;
- Review and update the emergency plans from each level of the Company;
- Organize the external review of the plans.

(2) Executive Office of the Directorate

- Prepare the emergency and preventive facilities, equipment (like the leak-stopping tools, emergency lagoons, protective equipment, rescue apparatus and emergency transports, etc.) and emergency supplies, particularly for the storage of chemicals capable of processing, dissolving and absorbing the pollutants.
- Provide the organized training courses on emergent accident salvage, and rehearse the emergency plan. Provide publications on the nature of major chemicals used by the plant and the knowledge on emergency rescue to the neighboring companies and villages.
- Report the emergent environmental incidents and the possible scale of influence;
- Conduct inspections and supervisions to make sure the preventive measures against emergent environmental incidents and emergency salvage preparations are properly made. Supervise and assist the relevant sections to eliminate the leakage and spillage toxic and hazardous substances.
- Determine the grade of the incident, and notify the grading to General Director. Organize the execution of the Company's emergency plan, contact and mobilize the emergency teams, and coordinate their works in site. Approve and execute the provisional emergency plans, and determine whether to seek external help in emergency cases.

(3) Emergent Incident Response Team

- Environmental Protection Team

Conduct the periodical inspections on critical environmental risk sources, and on the construction and operation of emergency facilities. Show up in the place of incident timely to organize investigations determining the nature and magnitude of the hazard, with the reports submitted to the office immediately. Prepare the pollutant disposal plans, determine the scale of pollution, carry out assessments on the influence of the incident, and prepare and organize the implementation of the recovery plans. Provide assistances for the environment monitoring practices undertaken by the superior authorities.

- Production Control Team

Organize the cutoff and transportation of materials in the incident site, and coordinate the operation of production facilities and the supply and utilization of fire-control water and steam. Coordinate the sewage emission procedure of other equipment and auxiliary devices. Organize the salvage team to conduct the system blocking and diversion works. Coordinate the operations of material recovery and sewage processing and storage. Organize the resumption of the production afterwards.

- Fire control team

Responsibilities: Rescue and evacuate the wounded and trapped personnel from the incident site. Organize the execution of the fire-control, gas protection and salvage plans in the site. Supply and distribute the protective equipment to the emergency response personnel in site. Perform the decontamination of the pollutants in site, with the water supply for fire control and decontamination being properly utilized.

- General Team

Establish the provisional medical center in the nearby safety zone, where the wounded are attended, and critical ones are transferred to hospital for further treatments. Arrange the vehicles, and determine the destination hospitals for rescue missions. Make casualty statistics. Execute the rescue plan according to the natures of the injury and toxicity.

Evacuate the personnel and guard the incident site. Secure the traffic for rescue missions. Organize the evacuation of personnel in the potentially influenced areas, and protect the security of the evacuated area. Protect the security the incident site and the surrounding areas.

Allocate the internal and external emergency supplies to secure the supply. Organize the delivery of such supplies, and detail vehicles for the transportation of pollution prevention supplies.

Coordinate and allocate the household supplies and personnel transportation. Make sure the site communication is well functioning. Perform the recording, videotaping and photographing of the incident site. Draft the notes and circulars published by the Directorate.

Provide consolations for the employees and the neighboring residents, and contact the local authorities as per the instructions of the Directorate, if necessary, for evacuation and pacification.

- Salvage Team

Confirm the cutoff of the disconnecting valve. Maintain and control the electrical equipment. Control and cut off the combustion sources. Shut off the external gate of the sewage processing system. Provide the existing supporting equipment and documents and those available nearby for the salvage efforts.

- Communication and Press Team

Receive the visitors from press, government agencies and other authorities. Handle the publication of the incident information.

5.3.4 Reporting and notification

In case of accidents, the National Response Plan for Emergent Environmental Incidents, the Practice of Notification for Emergent Environmental Incidents by Environmental Protection Administrations (Trail) and other governmental regulations should be followed to report the incident to the Directorate immediately, and to notify the incident to the superior authority and the local government at the same time, maintaining a 24h contact with the authorities to facilitate the corresponding salvage efforts.

5.4 Emergency responses and salvage measures

5.4.1 Responding procedure

In case of incidents escalating beyond the risk control of the company level (Grade I), the Communication and Press Team should immediately call for external supports, allowing for the district authority to take responses, taking uniform command to initiate the emergency plan at the district level.

The company level response (Class II response) emergency command is charged by the company emergency rescue headquarter, general manager holds the post of commander in chief and deputy general manager takes the job of deputy commander in chief for organization and command of emergency rescue work of the company, if the general manager and deputy general manager is not in the company, the minister of integrated management works as a temporary commander in chief and is responsible for the emergency rescue work (issue emergency action, resource allocation and emergency command).All functional departments should initiate their emergency plans by their responsibilities.

