

Checklists of Environmental Risk Identification

Chemical Industry



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Checklists of Environmental Risk Identification

Chemical Industry

by

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Overview

The objective of chemical industry checklist is to set up a standard and easy-operating reference of environmental risk identification for chemical enterprises, which will serve as a basis for environmental risk management. Considering the fact that environmental risk management is converting from pollution sources management to the risk management and responsibilities of environmental department are expanding from end-of-pipe treatment facilities to the front, the chemical enterprises, according to their equipment properties, are classified into four systems: production process, storage area, logistics, and end-of-pipe treatment. In addition, based on the duty and authority of China environmental management department, another three systems-----out-plant environment management, outlet management and environmental risks management are added in. Based on the characteristics, sub-checklists are given for all sub-systems standing for a unit or a facility set. In addition to the annual inspection checklist, the chemical industry checklist consisted of 26 sub-checklists for the environmental protection department to carry out chemical enterprise risk inspection and for enterprises to conduct self-inspection.

The first chapter of annual inspection checklist includes the key points and main content of environmental risk inspection and can be used for the general and overall annual inspection of enterprises to identify their level of enterprise risk management. Chapter two to eight respectively introduces the mechanism of environmental risk management, production process, logistics, hazardous chemicals, end-of-pipe treatment facility, outlet, and out-plant environment. Chapter nine lists the sub-checklists and calculation methods for system risk classification. It can be used as a reference to assess the environmental risk classification of enterprises.

All the checklists contain three sections: recommendation, recommendation implementation and improvement methods. The first section lists the important and key points for unit inspections and gives recommendation attained by analyzing from five perspectives: policy support, mainly laws and regulations in chemical and environmental fields; analysis of environmental incidents and accidents; typical chemical environmental risk management and practical investigation; investigation conducted by the environmental protection department and expert consultation. The second section examines whether or not enterprises execute the recommendations by means of "Q&A" and chart reports. The third section offers short-, medium- and long-term improvement methods that enterprises can use. The short-term methods can be implemented without many resources because they are pretty simple in terms of technology; the medium-term ones require resources and organizational inputs of enterprises, most of which can meet the requirement of recommendation after implementation; the long-term ones demand the efforts and centralized resources of enterprises and can fully fulfill the requirements of recommendations.

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Contents

Chapter One

Checklist of Annual Inspection

Section One Recommendations

- 1. Environmental impact report includes:
 - (1) Construction project profiles;
 - (2) Surrounding Environmental conditions;
 - (3) Environmental impact assessment and prediction;
 - (4) Environmental protection measures and economic and technical demonstration;
 - (5) Cost-benefit analysis of environmental impacts;
 - (6) Suggestions on environmental monitoring execution;
 - (7) Conclusion

Construction projects that concern water-soil conservation must have a water-soil conservation proposal approved by relevant administrative department.

2. Profiles of neighbouring environment

From the prospective of impacts on surrounding environments, the following issues should be included:

- (1) The profiles of surrounding surface and underground water;
- (2) The profiles of traffic;
- (3) Equipments and facilities for both domestic and industrial water supply and for transportation;
- (4) Pipe network and wastewater treatment facilities around enterprises;
- (5) Water resource protection area;
- (6) Other areas like waste treatment plant and landfills.
- Environmental risk management requires setting up a responsibility system to define the duties, rights, obligations and job contents of leaders (at all levels), managers, staff and all departments.
- 4. Enterprises shall identify significant hazardous sources and put in place significant hazardous source management.
- 5. Enterprises shall establish a mechanism for periodical inspection and random check for environmental risks.
- Enterprises shall establish a mechanism for projecting and revamping environmental accident potentials. The obviated potentials should be managed in a hierarchical and dynamic way.
- 7. Execute the risk prevention methods required according to the results of environmental risk inspection.
- 8. Establish emergency response system and execute hierarchical management system.

Enterprises need to establish a developed emergency management system and an organization structure.

- 9. According to the state regulations, prepare adequate emergency supplies and keep them in good condition.
- 10. According to the state and local laws and regulations, and combined with results of risk management, enterprises should develop emergency plans for potential incidents and sudden accidents.
- 11. Establish environmental incident reporting mechanism and procedures.
- 12. Establish change management mechanism, adjusting environmental risk management to the permanent and temporary changes in staffs, management, process, technologies and facilities.
- 13. Enterprises provide plant layout, PFD, surrounding area drawing, mass balance, water balance, and pipe network drawing.
- 14. Realize clean production process of low energy consumption and pollution by:
 - (1) Using non- or low toxic and noxious materials and energy;
 - (2) Using new technologies and processes to convert resource to the products as much as possible, and to discharge lowest pollution;
 - (3) Using new type of equipments that produce no or low pollution, low noise and that are energy-efficient;
 - (4) Rationalizing product structure and developing products with little or no impact on the environment;
 - (5) Using advanced, efficient and affordable facilities for material and energy recycling, and "three waste" treatment.
- 15. With regard to pollution prevention, in order to make sure that discharges from enterprises comply with state and local discharge limits, enterprises should take into account centralized and local management, total and concentration control, end-of-pipe disposal and whole process control as well as comprehensive utilization and purification.
- 16. All valuable chemical wastes are either recycled or comprehensively utilized:
 - Use remaining heat and combustible air as energy source and fuel for industry and households;
 - Separate and recycle or further process the usable part of the wastes to make new products;
- (3) Coordinate and recycle wastes among enterprises to improve wastes utilization.

Section Two Recommendation Implementation

1. Environmental impact assessment (EIA) report

1.1 Is the EIA report composed on the basis of the requirements?

Yes	No	Not applicable
1.2 Does the EIA r	eport include an exclu	usive chapter for environmental risk assessment?
Yes	No	Not applicable
1.3 Have the prev been carried throug	rention methods requ	lired by the exclusive chapter of environmental risk

Yes No Not applicable

Measures:
Short-term:
1. Organize production that strictly accords with the requirements in EIA report to control
the pollution.
2. Periodical inspection makes sure that methods in the report are able to play an
effective role.
<u>Medium-term</u> :
1. Improve the recommended methods in the report according to the actual production
and pollution fluctuation.
2. Periodically undertake self-inspection to assess the implementation of EIA report.
Long-term:
1. Compose EIA report according to the requirements.

Environmental risks confirmation			
Have all the detail points in recommendations been taken into account and implemented			
Yes	Partially	No	
RC=1	RC=5	RC=10	

2. Neighbouring environment

Has the enterprise investigated its surrounding environment, including:

- 2.1 Surface and underground water;
- Yes No Not applicable

2.2 Traffic;

- Yes No Not applicable
- 2.3 Equipments and facilities for both domestic and industrial water supply and for transportation;

Yes No Not applicable

- 2.4 Pipe network and wastewater treatment facilities;
- Yes No Not applicable

2.5 Water source protection area;

Yes No Not applicable

2.6 Other areas like waste treatment plants and landfills.

Yes No Not applicable

Short-term:

- 1. Fully coordinate and communicate with local environmental protection authority to know about the basic information and function requirements of surrounding environmental sensitive zones.
- 2. Have full-time staff undertake detailed investigation on surrounding environment, and follow up the corresponding changes.

Medium-term:

1. Take adequate methods to prevent hazardous substances from trespassing surrounding sensitive zones.

Enviro	Environmental risk confirmation			
Have all the detail points in recommendations been taken into account and implemented?				
	Yes	Partially	No	
	RC=1	RC=5	RC=10	

3. Responsibility system

3.1 Has a responsibility system been established to define the duties, rights, obligations and specific job contents of leaders (at all levels), management personnel, workers and departments?

Yes No Not applicable

Short-term:

- 1. Establish and integrate a responsibility system for environmental risk management.
- 2. Staffs and departments at all levels should be clear about their responsibilities, duties and requirements.
- 3. Objectives and requirements of environmental risk management. The objective of environmental risk management is to eradicate incidents by controlling the impacts of enterprises on surrounding water body and other sensitive zones within the permit of laws and regulations. For this matter, it has to
 - (1) Genuinely assess the pollution preventability of enterprises;
 - (2) Analyze the deficiencies in the current environmental pollution prevention methods, and identify possible environmental risks such as in materials and equipment from all aspects;
 - (3) Develop short-term, medium-term and long-term methods for environmental accident potentials.
 - (4) Periodically train leaders at all levels, management personnel and workers with corresponding environmental risk management.

Environmental risk co	onfirmation				
Have all the detail points in recommendations been taken into account and implemented					
	Deutielle	N1-			
Yes	Partially	NO			
RC=1	RC=5	RC=10			

4. Hazardous source identification

4.1 Has hazardous source identification been done?

Yes No Not applicable

4.2 Does hazardous source identification cover all aspects including equipment and facilities, activities, alternations, and internal/external environment of enterprise? If yes, fill in the table below.

Yes No Not applicable

Place, Activity, Equipment, Materials	Hazardous Source	Possible Harm	Existing Control Methods	Follow-up measures	Persons in Charge

4.3 Has the enterprise established hazardous source management including management goal, parameters, management proposal, etc.?

Yes No Not applicable

Remarks:

Measures:

<u>Short-term</u>:

- Changes in caption 7.2 include new or amended laws and regulations or other requirements; alternation in operation and process; new, reconstruction, expansion or technology transformation projects; new understanding of incidents and accidents or other information; and adjustment in organization structure.
- 2. Inform practitioners of risk assessment results and of altered prevention methods (by training).

<u>Medium-term</u>:

1. Timely assess the environmental risks of accident and alternations.

Environmental risk confirmation			
Have all the detail po	pints in recommenda	ations been take	en into account and implemented
Yes	Partially	No	
RC=1	RC=5	RC=10	

5. Inspection and random check

5.1 Has a system of periodical inspection and random check for environmental risk been established?

Yes No Not applicable

If yes, describe the regulations (inspection frequency, object, content, scope, etc.):

5.2 Does the system of inspection and random check define objectives, requirements, content and detailed plans?

Yes No Not applicable

Me	easures:
<u>Sh</u>	ort-terms:
1.	The objective of risk inspection and random check is to ensure the goal of controlling
	the environmental incidents achieved and to eradicate over-discharge practices.
2.	The main task of inspections is to investigate environmental accident potentials and to
	propose methods and measures for eliminating or controlling environmental risks.
3.	Enterprises should set up a contact system of persons in charge to periodically carry
	out and guide environmental risk inspection on key areas like discharge outlet,
	prevention facilities, etc.
4.	Clarify environmental risk inspectors' duty and authority.

Have all the detail points in recommendations been taken into account and implemented			
10			

6. Accident potentials management

6.1 Has the obviation of accident potentials been done? If yes, fill in the following table

Yes	No	Not applicable		
No.	Items	Impacts	Measures	Remarks

6.2 Do the detected accident potentials in 19.1 have any subsequent projects established or being revamped?

Yes No Not applicable

6.3 With regard to accident potentials, does the enterprise have a comprehensive and effective management system ensuring the potentials are prevented from evolving into environmental incidents or accidents?

Yes No Not applicable

Short-term:

- 1. Carry through the technical revamping proposal for the detected accident potentials.
- 2. Prepare a revamping proposal that includes goals and tasks; applied measures and methods; finance and materials; responsible organizations and people; schedule and requirements; and emergency response plans.
- 3. Revamping accident potentials should have specialists in charge of settling down staffing, financial issues, and schedule.
- 4. Periodically carry out investigations for detecting environmental accident potentials.

