SFG2398

GEF-Reduction and Phase-out of PFOS in Priority Sectors in China

Environmental Auditing Report for Hubei Hengxin Chemical Co., Ltd

Foreign Economic Cooperation Office, Ministry of Environmental Protection (FECO)
Hubei Academy of Environmental Sciences (HAES)

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Chapter 1 Overview

1. Introduction

In May 2009, members of the fourth meeting of conferences of the parties on the "Stockholm Convention of Persistent Organic Pollutants (POPs)" (hereinafter referred to as "the Convention") passed an amendment. In the amendment, 9 kinds of POPs are added, including PFOS, its salts, and PFOSF. The PFOS and PFOSF are listed in Annex B. The Convention has also listed in detail 12 "specific exemptions" and 8 "acceptable uses". On August 30, 2013, the Standing Committee of the National People's Congress approved the amendment. On March 26, 2014, the amendment will officially come into force in China.

To meet the requirements of the Stockholm Convention on POPs, the Foreign Economic Cooperation Office (FECO) and World Bank (WB) have developed the "GEF-funded Project for Reduction and Phase-out of PFOS (and its salts) in priority sectors in China". On June 4, 2015, the project obtained the approval from GEF. The PFOS project is to help China fulfill its mandatory obligation in phasing out of PFOS in exempted uses. It will also introduce BAT/BEP of acceptable uses in priority industries. The PFOS project plans to carry out demonstration, replacement, reduction/elimination activities in industries related to PFOS production and application such as hard chrome plating, decorative metal plating, pesticides and fire protection. The project is expected to reduce the production and use of 55-65 tons of PFOSF, and to enhance the ability to control environmental and health risks of chemicals, as well as to improve the supervisory capacity of relevant Chinese regulatory departments and agencies.

Hubei Hengxin Chemical Co., Ltd (hereinafter referred to as "Hubei Hengxin") is China's largest manufacturer of PFOS. Therefore, it is preferentially selected as a demonstration enterprise. In accordance with the requirements of PFOS project, it will prepare to carry out environmental audit. The aim is to ensure the implementation of demonstration projects in China is in line with environmental regulations and WB's environmental policies.

Since there is no environmental audit guidelines issued from the Environmental Protection Authority in China and the World Bank, based on the similar project experience, the Consultant developed the Environmental Audit TOR described in the PFOS Project Environment Management Frame (EMF) Annex II. As the largest producer of the PFOS in China, it is discussed and agreed to implement an independent environmental audit against the Hubei Hengxin Co. Ltd. The audit aims to learn about the enterprise's performance of environmental protection duties and the conformance of its environmental protection work with relevant laws and regulations. The enterprise must provide necessary supports to the consulting agency for the purpose of completing the audit.

2. Auditing basis

The environment-audit is mainly based on the *Environmental Management Framework* and its Annex 4 – *Environmental Auditing Outline*. Relevant regulations and standards are as follows:

1. Solid Waste Pollution Prevention Law of PRC (Revised on April 24, 2015);
2. Environmental Impact Assessment Law of the People's Republic of China, 2003.9.1;

3. Law of PRC on Promotion of Cleaner Production, 2012.7.1;
4. Administrative Regulations on Collection and Use of Pollutant Discharge Fees, 2003.7.1;
5. Regulations on the Safety Control of Dangerous Chemicals (revised on Dec. 7, 2013).
6. Management Regulation on Hazardous Wastes Manifests; 1999.10.1;
7. Administration Measures for Operating Licenses of Hazardous Wastes (State Council Order No. 408), 2013.12.7;
8. The Catalogue for the Guidance on Adjustment of Industrial Structure (Revised edition, 2013), 2013.2.16. In this catalogue, the "newly-build PFOS production equipment are listed as "restricted"; correspondingly, development and application of alternative products and technologies in substitution of PFOS and its salts is listed as "encouraged"; while "coatings containing PFOS" are listed as "obsolete".
9. Administrative Measures for Environmental Monitoring, 2007.9.1;
10. Administrative Measures for Acceptance Inspection of Environmental Protection for Completed Construction Projects, 2010.12.21;
11. Guidelines for Drafting of Environmental Report (HJ617-2011).

3. Overview of Hubei Hengxin Chemical Co., Ltd

Yingcheng Hengxin is a joint venture co-founded by Yingcheng Tianhong Chemical Co., Ltd. and Wuhan Defu Economic Development Co., Ltd in 2004. In the same year, the company initiated its production of organic silicon and organic fluorine products in Yingcheng Industrial Park, which is located in South of Changjing Bridge, Tiyu Road, Yingcheng City. In 2006, Yingcheng Hengxin Chemical Co., Ltd. is renamed Hubei Hengxin Chemical Co., Ltd after joining with Indonesia New Star Chemical Co., Ltd.

Hubei Hengxin Chemical Co., Ltd is located in the provincial industrial park- Yingcheng Economic and Technological Development Zone. The company is a provincial high-tech enterprise specializing in development, production and marketing of perfluoroalkanes products. Its production capacity of organofluorine series is 30 t/a. Its products include perfluorinated alkyl sulfonic acid, perfluorinated alkyl carboxylic acid, perfluorinated tertiary amines and its derivatives. Its products are mainly used in areas such as oil exploration, firefighting, textile finishing, paper waterproofing, pharmaceuticals, pesticides, photographic film, electronics, electroplating, flame retardant, lithium battery production, and historic preservation and photoresist materials. Its products sell to countries like Europe, America, Japan, South Korea and Taiwan.

In addition, Hubei Hengxin Chemical Co., Ltd covers an area of 19819.6m^2, with a building area of 2657.9m^2 and green area of 5820.0m^2. There are 58 employees working for 278 days every year. The company adopts three-shift working system and every shift lasts 7.5 hours.

Table 1 Basic status of the enterprise

Company name	Hubei Hengxin Chemical Co., Ltd.	Place of incorporation	Yingcheng City, Hubei

Production capacity	Production capacity of PFOSF is 30 tons/year.		
Legal representative	Gao Guobao	Registered capital	9 million RMB
Organization chart	As shown in Figure 2.		
Key products	Perfluorinated alkyl sulfonic acid, perfluorinated alkyl carboxylic acid, perfluorinated tertiary amines and its derivatives.		

Main production equipment are listed in Table 2:

Table 2 List of production equipment

No.	Equipment name	Model	Amount	Notes
1	Rectifier	KHS4KA	6 units	Used for electrolytic reaction, located in Plant No.3
2	Rectifier	KHS3KA	8 units	
3	Rectifier	KHS6KA	1 unit	
4	Rectifier	ZDDKS3KA	8 units	
5	Electrolytic tank	500L	23 units	
6	Condenser	15 ㎡	28 units	Used for sulfonation/chlorination/fluoridation reaction, located at Plant No.2
7	Tail-gas purification tower		4 units	
8	Circulating pump	Pumps for tail-gas purification tower	4 units	
9	Freezer	JVSLGF300 III	2 units	
10	Freezer	JZS-KF125C	2 units	
11	Salt-cleaning water pump	IH10080160	11 units	
12	Horizontal double-grate boiler	DZGI-0.7-A II	1 unit	
13	Measuring tank	1L	4 units	
14	Reaction kettle	1000L	5 units	Of which one is used for sulfonation reaction, one for acylation reaction, and one for drying.
15	Reaction kettle	500L	3 units	Of which two units are used for fluorination reaction, one for acyl chloride reaction.
16	A-series centrifugal spray dryer		1 unit	Used for desiccation after sulfonation/chlorination/fluoridation reaction, located at Plant No.2
17	Heat conduction oil tank		3 sets	

No.	Equipment name	Model	Amount	Notes
18	Boiler	1t/h	1 unit	Located in the boiler room. Provides steam for bathe and production process

Figure 1 Plant photos

4. Main auditing content

Based on the Environmental Management Framework of PFOS, environment-audit needs to be conducted against technically reformed enterprises. In accordance with environment-audit requirements specified in Annex 2 (of the Environmental Management Framework), main environment-audit contents are as follows:

1. Implementation of Three Simultaneous System and EIA;
2. Conformity with industrial policies;
3. Implementation of sewage discharge registration, waste discharge permit (if any);
4. Emission behavior of key pollutants and specific pollutants;
5. Stable operation of environmental protection facilities and automatic monitoring equipment (if any);
6. Implementation of Cleaner Production (if any);
7. Pollution control of hazardous chemicals and registration of prohibited substances and new chemicals (if any);
8. Disposal of hazardous wastes and general industrial solid wastes (if any);
9. Implementation of ecological protection measures (if any);
10. Impacts on environmental sensitive areas such as drinking water source (if any);
11. Environmental risks, contingency plans and environmental incidents (if any);

Institutional arrangement is shown as below:

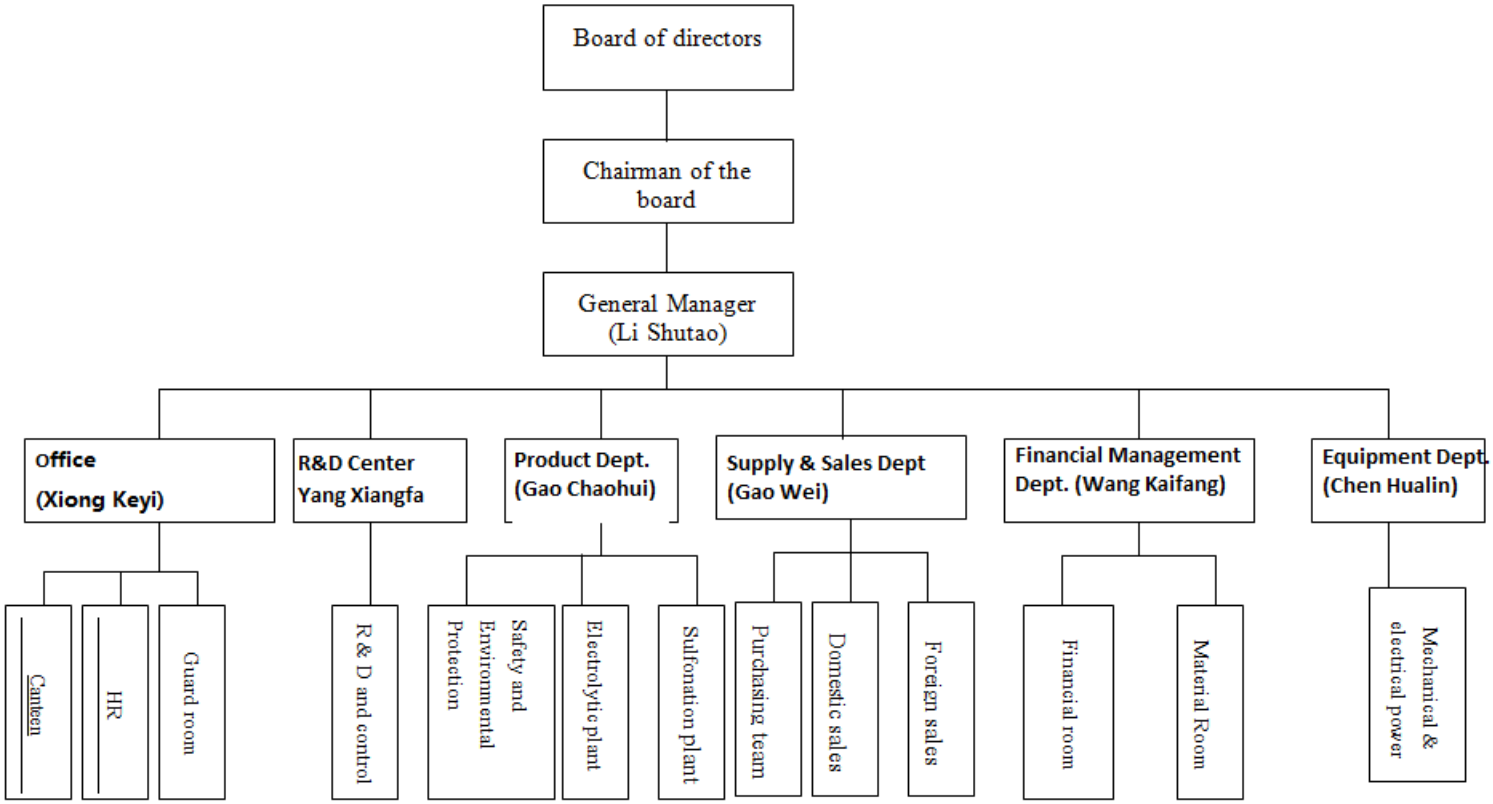


Figure 2 Organizational chart of Hubei Hengxin

5. Auditing time

In accordance with the environmental audit requirements of listed companies, the audit covers 36 consecutive months, dating back from the 6th month before the environmental protection department accepts the application. The environmental audit work of Hubei Hengxin Chemical Co., Ltd starts form January 1, 2013 to December 31, 2015, covering items such as pollution discharge registration, waste discharge permit and sewage fees.

6. Applied standard

In accordance with *Notice of the General Office of the People's Government on forwarding the Functional Category of Surface Water Environment by Provincial Environment Protection Administration* ([2000] No.10), and *Letter on Environmental Impact Assessment Standards and Total Pollutant Discharge Control Indicators for Hubei Hengxin Chemical Co., Ltd. with a Capacity of 30t/a Organic Fluorine Products* (No. 35 [2007] issued by EPA of Yingcheng City, the execution standards are as follows:

Table 3 Emission standards and environmental quality standards

CATEGORY		Standard No. and name	CATEGORY	Pollutant concentration limits		
				Name	Value-getting time	Secondary standard
Environmental quality standards	Ambient air	GB3095-1996 Ambient Air Quality Standard and its amendments	Category II	Sulfur dioxide (SO2)	Annual average	≤0.06mg/m^3
					Daily average	≤0.15g/m^3
					1 hour average	≤0.50mg/m^3
				NO_2	Annual average	≤0.08mg/m^3
					Daily average	≤0.12mg/m^3
					1 hour average	≤0.24mg/m^3
				TSP	Annual average	≤0.20mg/m^3
					Daily average	≤0.30mg/m^3
				Fluoride	Daily average	≤7mg/m^3
					1 hour average	≤20mg/m^3
	Surface water environment	GB3838-2002 Environmental Quality Standard for Surface Water	Category Ⅲ	COD_{cr}	≤20mg/L	
				Chloride	≤250mg/L	
				PH	6~9	
				NH_3-N	≤1.0mg/L	
				Fluoride	≤1.0mg/L	

CATEGORY		Standard No. and name	CATEGORY	Pollutant concentration limits		
				Name	Value-getting time	Secondary standard
				Volatile phenol	≤0.005mg/L	
	Acoustic environment	GB3096-93 Standard of Environmental Noise of Urban Area	Category II	Name	Category II standard	
				Equivalent sound level-Leq (A)	Day and night ≤60dB (A)	
					Night ≤50dB (A)	
Emission standards	Waste gas	GB16297-1996 Integrated Emission Standard for Air Pollutants	Table 2 Category II	Hydrogen chloride, hydrogen fluoride	Concentration limit of hydrogen chloride at fugitive emission monitoring point: 0.20 9mg / m3; Concentration limit of hydrogen fluoride at fugitive emission monitoring point: 20ug / m3	
		GB13271-2014 Emission Standard of Air Pollutants for Boilers	Category-II area and Category-II period	Soot & dust, SO2, NOx	Gas boiler: Soot & dust: 50 mg / m3, SO2: 100mg / m3; NOx400mg/m^3	
	Wastewater	GB8978-1996 Integrated Water Discharge Standard	Table 4 Category I	PH, CODCr, ammonia, fluoride	PH: 6 ~ 9; CODCr: 100mg / L; ammonia: 15mg / L; Fluoride: 10mg/L	
		DB42 / 168-1999 Chloride Discharge Standards for River in Hubei Province	Table 1 Category II in chemical industry	Chloride	300 mg/L for dry season, 400 mg/L for wet season	
	Acoustic noise	GB12348-90 Standard for Noise at Boundary of Industrial Enterprises	Category III	Continuous A-weighted sound level	Day-time: 60dB (A); Night-time: 55dB（A）	

Chapter 2 Environmental sensitive areas & environmental functional zoning

1. Environmental sensitive areas

Yingcheng City mainly has four rivers: Yunshui River, Zhang River, Dafushui River and Hanbei River. These rivers are tributary of Hanshui river system in Yangtze River. In 1959, Yunshui River is made as an independent river system straight into Yangtze River after its improvement. In 1969, the excavation of Hanbei River includes Dafushui River into the Hanbei River system. The length of Dafushui River in Yingcheng City is 65km. Its runoff area is 384km^2 and foreign water volume is 3.112 billion. The number of brook more than 5km long is 14, totaling a length of 201km in Yingcheng City. In addition to Dafushui River, Yingcheng City also has Salt River and Laoxian River. Salt River is an agricultural irrigation canal. Due to heavy salt pollution, it is called Salt River. Salt River originates from Duangang Reservoir. It flows from north to south into Laoxian River and then flows into the Hanbei River. Laoxian River is a part of the Dafushui River (the section from Chengguan to the North of Hanbei River) before river migration. After the curving cut-off of Dafushui, the front end of Laoxian River has been silted up. Receiving domestic sewage from the urban region and salt chemical sewage with high degree of chloridion, Laoxian River has become a wastewater canal substantially. The reach from Ruanjiawan to Lvjiawan is about 7.8 km. Laoxian River flows into Dafushui through the right-angled stream artificially excavated in Yujia Floodgate, which is located downstream from central downtown region. Yujia Floodgate is open all the year round, as Laoxian River has been out of agricultural irrigation function. Currently, Yujia Floodgate has become the major sewage draining exit of Yingcheng City.

The company locates at 1 Changjing Avenue in Yingcheng Industrial Park, adjacent to Yanshui River to the east with farmlands across the river, to Guangming Reclaimed Rubber Factory to the south, to Tiyuchang Road to the west with residential area across the road, and to Beimei Industrial Park to the north. Sewage water from this plant flows into Salt River and goes into Dafushui by going through Laoxian River, passing Hanbei River and finally flowing into the Yangtze River.

Figure3. Geographical location and surrounding of Hengxin

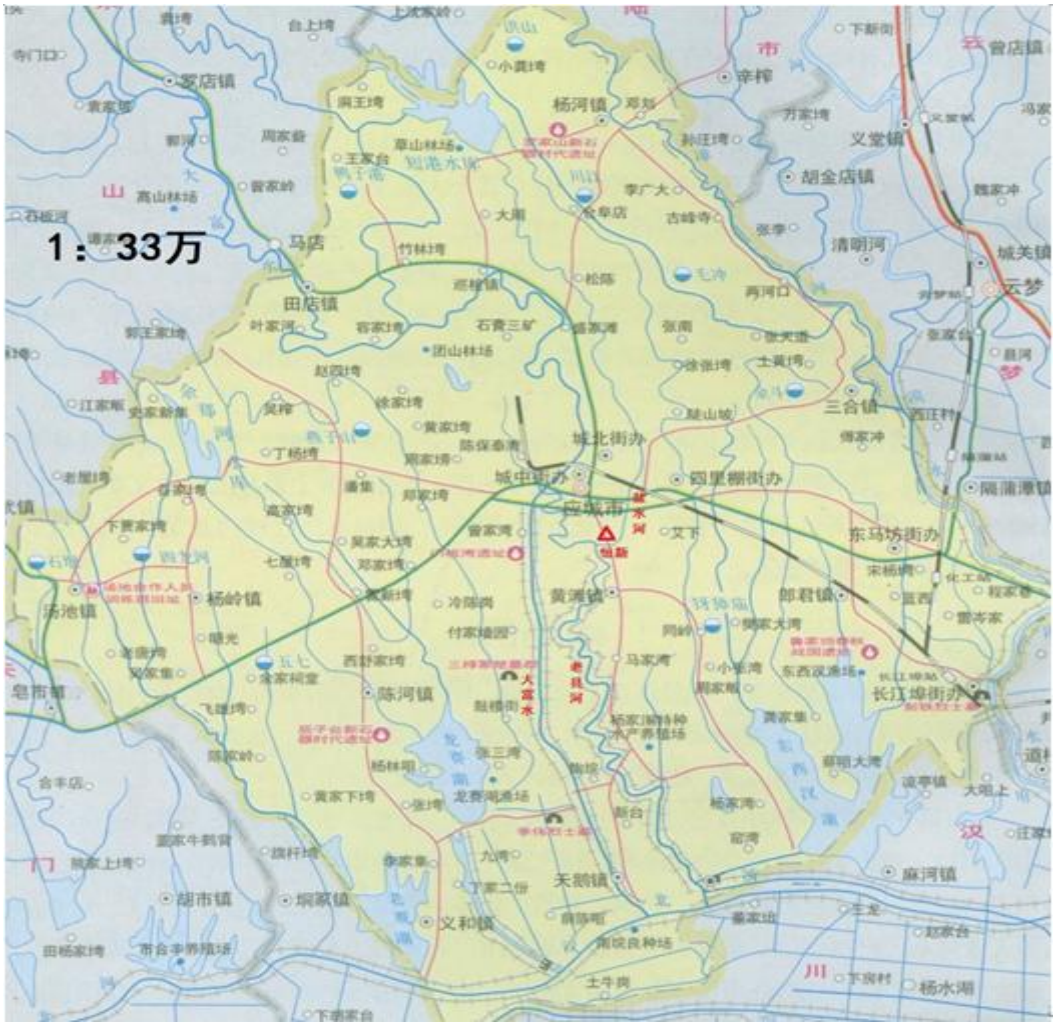


Figure4. Urban region and drainage map of Yingcheng City where Hengxin is located

(1)Environmental protection goals of surface water: Sewage water from this plant flows

into Salt River and goes into Dafushui by going through Laoxian River, passing Hanbei River and finally flowing into the Yangtze River. Therefore, quality of Salt River, which is the direct receptor of water discharged by this plant, shall meet the Category-III standard in GB3838-2002 Environmental Quality Standard for Surface Water;

(2)Environmental protection goals of ambient air: The ambient air quality shall meet the requirement in GB3095-2012 Ambient Air Quality Standard and its Category-II standard of its amendments;

(3)Environmental protection goals of acoustic environment: Acoustic environmental quality shall meet Category-II standards of GB3096-2008 *Environmental Quality Standard for Noise*.

Environmental sensitive spots around the project site are shown in Table 4:

Table 4 List of environmental sensitive spots around project site

Items	Sensitive spots	Position	Distance from the enterprise boundary	Protection class	Scale
Ambient air	Resident	W	50~100m	GB3095-1996, Category-II	About 10 households, 40 people
	Resident	SE	400~500m		About 20 households, 80 people
Surface water	Salt River	E	10m	GB3838-2002, Category-III	

2. Environmental functional zoning

In accordance with *Notice of the General Office of the People's Government on forwarding the Functional Category of Surface Water Environment by Provincial Environment Protection Administration* ([2000] No.10), and *Letter on Environmental Impact Assessment Standards and Total Pollutant Discharge Control Indicators for Hubei Hengxin Chemical Co., Ltd. with a Capacity of 30t/a Organic Fluorine Products* (No. 35 [2007] issued by EPA of Yingcheng City, the environmental functional zoning of the project site are shown in Table 5:

Table 5 Environmental function zoning of project site

Environmental factors	Regions and scopes	Functional categories
Ambient air	Yingcheng Industrial Park	Category-II area
Surface water	Dafushui River	Category-III water
Ambient noise	Yingcheng Industrial Park	Category-II area

3. General layout of the plant site

The general layout of Hubei Hengxin is shown in Figure5.

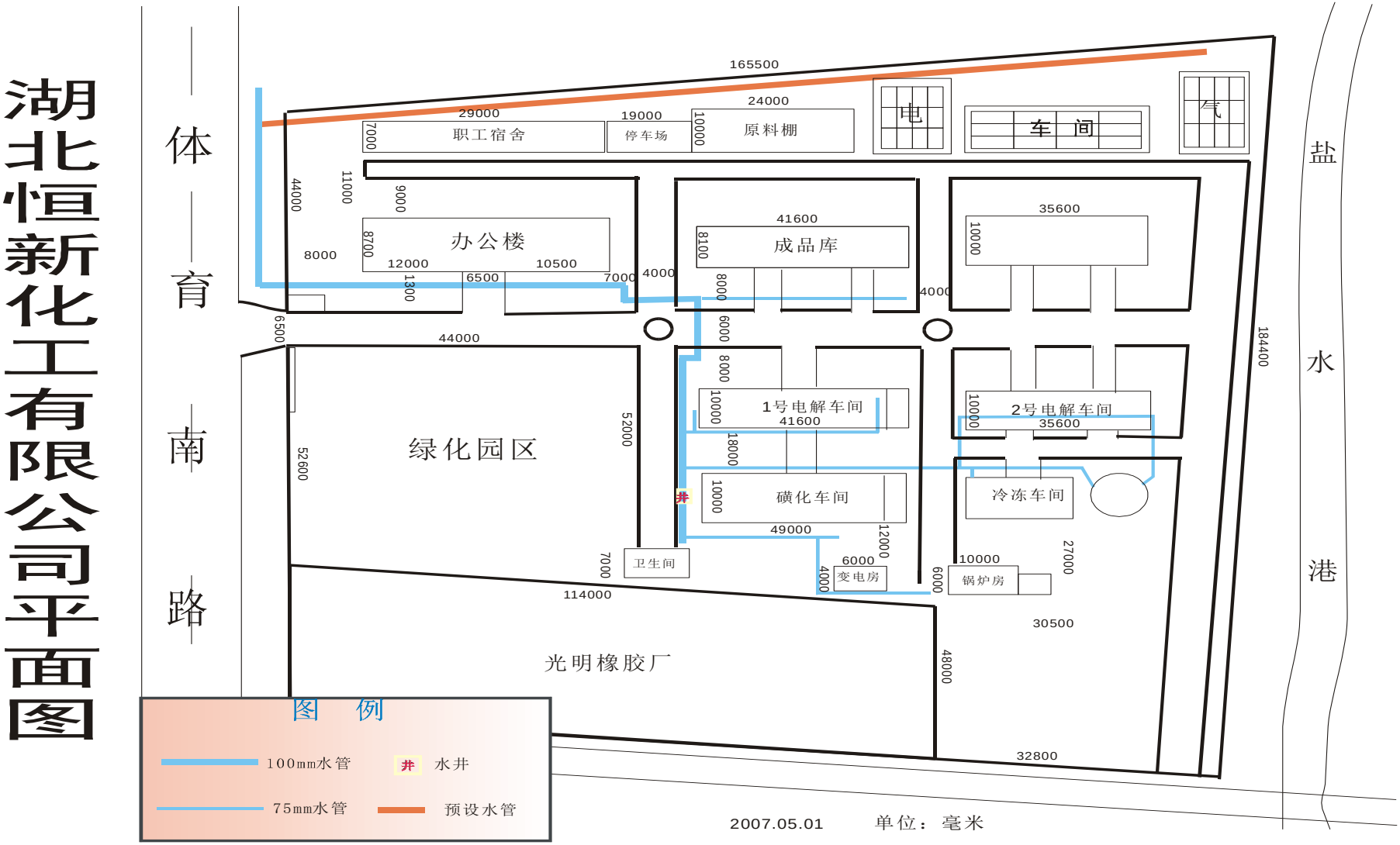


Figure5 General Layout of Hubei Hengxin

Chapter 3 Project overview

1. Project brief

The constructed projects are divided into main works, public works, environmental-protection works, and office and living facilities. See details in Table 6.