Department level response (Class III response) emergency command is charged by the production supervisor and immediately set up the workshop event emergency command department based on the shift supervisor and team leader, production supervisor works as commander for the organization and command of workshop emergency work. In case of incident escalating beyond the control of the workshop, the commander should report the situation to the Directorate of the Company, and upgrade the response to the company level (Grade I).

Post (shift) level response (Class IV response) emergency command is charged by the shift supervisor, immediately set up the team emergency event department based on staff on duty, shift supervisor works as commander for the organization and command of team emergency work. In case of incident escalating beyond the control of the team, the commander should report the situation to the Directorate of the Company, and upgrade the response to the workshop level (Grade III).

5.4.2 Emergency measures

The field response team should be equipped with professional protective gears fitful for the specific situations, along with other safety measures. The incident site emergency access procedure should be strictly followed.
The Directorate in site is responsible for the protection of the local residents, including:

- Notifying the residents to take necessary protective measures according to the nature of the incident;
- Instructing the responsible department to organize the evacuation of the residents to safety, and determining the means of evacuation according to the weather and geographical conditions and the population density;
- Set up the emergency shelter outside the safety boundary of the incident site;

The entity and individual responsible for the emergent environmental pollution incident and the supervising administration of such incidents should, upon the detection of the incident, report the incident to the Environmental Protection Agency of the government in 1 hour, and organize the field investigation immediately. It is allowable to bypass the reporting chain in urgent cases.

(1) Field Response Measures for Emergent Environmental Incidents

The responsible entity in the emergency environmental incidents should take immediate actions to control or cutoff the source of pollution, taking all possible measures to control the situation, in order to prevent the secondary pollution and the derivative incidents. The field rescue team should be organized immediately if necessary to reduce the casualty and property loss.

Meanwhile, it should be determined that whether the incident is severe enough to be reported to the superior office; the Grade I incidents must be reported to the executive office of the direct government, the district environmental protection administration and relevant experts, with necessary assistances being provided for the environmental monitoring station to gather up the environmental information, in order to further strengthen the existing responsive measures. Requests for support should be sent to the emergency response offices of the neighboring companies, if necessary, when taking the above measures. The superior government (or emergency response commission) and the superior administration should be notified of the incident according to the regulations on information disclosure.

Individuals in the contaminated area should be evacuated to safety, and irrelevant individuals should be barred from the area. The emergency response personnel should be equipped with self-contained breathing apparatus and chemical protection suits. No direct contact with the leaked substance. Conduct the leakage-stopping working safely. The flushing water used to dilute the pollutant should be drained to the sewage system. The pollutant absorbed by earth and

gravel should be neutralized by large volume of water before being drained into the sewage system. In case of severe leakage, the pollutant should be gathered with a cofferdam, and then collected, transferred and recycled, or should it be subject to nuisanceles treatment before been discarded.

5.4.3 Emergency monitoring

In case of unexpected environmental events, the company shall timely contact with Guandu District Environmental Protection Bureau and the Guandu District Environment Monitoring Station will make on-site emergency monitoring of accident scene and external air and water environment

5.4.4 Termination of emergency

The emergency for those situations that meet the following requirement is qualified to be terminated:

(1)The scene of incident has been under control, and the conditions for the incident to occur are removed;

(2) The leakage or release of pollution source has been limited within a stipulated scope;

(3) The hazard caused by the incident has been thoroughly removed and can not cause any new incident;

(4) It is not necessary to continue to adopt professional emergency disposals at the incident site;
(5) Necessary measures have been taken for protecting the public from any secondary danger。

6 Environmental training plan

The environmental training plan formulated by the original environmental management plan of the project still applies to the follow-up environmental management.

6.1 Goal and content of training

To ensure the effective implementation of the plan for environment protection management, related staffs shall have relatively rich environmental knowledge and high skills in environmental protection. Therefore, the personnel who participate in the project management and construction shall accept related environmental training so as to guarantee the effective implementation of environmental protection measures.

 Environmental regulations: The related governors to environmental protection management shall learn domestic environmental legal system and its constitutions, related World Bank environmental policies, the legal liabilities regulated by environmental laws, “Regulations on the Administration of Environmental Protection Management for Construction Project”, local environmental protection regulations and rules, and the plan and schedule for local national economy and social development to help administrative staffs learn laws and act by laws.

 Environmental monitoring: The related governors to environmental protection management shall learn the methods for environmental monitoring, regulations and methods for sampling water quality, air, living beings, etc., the analyzing methods, standards, and data reorganization for environmental parameters, and the requirements for analysis techniques.

 The treatment and reaction capacity for environmental accidents: The related governors to environmental protection management shall learn the occurrence mechanism of accident potential, corresponding preventive measures and methods, and emergency treatment methods after the occurrence of the accident.

 Public participation and public contact: The related governors to environmental protection management shall learn the types and methods, basic methods, and importance of public participations, and basic methods and procedures related to public participation.