Environmental risk confirmation				
Have all the detail points in recommendations been taken into account and implemented				
	Yes	Partially	No	
	RC=1	RC=5	RC=10	

7. Risks prevention measures

7.1 Are there enough risk prevention measures to ensure environmental risks are under control?

Yes No Not applicable

7.2 Are risk prevention measures well-integrated and functional?

Yes No Not applicable

<u>Short-term:</u>

- 1. Enterprises should arrange periodical inspections and random checks on environmental risks
- 2. Refer to the requirements of risk prevention measures in the checklist of enterprise environmental risks and chemicals for national key industries (See appendix).
- 3. Train practitioners to acquaint to the risks in their occupation and working environment, as well as to the relative preventive measures.
- 4. Construction of enterprises pollution prevention and emergency measures considers following aspects:
 - (1) Identification of key controlling objects and equipment/units of the enterprise environmental risk management; construction of pollution prevention system and materials preparation such as construction of pre-and post-wastewater treatment. Know about current status of enterprises pollution control.
 - (2) Pollution prevention measures for container and vessel dikes in storage area or other collection measures, for emergency tanks, and for filling and transportation of hazardous substances;
 - (3) Environmental risk management system and organization construction, training up employees' business competences and expertise;
 - (4) Enterprise regulations against fire, explosion and leakage, and storage of prevention materials, including firefighting water treatment and corresponding measures for key protection area;
 - (5) Identification and analysis of the natural hazard's impacts on enterprises equipment/units and construction situation of the corresponding preventive measures. Here we mainly consider lightning, flood, earthquake and other extreme natural conditions:
 - (6) The impacts on the enterprises from accidents in neighboring companies and corresponding measures.

Medium-term:

1. As described above in short-term measures, carry out construction of environmental risk measures.

Environmental risk confirmation			
Have all the detail points in recommendations been taken into account and implemented			
Yes	Partially	No	
RC=1	RC=5	RC=10	

8. Emergency management system

8.1 Does the enterprise have emergency management system for environmental incidents including emergency management regulations and an emergency management department?

Yes No Not applicable

If yes, describe the emergency management system; Emergency management regulations

Emergency management department:

8.2 Does current emergency management system comply with the state and local laws and regulations?

Yes No Not applicable

8.3 Is the current emergency management system adequate enough to deal with sudden environmental incidents?

Yes No Not applicable

Short-terms:

- 1. Develop an enterprise emergency management system according to the state and local laws and regulations
- 2. Negotiate with local environment and safety authority to identify the responsibility of each party and to inform cooperation mechanism.
- 3. Compose emergency plans for sudden environmental incidents according to the state and local laws and regulations, .
- 4. Establish an alarming system of environmental incidents to reduce the occurrence of environmental incidents and to control the affected area.
- 5. When environmental incidents occur, genuinely report to higher authority.

<u>Medium-term</u>:

- 1. Establish an emergency management department.
- 2. Establish a developed enterprise emergency response system, like emergency communication and supplies.

rmation	
s in recommendati	ons been taken into account and implemented
Partially	No
RC=5	RC=10
	rmation s in recommendati Partially RC=5

9. Emergency supplies

9.1 Are the emergency supplies prepared as required by the state and local laws and regulations?

Yes No Not applicable

9.2 Are the emergency supplies of enterprises kept in a good condition? If yes, genuinely fill in the following table.

Yes	No	Not applicable
-----	----	----------------

Emergency Supplies	Quantity (set)		Inspection Data	Well-maintained ?	
	Quantity In Need	Current Quantity	Inspection Date	Yes	No

Remarks:

Measures:

Short-terms:

- 1. Periodically inspect enterprises emergency supplies, ensuring that they are well-maintained and functional.
- 2. Fill in the preparation situation of emergency supplies according to the checklist of enterprise environmental risk and chemicals for state key industries (See appendix).

Medium-term:

- 1. Prepare the emergency supplies according to the state and local laws and regulations.
- 2. Make sure that the emergency supplies are well-maintained and functional.

Environmental risk co	nfirmation	
Have all the detail poi	nts in recommendation	ons been taken into account and implemented
Yes	Partially	No
RC=1	RC=5	RC=10

10. Emergency plan

10.1 Does the enterprise compose emergency plans according to the state and local laws and regulations?

Yes No Not applicable

10.2 Does the emergency plan consider the requirements of enterprise EIA reports?

Yes No Not applicable

Me	asur	es:
<u>Sh</u>	ort-te	erms:
1.	The	e enterprise emergency plan should consider the requirements proposed when EIA
	repo	ort goes for approval and hand-over.
2.	Acc	ording to enterprises' own properties, ensure the emergency plan itself has no
	pote	entials of environmental accidents as well as its variability and feasibility.
3.	Fro	m the perspective of environmental risks, it is required to investigate and analyze
	the	following content;
	(1)	Environmental risk management regulations and systems regarding application,
		treatment, storage, filling and transportation of hazardous substances, including
		organization structure, responsible department, operation models, emergency
		supplies, regulation construction, staff training, emergency response plans,
		monitoring and alarming system and etc.;
	(2)	Equipment and facility for pollution prevention;
	(3)	Emergency drills: in case of huge leakage of hazardous substances, evaluate its
		impacts on the environment and human, and arrange emergency response plans
		of the enterprise;
	(4)	Description of the soil and geographic situation of the enterprise for evaluating
		soil pollution and diffusion caused by hazardous substance leakage;

(5) Once leakage happened, consider its harm to the surrounding water body and plan out corresponding measures; the amount and diffusion situation of the hazardous substances that trespass the surface and underground water, and any other possible damages; and the enterprise's emergency plan and its implementing capability.

Medium-term

- According to the state and local laws and regulations, and combined with enterprises' own properties, establish environmental emergency plan. Compose the emergency plan according to the "Emergency Plan Composition Guideline for Hazardous Chemicals (Company Edition)", "General Emergency Plan for National Sudden Incidents", and "Guideline on the Establishment of Environmental Emergency Response Plan for Petrochemical Enterprises".
- 2. When uprising process, raw materials, or product alters, timely adjust emergency plan.
- 3. Launch emergency drills. In the meantime, consider inviting experts to discuss and assess emergency plan and adjust it accordingly.

Environmental risk confirmation			
Have all the detail points in recommendations been taken into account and implemented			
Yes	Partially	No	
RC=1	RC=5	RC=10	

11. Reporting system and procedures

11.1 Has the reporting system for environmental incidents been established?

Yes No Not applicable

11.2 Are there reporting procedures for environmental incidents?

Yes No Not applicable

Short-term:

- 1. Establish reporting system and procedures according to the state and local laws and regulations
- 2. "Emergency Plan for National Sudden Environmental Incidents" specifies the environmental incidents classification, reporting system and reporting procedures. It is an important reference of reporting system and procedures for enterprise environmental incidents.

Environmental risk confirmation			
Have all the detail po	ints in recommendation	ons been taken into account and implemented	
Yes	Partially	No	
RC=1	RC=5	RC=10	

12. Regulation of change management

12.1 Has the enterprise set up regulations of change management?

Yes	No	Not applicable
12.2 Does change	management involve	all of the enterprise's hardware and software?
Yes	No	Not applicable

Sho	ort-term:		
wea	asures:		

- 1. Carry out planned control on permanent and temporary alternation in personnel, management, process, technology and facility.
- 2. Carry out feasibility study before alternation.

Environmental risk confirmation				
Have all the detail points in recommendations been taken into account and implemented				
Yes	Partially	No		
RC=1	RC=5	RC=10		

13. Whole process pollution control

13.1 During the production process, can whole process pollution control be achieved?

(1) Use non- or low toxic and noxious materials and energy;

Yes No Not applicable

(2) Use technologies and process with maximum resource conversion rate and minimum pollution discharges;

Yes No Not applicable

(3) Use equipment of no or less pollution, low noise and low energy consumption;

Yes No Not applicable

(4) Rationalize product structure and develop products with less or no pollution:

Yes No Not applicable

(5) Use advanced facilities of high availability, high efficiency, and cost-benefits for material and energy recycling, and "three waste" treatment

Yes No Not applicable

13.2 Can clean production measures reduce pollution discharges?

Yes No Not applicable

Remarks:

Measures:

<u>Short-term</u>:

1. Train production operators and managers to establish their awareness of whole process control.

2. Control pollution generation and discharges according to the EIA reports.

- 3. Process and equipment descriptions specifying the usage, basic structure and design situation of the equipment and basic process flow. As a key reference of risk assessment, it mainly includes:
 - Process conditions, especially for the equipment and production units which directly contact with existing materials and products;
 - (2) Mass balance (including auxiliary materials, wastes, residues and etc);
 - (3) Paying attention to the environmental and safety regulations of the equipment/units including equipment with special material coming in and out; equipment regarding pollution prevention measures, and other equipment relevant to environmental risks.
 - (4) Paying attention to the description of equipment/unit including design and construction properties, especially for the equipment relevant to pollution prevention; process conditions of equipment/units like internal physical and chemical conversion; and function and reliability of the metering, monitoring and calibration devices.

Medium-term:

1. Establish the pollution monitoring system for the production process so as to monitoring the amount of substances and their flow.

Long-term:

- 1. Improve facilities and equipments for pollution pre-treatment to reduce pollution generation.
- 2. Consider energy saving and environmental friendly requirements and use cost-benefit production process and equipment.

Environmental risk confirmation				
Have all the detail poir	nts in recommendation	ons been taken into account and implemented		
Yes	Partially	No		
RC=1	RC=5	RC=10		

14. Pollution prevention strategy

14.1 Is pollution prevention undertaken following the strategies below?

- (1) Integrate centralized and local disposal;
- Yes No Not applicable

Total and concentration control;

- Yes No Not applicable
- (2) End-of-pipe treatment and whole process control;
- Yes No Not applicable
- (3) Comprehensive utilization and purification
- Yes No Not applicable

14.2 Does the pollution discharge of the enterprise meet the state or local discharge standard?

- Yes No Not applicable
- 14.3 Does key pollutants discharge reach the requirement of total control where the total control of key pollutant discharge is available?
- Yes No Not applicable
- Remarks:

Short-term:

1. Establish pollution monitoring system at enterprise's discharge outlet.

Long-term:

1. Install monitoring basin to prevent discharge over the limits.

Have all the detail points in recommendations been taken into account and implemented						
ł						

15. Comprehensive utilization

15.1 Does the enterprise have recycling or comprehensive utilization measures to treat and dispose valuable chemical wastes?

Yes No Not applicable

15.2 Does the enterprise use the remaining heat and combustible air as energy and fuel for industry or households?

Yes No Not applicable

15.3 Does the enterprise separate and recycle or further process the usable part of the wastes to make new products?

Yes No Not applicable

15.4 Are there any plans to coordinate and recycle wastes among enterprises to improve wastes utilization?

Yes No Not applicable

Remarks:

Measures:

Short-term:

1. Optimize production process and comprehensive utilization of materials and energy.

Have all the detail points in recommendations been taken into account and implemented						

Checklist Summary

Detail Points of Recommendations	Potential Risks	Risk Classification (RC)
1	1/5/10	
2	1/5/10	
3	1/5/10	
4	1/5/10	
5	1/5/10	
6	1/5/10	
7	1/5/10	
8	1/5/10	
9	1/5/10	
10	1/5/10	
11	1/5/10	
12	1/5/10	
13	1/5/10	
14	1/5/10	
15	1/5/10	

Average Risk of Checklist(ARC)

Recommended Inspection Procedures



Chapter Two

Chemicals Storage and Transportation

2.1 Hazardous Chemicals Management

Section One Recommendations

- Hazardous chemicals must be stored in a special warehouse, place or storage room. The means, methods, and amount of storage must comply with the state and local standards, and must be managed by full-time employees.
- Shipping, loading and unloading hazardous chemicals should be in accordance with relevant laws, legislations, regulations and national standards and prevention actions based on the chemicals hazard properties should be taken.
- Carry out general inspections on all chemicals which may have contact with and on producing chemicals (including products, raw materials and intermediate) and establish a datasheet for chemicals.
- 4. Train practitioners and relevant persons about the properties of hazardous chemicals in the production process to reduce or get rid of the dangerous consequences.

Section Two Recommendations Implementation

1 Chemicals Storage

1.1 Are chemicals stored in a special warehouse, place or storage room?

Yes No Not applicable

1.2 Do storage measures and the amount comply with the state and local standards? If yes, fill in the following table.

Yes No Not applicable

1.3 Are the chemicals managed by full-time employees?

Yes	No	Not applicable
-----	----	----------------

No.	ltomo	Weight (kg)		
	nems	Flammable	Combustible	Toxic

Remarks:

Measures:

Short-term:

- 1. Chemicals storage managed by full-time employees.
- 2. Hazardous chemicals must be stored in special warehouses.
- 3. Management personnel of the storage should regularly attend the training.
- 4. Set up database for hazardous chemicals, including the name, storage amount, description of the physical and chemical properties and the person in charge.