Table 6 List of constructed projects

No.	Project categories	Production shop/project name	Main contents
1	Main works	Production shops	4 production shops
			1 repair shop
			1 warehouse
2	Public works	Supply and drainage system	1 water supply pipe of Yingcheng City: Pipe diameter is DN108mm. 12 water supply pipes in the plant: pipe diameter is DN57-108mm, and water pressure is 0.2Mpa.
			The drainage system: a system diverting clean water from sewage water and a system diverting rainwater from sewage water. Quantity of domestic sewage is 2551 m3 /a; and quantity of industrial wastewater is 208 m3 / a. After treatment, the water will be discharged to Salt River, then flows into Dafushui River, and finally flows into the Yangtsze River through the Han River system.
		Circulating water system	Tap water is used for cooling and reflows during the distillation process. The volume of circulation water is 15 m3/h, and cooling time is 7200 hours; the volume of circulation water in cooling unit is 250 m3/h, and usage time is 4800 hours; the volume of circulating water in vacuum pump is 3 m3/h, and usage time is 300 hours/year.
		Boiler heating system	A 1t / h boiler is adopted to provide steam, using natural gas as energy.
		Power supply system	A 10kV power line of Yingcheng Electric Power Company is used. The supply capacity is 333 kVA, and power consumption is 5.4 × 106kW·h/year.
3	Environmental-protection works	Exhaust treatment system	The exhaust gas goes through a spray tower before fugitive emission. The hydrogen chloride and fluoride are tested out of the plant boundary. The coal-fired boilers are changed into gas-fired boiler. Tests of SO_2, NO_x and dust are conducted in the sampling port of chimney flue.
		Wastewater treatment system	The washing wastewater is neutralized and deposited before being discharged into sewage pipe network along with sanitary waste. Wastewater treatment plant of Yingcheng City: The handling capacity of this plant is designed to be 30000m^3 per day. The sewage treatment equipment has maintained good performance since January, 2009, with an average daily sewage treatment capacity of 32100 m^3. The oxidation ditch treatment process has been adopted in this project and the sewage water quality after the

No.	Project categories	Production shop/project name	Main contents
			treatment reaches B-level discharge standard specified by *Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant* (GB18918-2002). The pollutants discharge of this wastewater treatment plant during the audit period is within the limits.
		Solid waste treatment	The domestic waste of the plant shall be periodically handled by the sanitation department. The distillation residue (rectification residue) and precipitate CaF2 shall be transferred to Yichang Hazardous Wastes Treatment Center (there is no qualified hazardous waste treatment center in Wuhan City)_.
4	Office	Office	Total construction area of office building is 504.2 ㎡
5		Living facilities	Total construction area of the canteen is 201.6 ㎡

2. Production process

Production process of PFOS:

(1) Sulfonation: First, use a metering pump to put water into the sulfonation reactor. Then, use a vacuum pump to put bromooctane and sodium sulfite into to the sulfonation reactor. Meanwhile, add water and ethanol, and control the reaction temperature at about 80 ℃. Next, use a condenser for reflux condensation and stirring. The reaction time is 24 hours. After that, use distillation method to recycle the solvent. Then, collect the solvent into the gauging tank in 100℃. The distillation time is 6 hours. After reaction, the material in reactor shall be delivered to a dryer. The drying time is 14 hours and drying temperature is 120°C. The dried product-sulphonated saltmixture-shall be used for the next procedure-chlorination. The reactions in the reactor are as follows:

$$C_8H_{17}Br + Na2SO_3 \rightarrow C_8H_{17}SO_3Na + NaBr$$

Bromooctane Sodium sulfite Octyl sodium sulfonate Natrium bromide

The conversion rate of bromooctane is 98%.

(2) Acyl chlorination： The phosphorus oxychloride and sulphonated saltmixture shall be put into the reactor by vacuum pump. The reaction temperature is about 75 ℃, and the reaction time is about 5 hours. Then, slowly add water to stir the reaction mixture for approximately 5 hours.After reaction, let stand for 3-4 hours for stratification. The lower part -wastewater-shall be discharged into sewage treatment station before final emission. The upper part shall be pumped into metering tank. The reactions in this reactor are as follows:

$$3C_8H_{17}SO_3Na + 2POCl_3 + 3H_2O \rightarrow 3C_8H_{17}SO_2Cl + 3HCl + Na_2HPO_4 + NaH_2PO_4$$

Octyl sodium sulfonate Phosphorus oxychloride Water Octanesulfonyl chloride Hydrogen chloride Sodium hydrogen phosphate Sodium Dihydrogen Phosphate

Conversion rate of C8H17SO3Na is 95%.

(3) Fluorination: The potassium fluoride and octanesulfonyl chloride are put into the fluorination reactor by vacuum pump. The reaction temperature is about 80℃. The reaction time is 4-5 hours. Add gauged water to stir the reaction for 1 hour. Let stand for 4 hours for stratification. The lower part (wastewater) will be put into the sewage

treatment station before emission. The upper product is pumped to a distillation kettle. The control temperature for heat transfer fluid is 120 ℃. The distillation time is 4 hours. The reactions in this reactor are as follows:

$$C_8H_{17}SO_2Cl + KF \rightarrow C_8H_{17}SO_2F + KCl$$

Octanesulfonyl chloride Potassium fluoride Potassium Fluoride Potassium chloride

Conversion rate of octanesulfonyl chloride is 95%.

(4) Electrolyzation: Use frozen brine to keep the electrolyzation temperature at -40 ℃. Put gauged hydrofluoric acid and nitrogen into the electrolytic tank. Use nitrogen gas as shield gas. Use rectifier to supply power for the polar plate of the electrolytic tank. Then, put gauged C8H17SO2F into the electrolytic tank. The electrolyzation time is about 48 hours. When current drops, the chemical $C_8H_{17}SO_2F$ need to be added to control the current. After electrolyzation, let stand for 1-2 hours. The crude product will flow into the trough under the impact of gravity. Iron plate will be used as negative pole, and nickel plate will be used as an positive electrode. The chemical reactions occurring during the electrolytic process are as follows:

Octyl sulfonyl fluoride Hydrofluoric acid PFOSF

$$C_8H_{17}SO_2F + 17.1HF \rightarrow 0.7C_8F_{17}SO_2F + 0.1C_{10}F_{21}SO_2F + 0.1C_6F_{13}SO_2F + 0.1C_4F_9SO_2F + 0.05C_8F_{18} + 17H_2\uparrow$$

Hydrogen

Conversion rate of octyl sulfonyl fluoride is 97%.

(5) Distillation: The receiving tank is filled with water to form a seal. The products will flow automatically to the receiving tank for cleaning. The water quantity for each batch of cleaning is 0.1 m^3. The cleaning time is 12 hours. After cleaning, let stand for stratification. Put crude products into the heat-conduction oil tank for distillation. Control the temperature by heat-conduction oil tank. Under 100 ℃, get the front cut fraction. The duration is 4 hours; then rise to 110 ℃ to get the product. The duration is 2 hours. As required, the final product will be packaged into 25kg/barrel, 50 kg/barrel or 200 kg/barrel.

The front cut fraction will undergo deep processing at room temperature. The front cut fraction from rectification will be put into a reactor, which is dedicated to deep processing. The admixture (by-product) obtained will be added with perfluoro surfactant to get the final product. The process is shown in Figure 3.

The maximum production capacity per batch is 100kg. The production time for each batch is about 136 hours. The electrolysis can be carried out in three batches simultaneously. Hence, the production time can be guaranteed.

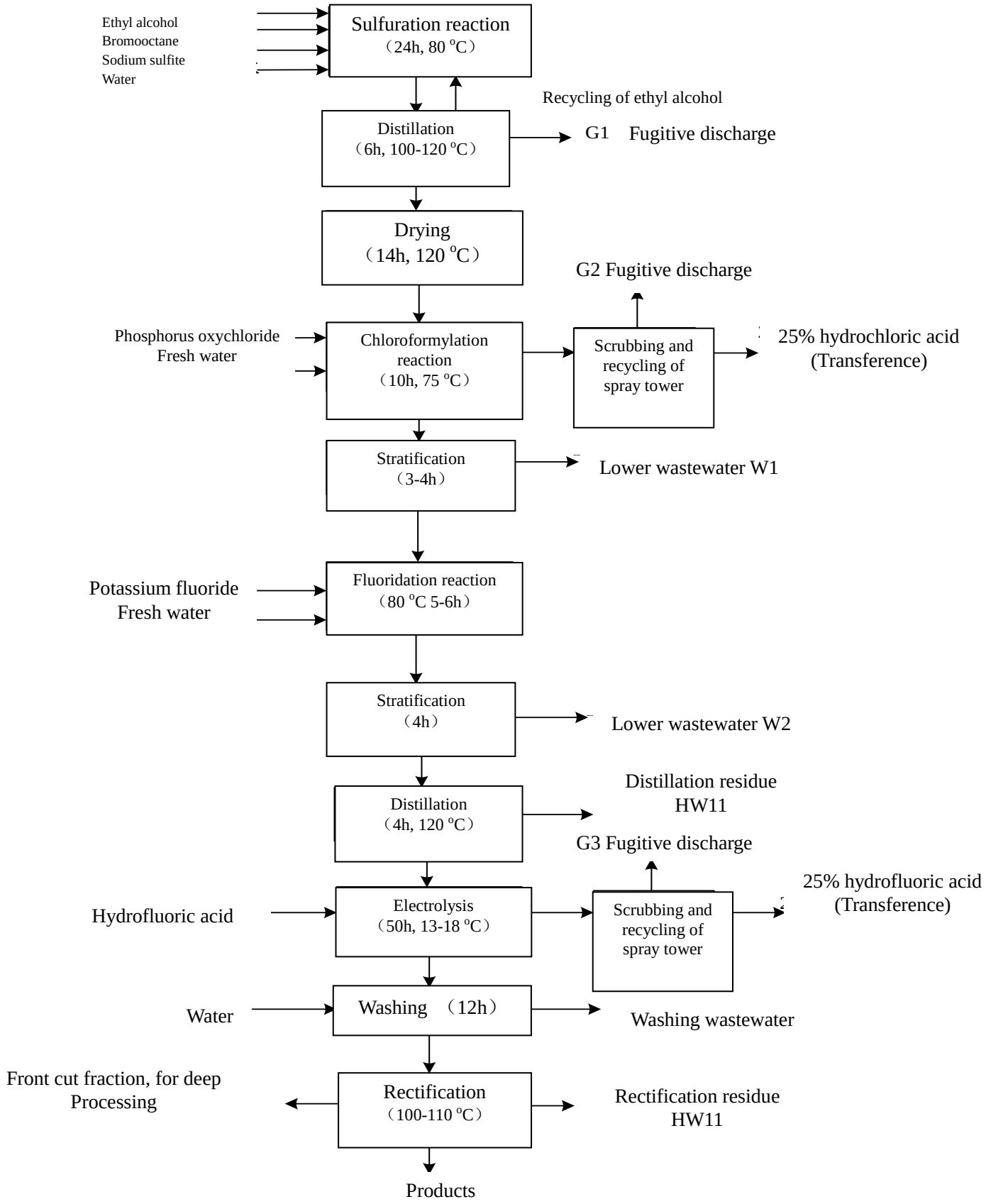


Figure 6. Production process & products

Figure 7 No.1 workshop and hydrogen chloride absorption tower

Figure 8 Electrolytic workshop

Figure 9 Condensing workshop and condensed water circulation system

Figure 10 Distillation workshop

3. Raw materials and products

The project's product solutions are listed in Table 7. Hengxin's output in 2015 exceeded the limit, i.e. 30t/a, specified in the *Reply of EIA*. So, Hengxin shall control its output below the limit or apply to local EPB for reconstruction or expansion, depending on market needs and its own productivity.

Table 7 List of product solutions

No.	Product name	Annual output			Executive standard
		2013	2014	2015	
1	PFOSF	25920kg	23262kg	36428kg	Q/YH01-2005
4	products of fluorocarbon	4086kg	3148kg	3172kg	

The raw/auxiliary materials and storage methods are shown in Table 8:

Table 8 List of raw/auxiliary materials

Materials	Usage (t/a)	Consumption quota(kg / tonne of product)	Remarks (origin, ingredients, storage methods, etc.)

Materials	Usage (t/a)	Consumption quota(kg / tonne of product)	Remarks (origin, ingredients, storage methods, etc.)
Bromooctane	17.1	570	≥98%, outsourcing, iron drum-200kg / barrel
Sodium sulfite	11.2	374	≥98%, outsourcing, bagged-25kg / bag
Nitrogen	0.24	8	≥98%, outsourcing, bottled-340kg / bottle
Hydrofluoric acid	32.7	1090	≥99.5%, outsourcing, in HF storage tank placed in ambient temperature
Phosphorus oxychloride	8.6	287	≥98.5%, outsourcing, plastic barrel-200kg / barrel
Potassium hydroxide	4.6	153.3	≥96%, outsourcing, bagged-25kg / bag
Ethanol	1.9	300	≥99%, outsourcing, in sealed plastic bucket, placed in shade to avoid direct sunlight.
Water	21456	325.3	Running water
Electricity	5.4×10^{6}kw·h	1.8×10^{5}	Supplied by Yingcheng Power Supply Company

4. Main pollutant-producing sections & pollution treatment

According to final acceptance inspection report of environmental protection monitoring station of Yingcheng City (HY[2005] No.B01) and Retrospective Evaluation Report of the 30t/a Organic Fluorine Products Project of Hubei Hengxin Chemical Co., Ltd and the replies (X.H.H [2008] No.19), the practical implementation of pollution treatment measures for the project are shown in Table 9.

Table 9 Major pollution sources and implementation of pollution prevention measures

Pollution sources	Treatment measures proposed in EIA	Actual implementation and effects	Audit comments
Industrial wastewater	Industrial wastewater will be used as circulating water of the chiller after neutralization	Constructed, and water recycling has been achieved.	Reasonable
Washing wastewater	By adding Ca (OH) 2 and flocculants, wastewater will be used for washing , after which the water will enter into the municipal pipe network	Constructed, and up-to-standard discharge has been achieved.	Reasonable
Domestic sewage	A biological treatment system will be adopted for treatment of domestic sewage.	Not constructed yet, and the water flows into the municipal pipe network directly.	As the survival of biological bacteria will be affected by hydrogen fluoride, which makes it inappropriate to construct biological wastewater treatment

			system. What's more, the business scale of this enterprise is not large and the discharge of sewage has met with the standard. Thus, it is not recommended in this audit to construct any biological wastewater treatment system.
Rain water	Sewage pipes to separate rain & polluted water will be constructed.	Separation of rain & polluted water has been achieved.	Reasonable
Hydrogen chloride waste gas	Use spray tower to wash before emission.	Constructed, the hydrogen chloride recycling efficiency is greater than 99%	Reasonable
Hydrogen fluoride waste gas	Use three-layer spray tower to wash before emission.	Constructed, the treatment efficiency is greater than 99%	Reasonable
Exhaust gas of the boiler	Switch to gas-fired boiler by using natural gas as fuel	Constructed, and up-to-standard discharge has been achieved.	Reasonable
Factory boundary noise	(1) The boiler will be installed in a private boiler room. (2) Low-noise cooling tower will be used. (3) Soundproofing doors and windows will be used. (4) Doors and windows will be closed during production at night.	Soundproofing doors and windows are not installed and low-acoustic noise cooling tower has not been adopted. Acoustic noises produced may go beyond the limit when production is arranged in the night.	As founded during the site inspection, acoustic noise produced by cooler units is high and it is recommended to construct soundproofing doors and windows or to use low-noise cooling towers in accordance with the original environmental assessment requirements.
Distillation residues	After acid chloride reaction, the front cut fraction in distillation will be transferred; after electrolysis process, the front cut fraction in distillation will undergo deep processing for sale.	Distillation residues are temporarily stacked at the storage yard of hazardous wastes.	The storage yard of hazardous wastes is not installed in a standardized way. For example, impervious separated regions are not arranged in the storage yard, hazardous wastes are not strictly separated from other wastes, warning marks and graphical signs for environmental protection are not made in accordance with GB15562.2. There are high risks associated with the storage yard and the enterprise needs to enhance standardized management accordingly.
CaF_2	For road filling of the plant site	According to the hazardous wastes identification criteria, CaF2 residues with category code of HW49 are transferred to Yichang concentrated hazardous	Reasonable

		wastes treatment center for treatment and there are no signs of landfilling. Besides, there are still 40 tons of CaF2 having not been transferred due to the denial of Yichang concentrated hazardous wastes treatment center. Currently, Yingcheng environmental protection agency is trying to find a solution	
Household refuse	Gathered and delivered to the Yingcheng household refuse treatment plant by the environmental protection agency uniformly	Taken, and details of this waste yard can be found in Table 2.1.	Reasonable
Fire	A 250m³-emergency fire pond needs to be installed.	Recycling water pond is also used as the emergency fire pond. fire hydrants are installed at the doors of every workshop and relevant buildings, meeting water needs of fire protection. The pond is 1000m^3	Reasonable
Invalidation of wastewater treatment station	Emergency fire pond (with the size of 22 m^3 at least) needs to be arranged.	The original emergency fire pond is changed into a 250m^3emergency pond in the wastewater treatment station, with pipes connected with sulfonation and electrolysis workshops. Standards required are met with.	Reasonable
Plant greening	To plant trees and grasses	Taken	Water demand for afforestation is huge (8730m^3 per year) and one alternative option is to implement greening management by using scientific technologies to save water.

Chapter 4 Contents of environmental audit

1. Implementation of “Three Simultaneous System” and EIA

Yingcheng Hengxin Chemical Co., Ltd. is a joint venture co-founded by Yingcheng Tianhong Chemical Co., Ltd. and Wuhan Defu Economic Development Co., Ltd in 2004. In the same year, the company initiated its production of organic silicon and organic fluorine products in Yingcheng Industrial Park, which is located in South of Changjing Bridge, Tiyu Road, Yingcheng City. In April 2004, Yingcheng Hengxin Chemical Co., Ltd. entrusted Wuhan Environmental Protection Science Research Institute to prepare the Environmental Impact Statement for Organic Silicon and Organic Fluorine Products Project of Yingcheng Hengxin Chemical Co., Ltd. In the same year, the environmental protection agency approved the statement. In July 2005, the project passed final acceptance. The company did not install silicone manufacturing equipment. The main products of the company are organofluorine series. Its annual production capacity of PFOSF is 30 tons.

In September 2007, the company commissioned Hubei Junbang Environmental Technology Ltd to prepare Retrospective Evaluation Report of the 30t/a Organic Fluorine Products Project of Hubei Hengxin Chemical Co., Ltd (See Annex 1-1). In March 2008, the report got the approval of Yingcheng Environmental Protection Agency (See Annex 2-3:X.H.H [2008] No.19) (See Annex 1-3). In March, 2009, the company passed the environmental protection acceptance check (See Annex 2-5: X.H.H [2009] No.34 (See Annex 1-5).

See Table 10 for implementation of three simultaneous system and EIA

Following the review comments for environmental acceptance check of the 30t/a Organic Fluorine Products Project, the project conducted the following work: (1) Standardized the eco-label at the sewage outfall; (2) Monitored the water pH; entrusted Yingcheng monitoring station to carry out the supervisory monitoring twice a year. The monitoring indicators meet the standards.

However, the output of PFOSF at Hubei Hengxin in 2015 exceeds 30 tons, which is the approval limit for EIA.

Table 10 Environmental approval documents

No.	Location	Company name	Project name	Nature	Project content	Start/end time of construction	EIA document type	EIA			Environmental protection acceptance check		
								Approval Unit	Approval date	Approval No.	Approval Unit	Approval date	Approval No.
1	Yingcheng City, Hubei	Hubei Hengxin Chemical Co., Ltd.	Environmental impact statement for silicone products and organic fluorine project of Hubei Hengxing Chemical Co., Ltd.	New-built	Scale of production: fluorine-20 ton/year, silicon-250 ton/ year	2003 to 2005	Report form	Yingcheng Municipal Environmental Protection Bureau	2004.2	Replied	Yingcheng Municipal Environmental Protection Bureau	2005.7	H.Y. [2005] No. B01
2	Yingcheng City, Hubei	Hubei Hengxin Chemical Co., Ltd.	Retrospective evaluation report for 30 t/a organofluorine project of Hubei Hengxin Chemical Co., Ltd	Reconstruction	30 t/a PFOSF	2003 to 2005	Report	Xiaogan EPA	2008.3	X.H.H [2008] No. 19	Xiaogan EPA	2009.3	X.H.H [2009] No. 34

2. Compliance of industrial policies

In the construction period ** of production line, the products of this project is listed as "permit category', in accordance with Decision of State Council on Releasing Interim Provisions for Promoting Industrial Restructuring (G.F [2005] No. 40) and Guidance Directory for Adjustment of Industrial Structures-2011(amended in 2013).

However, the Standing Committee of the National People's Congress approved On Amendment of Annex A, Annex B and Annex C Associated with 9 Kinds of POPs Stated in Stockholm Convention and Notice on Entry into Force of Amendments to Annex A Associated with Newly-Added Endosulfan (Notice of the Ministry of Environmental Protection, No.21, March 25, 2014.) The amendment came into force on March 26, 2014. On March 25, 2019, the specific exemption will expire. China should phase-out 6 kinds of PFOS of specific exemptions before the end of specific exemption date. Besides, China should gradually develop BAT/BEP for 7 kinds of PFOS in PFOS industries of acceptable uses. Therefore, the products in this project are required to be phased-out in a specified time limit. .

3. Implementation of emission declaration, emission permit and sewage charges payment

3.1 Implementation of emission declaration

Documents for emission declaration of Hubei Hengxin Chemical Co., Ltd. are complete. The sampling is shown in Annex 2-1.

3.2 Implementation of emission permits

The term of validity for emission permit (see Annex 2-2, Annex 2-3 and Annex 2-4) is April 16, 2012-April 15, 2015, April 16, 2015-April 15, 2016 and April 16, 2016--April 15, 2017. The implementation of emission permit is shown in Table 11.

However, in the emission permit, there are no control requirements for emission of specific pollutants.

Table 11 Implementation of emission permits

Year			2013	2014	2015
License name			Emission permit of Hubei Province		
License No.			K.Y.0900007		
Issued by:			Yingcheng Municipal Environmental Protection Bureau		
Contents and status	SO_2	License quantity, t/a	0.5	0.5	0.5
		Emission quantity , t/a	0.144	0.144	0.144

Year			2013	2014	2015
		License quantity - emission quantity, t/a	0.356	0.356	0.356
	NOx	License quantity, t/a	1.42	1.42	1.42
		Emission quantity , t/a	0.828	0.828	0.828
		License quantity - emission quantity, t/a	0.592	0.592	0.592
	Dust	License quantity, t/a	0.19	0.19	0.19
		Emissions, t/a	0.0216	0.0216	0.0216
		License quantity - emission quantity, t/a	0.1684	0.1684	0.1684
	COD	License quantity, t/a	0.12	0.12	0.12
		Emissions, t/a	0.11	0.11	0.11
		License quantity - emission quantity, t/a	0.01	0.01	0.01
	Ammonia	License quantity, t/a	0.04	0.04	0.04
		Emission quantity, t/a	0.008	0.008	0.010
		License quantity - emission quantity, t/a	0.032	0.032	0.03

3.3 Implementation of sewage charges payment

In accordance with payment notices and payment invoices of Hubei Hengxin issued by Yingcheng Environmental Protection Agency, the company's timely payment of serwage charges is in full amount during the production period.

Table 12 Payment of sewage charges

Year	Payment notice			Paid contribution (yuan)	Collection agencies of sewage charges
	Time interval	Code	Amount payable		
2013	January to December	H.J.F.H.Z [2013] No. 322	20000	20000	Yingcheng Municipal Environmental Protection Bureau
2014	January to December	Invoices found, payment notice not found	-	20000	Yingcheng Municipal Environmental Protection Bureau
2015	January to June	H.J.F.H.Z [2015] No. 315	10000	10000	Yingcheng Municipal Environmental Protection Bureau
	July to December	H.J.F.H.Z [2015] No. 343	10000	10000	Yingcheng Municipal Environmental Protection Bureau

4. Specific pollutants and their emission & treatment

4.1 Pollutant sources and pollution treatment

According to final acceptance report of Yingcheng Environmental Monitor Station (HY[2005] No.B01) and Retrospective Evaluation Report of the 30t/a Organic Fluorine Products Project of Hubei Hengxin Chemical Co., Ltd and its relevant approval (X.H.H [2008] No.19), the practical implementation of pollution treatment measures for the project are shown in Table 9 (Annex 5- Operation Log of Sewage Treatment Station), including discharge standards, up-to-standard discharge assessment and analysis of key pollutants.

4.2 Discharge monitoring

According to the routine monitoring data got by Yingcheng Environmental Protection Monitoring Station (for sampling, see Annex 3), the emission behavior of Hubei Hengxin within the audit period is shown in Table 13. Judging from the statistical results in Table 13, the emission behavior of major pollutants during the verification period meets the emission standards. But:

(1) The company's monitoring frequency of pollutants is only two times, failing to reach 4 as required in EIA (Retrospective Evaluation Report of the 30t/a Organic Fluorine Products Project of Hubei Hengxin Chemical Co., Ltd);

(2) The indicator of fluoride in wastewater has not been got due to lack of monitoring capacity of Yingcheng Environmental Monitor Station;

(3) The monitoring of indicators for plant-boundary fugitive emissions-hydrogen chloride and hydrogen fluoride gas-has not been carried out as required by EIA;

(4) The number of monitoring sites for plant-boundary noise did not reach 8 as required by EIA;

The specific pollutants for Hubei Hengxin Chemical Co., Ltd refer to perfluorinated compounds-PFOS and PFOA, in accordance with Reply on Entrusted Monitoring of Specific Pollutants of Hubei Hengxin Chemical Co., Ltd. Perfluorinated compounds are listed items in Amendments of 9 kinds of POPs in Stockholm Convention. The Stockholm Convention comes into force in August 30, 2013. However, there are no national environmental quality standards, emission standards and technical specification for testing for such specific pollutants. Due to this reason, this specific pollutant was not monitored.