 Pollution control and management during construction period: The contractor of the construction work shall learn the constructive procedure of the project and the links that will produce pollutions, the pollution controlling methods during construction period, and management and monitoring measures.

6.2 Regular training plan

The Konggang Incinerator has regular training plan, as described in this section. The GEF project will support enhanced training for incinerator manager snd operators, which is described in section 6.3.

The Konggang Incinerator offers the staffs three-level training, namely, group-level training, department-level training, and company-training, formulates corresponding annual training plan, as well as examines and evaluates the results of the training so as to improve the staffs’ capacity of emergency treatment and environmental pretreatment.

6.2.1 Emergency drill and training

(1) A drill that consists of environmental incidents is organized every year to imitate the organization and command of emergency measures.

(2) A special drill is organized every year: A drill where the members of special groups of the company respectively carry out special operations included in emergency rescue tasks.

(3) At the beginning of each year, the annual, quarterly, and monthly emergency training plans

will be formulated.

6.2.2 Special trainings on environmental laws and regulation as well as related environmental knowledge

(1) In terms of knowledge related to the raw and auxiliary materials the company deals with, security features of chemicals, fire equipment, the usage of tools for emergency rescues, the basic knowledge of rescuing people on the spot, related environmental laws and regulations, etc., every year, the company delivers a written publicity, an oral publicity, and corresponding lectures to improve the staffs' environmental preparedness and capacity of emergency treatment.

(2) Special training shall be conducted on the new laws, regulations, national standards, industrial standards and technical standards on environmental protection to ensure that the existing staffs have some acquaintance with the relevant existing regulations for the purpose of promoting their legal awareness.

6.2.3 Environmental risk identification

(1) The staffs shall be organized to be familiar with the features, sources of danger and points of risks of the relevant environmentally protective facilities and equipment and the relevant preventive measures.

(2) New contractors and staffs of the factory shall be treated with three-level education to ensure that each employee be familiar with the sources of danger and points of risks of the environment and the relevant environment system of the company.

(3) Risk analysis, analysis evaluation and the corresponding preventive measures against pollution sources of the company shall be quarterly made to effectively promote the staffs' awareness of sources of environmental risks and dangers and to avoid the environmental pollution accidents.

6.2.4 Budget for training expenditure

Training shall be planned once each quarter. Budget for each training shall be about RMB 30,000 and that for training each year shall be RMB 120,000.

6.3 Enhanced training for incinerator managers and operators

The GEF project would fund consultant services to design training materials and train approximately 250 MSW incinerator managers and operators in BAT and BEP. The program would be implemented in three phases: (i) training of eight trainers, (ii) training of approximately 30 managers and operators from incinerators in Kunming, and (iii) training of approximately 200 managers and operators from across China. Based on the experience with the pilot program, consultants would prepare recommendations for the institution of a training and certification requirement for MSW incinerator operators. Detailed training program and materials will be developed during project implementation.

7 Environmental reporting

7.1 Reporting

During operation period of the project, the company shall conduct environmental monitoring according to the operation situation of the project and timely submit the monitoring report to the local environmental protection department. Contents of monitoring reports:

(1) Monitoring time, frequency, point position, monitoring items, methods and quality control program;

(2) Monitoring data and statistical analysis;

(3) Description of operation conditions of the facilities during monitoring period;

(4) Remarks on abnormal working conditions.

To sum up, construction unit of the project shall conduct the monitoring and plan the filing as per construction period and operation period and shall submit one semi-annual monitoring report to the environmental protection department and the World Bank.

7.2 Record filing

There are two main aspects in the account of project management: one is the project account generated in the course of the implementation of the project funded by GEF; the other is the account of the production conditions and the operation of pollution control measures recorded by Konggang in the course of operation. The two kinds of account are of the same importance to the implementation and management of the project, and need equal attention in the follow-up implementation of environmental management.

7.2.1 Technical Renovation Account

Konggang need to record in detail the accounts generated during the implementation of projects funded by the World Bank. The main information to be recorded is as follows:

A. Feasibility study report of technical renovation;

B. Expert review comments of the feasibility studies;

C. Construction plan and use plan

D. Records of management and construction personnel training;

E. Records of management activities during inspection, verification and maintenance;

F. Environmental monitoring reports before and after the completion of technological renovation;

G. Information on project implementation;

H. Acceptance of supporting materials and audit opinions the effective operation of environmental management system.

In addition, it is necessary to control the above-mentioned records, including the identification, collection, cataloguing, filing, storage, management, maintenance, inquiry, storage period and disposal of the records, so as to ensure the reasonable retention and use of the information.

7.2.2 Key Points of Recording Account Data and Flow in Operation

In the process of operation, Konggang needs to record the operation conditions of production conditions and pollution control measures, establish operation account, help enterprises find the improvement of environmental emission space and improve the scientific decision-making level by analyzing the long sequence of accounting information. Detailed account information required to be recorded is shown in Table 7.2-1.