Medium-term:

- 1. Construct special storage warehouses and places.
- 2. Put in place adequate preventive measures against chemicals trespassing the environment.
- Install a monitoring system such as air/liquid leakage sensor, alarm system, surveillance system, thermometer, hygrometer, etc.
- There must be enough safety distance between chemical storage places and production facilities.

Environmental risk confirmation					
Have all the detail points in recommendations been taken into account and implemented					
Yes	Partially	No			
RC=1	RC=5	RC=10			

2. Transportation

2.1 Are operators clear about laws, regulations, and standards regarding chemicals transportation?

Yes No Not applicable

If yes, briefly enumerate relevant laws and regulations:

2.2 Have the physical and chemical properties of the chemicals been considered? If yes, fill in the following table.

Yes	No	Not applicable
-----	----	----------------

					Persons
	Chemical	Physical	Possible	Preventive	in
Items	Properties	Properties	Impacts	measures	Charge

2.3 Does the chemical transportation have adequate preventive measures for the accidents?

Yes No Not applicable

If yes, briefly describe the preventive measures:

Remarks:

Measures:
<u>Short-term</u>:
1. Transportation of hazardous chemicals must be done by licensed transportation companies or operators.
2. Transportation operators must know about the names, quantity, hazards, and emergency measures of the chemicals.

- 3. When transporting chemicals, relevant state and local laws, regulations and standards should be strictly followed.
- 4. Preventive measures should be taken according to the physical and chemical properties of the chemicals, when in transit.
- 5. At least two operators should be arranged for the transportation.
- 6. The floor of transit area should be concrete enough and permeation-proof.
- 7. The transit place should have equipment for collecting leaking waste liquids.

Environmental risk confirmation				
Have all the detail points in recommendations been taken into account and implemented				
Yes	Partially	No		
RC=1	RC=5	RC=10		

3. Chemicals general inspection

3.1 Have all the chemicals which possibly have direct contact with or produced (including products, raw materials and immediate) been inspected?

Yes No Not applicable

3.2 Has the chemicals database been established based on the inspection results?

Yes No Not applicable

Measures:

Short-terms:

- 1. Chemicals general inspection must involve all of the raw materials, intermediates and products.
- The content of general inspection includes chemicals names, quantity, physical and chemical properties, presence form, hazardous impact on human and environment, and relative prevention/control measures.
- Classify raw materials, intermediates and products according to the "Common Hazardous Chemicals Classification and Labels of Dangerous Chemical Substances Commonly Used" (GB13690-92) and incorporate the results into the chemicals database.

Medium-term:

- 1. Launch general chemicals inspection
- 2. Establish chemicals database and dynamically manage it based on facts.
- 3. When the amount of chemicals storage shifts, timely update the datasheet.

Environmental risk confirmation					
Have all the detail points in recommendations been taken into account and implemented					
Yes	Partially	No			
RC=1 RC=5 RC=10					

4. Training

4.1 Have the practitioners been trained about the physical and chemical properties of hazardous chemicals and current preventive measures?

Yes Not applicable No 4.2 Does the training include the properties of hazardous chemical, preventive measures, and emergency measures? Yes No Not applicable Remarks: Measures: <u>Short-term</u>: 1. Training includes physical and chemical properties, prevention and emergency measures, state laws and regulations, standards construction, and company regulation construction. 2. Have special organization and staffs do the training. 3. Periodically examine staffs of chemicals management, transportation and utilization on safety operation.

Medium-term:

1. Have management staffs and production operators periodically trained.

Environmental risk confirmation					
Have all the detail points in recommendations been taken into account and implemented					
Yes	Partially	No			
RC=1	RC=5	RC=10			

Checklist Summary

Detail Points of Recommendations	Potential Risks	Risk Classification (RC)
1	1/5/10	
2	1/5/10	
3	1/5/10	
4	1/5/10	

Average Risks of Checklist (ARC)

2.2 Chemicals Risks Classification

- Fill in chemical and physical properties of chemical substances as required by the "General Rules for Classification and Hazard Communication of Chemicals" GB 13690-2009, referring to the materials safety data sheet. http://msds.anquan.com.cn/
- 2. Material's impacts on environment can be described by three classes
 - WGK1: Slight harm to the water body
 - WGK2: Medium harm to the water body
 - WGK3: Significant harm to the water body

Moreover, some substances like rapeseed that have no apparent impacts on water body can be classified into WGK0.

3. Given the fact that an equipment or process unit can have two or more than two materials at the same time and the materials may have different hazard classes, the WGK3 equivalence is introduced. Conversion weight of materials in WGK0/WGK1/WGK2 to WGK3 weight equivalence is easy to assess the risks of equipments and units. Following is the conversion method.

Material Weight (kg)	Hazard Class	Conversion to WGK3 Weight Equivalence
М	0	M×10 ⁻³
М	1	M×10 ⁻²
М	2	M×10 ⁻¹
М	3	Μ

4. Risk index calculation and indicates, the magnitude of the risks. Calculate the WGK3 of all chemicals in equipment and process units according to the above Point 3. Then, seek the common logarithm of the sum of the weight equivalence. The result is the risk class of equipment and process unit. For instance, if the equipment has substance A, B, C, the WGK3 is calculated as following:

Items	Material Weight (kg)	Risk Class	Conversion to WGK3 Weight Equivalence
А	6000	1	60
В	300	2	30
С	10	3	10

Then the risk index of the materials in the equipment is $\log (60+30+10) = 2_{\circ}$

5. Risk classification. As risk index is calculated through the above Point 4, the rules for risk classification are:

Risk Index: 1~3 Low potential risk

- 3~5 Medium potential risk
- 5~10 High potential risk

The above information is listed in Table 1 below. With regard to different equipments/units, similar table can be made based on Table 1.

6. Table 2 lists the environmental hazard of common materials WGK.

No Chemicals		s Properties	Impacts Classification			Actual Weight	WGK3 Equivalence
NO.		WGK1	WGK2	WGK3	(kg)	(kg)	
1							
2							
3							
	Unit Risk Cla	ISS					

Table 1 Risk Description of Equipment/Unit

Table 2 Unit Environmental Hazard of Common Materials WGK

Materials	CAS. No.	WGK	Remarks
Crude Oil		3	
Diesel		2	
Gasoline	8006-61-9	3	
Naphtha	8030-30-6	3	
Liquified Petroleum Gas (LPG)	68476-85-7	3	
Kerosene	8008-20-6	1	
Benzene	71-43-2	3	
Xylene[1]; 1,2-Xylene[2]; 1,3-Xylene[3]; 1,4-Xylene[4];	1330-20-7[1]; 95-47-6[2]; 108-38-3[3]; 106-42-3[4]	1	
Methane	74-82-8		Flammable gas, boiling point -161.5°C
Ethane	74-84-0		
Ethane Isomers; (Including hexane <5%)		3	
Propane	74-98-6		
Butane [1] Isobutane [2]	106-97-8[1] 75-28-5[2]		
Butane (including butadiene≥0.1%)[1]; Isobutane (including butadiene≥0.1%) [2]	106-97-8[1] 75-28-5[2]	3	
Pentane [1] Isopentane [2]	109-66-0[1] 78-78-4[2]	3	
Heptane and its Isomers	142-82-5 [1] 108-08-7 [2] 464-06-2 [3] 562-49-2 [4]	3	

	565-59-3 [5] 589-34-4 [6] 590-35-2 [7] 591-76-4 [8] 617-78-7 [9] 31394-54-4 [10]		
Octane and its Isomers	$\begin{array}{c} 111-65-9 \ [1] \\ 540-84-1 \ [2] \\ 560-21-4 \ [3] \\ 563-16-6 \ [4] \\ 564-02-3 \ [5] \\ 565-75-3 \ [6] \\ 583-48-2 \ [7] \\ 584-94-1 \ [8] \\ 589-43-5 \ [9] \\ 589-43-5 \ [9] \\ 589-81-1 \ [11] \\ 590-73-8 \ [12] \\ 592-13-2 \ [13] \\ 592-27-8 \ [14] \\ 594-82-1 \ [15] \\ 609-26-7 \ [16] \\ 619-99-8 \ [17] \\ 1067-08-9 \ [18] \end{array}$	3	
Ethylene	26635-64-3 [19] 74-85-1		Flammable gas, boiling point-103.9°C, non water-dissoluble
Propylene	115-07-1		Flammable gas, boiling point -47.7°C,
Natural gas condensates (from petroleum)	64741-47-5	3	Extract liquid hydrocarbon compound from natural gas in surface separator by retrograde condensation. It mainly composes of hydrocarbon with

			C2 to C20 and
			presents in liquid
			form at normal
			temperature and
			pressure.
			Extract liquid
			hydrocarbon
			compound from
			natural gas in gas
Natural			collection devices by
gas(petroleum), raw	64741-48-6	3	cooling or absorption
liq. mix			process. It mainly
			composes of
			saturated aliphatic
			hydrocarbons with
			C2 to C8
Butadiene	106-99-0	3	
Heavy Fuel Oil		3	
Tert butyl peroxide	110-05-4	-	

2.3 Storage

Section One Recommendations

- 1. Make sure that containers have leakage-proof methods which are effective.
- 2. Materials that may lead to dangerous situation cannot be stored together. Here, situation mentioned means leakage, explosion, fire, etc.
- Make sure there will be no materials leakage and permeation from the containers. Storage containers must be sealed with solid structure and have enough chemical and physical resistance.
- If single-walled containers are used for chemical storage, dikes or other collection devices must be equipped. Firefighting water should be taken into account in the volume of collection devices.
- 5. When materials were stored by small drum containers, following conditions must be fulfilled. At outdoors, there should be enough sealing measures, broken preventive measures, and bad weather prevention measures. While in sealed rooms, enterprises should be able to address fault damage at anytime.
- 6. Since underground, sediment or flooding water may move containers, appropriate materials or other measures should be implemented to prevent containers from floatation.
- Conduits should be constructed around emergency tanks to direct leachate flowing into the tanks. Emergency tanks should have drainage devices.
- 8. With regard to solid material storage, the floor must be permeation-proof, especially in case of extreme weather. When at outdoors, there should be enough sealing measures, broken preventive measures, and bad weather prevention measures; when in sealed rooms, enterprises should be able to address the fault damage at anytime.
- Establish a monitoring system and deploy full-time employees to monitor containers and container areas 24-hour.
- 10. Containers must be labeled with clear and durable signs.

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Section Two Recommendation Implementation

Fill in the following form. If there are many containers, record them individually according to the

form formula.

Ge	General parameters of containers:			
1.	Location			
	1.1 Underground:	Ground:		
	1.2 Outdoor:	Indoors:		
	1.3 Barrel:	Tank:	Others:	
	1.4 Container Materials:			
2.	Capacity			
	Single Capacity:			
	Number:			
	Total Capacity:			
3.	Stored Materials:			
4.	Remarks:			

1. Leakage prevention measures

1.1 Do all containers have leakage prevention measures?

Yes No Not applicable 1.2 Do the leakage prevention measures of the containers always work?

Yes No Not applicable

Remarks:

Measures:

<u>Short-term</u>:

- Guide and train operators to ensure correct actions are taken when oil leakage happens.
- 2. When filling, at least two people are on site.
- 3. Periodically inspect the measuring instrument (filling level).
- 4. Always pay attention to the filling level.
- 5. If enterprises can afford it, they should consider installing level meters to show the filling level.

Medium-term:

- 1. Use appropriate leakage prevention devices from regular producers.
- 2. Install leakage alarming devices.

Environmental risk confirmation			
Have all the detail points in recommendations been taken into account and implemented			
Yes	Partially	No	
RC=1	RC=5	RC=10	

2. Mixed storage

2.1 Have the physical and chemical properties of the stored materials been clarified, especially the toxic, flammable, explosive, natural, and reaction materials. If yes, fill in the following table.

No

Not applicable

		Chemical	Physical		Persons in
Containers	Items	Properties	Properties	Weight	Charge

Remarks: if there are many container areas, it is required to list such a table for every area.

2.2 Are there enough preventive measures for possible accidents? If yes, fill in the following table.

Yes

No

Not applicable

	Preventive		Persons in
Items	measures	Date	Charge
	Items	Items Preventive measures	Preventive Items measures Date Items Items Items

2.3 Have the storage management staffs received professional training to ensure normal operation of containers and to take correct actions in case of accidents?