Table 13 Summary of emission behavior of key pollutants

Audit item :Hubei Hengxin							
Year	Pollutant sources	Pollutants	No. of emission standards executed	Limit of emission standards	Monitoring values	Emission behavior	Source
Emission behavior of water pollutant							
2013	Main outfall(namely, sewage treatment plant's outfall)	COD_{cr}	GB8978-1996 Integrated Water Discharge Standard-Category I	100mg/L	212-51.6	Pass	2013 Yingcheng Environmental Protection Monitoring Station (No.: Y.H.J.Z (2013) No. WY2013-017, Y.H.J.Z (2013) No. WY2013-070, two monitoring reports)
		Fluoride		10mg/L	-	-	
		PH		6~9	7.62-6.84	Pass	
		NH_3-N		15mg/L	6.8-1.2	Pass	
		Chloride	DB42 / 168-1999 Chloride Discharge Standards for River in Hubei Province-Category II	300 mg/L for dry season; 400 mg/L for wet season	71.46 (1 time)	Pass	
2014	Main outfall(namely, sewage treatment plant's outfall)	COD_{cr}	GB8978-1996 Integrated Wastewater Discharge Standard-Category I	100mg/L	68.4-93.4	达标	2014 Yingcheng Environmental Protection Monitoring Station (No.: Y.H.J.Z (2014) WY2014-020, Y.H.J.Z (2014) No. WY2014-059, two monitoring reports)
		Fluoride		10mg/L	-	-	
		pH		6~9	6.88-7.07	达标	
		NH_3-N		15mg/L	0.2-0.7	达标	
		Chloride	DB42 / 168-1999 Chloride Discharge Standards for River in Hubei Province-Category II	300 mg/L for dry season; 400 mg/L for wet season	79.97-95.72	Pass	
2014	Main outlet	Emission quantity	45 m^3/d				

Audit item :Hubei Hengxin							
Year	Pollutant sources	Pollutants	No. of emission standards executed	Limit of emission standards	Monitoring values	Emission behavior	Source
2015	Main outfall(namely, sewage treatment plant's outfall)	CODcr	GB8978-1996 Integrated Water Discharge Standard-Category I	100mg/L	12.0~87.4	Pass	2015 Yingcheng Environmental Protection Monitoring Station (No.: Y.H.J.Z (2015) No. WY2015-054, Y.H.J.Z (2015) No. WY2015-019, two monitoring reports)
		Fluoride		10mg/L	-	-	
		pH		6~9	6.86~6.87	Pass	
		NH_3-N		15mg/L	3.1~4.4	Pass	
		Chloride	DB42 / 168-1999 Chloride Discharge Standards for River in Hubei Province-Category II	300 mg/L for dry season; 400 mg/L for wet season	-	-	Unmonitored
Emission behavior of air pollutant							
2013	Plant boundary's fugitive emissions-No.1 plant	Hydrogen chloride	GB16297-1996 Integrated Emission Standard for Air Pollutants	Concentration limit of fugitive emission in monitoring point: 0.20 mg / m^3;	-	-	Unmonitored
	Plant boundary's fugitive emissions-No.2 plant	Hydrogen fluoride		Concentration limit of fugitive emission in monitoring point: 20 μg / m^3;	-	-	Unmonitored
	Boiler's exhaust funnel	Dust	GB13271-2014 Emission Standard of Air Pollutants for Boilers-Class II districts and II time interval	Coal: 200mg / m3; gas: 50 mg / m3	10.1-10.6	Pass	2013 Yingcheng Environmental Protection Monitoring Station (No.: Y.H.J.Z (2013) No. WY2013-017, Y.H.J.Z (2013) No. WY2013-070, two monitoring reports)
		NOx		400 mg / m^3	116-121	Pass	

Audit item :Hubei Hengxin							
Year	Pollutant sources	Pollutants	No. of emission standards executed	Limit of emission standards	Monitoring values	Emission behavior	Source
		SO_2		Coal: 900mg / m^3; gas: 100 mg / m^3	2	Pass	
2014	Plant boundary's fugitive emissions-No.1 plant	Hydrogen chloride	GB16297-1996 Integrated Emission Standard for Air Pollutants	Concentration limit of fugitive emission in monitoring point: 0.20 mg / m^3;	-	-	Unmonitored
	Plant boundary's fugitive emissions-No.2 plant	Hydrogen fluoride		Concentration limit of fugitive emission in monitoring point: 20 μg / m^3;	-	-	Unmonitored
	Boiler's exhaust funnel	Dust	GB13271-2014 Emission Standard of Air Pollutants for Boilers-Class II districts and II time interval	Coal: 200mg / m^3; gas: 50 mg / m^3	5-8	Pass	2014 Yingcheng Environmental Protection Monitoring Station (No.: Y.H.J.Z (2014) No. WY2014-020, Y.H.J.Z (2014) No. WY2014-059, two monitoring reports)
		NOx		400 mg / m^3	98-112	Pass	
		SO_2		Coal: 900mg / m^3; gas: 100 mg / m^3	18-37	Pass	
2015	Plant boundary's fugitive emissions-No.1 plant	Hydrogen chloride	GB16297-1996 Integrated Emission Standard for Air Pollutants	Concentration limit of fugitive emission in monitoring point: 0.20 mg / m^3;	-	-	Unmonitored
	Plant boundary's fugitive emissions-No.2 plant	Hydrogen fluoride		Concentration limit of fugitive emission in monitoring point: 20 μg / m^3;	-	-	Unmonitored
	Boiler's exhaust	Dust	GB13271-2014 Emission Standard of	Coal: 200mg / m^3; gas: 50 mg / m^3	6-11	Pass	2015 Yingcheng Environmental Protection Monitoring Station

Audit item :Hubei Hengxin							
Year	Pollutant sources	Pollutants	No. of emission standards executed	Limit of emission standards	Monitoring values	Emission behavior	Source
	funnel	NOx	Air Pollutants for Boilers-Class II districts and II time interval	400 mg / m^3	101-121	Pass	(No.: Y.H.J.Z (2015) No. WY2015-054, Y.H.J.Z (2015) No. WY2015-019, two monitoring reports)
		SO_2		Coal: 900mg / m^3; gas: 100 mg / m_3	1-68	Pass	
Behavior of plant-boundary noise							
Year	Monitoring points	Monitoring project	No. of noise standards executed	Noise standard limits	Monitoring values	Behavior	Monitoring Report No.
2013	Set 8 monitoring sites at 1m away from the plant boundary	Continuous A-weighted sound level	GB12348-90 Standard for Noise at Boundary of Industrial Enterprises-Category III	Day-time: 65dB (A); Night-time: 55dB（A）	Day-time: 1#48.1；2#43.6；3#52.2；4#49.1 Night-time: 1#42.3；2#40.2；3#46.1；4#44.1	Pass	2013 Yingcheng Environmental Protection Monitoring Station (No.: Y.H.J.Z (2013) No. WY2013-017, Y.H.J.Z (2013) No. WY2013-070, two monitoring reports)
2014	Set 8 monitoring sites at 1m away from the plant boundary	Continuous A-weighted sound level	GB12348-90 Standard for Noise at Boundary of Industrial Enterprises-Category III	Day-time: 65dB (A); Night-time: 55dB（A）	Day-time: 1#51.4-63.4；2#48.2-51.4；3#53.1-49.6；4#60.2-47.7 Night-time: 1#46.3-50.2；2#43.3-47.4；3#48.7-47.2；4#49.9-42.2	Pass	2014 Yingcheng Environmental Protection Monitoring Station (No.: Y.H.J.Z (2014) No. WY2014-020, Y.H.J.Z (2014) No. WY2014-059, two monitoring reports)
2015	Set 8 monitoring sites at 1m away from the plant boundary	Continuous A-weighted sound level	GB12348-90 Standard for Noise at Boundary of Industrial Enterprises-Category III	Day-time: 65dB (A); Night-time: 55dB（A）	Day-time: 1#52.2-54.3；2#55.1-63.4；3#62.2-50.3；4#48.9-51.5 Night-time: 1#43.6-47.7；2#47.0-51.4；3#47.8-53.0；4#45.6-46.6	Pass	2015 Yingcheng Environmental Protection Monitoring Station (No.: Y.H.J.Z (2015) No. WY2015-054, Y.H.J.Z (2015) No. WY2015-019, two monitoring reports)

Given the foregoing deficiencies, in order to understand whether discharges of the plant in 2016 has met with the control indicators, Hubei Academy of Environmental Sciences conducted supplementary monitoring tests on wastewater and noise indicators and PONY was commissioned for monitoring and testing air indicators (see Table 14), showing up-to-standard results in each indicator.

Table 14 Supplementary monitoring on pollutant discharge

Audit item: Hubei Hengxin							
Year	Pollutant sources	Pollutants	No. of emission standards executed	Limit of emission standards	Monitoring values	Emission behavior	Source
Emission behavior of water pollutant							
May, 2016	Main outfall(namely, sewage treatment plant's outfall)	COD_{cr}	GB8978-1996 Integrated Water Discharge Standard-Category I	100mg/L	48-72	Pass	Monitored by Hubei Academy of Environmental Science
		Fluoride		10mg/L	7.00	Pass	
		pH		6~9	6.03-7.42	Pass	
		NH_3-N		15mg/L	0.48-0.534	Pass	
		Chloride	DB42 / 168-1999 Chloride Discharge Standards for River in Hubei Province-Category II	300 mg/L for dry season; 400 mg/L for wet season	154-283	Pass	
Emission behavior of air pollutant							
May, 2016	Plant boundary's fugitive emissions-No.1 plant	Hydrogen chloride	GB16297-1996 Integrated Emission Standard for Air Pollutants	Concentration limit of fugitive emission in monitoring point: 0.20 mg / m^3;	0.017-0.028	Pass	Monitored by a commissioned company—PONY (an environmental monitoring agency recognized by environmental protection bureaus of Beijing, Dalian and Shenzhen. PONY is also on the list of socialized environmental monitoring agencies recognized by Hebei and Shandong Province. In addition, PONY is
	Plant boundary's fugitive emissions-No.2 plant	Hydrogen fluoride		Concentration limit of fugitive emission in monitoring point: 20 mg / m^3;	-	Pass	

Audit item: Hubei Hengxin							
Year	Pollutant sources	Pollutants	No. of emission standards executed	Limit of emission standards	Monitoring values	Emission behavior	Source
	Boiler's exhaust funnel	Dust	GB13271-2014 Emission Standard of Air Pollutants for Boilers-Class II districts and II time interval	Coal: 200mg / m^3; gas: 50 mg / m^3	10.4-11.8	Pass	also recognized by environmental protection bureaus of Jiangsu and Guizhou Province as an environmental monitoring agency for oil and gas recovery management projects. PONY is capable of providing professional water quality testing services.)
		NOx		400 mg / m^3	45-49	Pass	
		SO_2		Coal: 900mg / m^3; gas: 100 mg / m^3	6	Pass	
		NOx		400 mg / m3	101-121	Pass	
		SO_2		Coal: 900mg / m^3; gas: 100 mg / m^3	1-68	Pass	
Behavior of plant-boundary noise							
Year	Monitoring points	Monitoring project	No. of noise standards executed	Noise standard limits	Monitoring values	Behavior	Monitoring Report No.
May, 2016	Set 8 monitoring sites at 1m away from the plant boundary	Continuous A-weighted sound level	GB12348-2008 Standard for Noise at Boundary of Industrial Enterprises-Category III	Day-time: 65dB (A);	Day-time: 1#53.6; 2#52.7; 3#51.9; 4#52.1; 5#57.9; 6#55.7; 7#51.3; 4#57.7	Pass	Monitored by Hubei Academy of Environmental Science

5. Control of total pollutant discharge

According to the *Letter on Environmental Impact Assessment Standards and Total Pollutant Discharge Control Indicators for the 30t/a Organic Fluorine Products Project of Hubei Hengxin Chemical Co., Ltd.* (No. 35 [2007] of Yingcheng Municipal Environmental Protection Bureau) (Annex 4), the control indicators of total pollutant discharge are specified as shown in the table 15 below:

Table 15 Control indicators of total pollutant discharge

Types	Control factors	Expected total pollutant discharge	Recommended control indicators of total pollutant discharge and calculation method	
			Recommended values	Calculation method
Control indicators of total pollutant discharge in the 11th five-year plan	CODcr	0.12	0.12	According to actual discharge volume
	Ammonia nitrogen	0.04	0.04	According to actual discharge volume
	Soot & dust	0.096	1.9	According to actual discharge volume by coal-fired boiler
	SO2	0.08	6.4	According to actual discharge volume by coal-fired boiler, given sulfur content is 0.8%
	Industrial solid wastes	0	0	On the condition of disposing of all solid wastes legally
Specific pollutants	Chloride	0.13	0.13	According to actual discharge volume

Actual information about total pollutant discharge of the company is shown in the table 16 below.

Table 16 Statistics of total discharge of pollutants in the project

Type of pollutants	Specific pollutants	Pollutant production	Self-reduction	Total pollutant discharge
Wastewater	Total discharge (unit: 10,000 m3/a)	0.2579	0	0.2579
	CODcr (t/a)	0.642	0	0.642
	NH3-H (t/a)	0.08	0	0.08
	Chloride (t/a)	0.0302	0	0.0302

	Fluoride (t/a)		0.009	0.008	0.001
Exhaust gas	Industrial production	Hydrogen chloride (kg/a)	3030	2999.7	30.3
		Hydrogen fluoride (kg/a)	6540	6474.6	65.4
	Boiler	Soot & dust (t/a)	0.096	0	0.096
		SO2 (t/a)	0.08	0	0.08
Solid wastes	Hazardous wastes (t/a)		8	8	0
	General industrial solid wastes (t/a)		1.1	1.1	0
	Household refuse (t/a)		17	17	0

From the data in Table 16, it can be found that the total discharge of CODcr and ammonia nitrogen largely exceeds the limits. However, indicated from the data in Table 13-14, the concentration of CODcr and ammonia nitrogen in discharged wastewater does not exceed the limits. Basing on the audited water balance data of cleaner production, the reason behind the conflicting results may lie in concentration dilution due to overuse of domestic water and afforestation water of the enterprise (for details please refer to the audit of Cleaner Production).

6. Audit of Cleaner Production

The project aims to promote cleaner production and Best Available Techniques / Best Environmental Practices (BAT/BEP) through demonstration and popularization. However, audit of cleaner production, which is usually based on material balance, especially water balance, has not been conducted currently. Thus, water balance analysis is conducted as the first move in the preparation stage. The water balance in production process is shown in Table 17 and Figure 11 and other water consumptions of this enterprise are listed in Table 18.

Table17. Water balance in PFOSF production (Unit: t/a)

Workshop Section	Input		Output		
	Material name	Amount	Output name	Amount	Disposal
1. Sulfonation	Fresh water	120	Remanent water	6	To the next reaction
			Vapour	114	Uncontrolled discharge
2. Acylating chlorination	Water introduced for sulfonation	6	Remanent water	94.5	To the next step of stratification
	Fresh water	90			
	Water for reactions	-1.5			To the intermediate product
3. Stratification	Water introduced for acylating chlorination	94.5	Lower layer wastewater	103	25 % HCl are transferred

Workshop Section	Input		Output		
	Material name	Amount	Output name	Amount	Disposal
	Fresh water for spray washing	13	Remanent water	4.5	To the next reaction
4. Fluorination	Water introduced for stratification	4.5	Remanent water	94.5	To the next step of stratification
	Fresh water	90			
5. Stratification	Water introduced for fluorination	94.5	Lower layer wastewater	87	Mixing and transportation out of wastewater containing bromine and wastewater containing HCl
			Vapour	3	Fugitive discharge
			Remanent water	4.5	To the next reaction
6. Electrolysis	Water introduced for stratification	4.5	Scrubbing wastewater	26	25 % HF are transferred
	Fresh water for cleaning	30	Washing wastewater	33	Water treatment station
	Fresh water for spray washing	26	Remanent water	1.5	Rectification process
7.Rectification	Water introduced for electrolysis	1.5	Rectification residues	1.5	Hazardous wastes transference
Total fresh water consumption in production process	Including annual water consumption of 300 tons for production, 30 tons washing water, 13 tons HCl scrubbing water and 26 tons of HF scrubbing water, amounting to369 tons fresh water consumption per year in the whole production process.				

Notes: Water amount consumed in form of vapour include step1 and 5, amounting to 107 tons per year and water consumption for washing is 33 tons per year, using calcium hydroxide for wastewater neutralization sedimentation. Calcium fluoride generated in this process is to be delivered to hazardous wastes center for treatment.

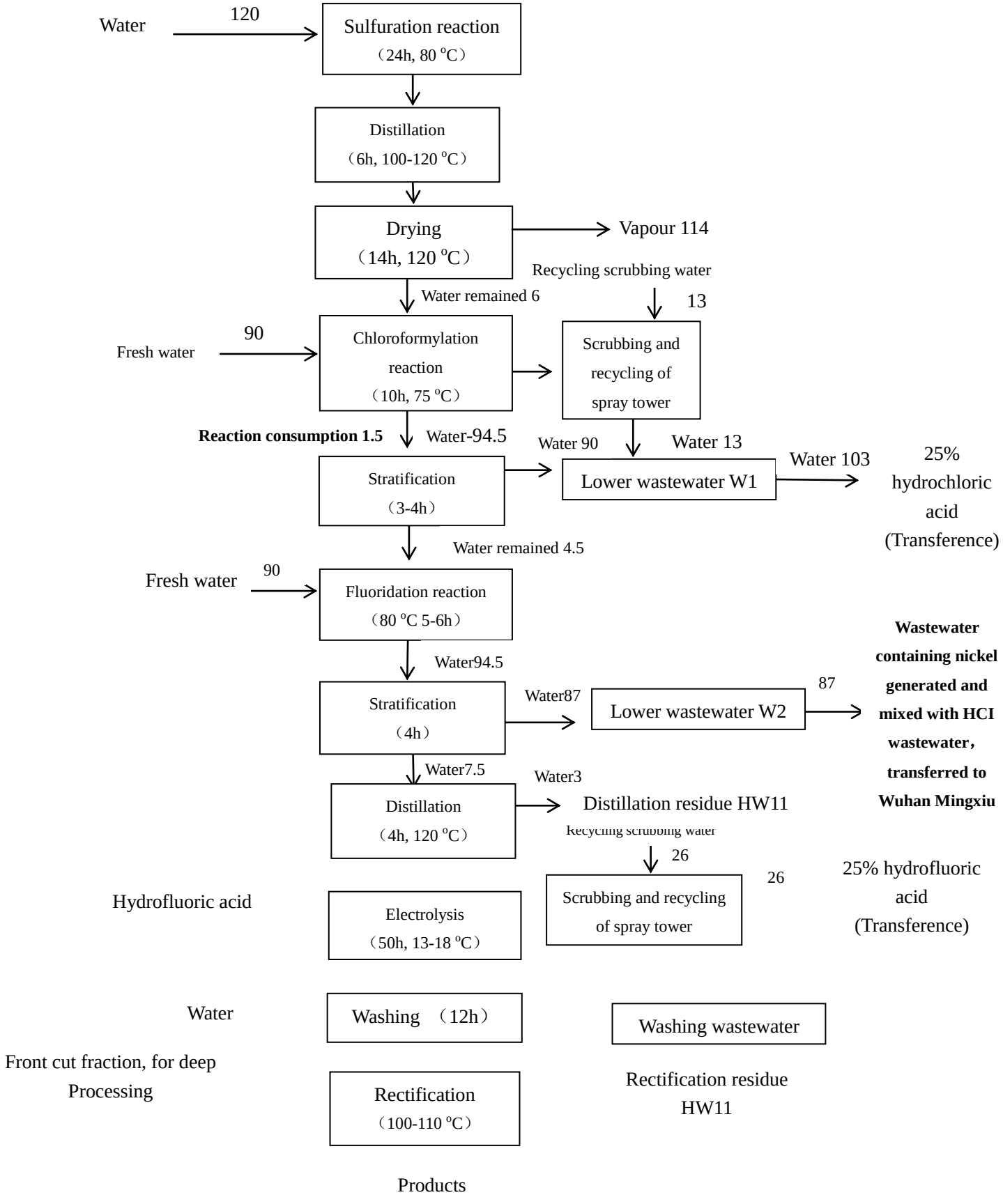


Figure11. Water balance of PFOSF (Unit: t/a)

Table17. Annual water consumption of Hubei Hengxin (Unit: t/a)

Water consumption department	Water supply（m^3/a）			Water consumption（m^3/a）			
	Total water supply	Circulating water	Fresh water	Water consumption in form of vapour [1]	Transference into others	Sewage discharge	Clean water discharge [1]
Circulating cooling water	108000	105840	2160	1080	0	0	1080
Circulating water for refrigerator	720000	717840	2160	2160	0	0	0
Production water supply [3]	300	0	300	117[4]	180[5]	3[2]	0
Cleaning water [3]	30	0	30		0	30[2]	0
HCl absorbing water [3]	13	0	13	0	13	0	0
HF absorbing water[3]	26	0	26	0	26	0	0
Water for afforestation	8730	0	8730	8730	0	0	0
Domestic water	3001	0	3001	450	0	2551	0
Water for vacuum pump	1800	1795	5	5	0	0	0
Boiler water	5100	0	5100	4600	0	0	500
Total	847000	825475	21525	17142	219	2584	1580

Notes: [1] Tonnage of water consumption in form of vapour and clean water drainage are estimates.

[2] Total wastewater drainage is 33 tons per year, including 30-ton washing wastewater and 3-ton industrial wastewater.

[3] Industrial water consumption includes water used for production, cleaning, HCl and HF absorption, of which details are listed in Table 17.

[4] 114 tons dry vapour for sulfonation per year and 3 tons dry vapour for fluorination per year are included in water consumption in terms of vapour (1).

[5] Consumption of water transferred into other forms includes 87-ton wastewater containing bromine generated out of stratification during the fluorination process per year. This wastewater is mixed with HCl wastewater generated from acylating chlorination before being transferred out. In addition, 90-ton water consumed in stratification during acylating chlorination per year and 3-ton water consumed in washing process per year, during which waste hydrochloric acids are generated, are also included.

As shown in Table 18, total annual water consumption of this enterprise is 84700 tons, including 825475 tons recirculating water per year. It can be found that the consumption of fresh water is 21525 tons per year. Audit analysis is as follows:

(1) Circulating water consumption is 829800 tons per year, including 1800-ton water for vacuum pump per year, 720000-ton circulating water for refrigerator per year and 108000-ton circulating cooling water per year. 4325 tons of fresh water needs to be replenished annually as circulating water, with a water recycling efficiency of 99.5 % which is very close to 100 % water recycling efficiency standard of cleaner production. In the meantime, 21,525 tons fresh water are required annually, including 369 tons fresh water consumed during the whole production process, 3001 tons domestic water, 8730 tons water for afforestation and 5100 tons water for boiler.;

(2) 3001-ton domestic water and 8730-ton water for afforestation are consumed annually in form of fresh water, accounting for 54.5% of the total annual fresh water consumption. It can be found that the water consumption volume is too large.

a) According to the standards set forth in the *Code for Urban Water Supply Engineering Planning GB 50282-98* (Table 2.2.3-4), water consumption standard for afforestation is 1000~3000 tons/km2/d. With green space of 5820.0m^2 and working hours of 278 days in Hengxin, the annual water limit for afforestation is in the range between 1617.96 tons and 4853.88 tons. Accordingly, water for afforestation in Hengxin obviously exceeds the standard of GB 50282-98 by 2-5 times.

b) According to the standards set forth in the *Code for Urban Water Supply Engineering Planning GB 50282-98* (Table 2.2.4, the districts in small cities), domestic water consumption is 190-350 L per people per day. Basing on the reality that there are 78 employees working 278 days per year in Hengxin, standardized annual domestic water consumption is 4119.96-7589.4 tons per year. Thus, domestic water consumption of this plant is within the limits.

c) Basing on the facts above, on one hand, a scientific water-saving method can be adopted in landscape administration to keep water consumption for afforestation within limits. On the other hand, afforestation water of the enterprise needs to be managed strictly to deal with the problem that the total discharge volume of CODcr and ammonia nitrogen has exceeded the control indicator. With regard to the controversial result that the discharge concentration of CODcr and ammonia nitrogen has not exceeded the limits, the reason may lie in the dilution effects generated by huge afforestation water consumption. To cope with this challenge, the enterprise may take measure to regulate the irrigation period, volume and coverage of afforestation and check the condition of water pipes of afforestation regularly to avoid water wastes. In addition, rain water and domestic wastewater can be collected to be used for afforestation since the annual precipitation in local place is high.

(3) 5100 tons of water is consumed annually for boilers, including 4600 tons of water being discharged into the air in form of vapour. However, boilers of this enterprise are in small sizes and used in a discontinuous mode. Heat and pressure of vapour decrease after going through the reducing valve and the reaction of heat exchange, result in difficulty of being used in electricity generation. Water consumption in form

of vapour in sulfonation process is also tremendous, with an annual volume of 114 tons. Thus, it is recommended to take effective measures to make use of heat energy of vapour for the heating of this enterprise to reduce direct loss of water in form of vapour and thus to achieve the objective of water saving.

(4) Water consumptions for hydrogen chloride and hydrogen fluoride absorption are 103 tons and 26 tons per year respectively, generating acid solution in high concentration. Besides, 87 tons of wastewater containing bromine per year generated in fluorination process is to be mixed with HCl wastewater. Acid solution abovementioned can be sold to other companies as useful chemical materials to realize cleaner production.

(5) The volume of wastewater generated is not large, consuming 30 tons washing water per year.

(6) Water used in the whole production process of this enterprise annually is 369 tons (including waste scrubbing water) and 1 ton products consume 12.3 tons water. Water consumption details of each production process are listed in Table 11 and Figure 11. There are 8 domestic enterprises providing products similar to Hengxin Chemical Co., Ltd. As the largest enterprise with most product categories and the highest production value among PFOS/PFOSF producers, there is no statistical data concerning the average unit water consumption of Hengxin Chemical Co., Ltd, making it impossible to make horizontal comparisons.

7. Prevention and control of dangerous chemicals and registration of prohibited substances and new chemicals

According to the *Classification and Labels of Dangerous Chemical Substances Commonly Used* (GTB13690), the chemical raw & auxiliary materials and intermediate products used in production by the company contain flammable liquids, flammable gases, non-flammable gases, flammable objects when wet, spontaneous combustible articles (corrosives) and poisonous substances. These are potential hazards in this project. The risks of the goods and materials used in this project are identified according to the *Catalog of Hazardous Chemicals* (2002), the *Directory of Highly Toxic Chemicals* and relevant references. Raw & auxiliary materials, intermediate products and byproducts used or produced in this project are shown in Table 19. Among the raw & auxiliary materials, intermediate products and dangerous chemicals involved in the proposed project, there are 8 dangerous chemicals and 1 highly toxic chemical. More details are provided in Table 18.