Table 7.2-1 Data Record List of Operating Accounts of Airport Waste Incineration Plant

S/N	Production Unit	Parameters for Record	Keeper	Requirements
1	Waste Reception	Received Amount of Waste	Ground Weight Room Staff	By day
		Calorific Value and Main Components of Waste Received	Production Staff	Video Monitoring Frequency Recording
2	Waste Treatment	Amount of Waste Feeding into the Furnace	Production Staff	By day
3		Calorific Value and Moisture Content of the Feeding in Waste	Production Staff	By day
4		Incinerator and Second Combustion Chamber Temperature	Automatic Recording of Data Acquisition System	Real Time
5		Oxygen Content in the Flue Gas	Automatic Recording of Data Acquisition System	Real Time
6		Records of Furnace Maintenance	Technical and Equipment Staff	Record the actual situation
7		Time of shutdown and startup of the furnace, and the shutdown and startup plan	Production Staff	Record the actual situation
8	Flue Gas Treatment	Urea Addition	Automatic Recording of Data Acquisition System	Real Time
9		Lime Addition	Automatic Recording of Data Acquisition System	Real Time
10		Temperature of the Bag Filters	Automatic Recording of Data Acquisition System	Real Time
11		Activated Carbon Addition	Automatic Recording of Data Acquisition System	Real Time
12		Replacement Frequency of Bag Filter	Technical and Equipment Staff	Record the actual situation

13		Automatic monitoring results, including flue gas emissions, oxygen content, CO, NO_X, SO_2, particulate matter, HCl emission concentration	Automatic Recording of Data Acquisition System	Real Time
14		Manual monitoring results, including manual monitoring conditions (such as the amount of waste into the furnace, consumption of environmental protection materials, slag, fly ash, etc.), pollutant emissions (flue gas emissions, oxygen content, CO, NO_X, SO_2, particulate matter, HCl emission concentration, etc.)	Safeguards and Environmental Protection Staff	Record the actual situation, and keep data in a comprehensive electronic way
15		Maintenance and time-consuming of environmental protection equipment and operation scheme of furnace body during maintenance	Safeguards and Environmental Protection Staff	Record the actual situation, and keep data in a comprehensive electronic way
16	Solid Waste Treatment Plan	Production and pretreatment of fly ash: amount of fly ash, amount of chelating agent, amount of curing agent, curing time, amount of fly ash after curing	Safeguards and Environmental Protection Staff	Record the actual situation, and keep data in a comprehensive electronic way
17		Fly ash disposal: including transferred disposal capacity, transfer list and disposal unit	Safeguards and Environmental Protection Staff	Record the actual situation, and keep data in a comprehensive electronic way
18		Slag disposal: including production and disposal amount	Safeguards and Environmental Protection Staff	Record the actual situation, and keep data in a comprehensive electronic way
19		Monitoring results of leaching toxicity of fly ash	Safeguards and Environmental Protection Staff	Record the actual situation, and keep data in a comprehensive electronic way
20		Slag Heat Deduction Monitoring Data	Safeguards and Environmental	Record the actual situation,

			Protection Staff	and keep data in a comprehensive electronic way
21	Waste Water Treatment Plan	Amount of Leachate in the Collection Pond	Production Staff	By Day
22		Amount of Leachate inflow into the treatment station	Production Staff	By Day
23		Amount of outflow from the Leachate Treatment Station	Production Staff	By Day
24		Leachate Treatment Station Concentrated Water Outflow and Its Direction	Production Staff	By Day
25		Leachate treatment station effluent self-monitoring results	Safeguards and Environmental Protection Staff	By Day
26		Third party monitoring data of leachate treatment station effluent	Safeguards and Environmental Protection Staff	Record the actual situation, and keep data in a comprehensive electronic way
27	Training Records	The training work, contents and participants carried out by enterprises are introduced in detail.	Safeguards and Environmental Protection Staff	Record the actual situation, and keep data in a comprehensive electronic way
28	Environmental Quality Monitoring	Record the monitoring results of surrounding environmental quality required by chapter IV of the environmental management plan	Safeguards and Environmental Protection Staff	Record the actual situation, and keep data in a comprehensive electronic way
29	Environmental Protection materials procurement records	Purchase of Ammonia Water, Lime, Cloth Bags and Activated Carbon	Production Staff	Record the actual situation, and keep data in a comprehensive electronic way

7.3 Environmental Information Disclosure System

According to the *Measures for Environmental Information Disclosure of Enterprises and Institutions (Decree No. 31 of the Ministry of Environmental Protection)*, enterprises should make environmental information disclosed. Specific plans are as follows:

7.3.1 Information Disclosure Content

Information disclosure content includes:

(1) Basic information, including the name of the unit, organization code, legal representative, production address, contact information, as well as the main content, product and scale of production, operation and management services;