Yes No Not applicable

Me	Measures:		
<u>Sh</u>	ort-term:		
1.	Know about the physical and chemical information of the hazardous chemicals and		
	develop corresponding preventive measures.		
2.	High pressure gas, cryogenic liquefied gas and ammonia-containing fertilizer cannot		
	be stored together with other toxic gases.		
3.	Materials liable to spontaneous combustion, materials able to produce toxic matters by		
	reaction with water, and flammable/combustible materials cannot be stored together.		
4.	Containers for boiling spill liquid should not be arranged along with the non-boiling		
	spill containers.		

- 5. When operating in the storage areas, potential differences or electrostatic charge generation from discharge process must be avoided to prevent fire, explosion and other dangerous situations.
- Develop emergency plans, for example, emergency plan for extreme weather (flood), fire, leakage and other situations.

<u>Medium</u>:

- 1. Have enough preventive measures, like firefighting devices and a monitoring system.
- 2. No useless pipes in the containers of flammable gas, combustion-supporting gas, liquefied hydrocarbon, and combustible liquid.
- Container foundation, fire dikes, banks, docks, pipe racks and pipe piers of the liquefied hydrocarbon, flammable liquid and gas, and combustion-supporting gas should use non-flammable materials.
- 4. Containers should have level meters, pressure meters and safety valves. Liquefied hydrocarbon containers should have additional temperature meters. Low temperature liquefied ammonia containers should have temperature indicators.
- 5. As for mixed stored materials, sufficient safety distance is required to guarantee no interaction and easy for daily operation.
- Install on-site monitoring devices, like camera surveillance system, temperature meter and hygrometer to make sure the person in charge knows about the situation in storage areas at anytime.
- Construct collection devices like dikes in storage areas. Enough volume is required and firefighting water is considered.

	Environmental risk confirmation			
	Have all the detail points in recommendations been taken into account and implemented			
	Yes	Partially	No	
	RC=1	RC=5	RC=10	
3.	Requirement of contain	ner prevention		
3.1	Can the air tightness of	the container be gu	uaranteed?	
Ye	s No	Not ap	oplicable	
3.2	Has the air tightness be	een periodically che	cked by special organizations	s or operators?
Ye	s No	Not applicable		
3.3	Does the container hav	e a firm structure to	make sure no inclination and	d settlement?
Ye	s No	Not ap	oplicable	
3.4 Does the container have enough resistance to the storage materials?				
(1) High temperature resistance				
Ye	s No	Not ap	oplicable	
(2) Chemical resistance				

Yes No Not applicable

(3) Mechanical stress

Yes No Not applicable

(4) Biological tolerance

Yes No Not applicable

Remarks:

Measures:

<u>Short-term:</u>:

- 1. Fix the unsealed part of the container and replace the sealing materials
- 2. Train container managers.
- 3. Periodically inspect the sealing situation.

Medium-term:

- 1. Conduct sealing performance check including water, stored materials, and pressure.
- 2. Places that can leak grad-A gases or liquids should install alarming systems for the flammable gases.

Environmental risk confirmation			
Have all the detail poi	nts in recommendation	ons been taken into account and implemented	
Yes	Partially	No	
RC=1	RC=5	RC=10	

4. Collection devices

4.1 Do the single-walled containers above ground have dikes or other collection devices?

Yes	No	Not applicable
4.2 Do the collecti possible leaking m	on devices mentione aterials?	d above have enough air tightness and resistance to the
Yes	No	Not applicable
4.3 If using dike as	s collection device, is	there enough volume to prevent leakage?
Yes	No	Not applicable
4.4 Is firefighting w	vater considered in the	e volume of collection devices?
Yes	No	Not applicable

4.5 Do the collection devices have exclusive trenches or drainage pipes to make sure leaking materials are discharged promptly?

Yes	No	Not applicable	
4.6 Is a switch valv	ve installed for the gre	ey wastewater drainage?	
Yes	No	Not applicable	
4.7 Is there a buff	er tank for the grey w	astewater?	
Yes	No	Not applicable	
4.8 Is the buffer tank large enough to take in discharged grey wastewater?			
Yes	No	Not applicable	
Volume of grey water buffer tank:			

Measures:

Short-term:

- 1. Periodically inspect collection devices. If any broken, fix it immediately.
- 2. Take appropriate measures to prevent leaking materials into environment in case of accidents.

Medium-term:

- 1. Underground containers should be installed with alarming devices for leakage.
- 2. Air tightness of the containers should be guaranteed, and validated by special organizations or people.
- Enough space is required between outdoor containers and nearby equipment and constructs. Protective belt can be set if necessary.
- 4. Enterprises should have storage tanks with enough volume. In case of uncommon situation, leaking wastewater can be collected immediately.

Environmental risk confirmation			
Have all the detail points in recommendations been taken into account and implemented			
Yes	Partially	No	
RC=1	RC=5	RC=10	

5. Small drum container

5.1 Are the containers sealed and have preventive measures for extreme weather conditions?

Yes

No

Not applicable

If yes, briefly describe the preventive measures.

5.2 Are there enough technologies, staffs and materials to deal with emergencies?

Yes No Not applicable

Remarks:

Measures:

Short-term:

- 1. Develop operation manuals, professional storage regulations, and emergency response procedures for breakdowns and accidents.
- 2. Train storage operators and management staffs about the measures in case of uncommon situation.

Medium-term:

- 1. Construct enough collection devices.
- 2. Ensure the air tightness of the collection devices.

Environmental risk confirmation		
Have all the detai	I points in recommendatio	ons been taken into account and implemented
Yes	Partially	No
RC=1	RC=5	RC=10

6. Floods

6.1 Can floating effect caused by underground, sediment and flooding water be prevented?

Yes No Not applicable

Remarks:

Measures:

<u>Short-term</u>

- Take appropriate measures to prevent plant containers from being washed off by floods. Following measures can be used to avoid floating effect: raising landfill soil, installing concrete plates for containers and fixing the containers on the concrete plate by metal parts.
- 2. If the collection devices of the containers are coated, the above fixation methods should be avoided. If have to, the fixing spot requires special sealing treatment.
- 3. Containers and pipes must be able to handle the flooding stress.
- The bottom edge of the outdoor containers and pipes must be higher than the water level of flood once in a hundred year.
- If constructs have containers and pipes inside, they must be able to stand the impacts of floods.

Medium-term:

- Safety measures must be taken to prevent outdoor containers and pipes from strikes by floating objects.
- 2. The opening on the containers and pipes must be water proof.
- As filling joints may be affected by floods, sealing measures must be taken. These measures can only be undone while filling.

Environmental risk confirmation			
Have all the detail po	ints in recommendation	ons been taken into account and implemented	
Yes	Partially	No	
RC=1	RC=5	RC=10	

7. Emergency tank

7.1 Has the enterprise constructed emergency tanks for container group?

Yes	No	Not applicable
Yes	NO	Not applicat

7.2 Does the container group mentioned above have ditches for leaking liquid to flow into emergency tank?

Yes No Not applicable

7.3 Does the emergency tank have drainage devices?

Yes No Not applicable

Measures:

<u>Short-term:</u>

- 1. Emergency tank should be at least 30m away from the containers; emergency tank and ditch should not be less than 30m away from open flame site.
- Emergency tank should have camera surveillance system to monitor the stored liquids at anytime.

Environmental risk confirmation		
Have all the detail poi	nts in recommendation	ons been taken into account and implemented
Yes	Partially	No
RC=1	RC=5	RC=10

8. Solid substances

8.1 Does the floor resist to the physical and chemical properties of the substances and is leakage-proof in any operating conditions or extreme weather?

Yes No Not applicable

8.2 Are containers for the solid substances sealed and prevented from external damage, extreme weather, and physical and chemical properties?

Yes No Not applicable

Measures:

Short-term:

- 1. Maintain the sealing surface and roof.
- 2. Periodically inspect the air tightness.
- 3. Raise the height of sealing fringe to prevent rainwater.
- 4. Establish storage database for solid substances and record names, stored amount,

main physical and chemical properties, and persons in charge.

<u>Medium-term:</u>

- 1. Build a big enough roof.
- 2. Materials are stored in the sealed and compatible containers to prevent from external damage, extreme weather.
- Measures of leakage and permeation prevention should be done for the storage place of the solid substances.

Long-term:

- 1. Construct the sealing surface.
- 2. Store solid substances in the sealed cabin.
- If enterprises produce solid wastes, build solid landfill according to the state or local laws and regulations.

Environmental risk confirmation		
Have all the detail poir	nts in recommendati	ons been taken into account and implemented
Yes	Partially	No
RC=1	RC=5	RC=10

9. Monitoring system

9.1 Do the tank group and container for storage have alarming systems including gas/liquid leakage sensors?

Yes	No	Not applicable		
9.2 Are the absorption devices for leaking gas installed?				
Yes	No	Not applicable		
9.3 Is the camera s	surveillance system ir	nstalled?		
Yes	No	Not applicable		
9.4 Are there spec	ialists responsible for	monitoring storage areas?		
Yes	No	Not applicable		

Measures:

Short-term:

- 1. Periodically inspect the monitoring system to ensure normal operation.
- 2. Train staffs.

<u>Short-term</u>:

- 1. Install gas and liquid leakage sensors and an alarming system.
- 2. Install leaking gas absorption devices.
- 3. Install a camera surveillance system.

Environmental risk confirmation			
Have all the detail poi	ints in recommendation	ons been taken into account and implemented	
Yes	Partially	No	
RC=1	RC=5	RC=10	

10. Identification sign

10.1 Does the container have identification sign?

Yes No Not applicable

10.2 Is the identification sign clear and durable?

Yes No Not applicable

Measures:

Short-term:

- 1. Periodically inspect to make sure the identification signs stay intact.
- 2. The identification sign should specify the responsible person, contact details, material names in the storage area, etc.

Medium-term:

1. Establish identification signs.

Environmental risk confirmation			
Have all the detail po	ints in recommendation	ons been taken into account and implemented	
Yes	Partially	No	
RC=1	RC=5	RC=10	

Checklist Summary

Detail Points of Recommendations	Potential Risks	Risk Classification (RC)
1	1/5/10	
2	1/5/10	
3	1/5/10	
4	1/5/10	
5	1/5/10	
6	1/5/10	
7	1/5/10	
8	1/5/10	
9	1/5/10	
10	1/5/10	

Average Risk of Checklist (ARC)

2.4 Transportation

Section One Recommendations

- Transportation area must be concrete and protected from external shocks, leakage and physical and chemical properties.
- 2. Transportation area must have an appropriate collection system with sufficient volume.
- Transportation area must have enough emergency devices to prevent leaking hazardous materials from entering the environment. In addition, it must have treatment devices for leaking materials.
- 4. If transporting by pipes, make sure transmission is terminated in time so as to prevent leakage in case of accidents.
- Firefighting water and first flush are not allowed to be directly discharged to water body.
 Appropriate treatment is required.
- 6. Construct a drainage system for discarding leaking material and firefighting water.
- 7. Transportation areas and devices must have identification signs.

Section Two Recommendation Implementation

Fill in the following form. In case there are many transportation areas, record them individually according to the form formula.

Description of transportation process
1. Brief description of the transportation Mission:
2. Transportation method:
Tank truck:
Railway tanker:
Tanker:
Portable tank:
3. Transported materials:
Remarks:

1. Transportation area

1.1 Description of the floor in transportation area:

--Concrete

--Steel plate

--Pitch

--Others

1.2 Is the structure of transportation area concrete enough to stand external mechanical shocks?

Yes	No	Not applicable	
1.3 Can the a materials?	ir tightness	and resistance of the place mana	age the corrosion of the leaking
Yes	No	Not applicable	
1.4 Is the trans	portation are	a permeation-proof?	
Yes	No	Not applicable	
Measures:

<u>Short-term</u>

- 1. If the floor is not sufficiently concrete or resistant, inspection and immediate reparation are required every time after transportation.
- 2. Transportation junctions should take appropriate measures like collection basin to prevent hazardous substance from entering the environment.
- 3. If damage in the sealing layer is found, fix it immediately.
- 4. People in charge of hazardous chemical transportation must be authorized by traffic department. Drivers, escorts, etc. must have knowledge about hazardous chemicals transportation and pass examinations of relevant department to get qualification certificate, then they can start to work.
- All enterprises must define the route and parking spot for all incoming vehicles for hazardous chemical transportation. The parked vehicles must be watched by full-time employees.