Table 19 List of Major Dangerous Chemicals Used

No.	Goods & materials	Usage	Dangerous chemicals or not?	Highly toxic chemicals or not?
1	Bromooctane	Raw material	Yes, among Class 3.2: Flammable Liquids (flash)	No
2	Sodium sulfite	Raw material	No	No
3	Phosphorus oxychloride	Raw material	Yes, among Class 8.1: Acidic Corrosives	Yes
4	Potassium fluoride	Raw material	Yes, among Class 6.1: Toxic Substances	No
5	Sodium octyl sulfonate	Intermediate products	No	No
6	Chlorine octyl chloride	Intermediate products	No	No
7	Hydrogen	Exhaust gas	Yes, among Class 2.1: Flammable Gases	No\
8	Hydrogen fluoride	Recycled product	Yes, among Class 8.1: Acidic Corrosives	No
9	Hydrofluoric acid	Raw materials and byproducts	Yes, among Class 8.1: Acidic Corrosives	No
10	Perfluoroalkanesulfonyl Fluorides	Product	No	No
11	Hydrogen bromide	Product in accident	Yes, among Class 8.1: Acidic Corrosives	No
12	Hydrogen chloride	Byproducts	Yes, among Class 8.1: Acidic Corrosives	No

Although warehousing of toxic chemicals is managed by the company, some toxic or hazardous raw materials and some polluted packaging containers are stored in open warehouse. Warehouse of raw & auxiliary materials does not match the requirements, there is no leakage alarm system, no isolation facilities and no fire/explosion prevention measures at storage site, classified storage and management of dangerous chemicals is not provided, and no qualified organization is entrusted to handle and transport toxic chemicals. In addition, the company formulated emergency response plan in case of accidents and major hazards and there are records of emergency rescue drills, but these were not reported to competent authority for the record and the frequency of drills does not meet the requirements. Therefore, this enterprise needs to formulate and supervise the implementation of Environmental Management Plan.

Figure 12 Photos of raw materials storage site

8. Disposal of hazardous wastes and industrial solid wastes

Solid wastes generated by the project contain household refuses, CaF2 residues and distillation residues which includes those produced after fluorination and those produced after electrolysis.

Household refuses are collected uniformly by the sanitation department and disposed by Yingcheng refuse treatment station for landfilling.

Distillation residues and CaF2 residues are transported to Yichang Hazardous Wastes Treatment Center. However, a large amount of calcium fluoride sludge is stacked in the waste water processing station in this plant, failing to meet with relevant standards.

Recycling and disposal of industrial and dangerous wastes are listed in Table 20. Refer to Annexes 6-1 to 6-4 for waste disposal contracts and documents, Annex 7-5 for extracts of Register of Hazardous Wastes in Storage, and Annexes 6-6 to 6-8 for qualifications for disposal of hazardous chemicals. In addition, the company has improved the hazardous wastes management system and measures (see Annex 7-3).

Table 20 Comprehensive utilization and disposal of industrial solid wastes and hazardous wastes

Titles	Year	Output (t/a)	utilization(t/a)	disposal (t/a)	Recycling implementation
Distillation residue	2013	5		5	Cut fraction is transferred after the acylating chlorination and before the distillation process; front cut fraction generated out of the distillation before the electrolysis process are sold as byproducts after deep processing. Currently, the said front cut fraction is transferred to Yichang concentrated hazardous wastes treatment center after being stacked in the yard of hazardous wastes temporarily
	2014	2.8		2.8	
	2015	12		12	
CaF_2	2013	1		1	Basing on the requirements specified by the environmental protection agency, CaF_2 residues with category code of HW49 are transferred to the Yichang concentrated hazardous wastes treatment center for treatment and there are no signs of landfilling. Besides, there are still 40 tons of CaF2 having not been transferred due to the denial of Yichang concentrated hazardous wastes treatment center. Currently, Yingcheng environmental protection agency is trying to find a solution for this problem.
	2014	0.7		0.7	
	2015	1.2		1.2	
Recycled HF（25% acid water）	2013	25	25		Some potassium hydroxide and potassium fluoride are used by this enterprise and some are neutralized by lime into calcium fluoride wastes. Remaining waste acids are transferred to Wuhan Mingxiufeng Limited Company
	2014	28	28		
	2015	32	32		
Recycled HCl（25% acid water）	2013	180	180		Waste acids are transferred to Wuhan Mingxiufeng Limited Liability Company (there is barely any charge for this basing on the feedback of this enterprise and thus water consumption of hydrogen chloride and hydrogen fluoride acid are estimates).
	2014	198	198		
	2015	228	228		
Household refuse	2013	15		15	Collected uniformly by the sanitation department and disposed by Yingcheng refuse treatment station for treatment regularly.
	2014	14		14	
	2015	17		17	

At present, the company has some problems in the aspect of industrial solid wastes and hazardous wastes, e.g. improper storage of settling CaF_2 sludge for wastewater treatment, which doesn't meet the requirements for disposal of hazardous wastes.

Figure 13 Photos of hazardous wastes storage site

9. Implementation of ecological protection measures

When implementing environmental protection audits against enterprises (relevant to energy, mineral resources mining, forestry-paper integration etc.), the implementation of ecological protection measures needs to be specified. Hubei Hengxin Chemical Co., Ltd. is located in the industrial park of Yingcheng City, without involvement of exploitation and destruction of the ecological environment. Therefore, there is no need to audit the implementation of ecological protection measures.

10. Project impact on environmental sensitive areas including drinking water source protection area

Yingcheng city has abundant water resources including rivers, ports, reservoirs (mainly in the southwest), lakes (mainly in the south) and ponds, and most of its

terrain is made up of plain, hillock and water. The water area amounts to 118km^2, accounting for 10.7% of the city's total area. Surface water mainly comes from the runoff water formed from foreign water and rainwater and the lakes. In the territory of this city, there are four major rivers, namely Yun River, Zhang River, Dafu River and Hanbei River, all of which flowed into Han River, a tributary of Yangtze River. In 1959, Yun River was rectified and became a direct feeder to Yangtze River without flowing through Han River. After Hanbei River was excavated in 1969, Dafu River began to flow into Hanbei River, finally to Han River. Dafu River has a length of 65km in the territory of this city, it collects water from an area of 384km^2 surrounding it, and its water capacity in the territory of this city amounts to 3.112 billion m^3. Yingcheng city also has 14 streams longer than 5km, with a total length of 201km.There were 21 lakes in the southeast of this city, covering an area of about 285,000mu (190km^2), of which three large lakes named Dongxicha, Longsai and Laoguan cover an area of 64,500mu (43km^2). There are no large lakes in urban area and there are a dozen of small ponds in the industrial park. In this city, there are 2 medium-sized reservoirs, 17 small-sized class-I reservoirs and 69 small-sized class-II reservoirs, with total water capacity of 137.525 million m^3, collecting rainwater from an area of 498.76km^2 surrounding them, having a channel density of 0.29km/km^2. In normal conditions, Yingcheng city has a water production of 483 million m^3, the annual precipitation amounts to 1.197 billion m3, total surface runoff water amounts to 383 million m^3, all rivers and canals have a total length of 589km, water storage and diversion amounts to 78.6 million km^2.

Shenggang River has its source in Sanlianwan, Jingshan County, flows into Yanghe Town of Yingcheng City, then goes through Zhaojiayan (Yanghe Town), Duangang, Moyushan (Chengbei subdistrict), Changhu (Chengzhong subdistrict), Liuyang (Silipeng subdistrict) and Chenta (the Development Zone), then feeds into Laoxian River at Xiangshuiqiao, divides in two after that, one flowing into Dafu River through Henghe sluice and the other flowing into Jiahe canal through Yujia sluice and finally into Hanbei River. Salt River is a section of Shenggang River, from the original railway bridge to the new railway bridge with a total length of 2km. It is named for the fact that it is heavily polluted by salt & chemical industry.

In addition, Hubei Hengxin Chemical Co., Ltd. is located in Guanghui Village, Silipeng District. Underground water within this region is low in flow velocity and takes calcium magnesium carbonate as its chemical type, being non-erosive to concrete. The calcium fluoride sludge has been disposed and transferred as hazardous wastes in 2013, which is appropriate and will not pollute underground water.

11. Environmental safety hazards, emergency response plans

11.1 Environmental safety hazards

In chemical production, many of raw materials, intermediate products and finished products are flammable, explosive or toxic substances. Chemical industry is highly susceptible to serious accidents. So, it's very important to identify the fire and explosion hazards in chemical production process.

Among raw materials used, the bromooctane is an flammable substance (flashpoint

23°C) in intermediate flashpoint group. It is very reactive and may easily react with air, causing fires and explosions. Other raw materials are incombustible or nonflammable substances. In addition, hydrofluoric acid and phosphorus oxychloride are acidic corrosives. Phosphorus oxychloride decomposes rapidly when meeting water to produce a great quantity of heat and dense smoke, which may cause explosion, and it also decomposes when meeting water vapor to release phosphoric acid, hydrogen chloride and other irritant gases which cause human poisoning. Hydrofluoric acid is a corrosive substance presenting strong acidic property, which reacts with most of metals to produce hydrogen, an explosive gas, forms explosive mixture when mixed with air, explodes when exposed to heat or meeting open flame, and burns immediately when meeting H blowing agent. Hydrofluoric acid is very corrosive and may damage human skin, equipment and buildings.

Table 21 List of Major Dangerous Chemicals Used

No.	Goods & materials	Usage	Dangerous chemicals or not?	Highly toxic chemicals or not?	Quantity in storage (t/a)	Storage method
1	Bromooctane	Raw material	Yes, among Class 3.2: Flammable Liquids (flash)	No	8	Iron bucket
2	Phosphorus oxychloride	Raw material	Yes, among Class 8.1: Acidic Corrosives	Yes	50	Plastic bucket
3	Potassium fluoride	Raw material	Yes, among Class 6.1: Toxic Substances	No	2	Steel jar
4	Hydrogen fluoride	Recycled product	Yes, among Class 8.1: Acidic Corrosives	No	100	Plastic Bag

Figure 14 Photo of emergency pond

Consequently, safe production awareness must be raised and fire and explosion prevention and control must be strengthened to lower and eliminate the risks of fire and explosion. Currently, the company has developed emergency response plan to take the measures in the plan in case of an accident to effectively reduce the impact on surrounding environment. However, the company shall add more risk prevention measures. Please refer to the Environmental Management Plan for details.

11.2 Emergency response plan

The company has developed emergency response plans for environmental accidents (see Annex 7-1 to Annex 7-4), including *Environmental Hazard Prevention Measures and Emergency Response Plan, Emergency Rescue Plan for Work Safety Accidents, Implementation of Standardized Management of Hazardous Wastes, Enterprise Work Safety Standardization Log I: Persons-in-charge and Responsibilities, Enterprise Work Safety Standardization Log II: Risk Management, Enterprise Work Safety Standardization Log III: Laws, Regulations and Management Provisions, Enterprise Work Safety Standardization Log IV: Safety Training and Education, Enterprise Work Safety Standardization Log V: Production Equipment, Enterprise Work Safety Standardization Log VI: Work Safety, Enterprise Work Safety Standardization Log VII: Product Safety and Hazard Announcement, Enterprise Work Safety Standardization Log VIII: Occupational Hazards, Enterprise Work Safety Standardization Log IX: Accidents and Emergency Responses, Enterprise Work Safety Standardization Log X: Inspections and Performance Appraisal.*

Up to now, there is no significant environmental risk accident occurring to this enterprise. Implementations of measures of environmental risks are listed in the table.

This report here presents a few review comments on these plans:

(1) The emergency response plans developed by the company only specify the measures to be taken in case of leakage of dangerous chemicals, but not include the accidents that may occur during production and the measures to be taken;

(2) The emergency response plans developed by the company only stipulates the rescue measures to be taken in case of an accident, but not include preventive measures during storage and transportation of dangerous chemicals.

(3) The emergency response plans developed by the company fail to well define what should be done and by whom when an accident occurs.

(4) More emergency drills shall be carried out and the drill information shall be submitted to relevant departments for the record (Annex 7-5: Photos of emergency drills), including information of occurrence of significant environmental risk accidents such as fire in warehouse etc.

Table 22 Environmental hazard and prevention measures

sources	Enviro risks	Recommended measures of EIA	Actual implementation	Audit opinions
Production	Fires and explosions of equipment	Implementations of automatic control, monitoring alarm and interlock protection of accidents in process system need to be enhanced.	Implemented	Reasonable
		Sophisticated DCS controlling system and interlock protection system need to be implemented in the safety control system, including the function of alarming, stops of vehicle and accident handling.	DCS controlling system has not been implemented	DCS controlling system needs to be implemented.
	Emergency measures of fires and explosions of equipment	An emergency pond of 250m³ needs to be installed for fire protection.	Constructed	Reasonable
	Leakage of reaction solution in equipment	Preservation and maintenance need to be made for system equipment and sealed units.	Implemented	Registration of periodical check of leakage has not been done, which needs to be improved.
	Leakage of HF gas in equipment	Two-circuit design needs to be adopted to avoid risks of HF leakage caused by unexpected brakes of vehicles.	Two-circuit system has not been constructed.	Two-circuit system needs to be developed to avoid HF leakage.
	Management negligence	Operational regulations, on-the-job training and professional education need to enhanced and regulated strictly.	Implemented	Standardization of management needs to be enhanced and risk management records need to be kept.
Storage	Fire and explosion caused by inappropriate design of chemical	Different dangerous chemicals need to be separately stored with an interval distance of over 50 m. Cofferdfeel needs to be set up independently, too.	Interval distance of dangerous chemicals is shorter than 50m. Cofferdfeel is not available.	Restricted by the limited plant area, Hengxin is incapable of maintaining an interval distance of 50m. Risks exist in the storage of dangerous chemicals and cofferdfeel needs to be installed.

sources	Enviro risks	Recommended measures of EIA	Actual implementation	Audit opinions
	warehouse			
	Fire and explosion caused by inappropriate management of warehouse equipment	Complete fire protection system needs to be set up and periodical check of chemical warehouse needs to be made.	Fire protection system is set up while check records are not preserved standardly.	Warehouse classification needs to be done as required, corresponding check frequency needs to be determined and check records need to be preserved.
	Oil spillage	None	Requirements in audit opinions need to be supplemented.	Fire dike needs to be installed, drain valves and pipes be settled strictly as required by the design regulations. Materials for purpose of preventing oil penetration and diffusion need to be paved on the surface of oil depot.
	Fire and explosion caused by lack of proper fire sources management	Kept in a shady, cool and ventilated place, far away from fire and heat sources. Temperature of warehouse shall not exceed 30 degree centig.	Chemicals are stored in a shady, cool and ventilated place.	Storage volume under high temperatures needs to be controlled at reasonable level to keep high temperature risks within limit, as the temperature of Hubei Province in Summer is usually over 30 degree centigrade.
	measures for fire and explosion of warehouse	An emergency pond of 250m³ needs to be installed for fire protection.	Constructed	Reasonable
Transport ation		Transportation of dangerous chemicals is in the charge of suppliers and associated risks and accidents are born by suppliers or transportation companies.	Adopted	Risk prevention manuals for the storage and transportation need to be supplemented, enhanced and regulated. The packaging of chemicals since the beginning of shipment needs to be complete and the loading operation needs to be stable and safe. Emergency leakage treatment equipment needs to be available for vehicles during the transportation. Vehicles need to follow regulated routes and shall not stay in residential and populated regions.
Wastewat er treatment	Invalidity of wastewater treatment stations	An emergency pond of at least 22 m³ needs to be installed	Constructed	Reasonable

11.3 Environmental accidents and the handling information

We conducted a site survey and found that the company received no administrative penalties for environmental affairs, had no major or extraordinarily serious environmental pollution accident, received no environmental appeals by letter or visit, and had no other acts in violation of environmental protection laws and regulations in the proposed period.

12. Corporate environmental management

In respect of corporate environmental management, Hubei Hengxin Chemical Co., Ltd. adopts general manager responsibility system and sets the Safety and Environmental Protection Department which will take charge of all environmental work, including environmental impact assessment of construction projects and the acceptance inspection of supporting environmental protection facilities (designed, constructed and put into operation simultaneously with the construction project), operation of environmental protection facilities, environmental monitoring, handling of environmental pollution accidents, and assisting local environmental protection authority in environmental law enforcement. According to our site survey, Hubei Hengxin Chemical Co., Ltd. has established a sound environmental management system and a sound environmental filing system, as shown in Table 23 and Table 24.

The company's environmental management organization is shown in Figure 15.

Table 23 Environmental Management System

Company Name	Environmental management department	Environmental management personnel	Environmental monitoring station	Environmental management regulations
Hubei Hengxin Chemical Co., Ltd.	Safety and Environmental Protection Department	General manager:1, deputy manager for environmental protection: 1, Safety and Environmental Protection Department staff: 3	Supervisory monitoring by Yingcheng Municipal Environmental Monitoring Center	No

Table 24 List of Environmental Files of Hubei Hengxin Chemical Co., Ltd.

No.	Title	Date	Remarks
1	The EIR Form (environmental impact report form) and its reply as well as the reply concerning acceptance inspection for organic silicon and organic fluorine products project of Hubei Hengxin Chemical Co., Ltd.	2004.2	H.Y. [2015] No. B01
2	The retrospective evaluation report and its reply as well as the reply concerning acceptance inspection for the 30t/a Organic Fluorine Products Project of Hubei Hengxin Chemical Co., Ltd.	2008.3	X.H.H. [2008] No.19 X.H.H. [2009] No. 34

No.	Title	Date	Remarks
3	Pollutant Discharge Permit for the period from April 16, 2012 - April 15, 2015 and for the period from April 16, 2015 to April 15, 2016	2012.4, 2015.4	Yingcheng Municipal Environmental Protection Bureau
4	Payment notice and invoices for pollutant discharge	2013-2015	Yingcheng Municipal Environmental Protection Bureau
5	Monthly pollutant discharge declaration form of Shenzhen Gelinmei Company	2011	Hubei Hengxin Chemical Co., Ltd.
6	6 monitoring reports	2013-2015	Yingcheng Municipal Environmental Monitoring Station
7	Environmental Hazard Prevention Measures and Emergency Response Plan	2011	Hubei Hengxin Chemical Co., Ltd.
8	Implementation of Standardized Management of Hazardous Wastes	2015	Hubei Hengxin Chemical Co., Ltd.
9	Emergency Rescue Plan for Work Safety Accidents	2011	Hubei Hengxin Chemical Co., Ltd.
10	10 Enterprise Work Safety Standardization Log Books	2011	Hubei Hengxin Chemical Co., Ltd.
11	Dangerous Goods Transportation Contract		
12	Industrial Wastes Disposal Contract		
13	Permit for collecting hazardous wastes of Hubei province		
14	……		

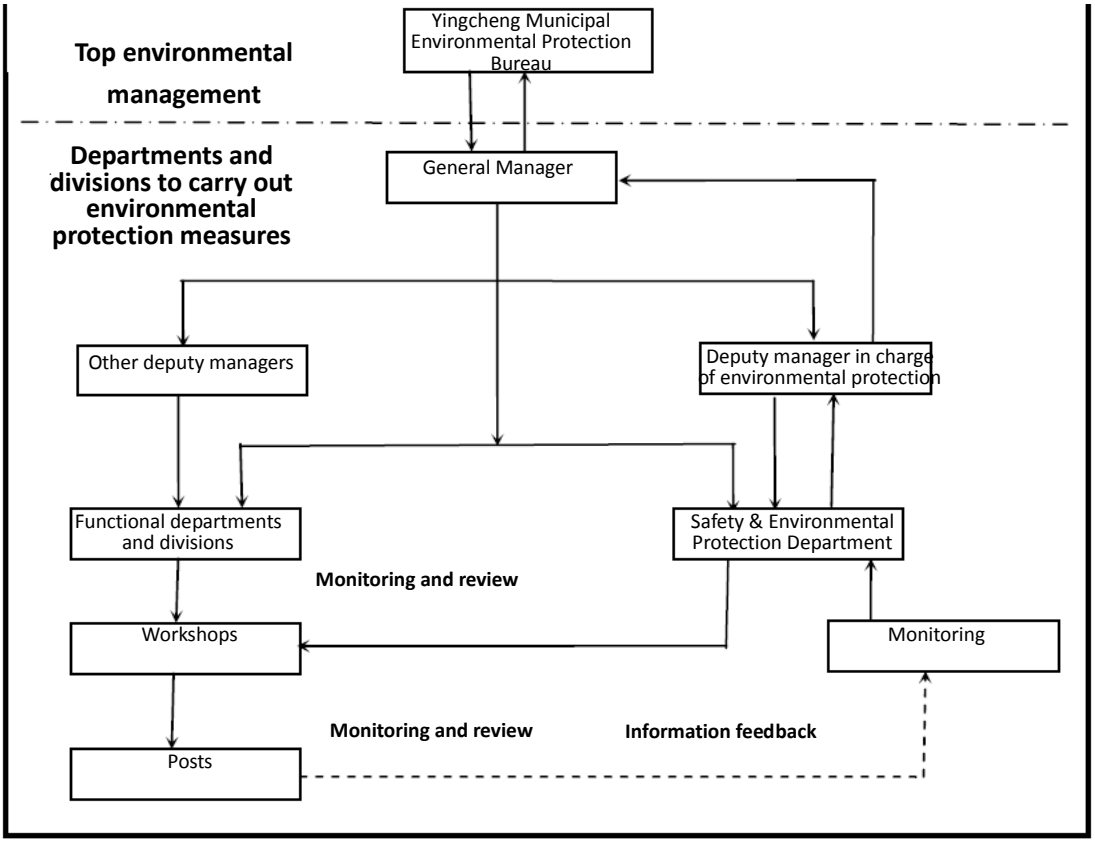


Figure 15 Management Organization Chart of Hubei Hengxin Chemical Co., Ltd.

13. Disclosure of environmental information

In accordance with *Measures for Administration of Environmental Information Disclosure*, Hubei Hengxin Chemical Co., Ltd. has the obligation of disclosing the environmental information. Disclosure of environmental information of Hubei Hengxin upon investigation is shown in Table 25, Figure 16-17. And disclosure of environmental information before PFOS project was not done. Therefore, the company is obliged to disclose environmental information according to the regulations in the future and perform its obligations and liabilities for environmental protection.

Table 25 Disclosure of environmental information of Hubei Hengxin

Media	Disclosure time	Information disclosed	Website	Annex
Governmental website	June 30, 2016	Announcement on Environmental Auditing Report of Hubei Hengxin Chemical Co., Ltd. - GEF-funded Project for Phase-out of PFOS-related Industries in China	http://www.mepfeco.org.cn/dtxx/tzgg/201606/t20160630_68020.html	Annex 9-1
Enterprise website	June 30, 2016	Announcement on Environmental Auditing Report of Hubei Hengxin Chemical Co., Ltd. of GEF-funded Project for Phase-out of PFOS-related Industries in China	http://www.fluoride-cn.com/news_detail/id/14.html	Annex 9-2
Website of Hubei Academy of Environmental Science	July 1, 2016	Environmental Management Framework of GEF-funded Project for Phase-out of PFOS-related Industries in China	http://www.hbaes.com/newsView.do;jsessionid=FB9C63C6334B02FECAD386B09DDE9658?infoId=2010	Annex 9-3
Website of Department of Environmental Protection of Hubei Province	July 4, 2016	Announcement on Environmental Management Framework of GEF-funded Project for Phase-out of PFOS-related Industries in China	http://report.hbepb.gov.cn:8080/pub/root8/tjgzs/gtfwgl/201607/t20160704_96104.html	Annex 9-4
Yingcheng Municipal Environmental Protection Bureau	August 3, 2016	Environmental Auditing Report of Hubei Hengxin Chemical Co., Ltd. of GEF-funded Project for Phase-out of PFOS-related Industries in China	http://www.hbycepb.gov.cn/html/2016/0803/891.html	Annex 9-5

Figure 16 Web Page Screenshot of Information Publicity of Yingcheng Environmental Protection Bureau

Web Page Screenshot of Environmental Information Publicity of Hubei Hengxin Chemical Co., Ltd.

Meanwhile, public consultation with the in-service employees and residents of the surrounding areas has been implemented through discussion meeting and questionnaire during the disclosure period. On the one hand, a discussion meeting on the project was held in the meeting room of Hubei Hengxin Chemical Co., Ltd. on August 10, 2016 and 35 people (refer to figure 16 and for details on attendants, refer to attachment 10-1) have participated in the meeting. The meeting procedures are as follows: General Manager of Hubei Hengxin Chemical Co., Ltd., Li Shutao, first made brief introduction; then Doctor Li Yu from Hubei Academy of Environmental Science explained the PFOS project and the environmental issues that may occur in the implementation of the project by Hubei Hengxin, distributed questionnaire and solicited opinions from the attendants. On the other hand, questionnaires were distributed to the residents of the surrounding areas and altogether 86 questionnaires were returned. The introduction to the project and main contents of the questionnaires are shown in annex 10-2. The feedback is shown as follows:

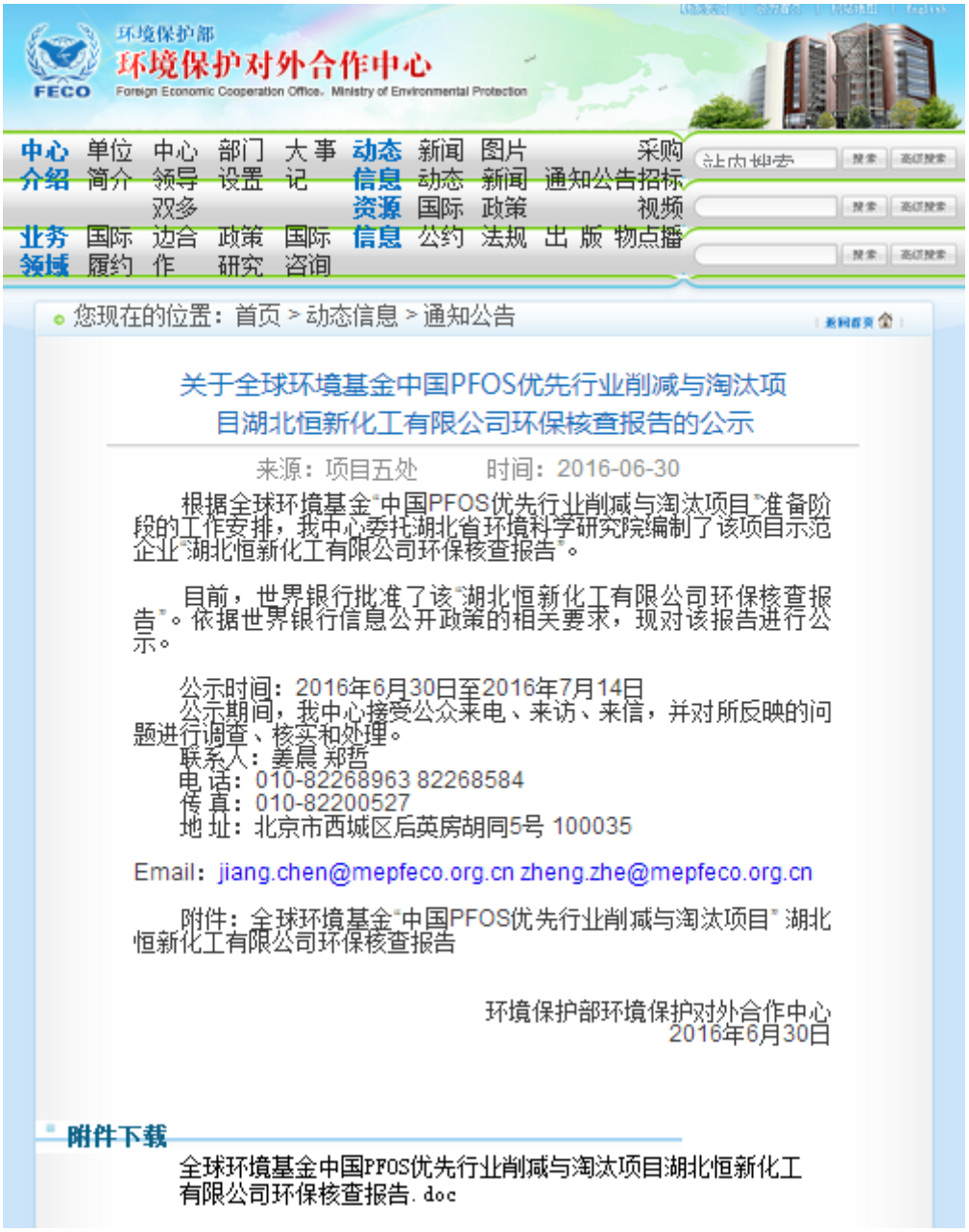


Figure 17 Web page screenshot of Environmental Information Publicity of Hubei Hengxin Chemical Co., Ltd from Foregin Economic Cooperation Office of Ministry of Environmental Protection

(1) Discussion meeting

At the discussion meeting, the attendants mainly asked about what the persistent organic pollutant is, the impact on PFOS phase-out exerted by production change and whether the living of the residents will be affected, and hoped that Hubei Hengxin Chemical Co., Ltd. will strength the safety management.