(2) The company's environmental protection policy, annual environmental protection objectives and results;

(3) Pollutants emission information, including the names of major pollutants and characteristic pollutants, discharge modes, quantity and distribution of discharge outlets, concentration and total amount of discharge, exceeding standards, as well as the implementation of pollutant discharge standards and the approved total amount of discharge;

(4) Construction and operation of pollution prevention facilities;

(5) Environmental impact assessment of construction projects and other administrative permits for environmental protection;

(6) Emergency plans for environmental incidents;

(7) Environmental self-monitoring scheme;

(8) Other environmental information that should be made disclosed.。

7.3.2 Information Disclosure Methods

(1) Publicity through the website of Sanfeng Company, the superior unit of Konggang Incinerator;

(2) To publicize the online monitoring results through the electronic display screen installed according to the *Notice on Installation of Automatic Pollutant Discharge Monitoring Equipment and Networking Related Matters in Domestic Waste Incineration Plant*;

(3) Publicity through the online monitoring data publicity platform of the Environmental Protection Department;

(4) Disclose by the project publicity column established at Yunnan Environmental Protection Department web page during the implementation of GEF project;

(5) Make public through the company's own information open column, information kiosk, electronic screen, electronic touch screen and other places or facilities.

8 Public Engagement and Plan

The GEF project will support a comprehensive public engagement program that consists of public disclosure of emission data and public awareness raising aspects. Such program include :a) organizing residents to visit nearby MSW INCINERATION plants; b) installing display panels at plant gates to disclose online monitoring information; c) disclosing online monitoring data of the MSW INCINERATION plants to the public; d) conducting publicity events annually; e) strengthening the online monitoring system for incineration gases; and f) developing an information disclosure and public participation plan.

Of particular important is the disclosure of incinerator operating and emission data. Key emission and plant data would be disclosed on a website that the general public can access at will. Thus, a concerned citizen could observe real time SO_2, CO, NO_x and other emissions (monitored real time by CEMs); several key process variables such as the furnace temperature, and activated carbon feed rate; and periodic postings of annual stack test results for dioxins, heavy metals and the like.

8.1 Public Participation and Implementation at the First Stage of the Project

Konggang Incinerator attaches great importance to the implementation of public participation plan, and actively implement public feedback into the environmental management plan. The main ways of public participation are as follows:

(1) Actively publicize the Information through the environmental education base built by Konggang itself.

Konggang Incinerator is the only environmental protection education base in the domestic waste incineration industry in Yunnan Province. From 2017 to 2018 alone, more than 20 groups have been invited to visit or study. The groups include local primary and secondary schools, university students, environmental protection authorities in Yunnan Province, CPPCC, local TV stations, newspapers and others. By introducing a close contact between the public and Konggang Incinerator, a comprehensive understanding of the domestic waste incineration plant has been strengthened, and Konggang Incinerator have further understanding of public demands to the plant through the feedback.

(2) Community publicity carried out through public participation consultant

During the implementation of the project, the public participation consultant was procured to carry out community propaganda activities. Through handing out leaflets in nearby villages and communities, on-site explaining relevant knowledge of waste incineration, the public's objective and scientific understanding of waste incineration was enhanced.

(3) Promotion of World Environment Day

Environmental protection activities were organized and implemented on campus on the World Environment Day. By instructing students to prepare handicraft and other activities for domestic waste, children can understand the hazards of garbage production from an early age and reduce garbage from the source.

(4) Information disclosure

Since 2013, Konggang Incinerator has disclosed the monitoring data through the screen at the entrance of the plant area and the monitoring data disclosure system, so that the public can timely understand the emission level of Konggang and accept public supervision.

8.2 Information Disclosure and Public Participation Strategy

In order to ensure that the public can easily obtain relevant information on pollutant emissions from incinerator plants (especially incineration flue gas), participate in emission reduction fairly,

and enhance the awareness of public participation, information disclosure and public participation strategies should be carried out in the ways of enterprise publicity, environmental protection department publicity, community publicity and enterprise-citizen interaction. The main methods are as follows:

(1) Information Disclosure - Public Notification

Konggang Incinerator has set up a public screen at the gate of the plant. The public screen can display the production conditions of the incinerator and the emission concentration of pollutants. The production conditions include the number of the incinerator, the treatment capacity, the flue gas temperature of the incinerator, and the emission concentration of SO2, NOx, CO, HCl and particulate matter. The purpose of timely information disclosure can be achieved by means of public screen.

(2) Information Disclosure - Publicity of Online Monitoring Data

In the follow-up operation phase of the project, enterprises should maintain and correct online monitoring facilities in accordance with the requirements of *"Measures for the Automatic Monitoring and Management of Pollution Sources" (Decree No. 28 of the State Environmental Protection Administration), "Measures for the Operation and Management of Pollution Source Automatic Monitoring Facilities" (Environmental Development [2008] No. 6), and "Measures for the Management of Environmental Monitoring" (Decree No. 39 of the State Environmental Protection Administration).* The collection rate and transmission rate of the measured data can ensure that the relevant monitoring data can be timely transmitted to the relevant publicity platform of the environmental protection system for real-time publicity, and ensure the public's right to be informed of environmental information.