Medium-term:

- 1. Use concrete surface layer like pitch, concrete, steel plate, etc.
- 2. The junction of sealing surface must fulfill the airtight requirement.
- 3. Use better sealing materials.
- 4. Transportation areas need to build separate drainage systems to separate rainwater, greywater, firefighting water, and drop leachate of transportation.
- 5. Construct appropriate collection system to timely gather leachate.
- 6. Have at least two operators.

Environmental risk confirmation			
Have all the detail poi	nts in recommendation	ons been taken into account and implemented	
Yes	Partially	No	
RC=1	RC=5	RC=10	

2. Collection devices

2.1 Does the transportation area have a collection system?

Yes No Not applicable

2.2 Does the collection device have enough volume?

Yes No Not applicable

If yes, write down the coverable leakage amount:

Volume of the collection device:

Remarks:

Measures:

Short-term:

- 1. Transportation operation must be done by at least two people.
- 2. Adjustable junctions must be placed at portable collection basins.

- 3. Install pumps, tanks, etc for collecting leaking hazardous materials.
- 4. Tanks or other containers for hazardous chemicals transportation must be sealed to stand both internal and external pressure during the normal transportation, ensuring no leakage, given the changing temperature, humidity, and pressure.
- 5. Install appropriate collection system to timely collect the leachate.

Medium-term:

- Collection system must have enough volume. The leachate amount should be considered in case of accidents and effective actions should be taken to retard the leaking time.
- 2. Deploy emergency mobile pumps and tank cars to timely collect leachate.

Environmental risk confirmation			
Have all the detail poin	nts in recommendati	ons been taken into account and implemented	
Yes	Partially	No	
RC=1	RC=5	RC=10	

3. Emergency storage

3.1 Are there enough equipment and measures to prevent material leakage? Whole process monitoring makes sure the transportation is done in a good situation and guarantees the air tightness of the flange. Collection containers are equipped.

Yes No Not applicable

If yes, briefly describe the equipments and measures:

3.2 Is the equipment and measures like pumps, tanks, etc sufficient to collect and effectively treat leaking materials?

Yes No Not applicable

If yes, briefly describe the equipments and measures:

Remarks:

Measure:

Short-term:

- 1. Install enough pumps, tanks, etc for leaking hazardous materials collection.
- Drivers, escorts, etc. for hazardous chemicals transportation must know about the chemical and physical properties of the transported chemicals, its hazards, properties of the containers and emergency measures. Hazardous chemical transportation requires necessary emergency equipment and protective devices.
- Transporting, loading and unloading hazardous chemicals must follow the hazardous properties of chemicals and safety measures should be taken such as sunshade, temperature control, explosion protection, fire prevention, anti-earthquake, water proof, anti-freeze, anti-dust, anti-spill, etc.

Medium-term:

- 1. Prepare pumping equipments.
- 2. When operating close to the river side, floatation fence should be used.

Environmental risk confirmation			
Have all the detail poi	nts in recommendatio	ons been taken into account and implemented	
Yes	Partially	No	
RC=1	RC=5	RC=10	

4. Transportation pipes

4.1 In case of potential accidents or breakdown, can transportation pipes be cut off at once to prevent leakage?

Yes No Not applicable

If yes, briefly describe the equipments and measures:

4.2 Is the measure in 4.1 periodically inspected to make sure its integrity and effectiveness?

Yes No Not applicable

Measures:

<u>Short-term</u>:

- 1. Place a wedge at transportation place to stop vehicles from moving.
- 2. Develop operation manuals to standardize the pipe transportation operation and to specify the measures for breakdown and accidents.
- 3. Inspect the capacity of the loader to avoid overload.

<u>Medium-term</u>:

- 1. Install check valve to prevent backflow of transporting materials.
- 2. Install clutch devices for tank trucks and trains.

Environmental risk confirmation			
Have all the detail poi	nts in recommendati	ons been taken into account and implemented	
Yes	Partially	No	
RC=1	RC=5	RC=10	

5. First flush and firefighting water

5.1 Can the transportation place ensure the first flush and firefighting water not be directly discharged into the drainage system (including grey and waste water system)?

Yes

No

Not applicable

5.2 If first flush and firefighting water goes into drainage system, can it be guaranteed that the quality and quantity of discharge fulfills the requirements of the receiving drainage system?

Yes No Not applicable

Remarks:

Measures: Short-term: 1. Collect leaking materials and clear up polluted surface right after leakage. 2. Monitor the quality of first flush from time to time to prevent first flush from entering the receiving water body. 3. When loading/unloading, prohibit wastewater discharges from anywhere. 4. Make sure that firefighting water flows into collection system. Medium-term: 1. Ensure the air tightness and resistance of the drainage pipes. 2. Use appropriate equipments and measures to treat first flush and firefighting water. Build collection system to gather first flush and firefighting water. 3.

Environmental risk confirmation			
Have all the detail points in recommendations been taken into account and implemented			
Yes	Partially	No	
RC=1	RC=5	RC=10	

6. Drainage system

6.1 Is there a drainage system to timely discharge leaking materials, rainwater, and firefighting water?

Yes No Not applicable

Remarks:

Environmental risk confirmation			
Have all the detail poir	nts in recommendation	ons been taken into account and implemented	
Yes	Partially	No	
RC=1	RC=5	RC=10	

7. Do the special place and other transportation devices have identification signs?

Yes No Not applicable

Measures:
<u>Short-term</u> :
1. Use containers and transportation vehicles with identification signs only for
transporting.

Environmental risk confirmation			
Have all the detail poi	nts in recommendation	ons been taken into account and implemented	
Yes	Partially	No	
RC=1	RC=5	RC=10	

Checklist Summary

Detail Points of Recommendations	Potential Risks	Risk Classification (RC)
1	1/5/10	
2	1/5/10	
3	1/5/10	
4	1/5/10	
5	1/5/10	
6	1/5/10	
7	1/5/10	

Chapter Three

Production Process

3.1 Risk Management of Production Facilities

Section One Recommendations

- 1. Actively use energy-saving and environmental friendly technologies. Put efforts to improving enterprises environmental protection level.
- 2. Changes in production facilities must strictly follow change management regulations, following change procedures and carry out risk management for the whole process.
- 3. Develop risk management regulations of production facilities.
- 4. Have specialists taking care of all kinds of environmental protection devices and carry out periodical inspection and maintenance.
- 5. Have prevention facilities and devices on site like workshop, warehouses, etc based on the species and properties of the chemicals.
- 6. Establish environmental risk dossiers and written report system of risk inspection for key devices and important parts.
- 7. Develop emergency plans for key devices and parts.
- 8. During maintenance, appropriate actions should be taken for pollution prevention.
- 9. Establish a facilities deconstruction and scrap system.
- 10. Post up warning labels and notices where flammable, explosive, toxic and noxious materials are present.

Section Two Checklist

1. Use Energy-saving technologies

1.1 Are the processes, materials, technologies, and equipments banned by the state and local decrees left out?

Yes No Not applicable

1.2 Are the Energy-saving or environmental friendly processes, materials, technologies and equipments actively used? If yes, fill in the following table.

Yes No Not applicable

Place, Activity	Advanced			Recommen	
Equipments, Materials	Processes	Equipments	Technologies	Materials	ded sources

Remarks: recommended sources such as "Environmental Protection Technology Category Encouraged and Developed by the State", "State Advanced Pollution Treatment Technology Demonstration Category", etc.

Remarks:

Measures:

Short-term:

- Keep in touch with environmental protection research institutes, follow up advanced technologies, equipments, processes and theory and actively launch or join researches for energy saving and environmental friendly technologies.
- 2. Make schedules to eliminate processes, equipments, and materials banned by national and local decrees.
- 3. When production processes, equipments and facilities alter, principles of energy saving and environmental friendly should be effectively considered.

Medium-term:

1. Carry out environmental risk evaluation when materials, technologies, processes and equipments alter.

Long-term:

- 1. Develop environmental technology research and construct a long-term reliable system.
- 2. Establish academic research institute with technical specialists
- 3. Use state and local advanced technologies, processes, equipments and materials with the enterprise's resources.

Environmental risk confirmation			
Have all the detail points in recommendations been taken into account and implemented			
Yes	Partially	No	
RC=1	RC=5	RC=10	
RC=1	RC=5	RC=10	

2. Change management

2.1 Has the change management system been established?

Yes No Not applicable

If yes, describe the change management:

2.2 Have the change management procedures been established?

Yes No Not applicable

If yes, describe the procedures:

2.3 Do the procedures apply to the process, equipment, technology, and material change?

Yes No Not applicable

Process, Activity, Materials, Place	Change Description	Environmental Impact Analysis	Person in Charge	Date

Remarks:

Measures:

Short-term:

- 1. Change procedures must be followed when process, equipment, technology, and materials change and environmental risk analysis should be carried out.
- 2. Have full-time employees responsible for environmental risk management from Changes.
- 3. Establish and keep change datasheet.

Medium-term:

- 1. When materials, technology, process, equipment change, take adequate preventive measures for environmental incidents or accidents.
- 2. Establish a change management system.
- 3. Improve change management procedures.

Environmental risk co	nfirmation	
Have all the detail poi	nts in recommendation	ons been taken into account and implemented
Yes	Partially	No
RC=1	RC=5	RC=10

3. Regulation construction

3.1 Description of environmental risk management system of existing production facilities (including prevention department and team building, risk inspection regulations, responsibility system, regulation construction, etc.):

3.2 Does the risk management of production facilities involve all the production departments, places and fields?

Yes No Not applicable

Remarks:

Measures:

Short-term:

- 1. Have production operators trained about environmental risk management regulations.
- 2. Train relevant staffs to strictly implement existing risk management regulations.
- 3. Enterprises must manage six phases: project proposal, feasibility study, basic design, general construction proposal, pre-construction conditions, and completion/handover according to the relevant state regulations.
- 4. Establish and improve relevant departments in enterprises that are responsible for environmental risk management.

Medium-term:

- 1. Improve environmental risk management system.
- 2. Establish enough preventive measures.

Environmental risk co	onfirmation	
Have all the detail po	ints in recommendation	ons been taken into account and implemented
Yes	Partially	No
RC=1	RC=5	RC=10

4. Production facilities

4.1 Are there enough devices to prevent environmental risks or accidents?

Yes	No	Not applicable
4.2 For each risk s	ource, are there any o	corresponding preventive measures?
Yes	No	Not applicable
4.3 Is the prevention	on device managed by	y full-time employees?

Yes No Not applicable

If yes, fill in the following table.

Risk Sources (Production Process)	Preventive measures	Emergency Plan or Not	Persons in Charge

4.4 Are these preventive measures checked and maintained periodically, and the assignment comes down to the individual person?

Yes No Not applicable

Remarks:

Measures: <u>Short-term:</u> 1. Carry out risk identification and establish a record database. 2. Periodically maintain risk prevention measures. 3. Prevention devices should be in the equipment maintenance plan and be periodically inspected. 4. Prevention devices cannot be arbitrarily deconstructed, embezzled or laid off. The demolished parts due to reparation must be restored right after. 5. Train staffs that are responsible for the inspection and maintenance of the prevention device. <u>Medium-term:</u> 1. Improve risk prevention devices. 2. Improve the maintenance system and regulation of risk prevention devices. 3. Keep environmental risk prevention measures intact and effective. 4. Develop an on-site alarming system, control environmental accidents or its scope.

Environmental risk confirmation		
Have all the detail po	ints in recommendati	ons been taken into account and implemented
Yes	Partially	No
RC=1	RC=5	RC=10

5. Hazardous chemicals

5.1 Are there enough preventive measures in production to keep hazardous chemicals out of surrounding environment?

Yes No Not applicable

5.2 Do the preventive measures cover all the hazardous chemicals?

Yes No Not applicable

5.3 Do the preventive measures fully consider the physical and chemical properties of the chemicals? If yes, fill in the following table.