Figure 16 Photo of the discussion meeting of Hubei Hengxin Chemical Co., Ltd.

(2) Summary of the questionnaire (86)

By issuing the questionnaires of **Hubei Hengxin Chemical Co., Ltd.**, A total of issuing questionnaires is 86, and the answer summary is shown in Figure 19 and Table 26. Meanwhile, the people education degree, age, occupation and gender distribution of the questionnaire is shown in table 27.

Table 26 The Summary of the questionnaire

Questions	Answer 1	Answer 2	Answer 3	Answer 4	Answer 5
Do you know about persistent organic pollutants PFOS	20 people answered yes（23%）	25 answered know a little （29%）	41 answered no（48%）		
Do you know about Hubei Hengxin Chemical Co., Ltd.	49 people answered yes（57%）	19 answered know a little （22%）	18 answered no（21%）		
Are you content with the environment of your current residents	28 people answered yes（33%）	44 answered basically content （51%）	14 answered not quite content （16%）		
What, do you think, are the principal environmental problems	6 people thought it is waste water pollution （70%）	1 thought it is gas pollution （1%）	25 thought it is noise pollution （29%）	10 thought it is deterioration of ecological environment （12%）	other 44 chose “know little about it”（51%）
What is the degree of impact	40 people answered	37 answered no impact	other 9 did not select		

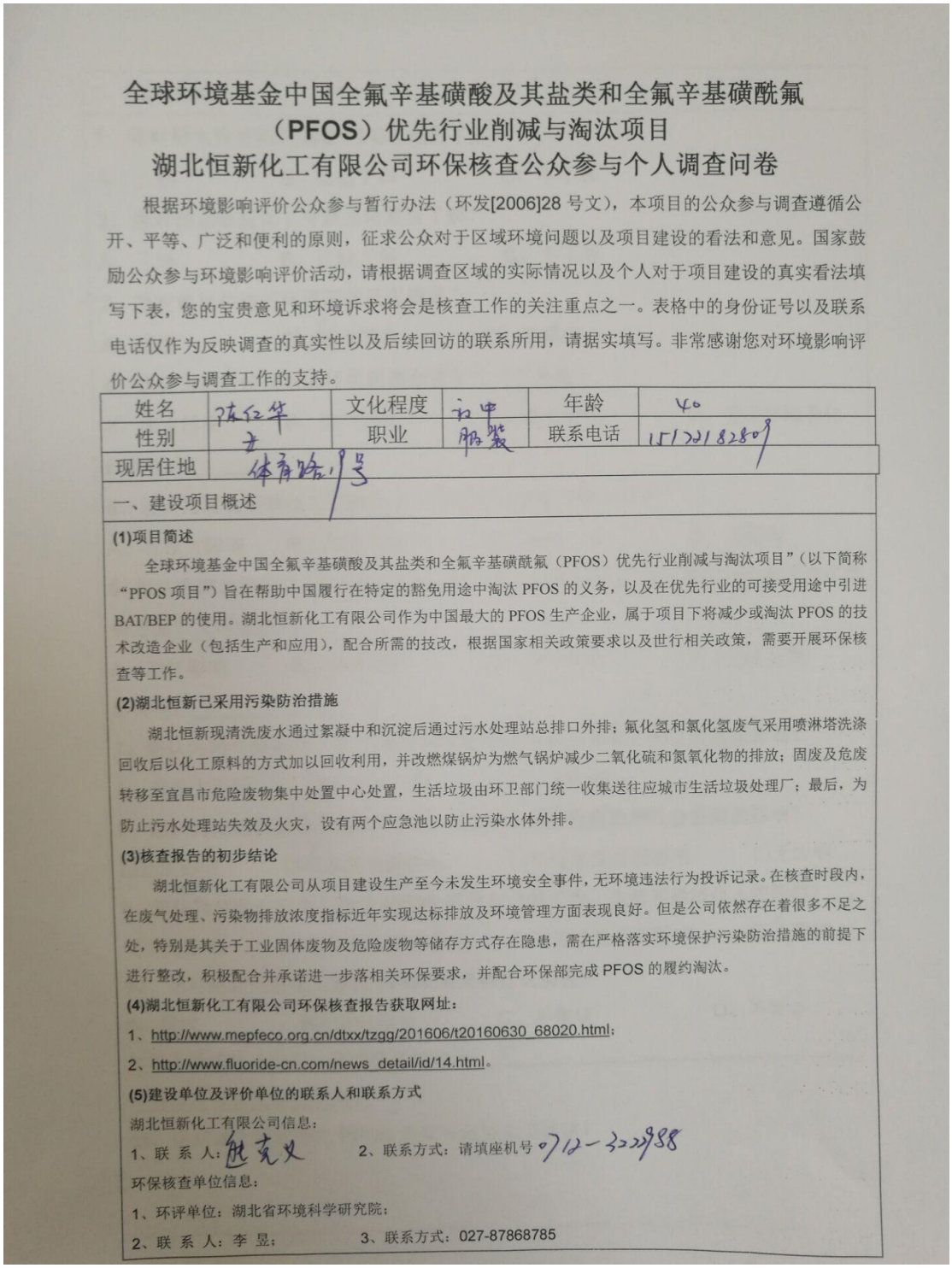
Questions	Answer 1	Answer 2	Answer 3	Answer 4	Answer 5
on environment of the surrounding areas exerted by Hubei Hengxin Chemical Co., Ltd.	fair（47%）	（43%）	any option （10%）		
What, do you think, are the environmental impact after Hubei Hengxin Chemical Co, Ltd. carry out PFOS phase-out through production change	5 people answered waste gas pollution （6%）	1 answered waste water pollution （1%）	10 answered noise pollution （12%）	18 answered noise pollution （21%）	52 expressed “know little about it”（60%）
Whether, do you think, the PFOS phase-out by Hubei Hengxin Chemical Co., Ltd. will influence your working and life	5 people answered “have relatively greater impacts” （6%）	15 people answered “the impact degree is fair”（17%）	66 answered “no impact” （77%）		
What, do you think, are the impacts on local economic and social development exerted by PFOS phase-out by Hubei Hengxin Chemical Co., Ltd.	10 answered “positive impact” （12%）	11 answered “tolerable adverse impact” （13%）	2 answered “intolerable adverse impact” （2%）	63 answered “no impact” （73%）	
What, do you think, are the impacts on your working, life and economic income exerted by PFOS phase-out by Hubei Hengxin Chemical Co., Ltd.	16 answered “positive impact” （19%）	10 answered “tolerable adverse impact” （12%）	2 answered “intolerable adverse impact” （2%）	58 answered “no impact” （67%）	
What is your attitude towards PFOS phase-out by Hubei Hengxin Chemical Co.,	18 expressed “in favor of it”（21%）	28 expressed “acceptable” （33%）	5 expressed “disagree” （6%）	other 35 expressed “indifferent to it”（41%）	

Questions	Answer 1	Answer 2	Answer 3	Answer 4	Answer 5
Ltd.					
What are your opinions and suggestions on PFOS phase-out by Hubei Hengxin Chemical Co., Ltd.	no answer was gained （100%）				

Table 27 The education degree, age, occupation and gender distribution characteristics of the participants of public consultation

	Primary school	**Junior high school**	**Senior high school**	**Technical secondary school**	**Junior college**	**University**
Education degree	4（7%）	58（67%）	9（10%）	8（9%）	3（3%）	4（5%）
	20-30	30-40	40-50	50-60	60-70	
Age	3（3%）	19（22%）	35（41%）	21（24%）	8（9%）	
	Farmer	Worker	Teacher	financial affairs		
Occupation	49（57%）	31（36%）	4（5%）	2（2%）		
	Male	Female				
Gender	50（58%）	36（42%）				

In conclusion, the results of public consultation show that 79% of the participants have some knowledge of Hubei Hengxin Chemical Co., Ltd., 84% of them are basically content with the surrounding environment. As for PFOS phase-out, 94% of the participants think it exerts not so much impacts on their working and life and less than 6% of them disagree with PFOS phase-out. Therefore, most of the public have no objection to PFOS phase-out of Hubei Hengxin Chemical Co., Ltd.



全球环境基金中国全氟辛基磺酸及其盐类和全氟辛基磺酰氟（PFOS）优先行业削减与淘汰项目

湖北恒新化工有限公司环保核查公众参与个人调查问卷

根据环境影响评价公众参与暂行办法（环发[2006]28 号文），本项目的公众参与调查遵循公开、平等、广泛和便利的原则，征求公众对于区域环境问题以及项目建设的看法和意见。国家鼓励公众参与环境影响评价活动，请根据调查区域的实际情况以及个人对于项目建设的真实看法填写下表，您的宝贵意见和环境诉求将会是核查工作的关注重点之一。表格中的身份证号以及联系电话仅作为反映调查的真实性以及后续回访的联系所用，请据实填写。非常感谢您对环境影响评价公众参与调查工作的支持。

姓名	陈红华	文化程度	初中	年龄	40
性别	女	职业	服装	联系电话	15132182809
现居住地	体育路1号				

一、建设项目概述

(1)项目简述

全球环境基金中国全氟辛基磺酸及其盐类和全氟辛基磺酰氟（PFOS）优先行业削减与淘汰项目”（以下简称“PFOS 项目”）旨在帮助中国履行在特定的豁免用途中淘汰 PFOS 的义务，以及在优先行业的可接受用途中引进 BAT/BEP 的使用。湖北恒新化工有限公司作为中国最大的 PFOS 生产企业，属于项目下将减少或淘汰 PFOS 的技术改造企业（包括生产和应用），配合所需的技改，根据国家相关政策要求以及世行相关政策，需要开展环保核查等工作。

(2)湖北恒新已采用污染防治措施

湖北恒新现清洗废水通过絮凝中和沉淀后通过污水处理站总排口外排；氟化氢和氯化氢废气采用喷淋塔洗涤回收后以化工原料的方式加以回收利用，并改燃煤锅炉为燃气锅炉减少二氧化硫和氮氧化物的排放；固废及危废转移至宜昌市危险废物集中处置中心处置，生活垃圾由环卫部门统一收集送往应城市生活垃圾处理厂；最后，为防止污水处理站失效及火灾，设有两个应急池以防止污染水体外排。

(3)核查报告的初步结论

湖北恒新化工有限公司从项目建设生产至今未发生环境安全事件，无环境违法行为投诉记录。在核查时段内，在废气处理、污染物排放浓度指标近年实现达标排放及环境管理方面表现良好。但是公司依然存在着很多不足之处，特别是其关于工业固体废物及危险废物等储存方式存在隐患，需在严格落实环境保护污染防治措施的前提下进行整改，积极配合并承诺进一步落相关环保要求，并配合环保部完成 PFOS 的履约淘汰。

(4)湖北恒新化工有限公司环保核查报告获取网址：

1、http://www.mepfeco.org.cn/dtxx/tzgg/201606/t20160630_68020.html；

2、http://www.fluoride-cn.com/news_detail/id/14.html。

(5)建设单位及评价单位的联系人和联系方式

湖北恒新化工有限公司信息：

1、联 系 人：熊克义　　2、联系方式：请填座机号 0712-3222988

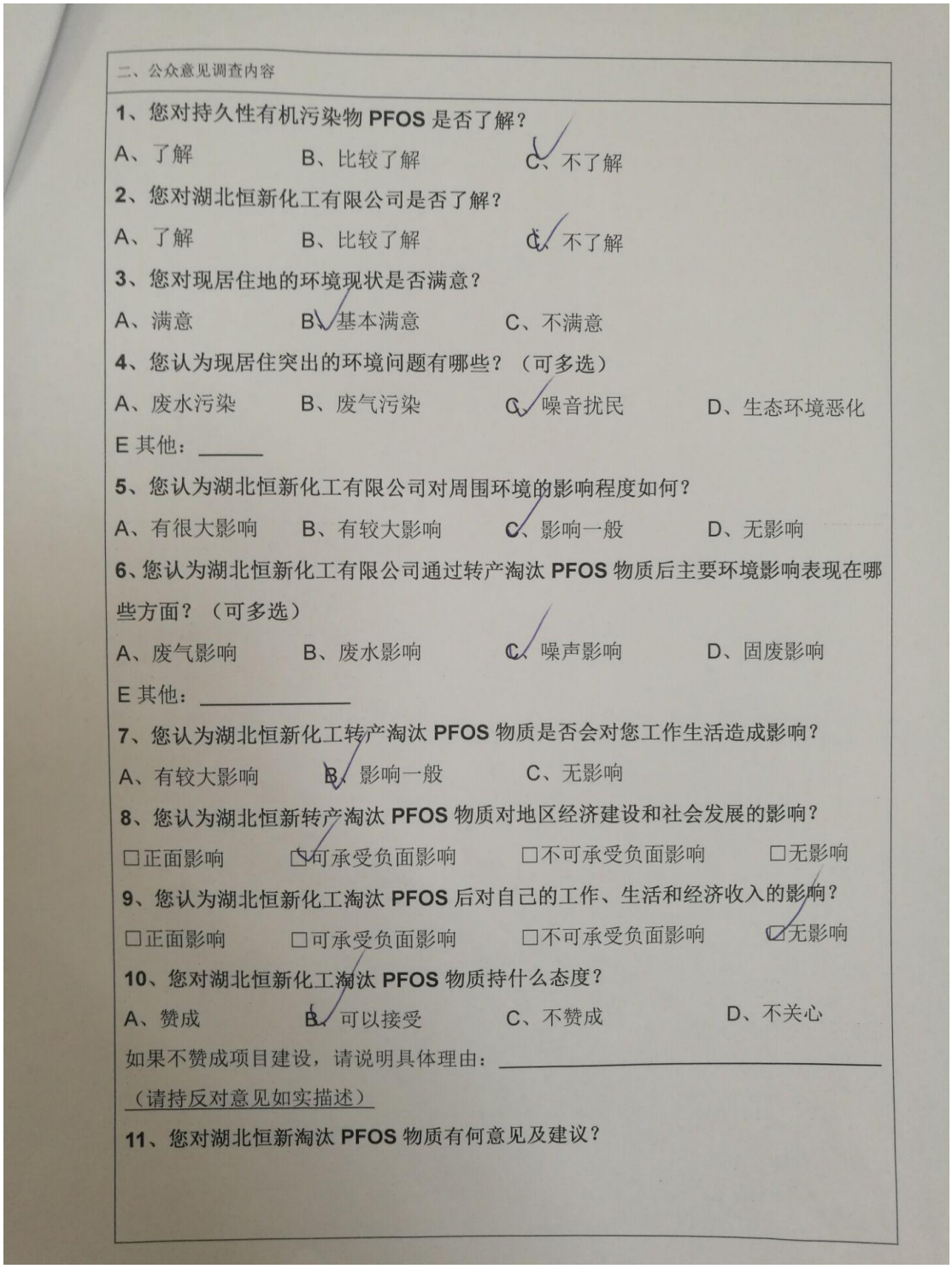
环保核查单位信息：

1、环评单位：湖北省环境科学研究院；

2、联 系 人：李 显；　　3、联系方式：027-87868785

Figure 19 Questionnaire of Public Consultation of Hubei Hengxin Chemical Co., Ltd.

（Figure 19-1）



二、公众意见调查内容

1、您对持久性有机污染物 PFOS 是否了解？

A、了解　　B、比较了解　　C、不了解

2、您对湖北恒新化工有限公司是否了解？

A、了解　　B、比较了解　　C、不了解

3、您对现居住地的环境现状是否满意？

A、满意　　B、基本满意　　C、不满意

4、您认为现居住突出的环境问题有哪些？（可多选）

A、废水污染　　B、废气污染　　C、噪音扰民　　D、生态环境恶化

E 其他：_____

5、您认为湖北恒新化工有限公司对周围环境的影响程度如何？

A、有很大影响　　B、有较大影响　　C、影响一般　　D、无影响

6、您认为湖北恒新化工有限公司通过转产淘汰 PFOS 物质后主要环境影响表现在哪些方面？（可多选）

A、废气影响　　B、废水影响　　C、噪声影响　　D、固废影响

E 其他：_____

7、您认为湖北恒新化工转产淘汰 PFOS 物质是否会对您工作生活造成影响？

A、有较大影响　　B、影响一般　　C、无影响

8、您认为湖北恒新转产淘汰 PFOS 物质对地区经济建设和社会发展的影响？

□正面影响　　□可承受负面影响　　□不可承受负面影响　　□无影响

9、您认为湖北恒新化工淘汰 PFOS 后对自己的工作、生活和经济收入的影响？

□正面影响　　□可承受负面影响　　□不可承受负面影响　　□无影响

10、您对湖北恒新化工淘汰 PFOS 物质持什么态度？

A、赞成　　B、可以接受　　C、不赞成　　D、不关心

如果不赞成项目建设，请说明具体理由：_____

（请持反对意见如实描述）

11、您对湖北恒新淘汰 PFOS 物质有何意见及建议？

Figure 19 Questionnaire of Public Consultation of Hubei Hengxin Chemical Co., Ltd.

（Figure 19-2）

Chapter 5 Environmental management plan

Upon audit, Hubei Hengxin Chemical Co., Ltd. is found to have many problems. Here are some improvement suggestions, namely environmental management plan. Hubei Hengxin Chemical Co., Ltd. should implement this plan to make it comply with relevant standard and environmental protection requirements.

1. Setup of environmental management organization

In accordance with actual conditions of the company, safety and environmental protection department is to be set. The department is responsible for safety and environmental protection of the whole company under leadership of the company leaders. The management organs are shown in figure 15.

The specific duties of environmental management organs of the departments and units to carry out environmental protection measures are:

1) Setting up sound environmental protection rules and regulations and clearly defining the accountability and awarding and punishment methods.

2) Determining the environmental management goal, such as, emission or discharge of gas, water and noise as per standard, realization of greening indicators and timely treatment of solid wastes and so on.

3) Setting up environmental protection files, such as environmental impact assessment report, environmental protection project acceptance report, pollutant source monitoring report, records of environmental protection equipment and the operation and other environmental statistics and so on.

4) Collecting and managing relevant pollutants discharge standard, environmental protection rules and regulations, technical data on environmental protection and implementing the environmental protection regulations and standards.

5) Well implementing “simultaneous design, construction and operation” of environmental protection with the construction project; supervising and evaluating the environmental protection work of various departments during the operation period of the project.

6) Prevention and control of gas, waste water and solid wastes pollution is one of important aspects of environmental protection and the normal operation of pollution prevention facilities should be guaranteed through environmental management measures. Managing all of the environmental protection facilities and main equipment in a coordinated way and realizing the simultaneous operation and repair of the environmental protection facilities and main equipment; when failure of the environmental protection facilities occur, the environmental management organ should immediately take joint measures with various departments to prevent and control the pollution.

7) Understanding the pollutants discharge of the whole site, setting up pollutant sources files and carrying out environmental protection statistics and well controlling the total discharge of pollutants.

8) Responsible for treatment of general pollution accidents.

9) Setting up and implementing ISO14001 environmental management system when the conditions permit.

10) Performing the obligation of disclosure of enterprise environmental information according to requirements.

2. Mitigation measures

Aiming at the evaluated adverse environmental impacts, the specific and operable mitigation measures (refer to Table 26) on operation period of Hubei Hengxin Chemical Co., Ltd. are brought up in accordance with relevant domestic regulations, norms and management measures and experiences of previous similar projects and with reference to the *Environmental, Health, and Safety Guidelines* (EHS Guidelines). The implementer is the company and the supervisor is the local PMO. The budget should be determined with reference to the production change plan of Hubei Hengxin Chemical Co., Ltd. and the cost should be borne by the company and GEF.

3. Monitoring plan

The exhaust gas monitoring sites, indicators and frequency are shown in Table 26.

Table 26 Exhaust gas monitoring plan

No.	Monitoring sites	Workshop	Monitoring indicators	Monitoring frequency	Pollution sources	Monitoring agency
1	Plant boundary (Fugitive emissions monitoring site)	First workshop	HCl	Monitor once every quarter, and each sample should be no less than 3 feet	Exhaust gas of acyl chloride process s	Yingcheng Environmental Monitoring Center
2	Plant boundary (Fugitive emissions monitoring site)	Second workshop	HF		Exhaust gas of electrolysis	
3	No.3 exhaust funnel	Boiler room	Dust, SO_2, NO_x		Exhaust gas of boiler	

The waste water monitoring sites, indicators and frequency are shown in Table 27.

Table 26 Environmental problems, risks and mitigation measures

Environmental medium	Problems and risks	Mitigation/prevention and control measures
Solid wastes	Non-standardized storage of industrial solid wastes and dangerous wastes	Strengthen management over harmful raw and auxiliary materials, poisonous chemicals and dangerous wastes, store and manage the dangerous chemicals in a classified way, entrust the departments with qualification to load, unload and transport the poisonous chemicals, install leakage alarming device and isolation devices in the storing site, take explosion and fire prevention measures, set up sound management system and facilities and implement the management measures.
		Set up impermeable isolated areas in the storing site, strictly separate the dangerous wastes from other solid wastes; implement classified storage of other solid wastes and prohibit mixing with dangerous wastes and domestic wastes.
		Set alarm signs and environmental protection image icons according to GB15562.2.
	Leakage and soaking of solid wastes	To prevent entry of runoff into the storing site and avoid increase of leachate, diversion devices should be set around the storing site and leachate catchment and drainage facilities and leakage blocking and sealing skirt should be designed.
		The caught leachate and leakage should be discharged upon treatment of the sewage treatment station.
		The ground and skirt should be made of solid and anti-leakage materials.
	Hidden dangers in transportation of solid and dangerous wastes of the company	Entrust the departments with qualification toe load, unload and transport, formulate the emergency plan of risk prevention in the transportation process.
	Treatment of CaF_2	Calcium fluoride sludge is dangerous inorganic fluoride wastes. In accordance with requirements of the environmental protection bureau, HW49 (category code of CaF2) are transferred to Yichang Hazardous Waste Disposal Center for treatment and should not be buried. In addition, about 40 tons calcium fluoride are still in the plant and was not transferred, because Yichang Hazardous Waste Disposal Center can't accept any more. Currently, Yingcheng Municipal Environmental Protection Bureau is finding solutions. Meanwhile, the temporary storage site of calcium fluoride should be standardized and cofferdam should be set to avoid its contact with concentrated acid.

Environmental medium	Problems and risks	Mitigation/prevention and control measures
Waste water	Discharge of domestic sewer	The company uses fresh water of 8730 m^3/a for greening and fresh water of 3001 m^3/a for living. The total consumption accounts for 54.5% of the total fresh water consumption. Therefore, scientific water saving methods can be used for greening. In addition, the total emission of CODcr and ammonia nitrogen exceeds the standard but the concentration does not exceed the standard. This may be caused by dilution of hugely consumed water. Therefore, water consumption for greening and living should be strictly managed to realize water saving.
	Treatment of production waste water and the emergency treatment	When the domestic sewer treatment device fails, the domestic sewer and waste water from production should be temporarily stored in the reservoir and then be treated by the sewage treatment devices after the devices have been repaired. Such water should not be directly discharged outside and the maximum discharge of such water of the company is specified to be about 11m^3/d. Now, 250m^3 emergency treatment pool has been built to cope with the situation of failure of sewage treatment station.
		Set up sound reactor emergency facilities and improve the inlet of HF emergency pool.
		Close all drainage outlets when accidents happen and all waste waste water is guided to the emergency pool or sewage treatment station and discharge to the outside is strictly banned.
Gas	Emission of hydrogen fluoride and chlorine hydride and so on	Spray tower washing has been used to recycle the hydrogen chloride and chlorine hydride and the emission has met the standard.
	Emission of gas of the boiler room	Natural gas has been used as fuel of the boiler and emission of SO_2, NO_x and soot has been effectively controlled. The emission has met the standard.
Noise	Noise of the freezer	Install sound-insulation doors and windows or use low-noise cooling towers according to the original environmental impact assessment requirements.
		Close doors and windows during the night production.
Accident	Fire and explosion in the production process	Strengthen the application of automatic control, monitoring alarm and chain protection of accidents of the process system.
		The safety control system should have improved DCS control system and safety interlock system, including alarming, parking and accident treatment functions.
		Set 250m^3 emergency pool for fire-fighting.
	Leakage in the production process	Maintain the system equipment and sealing units.
		Design dual-loop to avoid HF leakage caused by sudden stop.
	Fire, explosion or leakage in the storage process	Store the dangerous chemicals in different areas and the area spacing should be longer than 50m. Those areas should be isolated with cofferdam respectively.

Environmental medium	Problems and risks	Mitigation/prevention and control measures
		Store in the cool warehouse with good ventilation, be far away from fire and heat source, the temperature in the warehouse should be not higher than 30℃.
		Set up sound fire-fighting system; grade the warehouse in accordance with regulations; and determine the check frequency and keep the check records in accordance with the grading requirements.
		Set up fire-fighting dike, install drain valve and drainage pipeline strictly in accordance with the design standard; pave oil penetration and diffusion proof materials on the ground of oil depot.
	Fire, explosion and or leakage in the transportation process	Transportation of dangerous chemicals of the project will be undertaken by the supplier and the supplier or the transportation company should be responsible for the risks and accidents in the transportation process.
		It is required to supplement the risk prevention manuals for the storage and transportation process, strengthen management on storage and transportation of chemicals and standardize the transportation process: the package should be complete and the loading should be proper at the time of departure; the transportation vehicle should be equipped with emergency leakage treatment equipment, should avoid sunshine, rain and high temperature during the transportation and the transportation vehicle should run according to the given route and not stop at the residential areas and densely populated areas.
Environmental management	Problems in emergency management	Equip communication equipment, lighting facilities and safety wears and tools and set emergency protection facilities.
		Set up check and maintenance system, regularly check and maintain the water retaining wall and water diversion channels and so on, timely take necessary measures to ensure normal operation if damages or abnormalities are found; record the type and quantities of solid wastes transported to the site and other relevant data in details and keep them for long term for inquiry at any time.
		The person in charge and duty division at the time of accidents should be clearly defined in the emergency plan.
		Have more emergency rescue training and report it to the relevant department for record.