(3) Community publicity

In order to address the "not-in-my-backyard" reaction to the domestic waste incineration, Konggang Incinerator has carried out various forms of community propaganda in surrounding communities and distribute introduction handbooks to alleviate public doubts. Propaganda on the positive benefits of waste incineration plants, such as garbage incineration will greatly improve the overall quality of human settlements in urban and rural areas, and solve the problems of land occupation, groundwater pollution and odor in the waste filling process. At the same time, the technical characteristics of waste incinerator and its pollution control facilities should be widely publicized, such as the advanced nature of waste incineration compared with landfill treatment process, strict flue gas treatment facilities will be adopted in waste incinerator, and the current pollution discharge standards of incinerator in China are stricter. Through extensive and in-depth community publicity, public doubts can be dispelled and public support for waste incineration projects can be enhanced.

(4) Enterprise-citizen interaction

The best way to dispel the public's concerns is to let the public come into the enterprise, understand the enterprise, and then trust the enterprise. For a high-quality development enterprise, close supervision by the public is not only an enterprise's responsibility, but also an excellent platform to show its own business quality.

Konggang Incinerator has built an excellent platform for the interaction between the enterprise and the people. Its environmental protection education base can publicize the incineration process and pollution control process of waste incineration plant to the public through its intuitive and vivid manifestation, which can greatly reduce public doubts.

Since a new household has moved in about 50m around the plant area, Konggang Incinerator should strengthen the information disclosure for the household, and actively invite the household to participate in the interactive activities. At the same time, all kinds of propaganda

materials produced should be sent to the household in time to ensure that they get relevant information at the first time.

Table 8.1-1 Information Disclosure and Public Participation Strategy

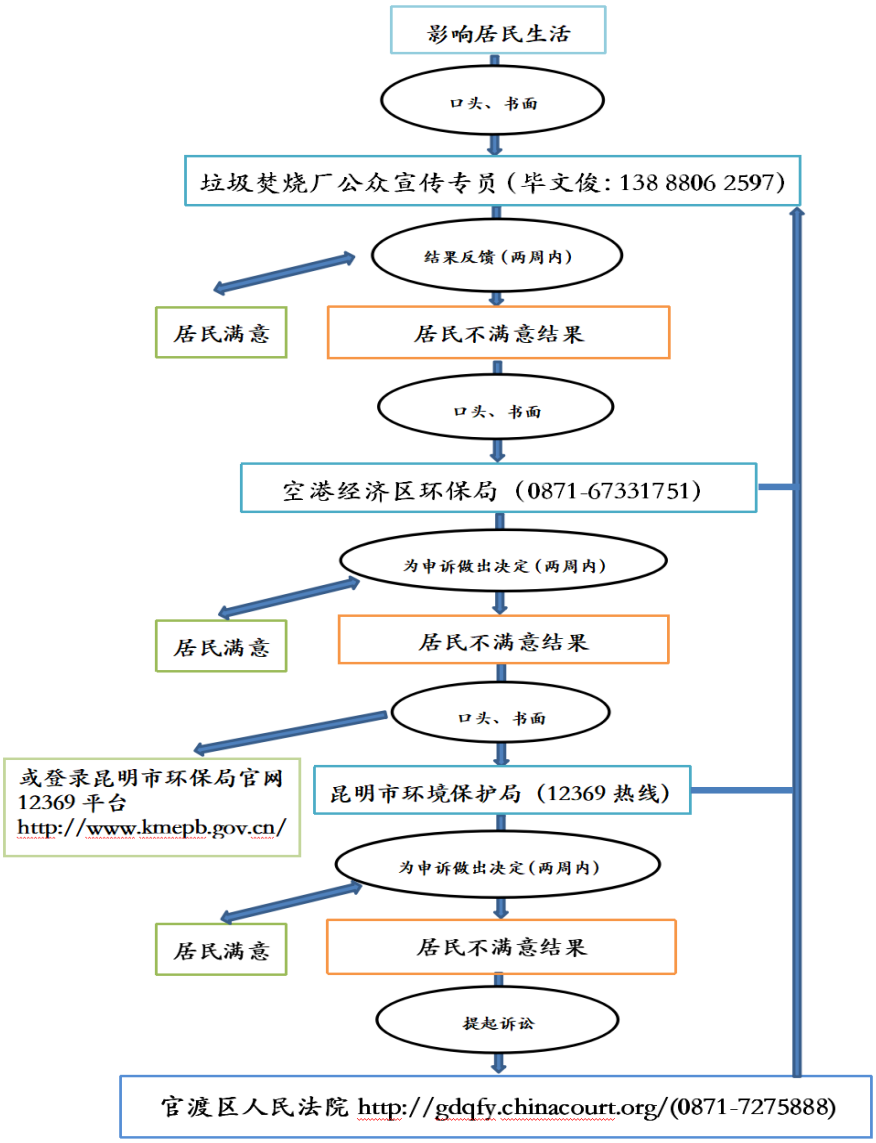
Content	Targeting people	Channel	Time and frequency	Implement institution	Monitoring index	Estimated cost (CNY)
Details and target of GEF project	Residents around MSW incineration plants	Community bulletin board Website of EPD	During the preparing stage of GEF project	PMO The village committee	Number of posters on the community bulletin board The publicity announcement on the website of EPD	Information interface establishment: CNY120,000 Publicity and interactive activities: CNY 374,400
Disclose the operating and online monitoring data (see table 5-19 for details of online monitoring data)	Residents around MSW incineration plants, especially vulnerable group which include the aged, women, children and disabled.	Community bulletin board Website of EPD LED panels	Community bulletin board: Once per month Website of EPD :Once per day LED panels: Instant	PMO Information center of EPD The village committee	Number of incineration data posters on the community bulletin board per month The publicity of monitoring data on the website of EPD per day The publicity of online monitoring data on the LED panels.	
Disclose the monitoring reports of dioxin	Residents around MSW incineration plants	Community bulletin board Website of EPD	Dioxin monitoring reports: 1 or 2 times per year	PMO Information center of EPD	Dioxin monitoring data and knowledge of dioxin on the community bulletin board The publicity of dioxin data on the website of EPD	
Popularize the	Residents around	Brochure	Irregularly	PMO	Reach to 80%	