Yes No Not applicable

Hazard Sources				
(Hazardous	Property		Emergency	Persons in
Chemicals)	Description	Prevention Measures	Plan or Not	Charge

Measures:

<u>Short-term</u>

- 1. Preventive measures for hazardous chemicals should consider monitoring, ventilation, sun block, temperature adjustment, anti-fire, anti-explosion, pressure relief, anti-poison, disinfection, neutralization, moisture-proof, lightning protection, anti-static, anti-corrosion, anti-leakage, protective embankment, isolated operation, etc.
- 2. Carry out reparation and maintenance for preventive measures in light of national standards and relevant regulations so as to keep them intact and functional.
- 3. Train management staffs about hazardous chemicals with environmental risk management.
- 4. Periodically inspect preventive measures and carry out plans and management procedures to prevent environmental incidents and accidents.
- 5. Examine the chemicals coming in and out of the enterprise. Establish chemicals databases, including their physical and chemical properties, quantity, toxicity, presence form, position, etc. If properties of above chemical change, update the database immediately.

Medium-term:

- 1. Improve risk prevention devices.
- 2. Improve maintenance system and regulations for risk prevention devices.

Environmental risk co	onfirmation	
Have all the detail po	ints in recommendation	ons been taken into account and implemented
Yes	Partially	No
RC=1	RC=5	RC=10

6. Risk inspection

6.1 Are hazardous sources periodically inspected? If yes, fill in the following table.

Yes No Not applicable

Hazard	Inspection		Suggestion	Persons	
Sources	Content	Inspection Results	s	in Charge	Date

6.2 Do the preventive measures involve all hazardous sources?

Not applicable Yes No

Remarks:

Measures:			
Short-term:			
1. Establish a well-developed system of periodical inspection, random check and			
normal/special inspection.			
2. Appoint full-time employees to do the inspection work.			
3. Inspection results should be filed and reported at once.			
<u>Medium-term</u> :			
1. Take appropriate preventive measures for the detected accident potentials to prevent			
environmental incidents or accidents.			
Environmental risk confirmation			
Have all the detail points in recommendations been taken into account and implemented			

Yes	Partially	No
RC=1	RC=5	RC=10

7. Emergency plan

7.1 Is there any emergency plan for the hazardous sources?

Not applicable Yes No

7.2 Are all the hazardous sources covered in the plan?

Yes No	Not applicable
--------	----------------

7.3 Does the emergency plan have strict management regulations and startup procedures?

Yes No Not applicable

Remarks:

Me	asures:
Sh	ort-term:
1.	Improve emergency plans for the hazardous sources, if the existing form of
	hazardous sources shifts, amend the emergency plan immediately.
2.	Train management staffs and production operators about emergency plans so that
	they know about the measures and procedures to be take in case of accidents.
3.	Periodically carry out emergency drills.

Environmental risk confirmation			
Have all the detail points in recommendations been taken into account and implemented			
Yes	Partially	No	
RC=1	RC=5	RC=10	

8. Facility maintenance

8.1 Are there any devices and equipments to prevent incidents or accidents during the maintenance?

Yes No Not applicable

Measures:

<u>Short-term</u>:

- 1. Improve maintenance regulation of production facilities to specify the time and frequency of maintenance.
- 2. Develop emergency plans to prevent incidents or accidents from happening during maintenance.
- 3. Prepare relevant materials, equipments or measures, and make sure maintainers are clear about potential incidents or accidents.

Environmental risk c	onfirmation		
Hove all the detail pe	into in recommondati	na haan takan inta aggaunt a	nd implemented
Have all the detail po	sints in recommendation	ins been taken into account a	na implementea
Yes	Partially	No	
103	ranany	110	
RC=1	RC=5	RC=10	
_			

9. Deconstruction and scrap system

9.1 Does the deconstruction and scrap system of production facilities fully consider the requirements of environmental risk management?

Yes	No	Not applicable
-----	----	----------------

Mea	asures:
<u>Shc</u>	ort-term:
1.	The deconstruction and scrap system should fully consider the requirements of
	environmental risk management.
2.	When deconstructing and scrapping, make an emergency plan.
3.	When deconstructing and scrapping, prepare for materials and technologies.
4.	Deconstructed and scrapped equipments and materials must be dealt with
арр	ropriate preventive measures.
5.	Establish a database for deconstructed and scrapped equipments and materials.

Environmental risk confirmation		
Have all the detail points in recommendations been taken into account and implemented		
Yes	Partially	No
RC=1	RC=5	RC=10

10. Are warning signs and notices placed at an appropriate spot of the flammable, explosive, toxic, and noxious place?

Yes	No	Not applicable
-----	----	----------------

Remarks:

Measures:

Short-term:

- 1. Timely install warning signs or notices
- 2. Ensure signs are clear, and check regularly to make sure they are intact.

Environmental risk confirmation		
Have all the detail points in recommendations been taken into account and implemented		
Partially	No	
RC=5	RC=10	
	ation recommendations be Partially RC=5	

Checklist Summary

Detail Points of Recommendations	Potential Risks	Risk Classification (RC)
1	1/5/10	
2	1/5/10	
3	1/5/10	
4	1/5/10	
5	1/5/10	
6	1/5/10	
7	1/5/10	
8	1/5/10	
9	1/5/10	
10	1/5/10	

Average Risk of Checklist (ARC)

3.2 Water and Material Balance

Section One Recommendations

- Calculate all kinds of enterprise water consumption index according to GB/T18916, GB/T7119, including water intake index of enterprise products, recycling rate, loss rate, discharge rate, wastewater reusing rate, cooling water recycling rate, condensation water recycling rate, discharge standard-meeting rate, uncommon water resource replacement rate, etc.
- 2. Water balance test.
- 3. Completely install measuring instruments and keep them intact and functioning.
- 4. Establish a database of water consumption technologies.
- 5. Material balance test.

Section Two Checklist

1. Fill in the water intake situation according to table 1, 2, and 3—table of water consumption of the past three to five years and daily water consumption.

1.1 Have the water resources been identified? If yes, fill in Table 1

Yes No Not applicable

1.2 Has the water consumption of recent several years been recorded? If yes, fill in table 2.

Yes No Not applicable

1.3 Has the daily water consumption been clarified? If yes, fill in Table 3 in the occurrence of steady water consumption.

Yes No Not applicable

Measures:

<u>Short-term:</u>

1. Fill in the enterprise water intake table, water consumption table of recent years and daily water consumption table.

Long-term:

1. Establish a database for enterprise water consumption.

Environmental risk confirmation			
Have all the detail points in recommendations been taken into account and implemented			
Partially	No		
RC=5	RC=10		
	ation recommendations b Partially RC=5		

2. Test enterprise's water balance according to Table 4

2.1 Has the water balance been tested? If yes, fill in Table 4.

Yes

Not

Not applicable

Measures:

<u>Short-term:</u>

1. Test the water balance.

2. File the test results.

3. Take appropriate actions for unbalanced water consumption.

4. Draw an enterprise's water balance sheet, especially identifying where the water goes, what amount and its physical and chemical properties.

Environmental risk co	nfirmation		
Have all the detail points in recommendations been taken into account and implemented			
Yes	Partially	No	
RC=1	RC=5	RC=10	

3. Measurement gauges

3.1 Are measurement gauges complete and sufficient?

Yes No Not applicable

3.2 Are the measurement gauges kept well and working properly?

Yes No Not applicable

Me	asures:	
<u>Sh</u>	<u>ort-term</u> :	
1.	Periodically inspect measurement gauges of water consumption system to make sure	
	they are kept well and working properly.	
2.	File the results and keep them in record.	
3.	Have a third party periodically calibrate those measure gauges to make sure they are	
fun	functional.	

Environmental risk confirmation											
Have all the detail points in recommendations been taken into account and implemented											
Partially	No										
RC=5	RC=10										
	mation in recommendat Partially RC=5										

4. Has the database of water consumption technology been established?

Yes No Not applicable

Remarks:

Measures:

Short-term:

- Technical documentation includes rules and regulations of water consumption and conservation; parameters of water sources like its quantity and quality, temperature, etc.; water supply and drainage network drawings; water gauges system drawing; daily log and summary table of water supply, consumption and drainage; improvement in water saving technology of the year; and water balance testing file of the year.
- 2. Documentation of water consumption technology should be intact, authentic and exhaustive.
- 3. Have full-time employees manage the documentation of water consumption technology, and constantly update it.

Environmental risk confirmation											
Have all the detail points in recommendations been taken into account and implemented											
Yes	Partially	No									
RC=1	RC=5	RC=10									

5. Material balance

5.1 Has the material balance been tested? If yes, test the material balance according to table 5.

Yes No Not applicable

5.2 Does the material balance involve main hazardous substances?

Yes	No	Not applicable

Remarks:

Measures:

Short-term:

- 1. Is the material balance datasheet intact, authentic and exhaustive?
- 2. Have full-time employees manage the database of water consumption technology, and constantly update it.
- 3. Draw a material balance sheet of the focal hazardous materials, especially marking their disposition and amount.

Environmental risk confirmation											
Have all the detail points in recommendations been taken into account and implemented											
Yes	Partially	No									
RC=1	RC=5	RC=10									

Checklist Summary

Detail Points of Recommendations	Potential Risks	Risk Classification (RC)					
1	1/5/10						
2	1/5/10						
3	1/5/10						
4	1/5/10						
5	1/5/10						

Average Risk of Checklist (ARC)

Table 1 Enterprise Water Intake sources

	Water Source Type		F	Fresh Water C	Capacity/(r	n ³ /d)		W					
		Water fr	om Cor Sour	nmon Water	Water from Uncommon								
No.		Design	Fact	Pipe Dimension (mm) x number	Design	Fact	Pipe Dimension (mm) x number	Temp.	рН	Hardness	Turbidity	Main Usage	Remarks
	Total												

1. As for the column of "water source type", if enterprises have many water sources, filled them in separately under common or uncommon water sources. Common sources include surface water, underground water, and tap water, outsourced softened water, and outsourced stream water; the uncommon include sea water, brackish water, reclaimed municipal wastewater, mine water, etc.

2. In case there are many kinds of water pipes, list their dimensions in sequence.

3. Specify fees, cost of producing water, etc in the column of "remarks".

Year		2005	2006	2007	2008	2009
Fresh water						
Volume						
(x10⁴m³)						
	Direct cooling water circulation					
Recvcling	Indirect cooling water circulation					
water	Other cooling water circulation					
Volume	Steam condensed water circulation					
(×10 [°] m°)	Reclaimed water					
	Series water					
	Discharge					
Others (×10 ⁴ m ³)	Loss					
(,	Water consumption					
	Main products					
	Unit product water intake					
	Recycling ratio					
	Recycling ratio of direct cooling water					
Critorio	Recycling ratio of indirect cooling water					
Chiena	Recycling ratio of steam condensed water					
	Recycling ratio of wastewater					
	Loss ratio					
	Standard discharge ratio					
	Replacement for uncommon water sources					
Remark 1: The 2: If e	Column of freshwater should be classified accorn nterprises have direct cooling water, the table should be classified accorn to the table should be classified a	ding to the	eir source a new col	es and fill umn for th	ed in sep nat.	arately.

Table 2 Enterprise Water Consumption (Recent Years)

Table 3 Daily Water Consumption (m³/d)

		Water			Reclair	med Water	Volume		Daily life	Water		Discharge amount		Recycling
Depart.	Work- shops	Consumpt ion	Fresh water	Series water	Cooling water	Process water	Boiler steam condensed water	Total	freshwater /capita	Consum ption	Water loss		rate%	rate %
Main														
noduction														
Workshop														
workshop														
Auxiliary														
production														
workshop														
Accessory														
production														
departments														

Table 4 Enterprise Water Balance

	Inlet Water								Outlet Water											
			Total			Inlet Water								Outlet water						
En	terprise	Morkehon	Water	Freshw	Series	Recycli	Recycling	Recycli	Recycling		Water	Water	Dischar	Recycli	Recycling	Recycli	Recycling	Total	Discharge	Recycling
ivia	nageme	vvorksnop	consum	ater	water	ng	ratio of	ng	ratio of	Total	consum	Loss	ges	ng	ratio of	ng	ratio of		rate%	rate%
	nı		ption			cooling	cooling	process	process		ption		0	cooling	cooling	process	process			
						water	water	water	water					water	water	water	water			
<	Main																			
Vorks	ר Pro																			
shop	ducti																			
	on																			
	Auxili																			
WORK	ary F																			
shop	rodu																			
	ction																			
	1																			
	Acces																			
Dep	sory																			
oarts	Proc																			
	luctio																			
	Ċ																			
	Total																			
Table 5 Material balance

No.	Items	Input/(t/a)	Output/(t/a)	Percentage of total (%)	Remarks
1					
2					
3					
4					
5					
	Total				

- 1. A material balance sheet for all substances is required;
- 2. Column "Items" includes raw materials, auxiliary materials, medium bodies, and products;
- 3. In case that the sheet is unbalanced, specify the details in the column of "Remarks" and find out what the causes are.