Table 27 Waste water monitoring plan

Monitoring sites	Monitoring indicators	Monitoring frequency	Pollution sources	Monitoring agency
General discharge outlet of waste water treatment station	Flow, pH, CODcr, ammonia nitrogen, fluoride	Self monitoring: Monitor twice every day for once every 8 hours and each sample should be no less than 3	Sewage, cleaning waste water	Monitoring should be carried out by the Company's monitoring station;
	Flow, pH, CODcr, ammonia nitrogen, chloridate, fluoride	Third-party monitoring: Monitor once every quarter, and each sample should be no less than 3		Yingcheng Environmental Monitoring Station (Provincial Environment Monitoring Station should be entrusted for the qualifications it does not have)
General discharge outlet of waste water treatment station	PFOS content (characteristic pollutants)	Third-party monitoring: Monitor once every year, and each sample should be no less than 3	Cleaning waste water	Hubei Provincial Environment Monitoring Station

Noise monitoring:

(1) Monitoring sites: eight monitoring sites should be arranged at 1m from the plant boundary; (2) Monitoring project: noise between day and night (equivalent continuous A sound level) in plant boundary; (3) Monitoring frequency: monitoring once every quarter; (4) Monitoring agency: Yingcheng Environmental Monitoring Station.

4. Capacity building and training program

The capacity building and training program of the project are shown in Table 28.

Table 28 Capacity building and training program of the project

No.	Name of activity	Specific actions	Implementation frequency of plan
1	Strengthening of the staff's post capacity	Check the staff's post capacity; strengthen the professional training of environmental management staff and understand environmental management knowledge in order to improve the quality of environmental protection work	Provide training fees for professional training in environmental management, and arrange once a year
2	Publicity of laws and regulations related to safety and environment	Publicizing laws and regulations related to safety and environment on office staff according to the company system requirements and job needs	Once every half year
3	Professional	Environmental monitoring personnel	Provide training fees for

No.	Name of activity	Specific actions	Implementation frequency of plan
	training on environmental monitoring personnel	should have a certificate, and be responsible for the provided environmental monitoring data, be familiar with the production process, and continuously improve their professional quality.	professional training in environmental management, and arrange once a year
4	Construction of laboratory	Noise monitoring equipment, acidimeter, flow meter, COD rapid detector, ultraviolet specrophotometer, analytical balance, ammonia meter and on-line monitoring devices should be provided according to the daily monitoring of the waste water in the sewage treatment station in plant area	Financed purchase

5. Supervision and reporting system

According to China's relevant environmental regulations and World Bank’s policy requirements, the subproject (that is, the Employer) shall be responsible for the preparation of "Evaluation and Monitoring Report on the Implementation of Environmental Management Plan" (usually twice a year). The purpose is to ensure that the related requirements and measures of environmental management plan are implemented, identify problems in time, analyze and summarize, in order to control adverse environmental impacts in the project follow-up work. The main contents of environmental management plan should include:

(1) Implementation of environmental management plan: main content of construction at this phase; training in environmental management at this stage; implementation of mitigation measures; problems and causes; corrective measures of the next step;

(2) Environmental monitoring results: give a brief explanation to the data, explain the problems and dissatisfaction phenomenon, analyze its causes, and recommend corrective measures; resident complaints and solution should be included when necessary;

(3) Environmental management: standardized situation of emissions; collection of effluent fees; construction of environmental protection facilities; summary of experience, problem analysis and conclusion. Working proposals and plans for the next half year.

Chapter 6 Auditing Conclusion

The cleaning wastewater generated by Hubei Hengxin Chemical Co., Ltd. are discharged through the general discharge outlet of wastewater treamment plant after being neutralized, flocculated and settled. The production wastewater should be utilized through selling by way of chemical raw materials, and sewage should be discharged together with treated cleaning wastewater to the municipal pipe network and treated together in Yingcheng wastewater treatment plant: (1) The concentrations of main indicators such as fluoride, chloride, CODcr, ammonia nitrogen and pH in treated wastewater can meet the primary standard in Integrated Wastewater Discharge Standard (GB8978-1996) and the emission concentration required by the secondary standard of the maximum acceptable emission of chemical industry in Discharge Standard of Chlorides for the Fuhe River Basin in Hubei Province (DB42/168-1999); (2) however, the total emissions of CODcr and ammonia nitrogen exceed the requirements of EIA, and the plant uses too much domestic water and green water, which should be improved in the project implementation period.

Some amount of HF gas escapes while hydrogen gas is released in electrolysis process. HF gas is condensed in condenser. The gases not condensed in condenser will flow into tail-gas washing tower through buffer tank and are purified in washing tower. HF gas will be washed with water by two-stage spraying system, with purification efficiency above 99%. After HF concentration becomes within 20-25%, HF gas is sent to tail-gas collecting tank and then transferred to Wuhan Mingxiufeng Chemical Co., Ltd. as by-product. The unabsorbed HF gas is discharged in uncontrollable manner, but within the limits for uncontrolled discharge monitoring points in Table 2 of Integrated Emission Standard of Air Pollutants (GB16297-1996). Similarly, the HCl gas produced in the acylating chlorination process is also recycled and treated through absorption by spray tower, and HCl acid waste water is sold to Wuhan Mingxiufeng Chemical Co., Ltd. as raw material, achieving the effect of pollutants recycling and the HCl indicator in gas of the plant is discharged up to the standard. What's more, in order to reduce the SO2, NOx and dust emissions in the boiler, Hubei Hengxin Chemical Co., Ltd. has transformed the boiler into boiler using natural gas in accordance with the requirements of the EIA, achieving the stable and standlized discharge of the three indicators.

Solid wastes generated by the Company contain household refuses, CaF2 residues and distillation residues which includes those produced after fluorination and those produced after electrolysis. Among them, (1) household refuses are collected and disposed of by sanitation department in Yingcheng Household Refuses Treatment Plant; (2) distillation residues are transported to Yichang Hazardous Wastes Treatment Center, which complys with the requirements of EIA; (3) The Company transfers all the CaF_2 residues with category code HW49 to Yichang Hazardous Wastes Treatment Center for disposal in accordance with the requiremnts of the Environmental Protection Bureau, and landfill phenomenon does not exist. In addition, there are still about 40 tons of calcium fluoride in the plant area. Since Yichang Hazardous Wastes Treatment Center no longer accepts the transfer, the EPB of Yingcheng is assisting in looking for solutions.

As a chemical enterprise, the greatest environmental risk of the Company is from the disposal and storage methods of industrial solid waste and hazardous waste. There are great potential risk and many areas for improvement, for example: the storage method of industrial solid waste and hazardous waste of the plant is not standardized, and there's leakage, wetting and soaking of solid waste. The environmental management on harmful raw materials, toxic chemicals and hazardous wastes should be strengthened. The hazardous chemicals should be classified for storage and management. The toxic chemicals should be handled and transported by qualified units. Leakage alarm devices and explosion-proof and fire-proof facilities should be installed. Relevant management system and facilities should be established and perfected. Management measures should be implemented. The detailed suggestions are shown in Table 28.

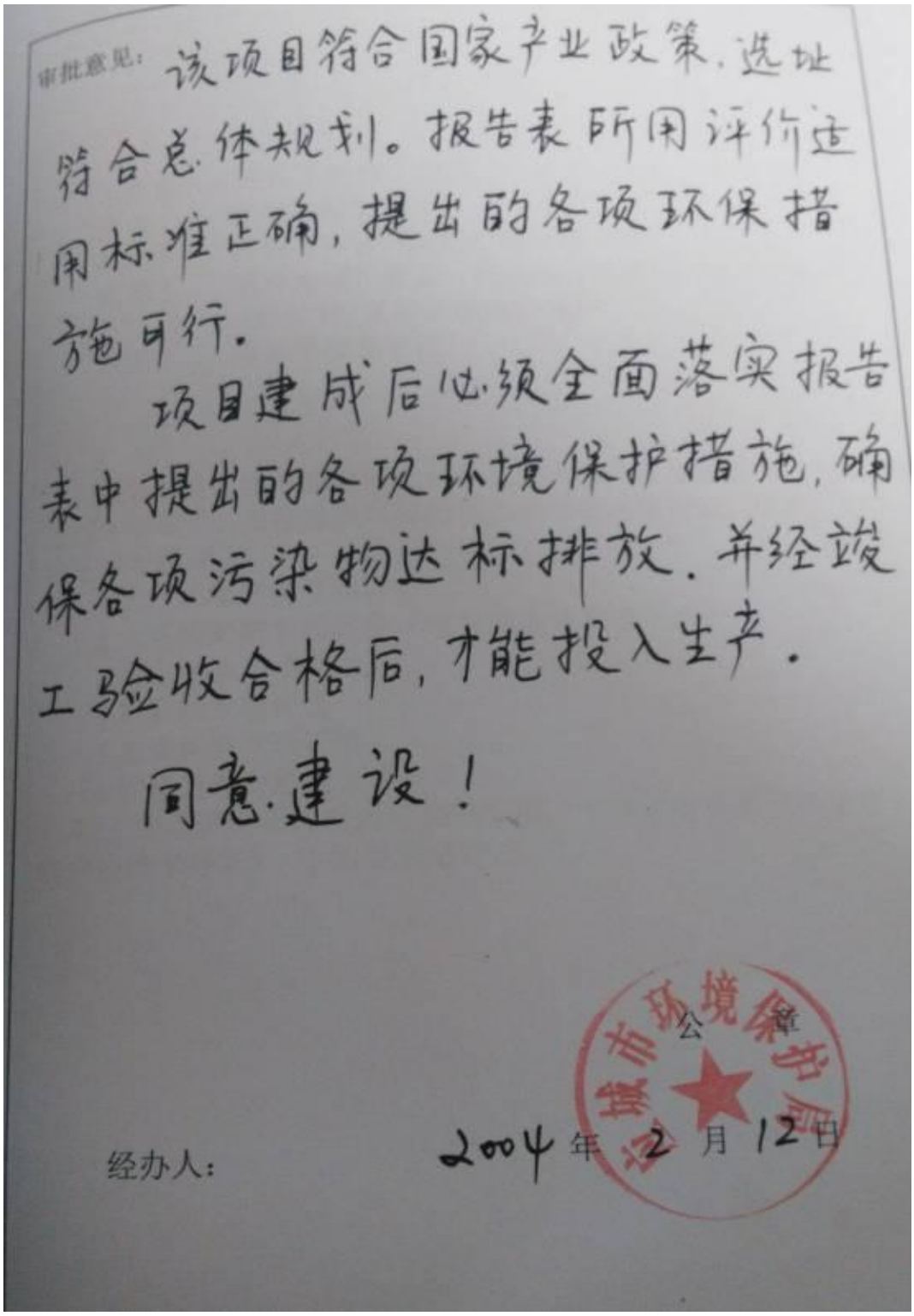
The noise of the Company is mainly generated from refrigeration units. Although the monitoring results show that the plant boundary noise indicators reach the standard, after the site investigation, it's considered that soundoroof windows and doors or low-noise refrigeration units still should be set up in accordance with the EIA requirements and doors and windows should be closed when working at night.

The Company needs to improve environmental management and strengthen risk awareness: (1) determine the responsible person and division of labor of environmental management; (2) formulate a more comprehensive emergency plan, and enhance emergency drills of the Company, which should be recorded by the Municipal Environmental Protection Bureau; (3) establish an inspection and maintenance system, and carry out regular inspection and maintenance on facilities such as retaining wall and diversion channel. When damage or abnormity is found, necessary measures should be taken to ensure the normal operation; the type and quantity of solid waste and other related information should be recorded in detail and kept for a long term for easy reference; (4) disclose environmental information in accordance with the requirements of the EIA.

In summary, no environmental safety accident occurred, and the Company had no illegal act violating environmental protection laws, and no complaint against the Company was received from startup of the project to this day. During the verification period, the Company does well in exhaust gas treatment, qualified pollutant emission concentration indicators in recent years and environmental management. But the Company still has many deficiencies, especially with regard to the potential risk of storage method of its industrial solid waste and hazardous waste, which should be improved under the premise of strictly implementing the environmental protection and pollution control measures, and actively cooperating and promising to implement the relevant environmental requirements.

Chapter 7 Annexes

Annex 1-1: Reply to EIR Form of the Organic Silicon and Organic Fluorine Products Project of Hubei Hengxin Chemical Co., Ltd. (2004)


审批意见：该项目符合国家产业政策，选址符合总体规划。报告表所用评价适用标准正确，提出的各项环保措施可行。

项目建成后必须全面落实报告表中提出的各项环境保护措施，确保各项污染物达标排放，并经竣工验收合格后，才能投入生产。

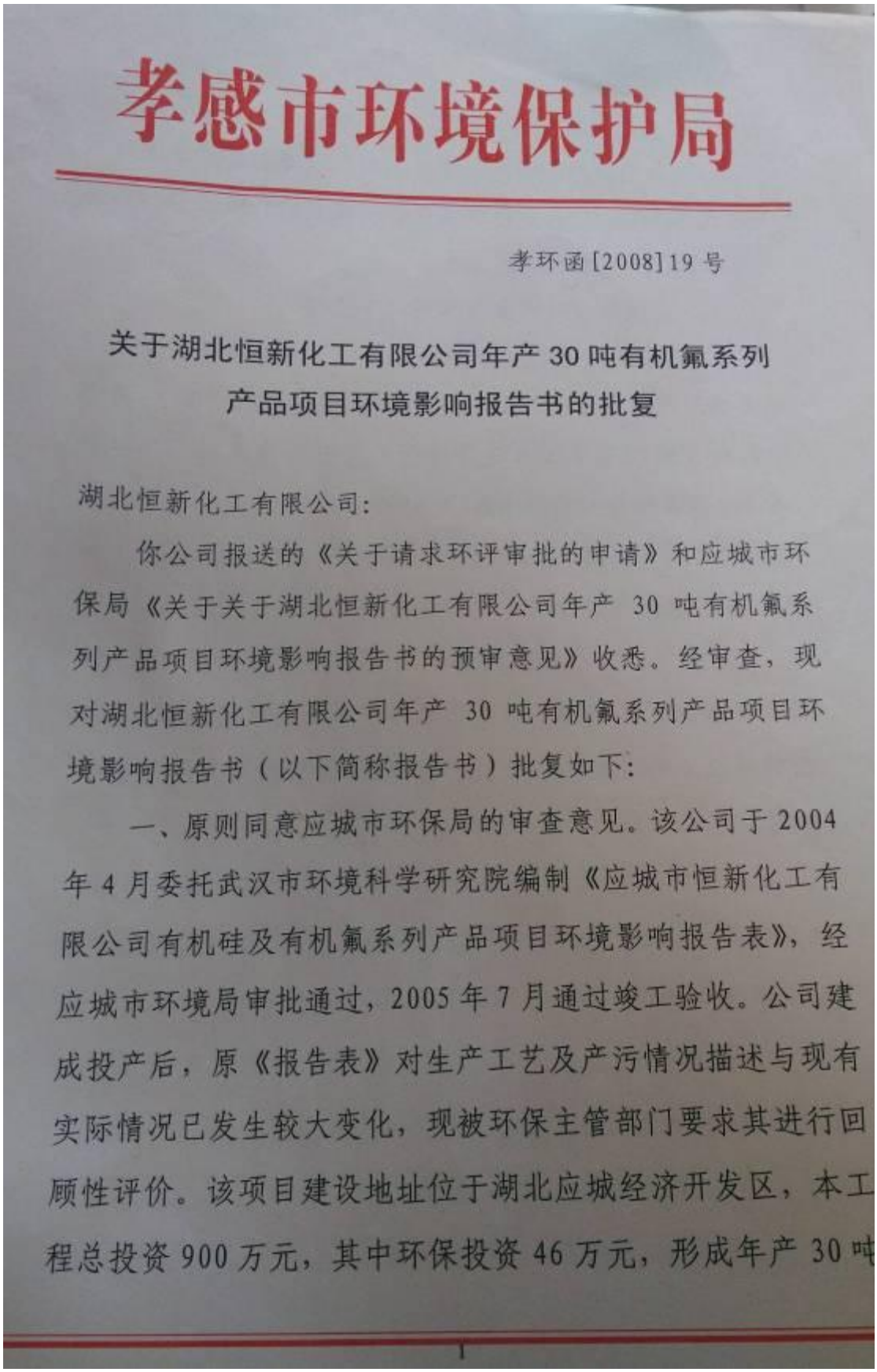
同意建设！

公章

经办人：

2004年2月12日

Annex 1-2: Reply to Retrospective Evaluation Report of the 30t/a Organic Fluorine Products Project of Hubei Hengxin Chemical Co., Ltd. (2008)



孝感市环境保护局

孝环函[2008]19号

关于湖北恒新化工有限公司年产30吨有机氟系列产品项目环境影响报告书的批复

湖北恒新化工有限公司:

你公司报送的《关于请求环评审批的申请》和应城市环保局《关于关于湖北恒新化工有限公司年产 30 吨有机氟系列产品项目环境影响报告书的预审意见》收悉。经审查，现对湖北恒新化工有限公司年产 30 吨有机氟系列产品项目环境影响报告书（以下简称报告书）批复如下:

一、原则同意应城市环保局的审查意见。该公司于2004年4月委托武汉市环境科学研究院编制《应城市恒新化工有限公司有机硅及有机氟系列产品项目环境影响报告表》，经应城市环境局审批通过，2005年7月通过竣工验收。公司建成投产后，原《报告表》对生产工艺及产污情况描述与现有实际情况已发生较大变化，现被环保主管部门要求其进行回顾性评价。该项目建设地址位于湖北应城经济开发区，本工程总投资900万元，其中环保投资46万元，形成年产30吨

有机氟系列产品的生产能力。

二、本项目属于国家允许类项目。项目选址符合应城市城市总体规划。在全面落实本报告书提出的各项污染防治措施后，该项目建设可行。

三、建设单位还须着重做好以下工作：

1、废水：对生产废水中和后回用于冷冻机循环水；采用生物处理系统对生活废水进行处理，投加 Ca（OH）$_2$和絮凝剂的方式对清洗废水进行处理。处理后废水排放应达到《污水综合排放排放标准》（GB8978-1996）中的一级标准及DB42/168-1999《湖北省府河流域氯化物排放标准》表 1 中化工行业最高允许排放浓度二级标准要求。

2、废气：对氯化氢气体采用喷淋塔洗涤回收后排放，处理效率应大于 99%；对氟化氢气体采用三级喷淋塔洗涤回收后排放，处理效率应大于 99%；燃煤锅炉换用天然气锅炉，使用天然气作为燃料。

3、噪声：对高噪声设备采取安装消音器、减振措施，降低噪声源。选用低噪声设备，确保厂界噪声达到《工业企业厂界噪声标准》（GB12348-90）III类限值要求。

4、固废：酰氯化工艺后蒸馏前馏分外售；电解工艺后蒸馏和前馏分进行深加工后作为副产品外售：煤渣、CaF_2：用于厂区内填平道路；生活垃圾交由环卫部门卫生填埋。

四、该项目已竣工。应按环评要求迅速完善环保设施后，

向我局提出试生产申请，经同意后，方可进行试生产。试生产期满（不超过3个月）应向我局申请办理项目竣工环保验收手续，经验收合格后，项目方可投入正式生产。

五、应城市环保局负责该项目现场环境监察管理工作。

二〇〇八年三月十七日

主题词：环保　化工　项目　环境影响　批复

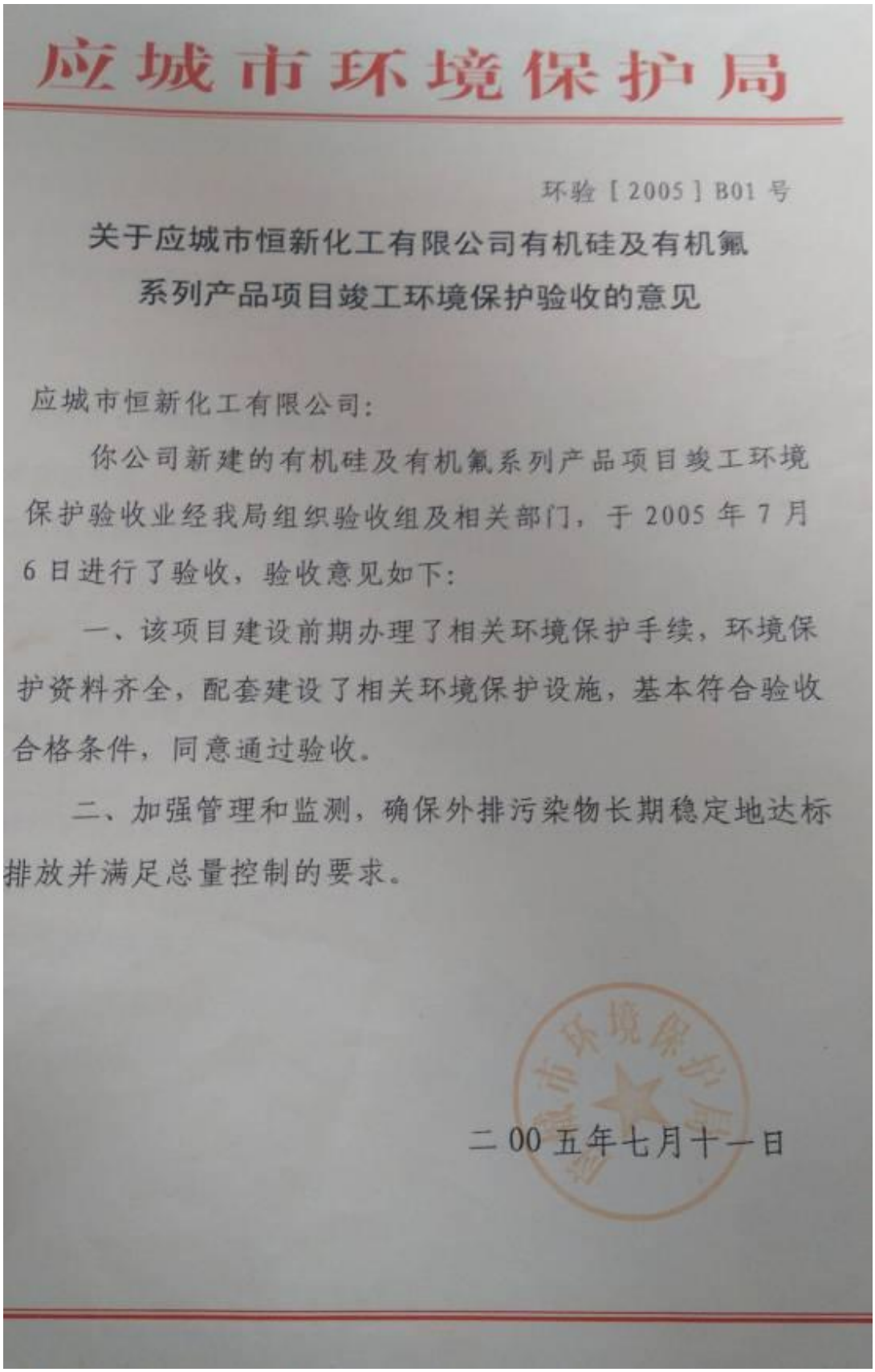
抄送：应城市环保局，市环境监察支队。

孝感市环境保护局办公室　　2008年3月18日印

共印8份

3

Annex 1-3: Opinions on Final Acceptance of the Organic Silicon and Organic Fluorine Products Project of Hubei Hengxin Chemical Co., Ltd. (2005)



应城市环境保护局

环验［2005］B01号

关于应城市恒新化工有限公司有机硅及有机氟系列产品项目竣工环境保护验收的意见

应城市恒新化工有限公司：

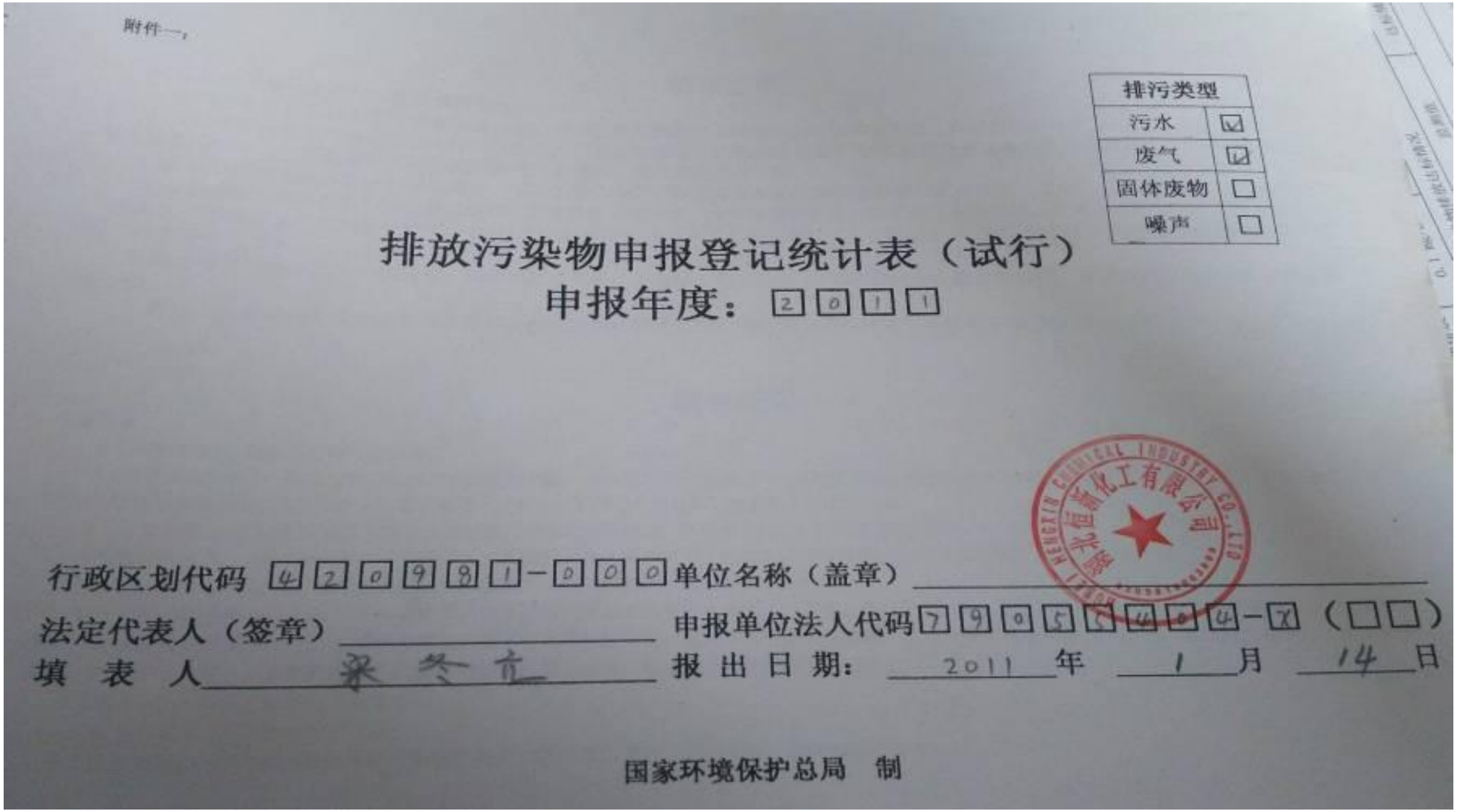
你公司新建的有机硅及有机氟系列产品项目竣工环境保护验收业经我局组织验收组及相关部门，于2005年7月6日进行了验收，验收意见如下：