knowledge of waste incineration and health. The knowledge publicity should be taken in an easy way to understand, such as chart, comic, etc.	MSW incineration plants, especially vulnerable group which include the aged, women, children and disabled.	Community bulletin board Website of EPD Media Events organized by MSW incineration plants		Information center of EPD UMB MSW INCINERATION plants Public participation expert	awareness rate of incineration, health and dioxin knowledge in the residents around MSW incineration plants	
Activities on popularizing the knowledge of waste sorting and incineration	Residents around MSW incineration plants, especially vulnerable group which include the aged, women, children and disabled. Insure 30% women of participation	Brochure Community bulletin board Website of EPD Media Events organized by MSW incineration plants	Once per half year	PMO Information center of EPD UMB MSW INCINERATION plants Public participation expert	Waste sorting and incineration knowledge on the community bulletin board around the MSW incineration plants Column of waste sorting and incineration knowledge on the website of EPD Reach to 80% awareness rate of waste sorting and incineration knowledge in the residents around MSW INCINERATION plants	
Interaction of MSW incineration plants and the residents around the MSW	Residents around MSW incineration plants, especially vulnerable group	Residents visit to the MSW incineration plants FDGs between	1 or 2 times per year	PMO MSW incineration plants Village committee	Frequency of residents visit to the MSW incineration plants	

incineration plants, insure 30% women participation in the activities.	which include the aged, women, children and disabled.	residents and the MSW incineration plants		Public participation expert	Frequency of FDGs between residents and the MSW incineration plants The proportion of women participation in the activities.	

8.3 Grievance Mechanism

In order to strengthen public supervision and participation in waste management and waste incineration environmental management, the GEF China Municipal Solid Waste Management Project will promote the establishment of public complaints and appeal channels in four wastes to energy power plants in Kunming. In the operation of waste incineration power plant, if environmental pollution accidents happens, which affects the health of nearby residents, residents can refer to the following flow chart (take Konggang as an example), and feed back the problem to the waste incineration power plant at the first time. If the residents are unsatisfied with the results conducted by the incineration power plant, they can further contact the responsible person of the relevant agencies.



空港垃圾焚烧发电厂 宣

The above procedures have been notified to the public through bulletin boards and posters. The project will monitor the effectiveness of these complaints and the results.

8.4 Other Public Participation Plans

The project should establish a liaison mechanism with the mass media and valuing the role of new media. To this end, the project will (a) continuously publish project information on the

official website of the Provincial Environmental Protection Department; (b) try to publicize project information and implementation experience through the official Wechat public account of the World Bank and China Environmental Daily; (c) publicize the operation of enterprises through enterprise websites and Wechat public account; (d) Expand and publicize the municipal solid waste integrated management knowledge through the environmental science education societies and organizations.

9 Legal implication of environmental management plan

Environmental management plan shall have the corresponding legal force in view of environmental standards, clean production, total quantity control, relevant project documents and agreements.