Chapter Four

Environmental Risk Management System

4.1 General Requirements

Section One Recommendations

- The establishment of a responsibility system is required by the environmental risk management to define job responsibilities, rights, obligations and specific work content of leaders(at all levels), management staff, workers and various departments. Operators are directly responsible for the environmental risk management of their occupations.
- 2. Execute standardized management.
- 3. Implement an all around and 24-hour environmental risk management and supervision.
- 4. Identify annual goals of environmental risk management and give relative assessment.
- 5. Organize at all levels to develop working plans for environmental risks management in order to make sure that the goals and strategy are obtained.
- 6. Set up a department or have full-time employees to manage environmental risk to improve the network.

Section Two Recommendation Implementation

1. Responsibility system

1.1 Does the environmental risk management have a responsibility system to define job responsibilities, rights, obligations and specific work content of leaders (at all levels), management staff, works and departments?

Yes No Not applicable

1.2 With regard to environmental risk management, are people at all positions clear about their own responsibilities? Training, drill, etc can be considered for environmental risk management.

Yes	No	Not applicable

Short-term:

- 1. Make sure that people at all positions are clear about their own responsibilities through training (Here refers to environmental risk management).
- 2. Thoroughly execute the rules that people at all positions are responsible for their own duties.
- 3. Establish a developed responsibility system of environmental management.
- 4. People at all positions are clear about the detailed working requirements and content.

Environmental risk confirmation				
Have all the detail points in recommendations been taken into account and implemented?				
Partially	No			
RC=5	RC=10			
-	ation recommendations be Partially RC=5			

2. Standardized management

2.1 Does the enterprise with environmental risk management have corresponding regulations, procedures, and norms as the reference for practitioners?

Yes No Not applicable

2.2 Do regulations, procedures, and norms mentioned above involve the whole process of the environmental risk management?

Yes No Not applicable

2.3 Have all the regulations, procedures, and norms mentioned above been constantly updated and adjusted according to the actual situation?

Yes	No	Not applicable
-----	----	----------------

Short-term:

- 1. Improve the regulations, standards and norms of the enterprise environment management.
- 2. Train practitioners about environmental risk management.

Environmental risk confirmation				
Have all the detail points in recommendations been taken into account and implemented?				
Yes	Partially	No		
RC=1	RC=5	RC=10		

3. Does the enterprise execute an all around and 24-hour environmental risk management and supervision? It is required to have a corresponding working system, management and supervision references, and full-time employees.

Yes No Not applicable

Remarks:

Environmental risk confirmation				
Have all the detail points in recommendations been taken into account and implemented?				
Yes	Partially	No		
RC=1	RC=5	RC=10		

4. Strategies and objectives of environmental risk management

4.1 Has the enterprise specified the strategies and objectives of the environmental risk management?

Yes No Not applicable

4.2 Have the strategies and objectives of the environmental risk management been filed?

Yes No Not applicable

If yes, briefly describe

The strategies of environmental risk management:

Objectives of environmental risk management:

4.3 Are the files in 4.2 given to the people at relevant positions?

Yes No Not applicable

Me	easures:
Sh	nort-term:
1.	Develop strategies and objectives of the enterprise environmental risk management
	and file them.
2.	Train workers to be clear about the strategies and objectives of the environmental risk
	management.
3.	Thoroughly carry through the strategies and objective as mentioned above into daily
	work of the environmental risk management.
4.	The rules for developing environmental management goals: improve environmental
	management and control environmental incidents.

Environmental risk confirmation				
Have all the detail points in recommendations been taken into account and implemented?				
Yes	Partially	No		
RC=1	RC=5	RC=10		

5. Working plan

5.1 Do units at each level make corresponding working plans of the environmental risk management to ensure the strategies and objectives of the environmental risk management achieved?

Yes No	Not applicable
--------	----------------

Remarks:

Measures: <u>Short-term:</u>
1. Develop the working plan according to the objectives of the environmental risk management to make sure the implementation of the goals.
2. Strictly carry through environmental management plans.

Environmental risk confirmation				
Have all the detail points in recommendations been taken into account and implemented?				
Yes	Partially	No		
RC=1	RC=5	RC=10		

6. Organization construction

6.1 Does the enterprise set up a department for environmental risk management and have full-time employees?

Yes No Not applicable

If yes, describe the environmental risk management department including department function, work content, workforce, relevant regulations, etc.:

6.2 Are the environmental risk managers qualified for the job in terms of professionalism and management ability?

Yes No Not applicable

If yes, give detailed information of the environmental risk managers, like education background, working experience, awards, etc:

Remarks:

Measures:

Short-term:

- 1. Have full-time employees of environmental risk management in the fundamental workshops.
- 2. Specify the responsibilities of environmental risk management departments and staff at all levels.
- 3. Main responsible persons, duty leaders and environmental risk management staff from both enterprises and production entities must have environmental knowledge and management ability corresponding to their production and business.

Environmental risk confirmation				
Have all the detail points in recommendations been taken into account and implemented?				
	Yes	Partially	No	
	RC=1	RC=5	RC=10	

Checklist Summary

Detail Points of Recommendations	Potential Risks	Risk Classification (RC)
1	1/5/10	
2	1/5/10	
3	1/5/10	
4	1/5/10	
5	1/5/10	
6	1/5/10	

Average Risk of Checklist(ARC)

4.2 Training

Section One Recommendations

- 1. Main responsible persons and environmental risk management staff should be trained about environmental risk knowledge and management ability.
- 2. Train practitioners at bottom position with environmental risk management. The position can only be taken after passing the examination.
- 3. Train drivers, sailors, handing managers, and escorts of hazardous chemical transportation with relevant knowledge of environmental risk management.
- 4. Before new process, technologies, facilities or products go into production, the administrative department should organize the development of new management regulations of environmental risks and give practitioners specialized trainings.
- 5. Have orientations of plants, workshops and groups for new practitioners.
- 6. Have group environmental risks education and promotional activities.
- 7. Enterprises should guarantee the resources for the environmental risk training.

Section Two Recommendation Implementation

1. Management staff

1.1 Have main responsible persons of the enterprise and environmental risk management staff been trained with knowledge of environmental risk and management ability?

Yes	No	Not applicable
1.2 Are the training	s above conducted b	y professional organizations or specialists?
Yes	No	Not applicable
1.3 Is examination	required for the traini	ng?
Yes	No	Not applicable

Short-term:

- 1. Invite professional organizations or specialists to launch the training of environmental risks.
- 2. The training of environmental risk management mainly includes the strategies, laws, regulations and standards of the national environmental risk management; regulations and responsibilities of enterprise environmental risk management; technology and management of environmental risk; relevant accidents and emergence management, etc.
- 3. Timely evaluate the effectiveness of training. Improve it if it cannot fulfill the requirements of environmental risk management.
- 4. Training records are required to be filed, including the host company, training content, examination results, evaluation and improvement of training effectiveness, etc.
- 5. Main responsible persons of the enterprises, environmental risk management staff and practitioners must be trained with how to deal with emergencies and be clear about the emergency response process and measures.

Environmental risk confirmation			
Have all the detail point	s in recommendati	ons been taken into account and implemente	d?
Yes	Partially	No	
RC=1	RC=5	RC=10	

2. Basic-level practitioners

2.1 Have the basic-level practitioners been trained in basic environmental risk management?

Yes No Not applicable

2.2 Does the training require examinations?

Yes No Not applicable

Short-term:

- 1. Invite professional organizations or specialties to launch trainings of environmental risks.
- 2. The training includes: essential knowledge about environmental risks; know well about environmental risk regulations and operation procedures; and master the environmental risk operation skills of the occupation.
- 3. Timely evaluate the content and results of the training.
- 4. File the training records according to the requirements including host companies, training content, examination results, training evaluation and improvement.

mation	
in recommendation	ons been taken into account and implemented?
Partially	No
RC=5	RC=10
	mation in recommendation Partially RC=5

3. Storage and transportation staff

3.1 Has the staff of storage and transportation been trained with relevant knowledge of environmental risk management?

Yes No Not applicable

Remarks:

Measures

Short-term:

- 1. Drivers, sailors, staff of handing management and escorts of hazardous chemical transportation must have relevant certificates. The position can only be taken by qualified people.
- 2. Train above employees responsible for chemicals transportation with knowledge and skills of environmental risks.

- 3. Timely evaluate the content and results of the training.
- 4. Training records are required to be filed, including the host company, training content, examination results, training evaluation and improvement, etc.

Environmer	ntal risk confirma	tion	
Have all the	e detail points in r	recommendations be	een taken into account and implemented?
Yes	S	Partially	No
		-	
RC	<u>`_1</u>	RC-5	RC-10
	·— I	NO=5	

4. Process update

4.1 Before new process, technologies, facilities or products are implemented, has the administrative department organized the development of new management regulations for environmental risks?

Yes	No	Not	applicable	
4.2 Have prac	titioners receiv	ed the specializ	zed training?	
Yes	No	Not	applicable	
Remarks:				
F acing and and	tal viale a sufirma	- 4:		
Environmental risk confirmation				
Have all the	detail points in	recommendati	ons been taken into account and implemented?	
Yes		Partially	No	
RC	=1	RC=5	RC=10	
l				

5. Have the new employees received an orientation about the plant, workshop and working groups?

Remarks:

Measures:

<u>Short-term</u>:

- The first level training of the plant includes: relevant laws and regulations, standards; basic knowledge of environmental risk management; rules for environmental risk management; risks at operation sites, prevention and emergency response measures; case study of relevant accidents, etc.
- 2. Workshop (process unit) training includes: characteristics of workshop (process unit, block and group) production environment management; environmental risk management regulation system and operation procedures; risks at the operation sites and in workplace and its preventive measures; typical accident case study and emergency response measures, etc.
- 3. Group training includes: production process, facilities, operation manuals and important matters of position safety; usage, function and properties of prevention devices and materials (appliances); preventive measures for accidents, accident cases, etc.

Environmental risk co	Environmental risk confirmation			
Have all the detail po	ints in recommendation	ons been taken into account and implemented?		
Yes	Partially	No		
RC=1	RC=5	RC=10		

6. Are environmental risk education and promotional activates carried out periodically?

Yes No Not applicable

Short-term:

- 1. Learn about the state and government's laws, regulations, and standards of the environmental risk management.
- 2. Study files, bulletins, regulations, operation procedures and technical knowledge of the environmental risk management.
- 3. Discuss and analyze typical accidents so as to avoid them from happening.
- 4. Launch firefighting, anti-explosion and anti-leakage trainings and emergency drills.
- 5. Launch activities for sharing technologies about environmental risk prevention (such as in the form of a competition).
- 6. Launch investigations into hidden dangers and combat habitual peccancy activities.
- 7. Launch workshops for environmental risk management.
- 8. Familiarize with the risks and preventive measures for operation sites and job positions.

Environmental risk co	nfirmation	
Have all the detail poi	nts in recommendation	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

7. Does the environmental risk training have enough resources guaranteed?

Yes

No

Not applicable

<u>Short-terms:</u>

1. Make sure there are sufficient staff, finance and equipments for the safety training.

Environmental risk co	onfirmation	
Have all the detail po	ints in recommendation	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

Checklist Summary

Detail Points of Recommendations	Potential Risks	Risk Classification (RC)
1	1/5/10	
2	1/5/10	
3	1/5/10	
4	1/5/10	
5	1/5/10	
6	1/5/10	
7	1/5/10	

Average Risk of Checklist (ARC)

4.3 Major Hazard Sources

Section One Recommendations

- 1. Identify the major hazardous sources of enterprises, and establish a relative management system.
- 2. A database for major hazardous sources should be set up for periodical check, evaluation and monitoring.
- 3. Enact an emergency plan and inform practitioners and other relevant people of the emergency measures in case of any urgent situation.
- The protection zone between equipments of major hazardous sources and their surrounding environmental protection targets should meet the national standards or relevant regulations.