一、该项目建设前期办理了相关环境保护手续，环境保护资料齐全，配套建设了相关环境保护设施，基本符合验收合格条件，同意通过验收。

二、加强管理和监测，确保外排污染物长期稳定地达标排放并满足总量控制的要求。

二00五年七月十一日

Annex 2-1: Cover of the *Statistical Form for Declaration and Registration of Pollutant Discharge* (2011)



附件一：

排污类型	
污水	☑
废气	☑
固体废物	□
噪声	□

排放污染物申报登记统计表（试行）

申报年度：2011

行政区划代码 420981-000 单位名称（盖章）

法定代表人（签章） 申报单位法人代码 79055404-X（□□）

填 表 人 梁冬立 报 出 日 期： 2011 年 1 月 14 日

国家环境保护总局 制

Annex 2-2: Pollutant Discharge Permit of Hubei Province (2012-2015)

湖北省排放污染物许可证

证书编号：K应-0900007

单位名称：湖北恒新化工有限公司

法人代表：高国保

单位地址：应城市体育南路长荆铁桥南1号

排放主要污染物种类：COD NH_3-N SO_2

排放主要污染物浓度：COD：100mg/L NH_3-N：15mg/L SO_2：900 mg/m^3（其余见副本）

总量控制指标：COD ：0.12t/a NH_3-N：0.04t/a SO_2：6.4t/a

有效期限：2012 年4 月16日至2015 年4 月15日

发证机关（公章）

2012年4 月16日

Annex 2-3: Pollutant Discharge Permit of Hubei Province (2015-2016)

湖北省排放污染物许可证

证书编号：K应_090007

单位名称：湖北恒新化工有限公司

法人代表：高国保

单位地址：应城市体育南路长荆铁桥南1号

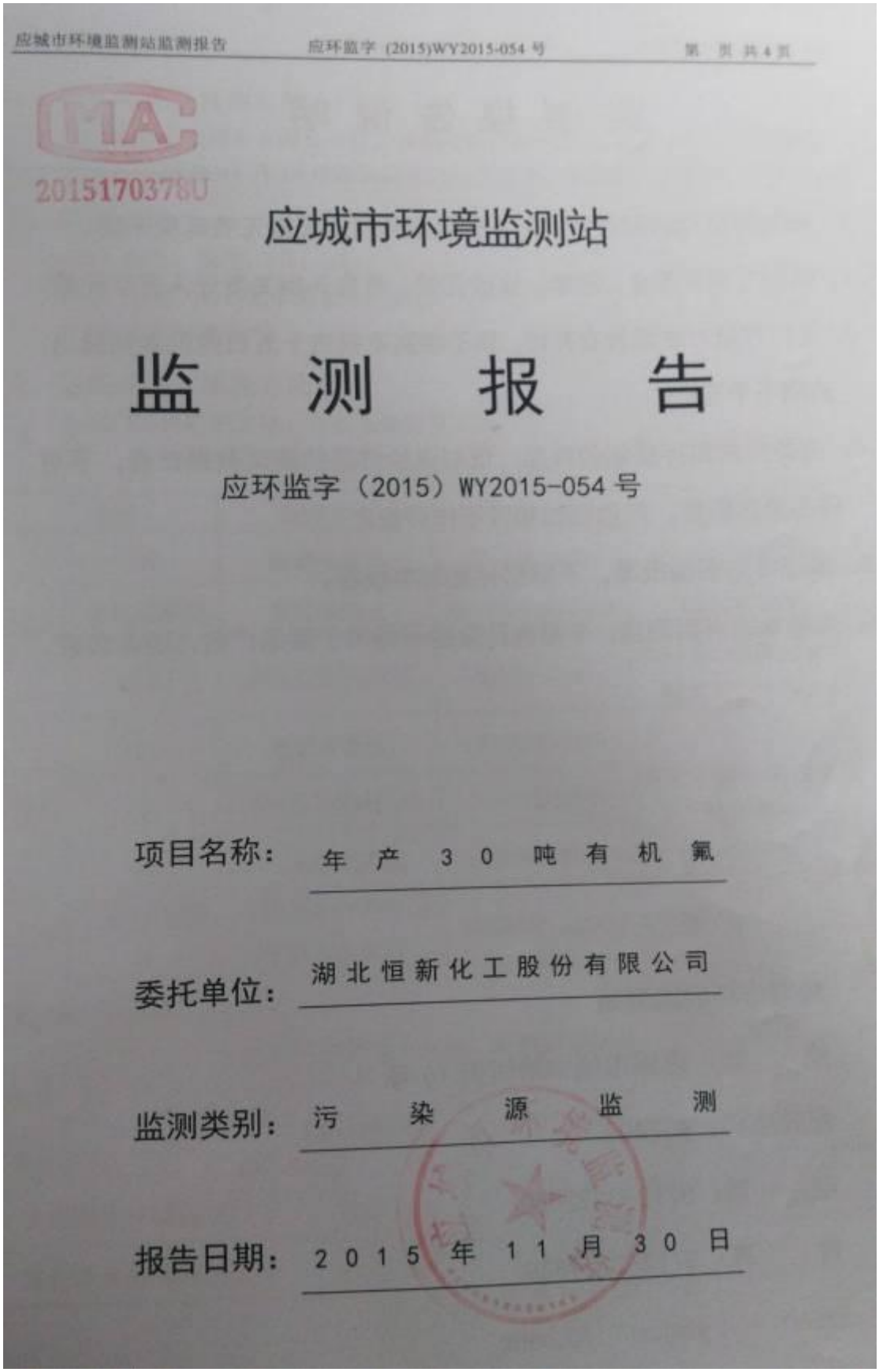
	COD	NH_3-N	SO_2	NO_x	烟尘
排放主要污染物种类：					
排放主要污染物浓度：	100mg/L	15mg/L	100 mg/m³	400 mg/m³	50 mg/m³
总量控制指标：	0.12t/a	0.04t/a	0.5t/a	1.42 t/a	0.19 t/a

有效期限：2015年4月16日至2016年4月15日

发证机关（公章）

2015年4月16日

Annex 3: Supervisory Monitoring Report (2015)



CMA
2015170378U

应城市环境监测站

监 测 报 告

应环监字（2015）WY2015-054 号

项目名称：年产30吨有机氟

委托单位：湖北恒新化工股份有限公司

监测类别：污染源监测

报告日期：2015年11月30日

1、任务来源及监测目的

湖北恒新化工股份有限公司位于应城市体育路长荆铁路南 1 号，受其的委托，我站于 2015 年 11 月 13 日对该公司进行了监测。监测期间该公司生产正常。

2、监测项目

（1）废气：烟尘、SO_2、NO_x；

（2）废水：pH、化学需氧量、氨氮；

（3）厂界环境噪声。

3、监测分析方法及方法来源

监测项目的监测方法、方法来源见表 3-1。

表 3-1　监测方法及方法来源

项目		监测方法	方法来源	使用仪器
废水	pH	玻璃电极法	GB/T6920-86	pHS-3C 型酸度计
	化学需氧量	重铬酸钾法	GB/T11914-1989	50ml 滴定管
	氨氮	纳氏试剂比色法	HJ535-2009	TU-1901 双束光紫外可见分光光度计
废气	烟尘	动压平衡法	GB16157-1996	崂应 3012H-08 烟尘烟气采样仪
	SO_2	定电位电解法(A)	HJ/T57-2000	
	NO_x	定电位电解法	HJ693-2014	
噪声	厂界环境噪声	工业企业厂界环境噪声排放标准	GB12348－2008	AWA6228 声级计

4、监测结果

表 4-1 生产废水排放口监测结果统计　　单位：mg/L

监测项目 / 采样点位	pH(无量纲)	化学需氧量	氨氮
恒新废水处理池进口	7.02	77.0	1.5
恒新废水处理池出口	6.86	87.4	3.1

表 4-2 废气监测结果

污染源名称	烟尘			SO_2			NO_x		
	排放浓度 mg/m³		排放量 kg/h	排放浓度 mg/m³		排放量 kg/h	排放浓度 mg/m³		排放量 kg/h
2T/h 燃气锅炉	实测	6	0	实测	1	0	实测	108	0.26
	折算	7		折算	1		折算	120	

标况风量 2413m³/h，锅炉压力为 82%。

（注：以实测浓度计算排放量；以折算浓度考核达标与否。）

表 4-3 厂界噪声监测结果　　单位：dB(A)

监测时间 \ 点号		1#	2#	3#	4#
11 月 13 日	昼	52.2	55.1	62.2	48.9
	夜	43.6	47.0	53.0	45.6

监测布点见附图

表 4-4 排放标准

标准号	标准名称	污染物	单位	标准限值
GB8978-1996	污水综合排放标准	化学需氧量	(mg/L)	100
		氨氮	(mg/L)	15
		pH	-	6～9
GB13271-2001	锅炉大气污染物排放标准	烟尘	mg/m³	50
		SO_2	mg/m³	100
		NO_x	mg/m³	400
GB12348-2008	工业企业厂界环境噪声排放标准(3 类)	厂界环境噪声	dB(A)	65(昼) 55(夜)

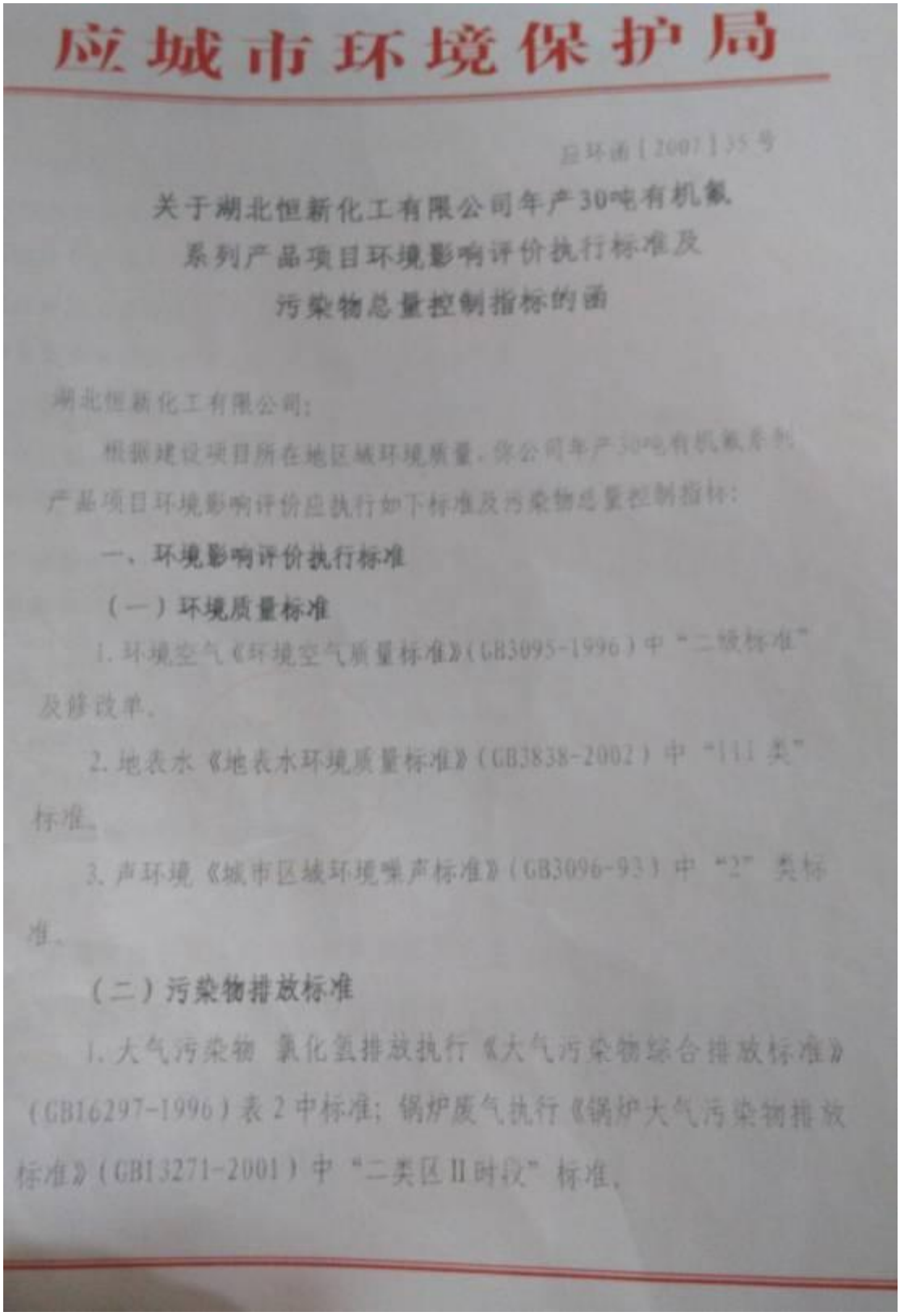
5、结论

监测结果显示该公司废水处理池出口所测废水中的污染因子浓度均未超过（GB8978-1996）《污水综合排放标准》中的规定限值；该公司所测废气和噪声均未超过相关标准中的规定限值。

报告编制：张冉　　审核：陈华　　签发：

日期：2015.11.30　　日期：2015.11.30　　日期：2015年11月30日

Annex 4: Letter on Total Pollutant Discharge Control Indicators of Hubei Hengxin Chemical Co., Ltd.



应城市环境保护局

应环函〔2007〕35号

关于湖北恒新化工有限公司年产30吨有机氯系列产品项目环境影响评价执行标准及污染物总量控制指标的函

湖北恒新化工有限公司：

根据建设项目所在地区域环境质量，你公司年产30吨有机氯系列产品项目环境影响评价应执行如下标准及污染物总量控制指标：

一、环境影响评价执行标准

（一）环境质量标准

1.环境空气《环境空气质量标准》（GB3095-1996）中"二级标准"及修改单。

2.地表水《地表水环境质量标准》（GB3838-2002）中"III类"标准。

3.声环境《城市区域环境噪声标准》（GB3096-93）中"2"类标准。

（二）污染物排放标准

1.大气污染物 氯化氢排放执行《大气污染物综合排放标准》（GB16297-1996）表2中标准；锅炉废气执行《锅炉大气污染物排放标准》（GB13271-2001）中"二类区II时段"标准。

2.水污染物《污水综合排放标准》(GB8978-1996)表4中"一级标准"；氯化物执行《湖北省府河流域氯化物排放标准》(DB42/168-1999)表1中化工行业二级标准。

3.厂界噪声执行《工业企业厂界噪声标准》(GB12348-90)中"II类"标准。

二、污染物总量控制指标

COD	0.12t/a
氨氮	0.04t/a
氯化物	0.13t/a
SO_2	6.4t/a
烟尘	1.9t/a
固体废弃物	0t/a

请你公司按上述标准和指标组织该项目的环境影响评价工作。

二〇〇七年十二月十二日

主题词：环评　恒新化工　有机氟　标准　总量指标　函

应城市环境保护局　　2007年12月12日发

共印3份

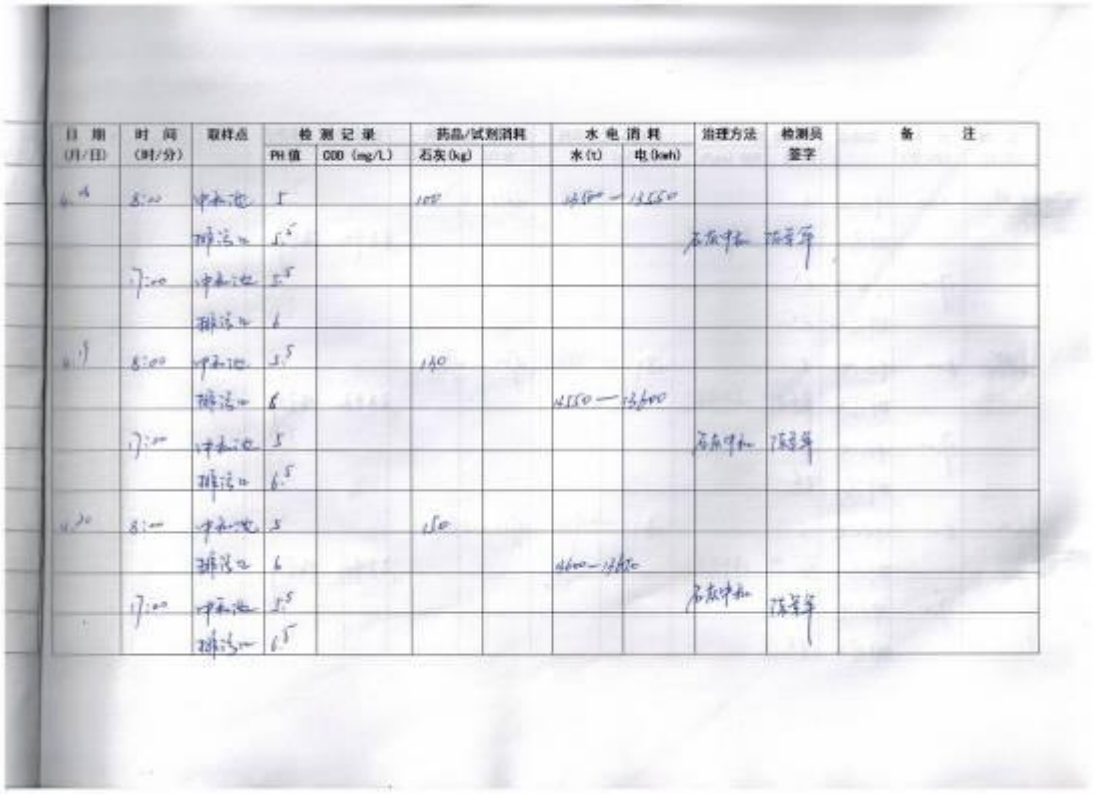
Annex 5: Operation Log of Environmental Protection Facilities

污染治理设施

运行记录

湖北恒新化工有限公司

2015 年（4 月 6 日—12 月 30 日）



日期 (月/日)	时间 (时/分)	取样点	检测记录 PH值	检测记录 COD (mg/L)	药品/试剂消耗 石灰(kg)	药品/试剂消耗	水电消耗 水(t)	水电消耗 电(kwh)	治理方法	检测员签字	备注
4.6	8:00	中和池	5		100		12500—13550				
		排污口	5.5						石灰中和	陈孝华	
	17:00	中和池	5.5								
		排污口	6								
4.9	8:00	中和池	5.5		140						
		排污口	6				13550—14600				
	17:00	中和池	5						石灰中和	陈孝华	
		排污口	6.5								
4.20	8:00	中和池	5		150						
		排污口	6				4600—13650				
	17:00	中和池	5.5						石灰中和	陈孝华	
		排污口	6.5								

Annex 6-1: Hazardous Wastes Disposal Contract (2015)

合同编号:

危险废物处置合同书

委托方（下称甲方）：湖北恒新化工有限公司

地　址：应城市·[illegible]

电　话：　　　　传　真：0712-3222988

受托方（下称乙方）：宜昌市危险废物集中处置中心

地　址：宜昌市伍家岗工业园

电　话：0717-6087488-8015　　传　真：0717-6087402

根据《中华人民共和国固体废物污染环境防治法》，甲乙双方就危险工业固体废弃物（以下简称"危险废物"）的安全处置，本着符合环境保护规范的要求、平等互利的原则，经双方友好协商，达成协议如下：

一、合作内容：

1、甲方作为危险废物的产生单位，特别委托乙方进行危险废物的处置。乙方作为专业危险废物处置单位，必须依据环保规范进行安全处置。

2、甲方提供的危险废物必须按废物的不同性质进行分类包装存放、标识清楚；乙方负责到甲方指定的贮存场所提取危险废物并运输到乙方处理场进行无害化处置。

3、乙方按双方约定或甲方通知时间收集甲方危险废物，甲方提供装车设备、人员等必要协助；废物出厂时，甲乙双方对数量、种类进行确认，以便跟踪管理及结算。

4、乙方按国家有关规定，对甲方的危险废物进行安全无害化处置，危险废物自甲方场地运出起，运输、处置过程中的所有风险均由乙方承担。乙方人员及车辆进入甲方厂区，需遵守甲方厂区规定进行作业。

5、自合同生效之日起，乙方即接受甲方委托，进行危险废物交接运输及处置工作。

二、危险废物名称及收费标准：

1

1、危险废物名称：HW11 、HW49

2、危险废物处理单价：5500元/吨

3、运输费：

三、结算方式：

在完成现场交接后，5个工作日内一次性付清，乙方提供正规发票。

付款方式：银行转账；付款信息：户名：宜昌市危险废物集中处置中心；

开户行：中行宜昌伍临路支行；账号：579457532659。

四、双方约定：

1、乙方未按双方约定时间到达甲方指定地点提取危险废物，造成甲方生产上的困扰；乙方未按规范要求进行危险废物处置。以上情况甲方有权中止合同，情节严重者，可根据合同法规定，索取相应赔偿。

2、甲方违约未将危险废物交给乙方处置或擅自将危险废物通过非法途径转移。以上情况乙方有权中止合同，情节严重者，可根据合同法规定，索取相应赔偿。

3、甲方未如期支付处置费用的，按照每日万分之三支付逾期付款违约金，超过一个月的乙方有权解除合同。

4、合同在执行过程中，如有未尽事宜，需经合同双方当事人共同协商，另行签订补充合同，补充合同与本合同具有同等法律效力。

5、本合同一式贰份，甲乙双方签字并加盖公章后生效，甲、乙双方各持壹份。

6、合同有效期限自2015年5月12日至2016年5月11日。

甲方：

甲方代表：

日　期：2015年5月12日

乙方：

乙方代表：

日　期：2015年5月12日

2

Annex 6-3: Hazardous Wastes Manifest (2014)

湖北省危险废物转移联单

NO: 0024673 编号:

废物产生单位填写

产生单位 [illegible] 电话 0717-3222988

通讯地址 [illegible] 邮编 [illegible]

运输单位 [illegible] 电话 0717-6087401

通讯地址 [illegible] 邮编 [illegible]

接收单位 [illegible] 电话 0717-6087402

通讯地址 [illegible] 邮编 [illegible]

废物名称 [illegible] 编号 HW11；HW49 数量 1吨，5吨

废物特性 [illegible] 形态 液、固 包装方式 桶、袋

外运目的：中转贮存□ 利用□ 处理□ 处置☑

主要危险成分 [illegible] 禁忌与应急措施 泄漏、防毒

发运人 [illegible] 运达地 宜昌 转移时间 2014 年 6 月 18 日

第一联 产生单位

废物运输单位填写

运输者需知：你必须核对以上栏目事项，当与实际情况不符时，有权拒绝接受。

第一承运人 [illegible] 运输日期 2014 年 6 月 18 日

车（船）型 东风 牌号 [illegible] 道路运输证号 [illegible]

运输起点 应城 经由地 [illegible] 运输终点 宜昌 运输人签字 [illegible]

第二承运人 [illegible] 运输日期 ___ 年 ___ 月 ___ 日

车（船）型 ___ 牌号 ___ 道路运输证号 ___

运输起点 ___ 经由地 ___ 运输终点 ___ 运输人签字 ___

废物接受单位填写

运输者需知：你必须核对以上栏目事项，当与实际情况不符时，有权拒绝接受。

经营许可证号 [illegible] 接收人 [illegible] 接受日期 2014.6.18

废物处置方式：利用□ 贮存□ 焚烧□ 安全填埋□ 其他□

单位负责人签字 [illegible]（章） 日期 2014.6.18

环保部门意见

移出地环保部门意见

（盖章）

年 月 日

接收地环保部门意见

同意

（盖章）

2014年6月20日

注：此联交付运输单位与废物转移运行，经废物接受单位盖章后交废物产生单位

Annex 6-4: Hazardous Wastes Manifest of Hubei Province (2015)

湖北省危险废物转移联单

NO:0018262　　编号：

废物产生单位填写

产生单位 [illegible]（章） 电话 0712-3222988

通讯地址 [illegible] 邮编 423000

运输单位 61699部队 电话 0717-6087401

通讯地址 邮编

接收单位 宜昌市危险废物集中处置中心 电话 0717-6087401

通讯地址 [illegible] 邮编 443000

废物名称 [illegible] 类别编号 HW11、HW49 数量 2.8吨，0.7吨

废物特性 [illegible] 形态 液、固 包装方式 [illegible]

外运目的：中转贮存□ 利用□ 处理□ 处置☑

主要危险成分 [illegible] 禁忌与应急措施 泄漏、防毒

发运人 运达地 宜昌 转移时间 2015 年 6 月 26 日

废物运输单位填写

运输者须知：你必须核对以上栏目事项，当与实际情况不符时，有权拒绝接受。

第一承运人 61699部队 运输日期 2015 年 6 月 26 日

车（船）型 东风 牌号 [illegible] 道路运输证号 [illegible]

运输起点 应城 经由地 [illegible] 运输终点 宜昌 运输人签字 [illegible]