(1) Environment standards shall be the regulations on various works related to environment in accordance with the environmental protection law and the relevant policies to protect the population health, prevent environmental pollution, prompt the virtuous circle of ecology, utilize the resources reasonably and promote the economic development. Since the companies are difficult to avoid the pollutant emission during production, to prevent that the companies transfer the internal costs to the external environment and to balance the emission rights among the companies, the governments on behalf of public interests shall control the emissions of pollutants and thus the standards for emission of pollutants emerge. This represents the external index of characteristics of pollution sources on environmental effect. It requires that the technical measures against continuous emission and reduction of pollutants at the sources of pollution shall be made and the technical compulsory measures with legal binding force shall be implemented against the behaviors of pollutant emission.

(2) Clean production refers to continuously apply the comprehensively preventive environmental protection strategies to the production and products so as to reduce the human and environmental risks. In connotation, clean production substantially means a production mode of taking the wholly preventive environmental strategies against the production process and the products to reduce or eliminate their possible danger on human and environment and meanwhile to fully meet the human demands and maximizing the social and ecumenical benefits. Law of the People’s Republic of China on Promoting Clean Production was issued and publicized on June 29, 2002 In the ninth session of the standing committee of the National People's Congress of the People’s Republic of China and has been executed since January 01, 2003.

(3) Total quantity control of pollutant emission (shorted as total control) means to control under the scope of some amount the total quantity of pollutants at some control area (such as administrative region, river basin, environmental functional area, etc.) which is taken as a complete system so as to meet the environmental quality requirements at the area. Total control shall include the contents in the following three aspects: total amount, area and time of pollutant emission. Total control system means a legal system that the national environmental management authorities decide the total amount of pollutant emission at the area according to the surveyed regional environmental capacity and individually distribute to the companies in the area their own mode of total amount limit of pollutant emission according to the reduction plan of total amount of emission.

(4)Details of the environment management plan is a part constituting the tender document and the construction contract signed between the project owner and project contractor

(5)This project is executed by the World Bank, complying with the environment management plan is specified as one clause in the project agreement and grant agreement between the World Bank and the Chinese government, the environment management plan shall come into legal effect therefore.

Therefore, the project construction unit shall strictly implement environmental pollution

prevention measures, environment risk elimination measures, accident emergency plan, environment supervision plan, regular environment report of environmental impact, environment information discussion plan, environment protection record plan, environment protection supervision plan to maintain the legal effect of environment management plan.

10 EMP Budget

In the second phase of the project, the total cost of environmental management for Konggang will be RMB 14.45 million Yuan (annual expenditure, not cumulative calculation), of which RMB11.15 million Yuan will be funded by the GEF and 3.4 million Yuan will be matched by Konggang (annual expenditure, not cumulative calculation). Among them, there are not only one-time expenditure expenses, such as equipment purchase and purchase fees for upgrading of 2# incinerator flue gas purification system, upgrade and transformation costs of SIS, MIS, DCS, SCADA systems, development costs of account management system, etc., but also annual expenditure expenses, such as monitoring fees, training fees, etc.

Table 10-1 An Overview of the Environmental Management Budget of Konggang at the 2nd Implementation Phase of the Project

S/N	Categories		Contents	Total Cost(Yuan)	GEF Grants(Yuan)	Matching Funds from Konggang	Implementation Duration
1	software and hardware upgrading	Upgrading the Flue Gas Purification System of the 2# Incineration Line, goods supply and installation	Part design, site demolition, equipment supply and installation, commissioning, technical services, training, trial operation and performance assurance of equipment transformation, etc.	6million	6million	0	2018~2019
2		Construction of SIS and MIS Systems and Adding Process Function Charts	Increase production operation monitoring and information management system	1.5million	0	1.5million	2018~2019
3		DCS subsystem: upgrading and transformation of boilers, flue gas and public systems; adding historical databases	Boiler combustion control, flue gas treatment and public system ECS-700 system upgrade and debugging; fly ash curing system access to DCS control; ACC function design and debugging; adding historical database	3.85million	3.85million	0	2018~2019
4		DCS Subsystem: Upgrading and Retrofitting of Steam Turbine Control DEH	Steam Turbine Control DEH System NT6000 V3A Upgrading	0.45million	0.45million	0	2018~2019

		System					
5		DCS Subsystem SCADA upgrading	SCADA System upgrading and transformation, function improvement and debugging;	0.7million	0.7million	0	2018~2019
6	Monitoring Budget		Contract the third party to implement relevant monitoring work following the requirements of Chapter 4 of the EMP	1.5million	——	1.5million annually	by year
7			Comparisons and analysis of pollutants before and after technical renovation in accordance with World Bank requirements	other budget	other budget	——	2018~2019
8	Training Budget			50,000 per year	50,000 per year	100,000 per year	2018~2019
9	Electronic Design of Environmental Account Management		Setting up the whole process of electronic report forms and connecting with Konggang's database to realize the electronic and informationization of company management	0.4million	0	0.4million	2018~2019
10	Sub-total			14.45million	11.05million	3.4million	