第二承运人 运输日期 年 月 日

车（船）型 牌号 道路运输证号

运输起点 经由地 运输终点 运输人签字

废物接收单位填写

接受者须知：你必须核对以上栏目事项，当与实际情况不符时，有权拒绝接受。

经营许可证号 S-42-05-03-0047 接收人 [illegible] 接受日期 2015.6.26

废物处置方式：利用□ 贮存□ 焚烧□ 安全填埋□ 其他□

单位负责人签字 [illegible]（章） 日期 2015.6.26

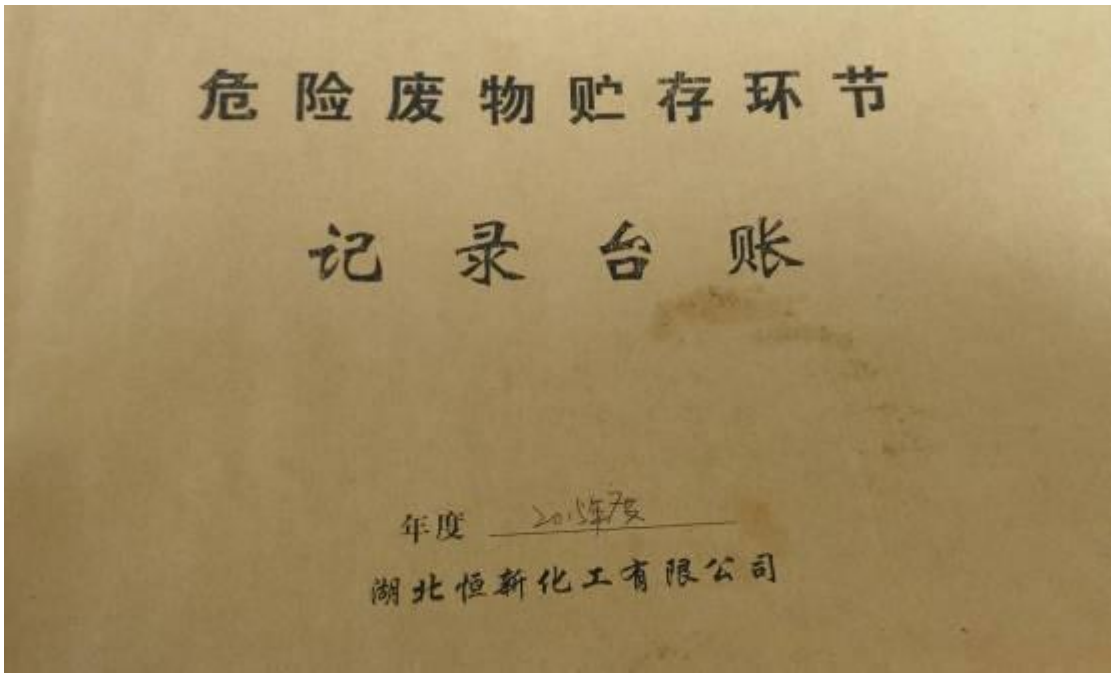
环保部门意见

移出地环保部门意见	接收地环保部门意见
（盖章） 年 月 日	（盖章） 年 月 日

第一联 产生单位

注：此联交付运输单位与废物转移运行，经废物接受单位盖章后交废物产生单位

Annex 6-5: Register of Hazardous Wastes in Storage



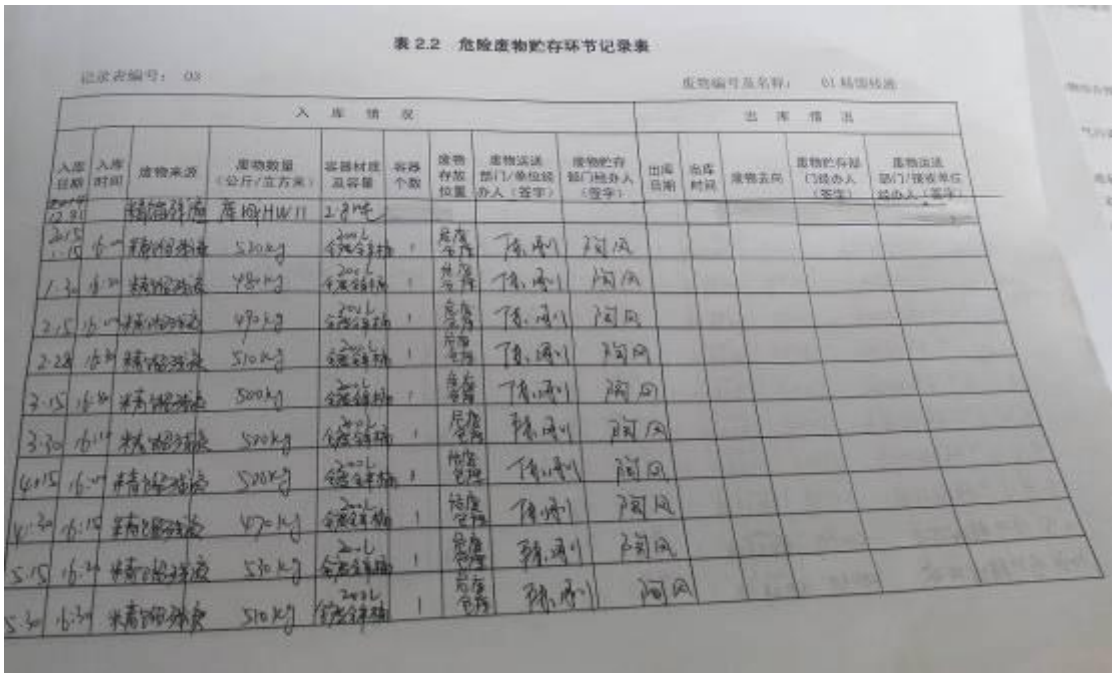


表 2.2 危险废物贮存环节记录表

记录表编号：03　　废物编号及名称：01 精馏残渣

入库情况								出库情况				
入库日期	入库时间	废物来源	废物数量（公斤/立方米）	容器材质及容量	容器个数	废物存放位置	废物送送部门/单位经办人（签字）	废物贮存部门经办人（签字）	出库日期	出库时间	废物去向	废物贮存部门经办人（签字）	废物送送部门/接收单位经办人（签字）
2017		精馏残渣	废物HW11	2.5吨									
2.15	16:11	精馏残渣	520kg	200L铁桶	1	危废仓库	陈刚	陈凤					
2.24	16:24	精馏残渣	480kg	200L铁桶	1	危废仓库	陈刚	陈凤					
2.28	16:11	精馏残渣	510kg	200L铁桶	1	危废仓库	陈刚	陈凤					
3.15	16:24	精馏残渣	500kg	200L铁桶	1	危废仓库	陈刚	陈凤					
3.30	16:11	精馏残渣	520kg	200L铁桶	1	危废仓库	陈刚	陈凤					
4.15	16:11	精馏残渣	500kg	200L铁桶	1	危废仓库	陈刚	陈凤					
4.30	16:11	精馏残渣	490kg	200L铁桶	1	危废仓库	陈刚	陈凤					
5.15	16:24	精馏残渣	510kg	200L铁桶	1	危废仓库	陈刚	陈凤					
5.30	16:24	精馏残渣	510kg	200L铁桶	1	危废仓库	陈刚	陈凤					

Annex 6-6: *Legal Person Certificate* and *Organization Code Certificate* of Yichang Solid Wastes Disposal & Management Center (Yichang Hazardous Wastes Treatment Center)

事业单位法人证书

事证第 142053000229 号

名　　称 宜昌市固废处置管理中心（宜昌市危险废物集中处置中心）

法定代表人 熊辉

宗旨和业务范围 负责中心城区生活垃圾转运 城区生活垃圾处理 全市医疗废物处理、危险废物的处置

经费来源 全额拨款

开办资金 ¥2251万元

住　　所 宜昌市西陵后路附10号

举办单位 宜昌市城市管理局

制发机关

登记管理机关

有效期 自 2013年4月3日 至 2014年3月31日

年度报告标记

中华人民共和国
组织机构代码证

代　　码 42018122-3

机构名称 宜昌市固废公司（宜昌市危险废物集中处置中心）

机构类型 事业法人　熊辉

地　　址 宜昌市西陵后路附10号

有 效 期 自2012年04月24日至2014年07月13日

颁发单位 湖北省宜昌市质量技术监督局

登 记 号 组代管420500-059614

中华人民共和国国家质量监督检验检疫总局

年检记录

NO.2011 1133282

Annex 6-7: Practicing certificates of hazardous wastes transport staff

姓名	赵锡福
性别	男
出生年月	1959年11月
住址	鄂枝江市马家店街办军民路4号
身份证件号	422723195911100092
从业资格证件号	420583101000800 4308
从业资格类别	道路危险货物运输驾驶员
初次发证时间	2005年6月21日
发证机关	有效期至 2014 年 11 月 17 日 发证日期 2009 年 11 月 17 日

服 务 单 位

联系电话： 地址： （盖章） 年 月 日	联系电话： 地址： （盖章） 年 月 日
联系电话： 地址： （盖章） 年 月 日	联系电话： 地址： （盖章） 年 月 日
联系电话： 地址： （盖章） 年 月 日	联系电话： 地址： （盖章） 年 月 日

姓名	边会萍
性别	女
出生年月	1974年3月
住址	鄂枝江市马家店街办军民路4号
身份证件号	422723197403050040
从业资格证件号	420583103001300 1088
从业资格类别	道路危险货物运输押运人员
初次发证时间	2013年11月5日
发证机关	有效期至 2019 年 11 月 05 日 发证日期 2013 年 11 月 5 日

服 务 单 位

联系电话： 地址： （盖章） 年 月 日	联系电话： 地址： （盖章） 年 月 日
联系电话： 地址： （盖章） 年 月 日	联系电话： 地址： （盖章） 年 月 日
联系电话： 地址： （盖章） 年 月 日	联系电话： 地址： （盖章） 年 月 日

Annex 6-8: ***Permit for Road Transport of Hazardous Wastes*** **and** ***Vehicle Registration Card***

中华人民共和国

道路危险货物运输许可证

鄂交运管许可 危 字 420983920004 号

单位名称：湖北南星化工总厂（61699部队）　　地　　址：湖北省宜昌市枝江市3号信箱12分箱

运输范围：1类1项;2类1项;5类1项;6类1项;8类###

证件有效期：2010 年 8 月 24 日 至 2014 年 7 月31 日　　2010 年 8 月 24 日

中华人民共和国交通部监制

Annex 7-1: Environmental Hazard Prevention Measures and Emergency Response Plan

环境风险防范
措施和应急预案

预案编号：HBHX-HJ-2014-01

版本号：A/O

分布日期：2006 年 01 月 01 日

修正日期：2014 年 12 月 30 日

编制单位：公司环境保护领导小组

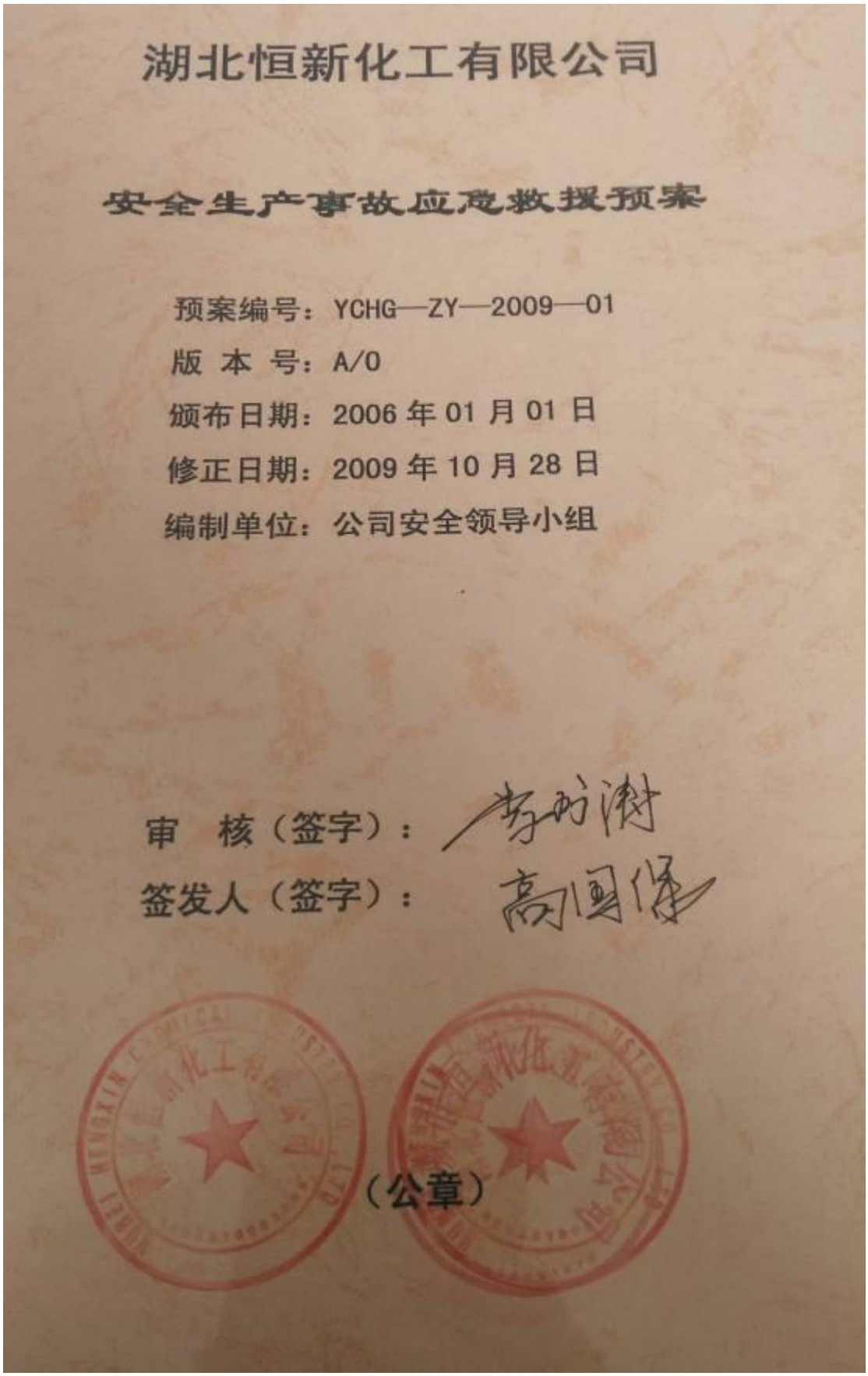
审 核（签字）：

签发人（签字）：

湖北恒新化工有限公司

二〇一四年十二月

Annex 7-2: Emergency Rescue Plan for Work Safety Accidents



湖北恒新化工有限公司

安全生产事故应急救援预案

预案编号：YCHG—ZY—2009—01

版 本 号：A/0

颁布日期：2006 年 01 月 01 日

修正日期：2009 年 10 月 28 日

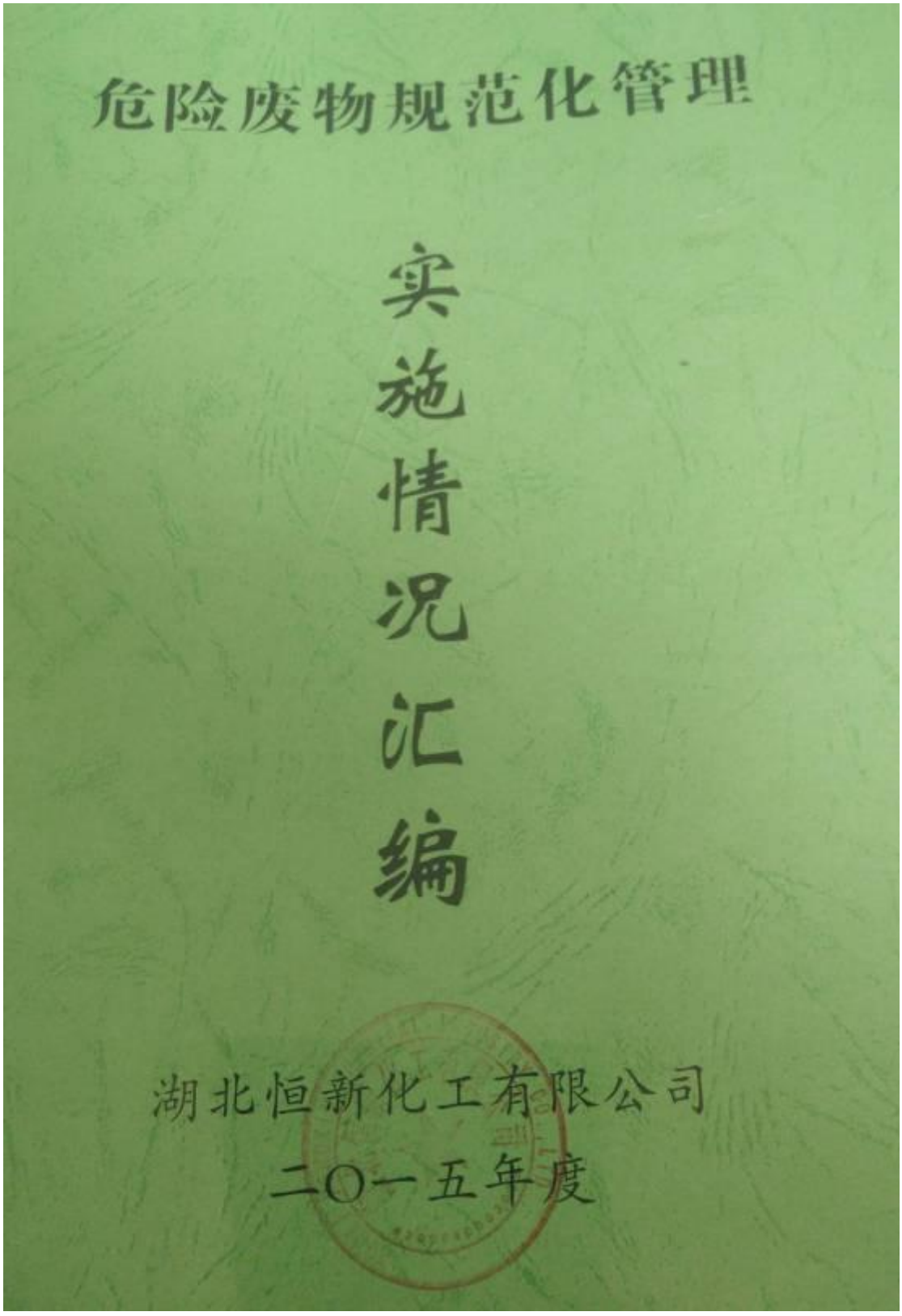
编制单位：公司安全领导小组

审 核（签字）：

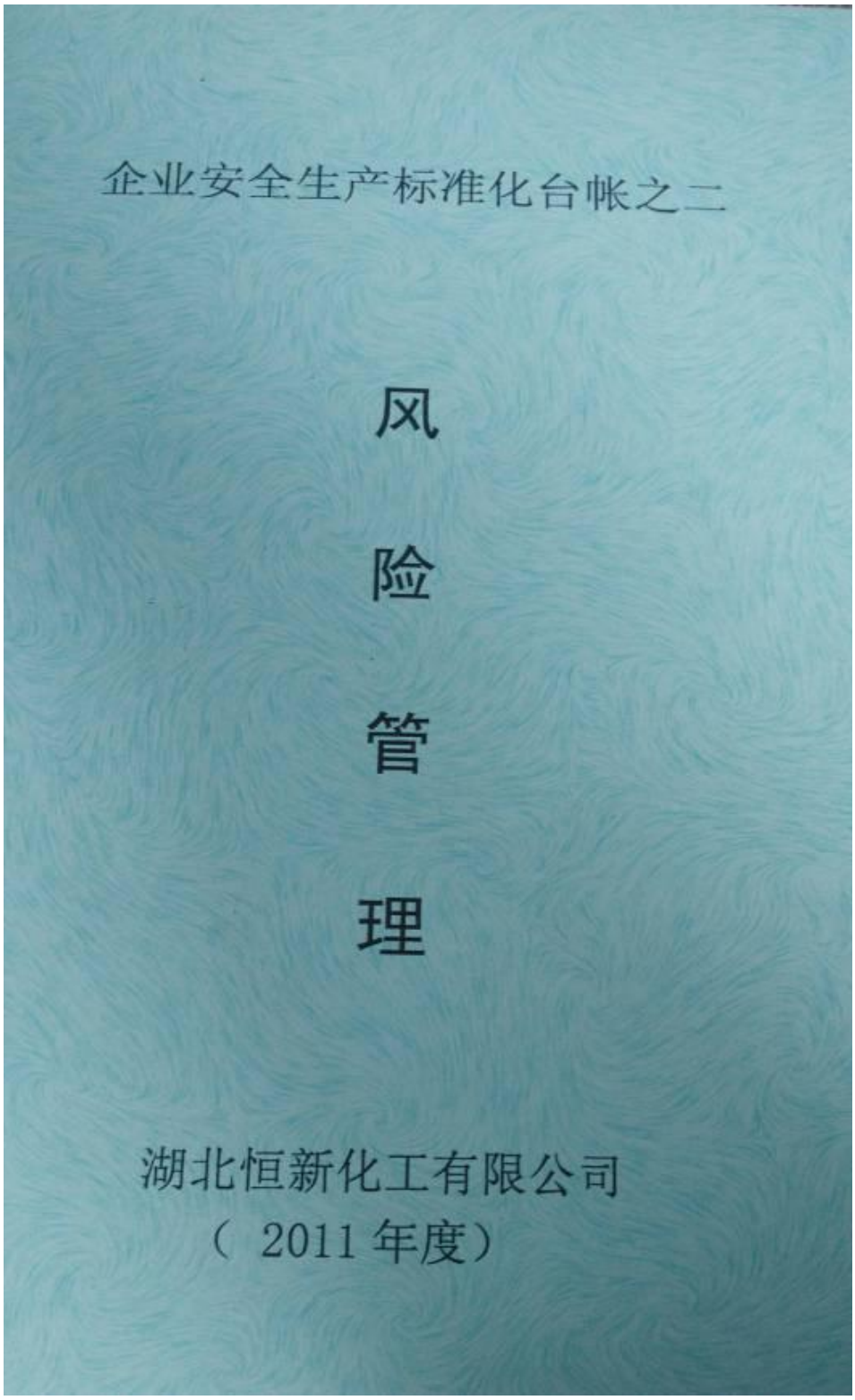
签发人（签字）：

（公章）

Annex 7-3: Implementation of Standardized Management of Hazardous Wastes

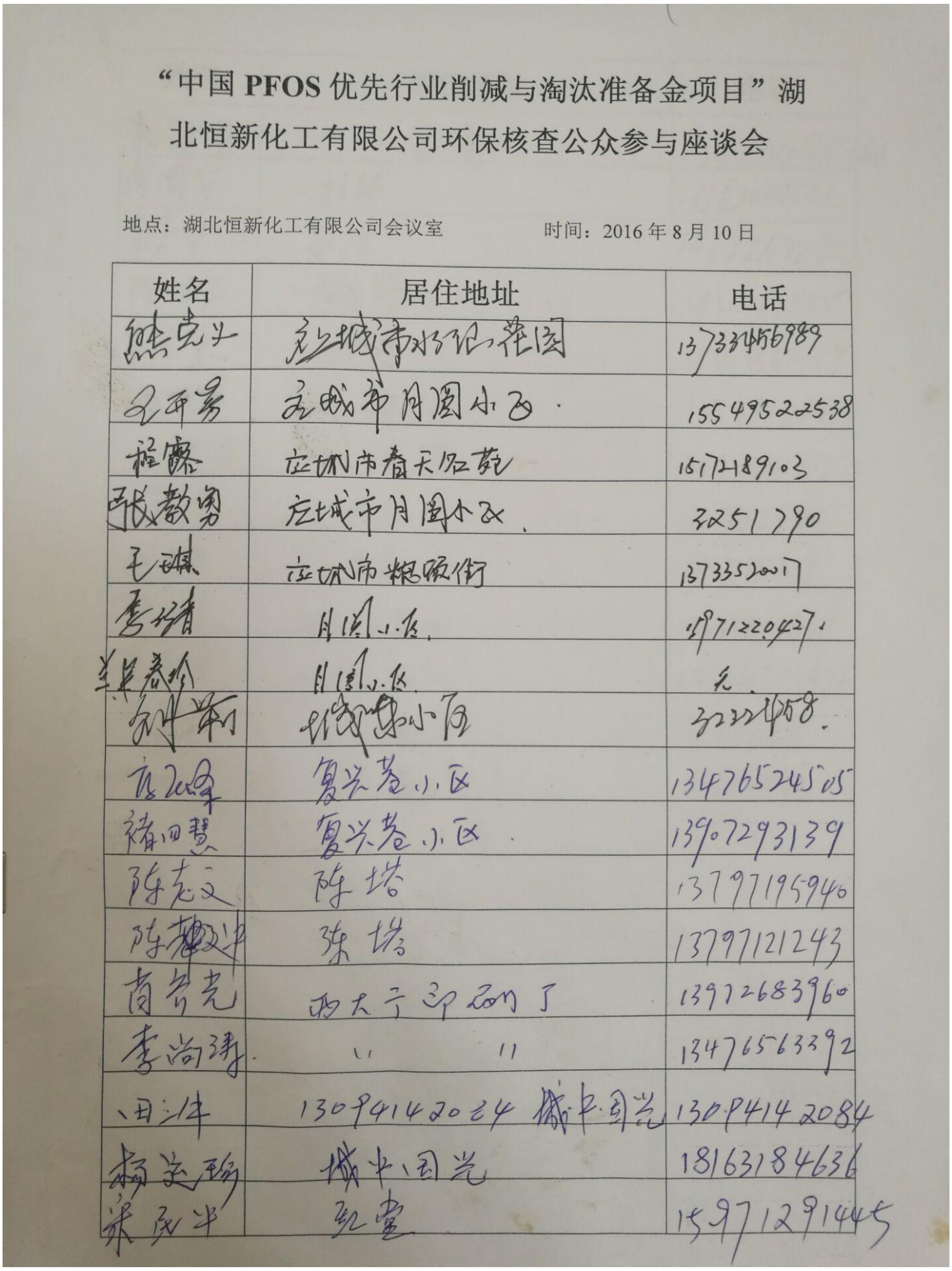


Annex 7-4: Cover of the *Enterprise Work Safety Standardization Log II: Risk Management*



Annex 8: Sign plate of wastewater discharge outlet

Annex 9: Sign-in Sheet of Discussion Meeting of Public Consultation of Hubei Hengxin Chemical Co., Ltd.



"中国 PFOS 优先行业削减与淘汰准备金项目"湖北恒新化工有限公司环保核查公众参与座谈会

地点：湖北恒新化工有限公司会议室 时间：2016 年 8 月 10 日

姓名	居住地址	电话
熊克义	应城市水利花园	13733456989
王开秀	应城市月圆小区	15549522538
程露	应城市春天花苑	15172189103
张教勇	应城市月圆小区	3251790
毛琪	应城市粮贸街	13733520017
李小清	月圆小区	13971220427
姜春玲	月圆小区	无
刘华莉	城东小区	3232458
陈飞峰	复兴苍小区	13476524505
储四慧	复兴苍小区	13907293139
陈志文	陈塔	13797195940
陈[illegible]中	陈塔	13797121243
肖翁光	西大宁印刷厂	13972683960
李尚涛	〃 〃	13476563392
田江伟	13094142024 城中国光	13094142084
杨美玲	城中国光	18163184636
朱庆华	红星	15971291445

姓名	居住地址	电话
汪仲平	湖北省应城市锦新锦	18171617229
刘翠君	湖北省应城市锦新锦	13872721119
路树安	开发区路塔村	17771218352
王永红	开发区路塔村	13545451759
黄汉年	湖北省应城市城中肖塘村黄塘组	15871323862
林冬梅	湖北省应城市城中肖塘村黄塘组	15897710306
陈志平	湖北省应城市陈塔村	13545451285
陈雁龙	湖北省应城市陈塔村	13545451285
夏新国	湖北省应城市粮贸街	18872669095
夏维	湖北省应城市粮贸街	18872669095
陈华林	湖北省应城市三合镇西头村陈南	15826870266
江红艳	湖北省应城市三合镇西头村陈南	15826870266
陈中尧	陈塔社区	13797119820
杨国珍	陈塔社区	63449
陈祥	应城市解放街古城社区	13217210680
王桂芳	应城市解放街古城社区	13165662962
高玉娟	应城市杨岭镇棉田村	15172236553
宋丽琴	应城市杨岭镇棉田村	17683792808