Section Two Recommendation Implementation

1. Hazardous source identification

1.1 Has the risk hazardous identification been done? If yes, fill in the following table.

Yes No Not applicable

1.2 Does the hazardous source identification cover everything including facilities, activities, changes, and outside and inside environment of the plant?

Yes No Not applicable

Place, Activity, Equipment, Materials	Hazardous Sources	Possible Harm	Existing Control Methods	Follow-up measures	Persons in Charge

1.3 Has the enterprise established a hazardous source management system that includes objectives, targets and management plans?

Yes No Not applicable

Remarks:

Measures:

Short-term:

- Above accidents or alternations include: requirements of new or amended laws and regulations; operation or process update; newly-developed, reconstructed, expansion or technological upgrading projects; new understanding of incidents, accidents or other information; and big adjustment in organizational structure.
- 2. Inform practitioners of the risk evaluation results and train them to know about the updated preventive measures.

Medium-term:

1. Timely evaluate environmental risks resulted from incidents or changes.

Environmental risk co	nfirmation	
Have all the detail poi	nts in recommendati	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

2. File and documentation

2.1 Are the detected sources of major hazards registered and filed?

Yes No Not applicable

2.2 Are there any action plans for the identified major hazardous sources, like periodical inspection, evaluation and monitoring?

Yes No Not applicable

Remarks:

Measures: <u>Short-term</u>:

- 1. Enhance the inspection on major hazardous sources, establish a datasheet of major hazardous sources management and dynamic monitoring log, and install essential gauges and monitoring equipments.
- 2. Carry out periodical inspection, evaluation and monitoring on the identified major hazardous sources.

<u>Medium-term:</u>

1. Establish a monitoring system and install necessary gauges and monitoring equipments.

Environmental risk c	onfirmation	
Have all the detail po	pints in recommendation	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

3. Emergency response plan

3.1 Is there a section about major hazardous sources in the enterprise's emergency plan?

Yes

No

Not applicable

3.2 Are the practitioners and relevant people clear about emergency measures in case of urgent situation?

Yes No Not applicable

3.3 Are the emergency supplies as required by the chapter of environment risks kept intact and functional?

Yes No Not applicable

Remarks:

Measures:

Short-term:

- 1. The major hazardous sources should have an exclusively emergency plan or be included in the enterprise emergency plans.
- 2. Train practitioners to familiarize with emergency response procedures for incidents or accidents.
- 3. Preventive measures and emergency plans should be kept in record in local environmental protection department and other relevant departments.

Medium-term:

1. Prepare essential emergency supplies and keep them intact and functional.

Environmental risk co	onfirmation	
Have all the detail po	pints in recommendation	ons been taken into account and implemented
Yes	Partially	No
RC=1	RC=5	RC=10
RC=1	RC=5	RC=10

4. Protection zone

4.1 Have the surrounding sensitive areas been investigated and identified?

Yes No Not applicable

4.2 Does the protection zone meet national standards or relative regulations?

Yes No Not applicable

Me	asures:
<u>Sh</u>	<u>ort-term</u> :
1.	Cooperate with local environmental protection department and identify nearby
	protected targets.
2.	Make sure the protection zone between hazardous sources and protected targets is
	in line with the relevant national and local regulations.
<u>Me</u>	edium-term:
1.	Arrange necessary preventive measures to eradicate environmental incidents or
	accidents that may threaten the enterprise and its surroundings.

Environmental risk co	onfirmation	
Have all the detail po	ints in recommendation	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10
_		

Checklist Summary

Detail Points of Recommendations	Potential Risks	Risk Classification (RC)
1	1/5/10	
2	1/5/10	
3	1/5/10	
4	1/5/10	

Average Risk of Checklist(ARC)

4.4 Risk Prevention

Section One Recommendations

- 1. Enterprise should constantly organize risk inspection and identify the environmental risks or accident potentials related to production.
- 2. According to the general and special inspection results, implement the selected risk prevention measures.
- 3. The projects identified as major accident potentials should be filed and regarded as the focus of environmental risk management.
- 4. Periodically evaluate or inspect the environmental risk prevention measures and stored material supplies to make sure that they are kept intact and functional.
- 5. When changes are made, assess the related environmental risks.

Section Two Recommendations Implementation

1. Risk inspection

1.1 Does the enterprise organize general and special risk inspections according to the requirements?

Yes No Not applicable

1.2 Is the general inspection involved all aspects such as facilities, activities, changes, and the environment?

Yes No Not applicable

Remarks:

Measures:

Short-term:

- 1. Periodically conduct general and special inspections to identify accident potentials.
- 2. Ensure that risk inspections cover all aspects.

Environmental risk	confirmation				
Have all the det	tail points in recomm	endations been	taken in	to account	and
implemented?					
Yes	Partially	No			
RC=1	RC=5	RC=10			

2. Risk prevention measures

2.1 Is there enough risk prevention measures to control the risks to an acceptable extent?

Yes	No	Not applicable
2.2 Are the enviror	nmental risk preventio	on measures kept intact and functional?
Yes	No	Not applicable
Remarks:		

Measures:	
<u>Short-term:</u> :	
1. Periodically conduct general and special inspections to identify the ac	cident
potentials in the enterprises.	
2. Fill in enterprise environmental risk prevention measures according to	b the
"Environmental Risk and Chemical Checklist of State Key Industry and Enterpri	ses".
3. Carry out promotion activities and trainings for practitioners to know about the	; risks
and preventive measures of their job position and working environment.	
<u>Medium-term</u> :	
1. Construct and put in place enough risk prevention measures.	

Environmental risk co	onfirmation	
Have all the detail poi	ints in recommendation	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

3. Documentation management.

3.1 Have the enterprises conducted investigation aimed at environmental accident potentials? If yes, fill in following tables.

Yes No Not applicable

Environmental Accident potentials	Possible Harm	Existing Preventive measures	Date	Persons in Charge

3.2 Has a file been established for projects identified with having big accident potentials?

Yes No Not applicable

Short-term:

- 1. Periodically conduct general and special inspections to identify accident potentials in the enterprise.
- 2. Files for accident potentials should include a risk evaluation report, a technical conclusion, evaluation suggestions, and disposal proposal for hidden hazards, cost estimation, a disposal schedule, persons in charge, and a completion acceptance report.

<u>Medium-term</u>:

1. Construct and put in place enough risk prevention measures.

Environmental risk co	onfirmation	
Have all the detail po	ints in recommendation	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

4. Are the risk prevention measures periodically checked and evaluated to make sure that they are intact and effective?

Yes No Not applicable

Environmental risk co	onfirmation		
Have all the detail points in recommendations been taken into account and implemented?			
Yes	Partially	No	
RC=1	RC=5	RC=10	

5. Accidents and alternation

5.1 Does the environmental impact assessment report include a chapter exclusively for the environmental risk evaluation?

Yes No Not applicable

5.2 When accidents or alternations happen, will the environmental risk evaluation be done timely? If yes, fill in the following table.

Yes

No

Not applicable

Accidents or Alternations	Possible Harm	Existing Preventive measures	Risk Evaluation Date	Evaluatio n Company

Remarks:

Measures:

Short-term:

- 1. Alternations here include: new or amended laws and regulations or other requirements; projects that are new, reconstructed, expanded or that are going through technological transformation; new understanding of incidents, accidents or other information; and major adjustments in organization.
- 2. Inform practitioners of the risk evaluation results and train them to be familiar with the changed preventive measures.

<u>Medium-term</u>:

1. Timely evaluate environmental risks after incidents or alternations.

Environmental risk confirmation				
Have all the detail points in recommendations been taken into account and implemented?				
Yes	Partially	No		
RC=1	RC=5	RC=10		

Checklist Summary

Detail Points of Recommendations	Potential Risks	Risk Classification (RC)
1	1/5/10	
2	1/5/10	
3	1/5/10	
4	1/5/10	
5	1/5/10	

Average Risk of Checklist (ARC)

4.5 Environmental Risk Inspection

Section One Recommendations

- Enterprise should establish a system of periodical inspection and random check for the environmental risks. With periodical inspection or checks, the goal of controlling the environmental incident and eradicating pollutant over-discharges and environmental incidents will be achieved.
- Enterprises should improve the approaches of environmental risk inspection and random check. Inspections should be based on laws, regulations, standards, norms and checklists.
- Analyze the reasons behind the hidden hazards investigated and identified by those risk inspections. Develop improvement measures and implement them immediately. Timely evaluate and accept the improved situation.

Section Two Recommendation Implementation

1. Inspection and random check

1.1 Has a periodical inspection and random check system been established for environmental risks?

Yes	No	Not applicable

If yes, describe the system (inspection frequency, object, content, scope, etc.)

1.2 Does the inspection and random check system specify its goals, requirements and content and have concrete plans?

Yes No Not applicable

Short-term:

- 1. The objective of risk inspection and random check is to ensure the goal of controlling environmental risks and eradicating pollutants over discharge achieved.
- 2. The main task of inspection is to obviate hidden hazards and to propose eradication or preventive methods/measures.
- 3. Enterprises should establish a contact point system of leaders for environmental risk management. The leaders should periodically undertake environmental risk inspection and guide on key and important places, like outlet, prevention devices, etc.
- 4. Develop all kinds of inspection and random check systems, and integrate them with the existing daily inspection system. Objectives for each kind of inspection system should be defined.

Environmental risk confirmation			
recommendations be	een taken into account and implemented?		
Partially	No		
RC=5	RC=10		
	ation recommendations be Partially RC=5		

2. Approach of inspection and random check

2.1 Are there enough and well-developed approaches of environmental risk inspection and random check. Are there relative regulations and manpower guaranteed, and hardware support like instruments and equipments?

Yes No Not applicable

2.2 Are there laws, regulations, standards, norms and checklist for the inspection and random check to follow?

Not applicable

Short-term:

- Inspectors should timely record, in written form, the inspection time, location, content and identified problems. The record should be signed by the inspector and responsible persons from the inspected enterprise. Inspectors should file the record and report it to a higher level of management. Feedback records are expected afterwards.
- 2. Enterprises should have penalty to enhance supervision and punishment against breach.

Environmental risk confirmation			
Have all the detail points in recommendations been taken into account and implemented?			
Yes	Partially	No	
RC=1	RC=5	RC=10	

3. Inspection result

3.1 Has an analysis of the reasons behind the risk potentials identified by the inspection been carried out?

Yes No Not applicable

3.2 Have revamping methods been developed for the accident potentials in the environment, and timely put into action?

Yes No Not applicable

3.3 Has the revamped results been evaluated and accepted?

Yes No	Not applicable
--------	----------------

<u>Short-term:</u>

- As for the accident potentials, a "Hidden Hazard Revamping Notice" should be given. What should be done is to develop corresponding revamping measures, appoint responsible persons, decide on the funding sources and specify the schedule.
- 2. Besides taking effective prevention actions, major accident potentials that the enterprise is unable to solve should be reported to the upper administrative department and local government in written form.
- Inspection organization at each level and staff should report the detected accident potentials and the revamping results to the upper administrative department. Environmental protection departments should file and save the major accident potentials and revamping situations.

Environmental risk cor	ifirmation		
Have all the detail points in recommendations been taken into account and implemented?			
Yes	Partially	No	
RC=1	RC=5	RC=10	

Checklist Summary

Detail Points of Recommendations	Potential Risks	Risk Classification (RC)
1	1/5/10	
2	1/5/10	
3	1/5/10	

Average Risk of Checklist (ARC)	
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4.6 Accident Potentials Management

Section One Recommendations

- 1. Enterprises need to establish projects for accident potentials, develop a revamping system, and execute hierarchical and dynamic management on the detected accident potentials.
- 2. Accident potentials must be monitored before being revamped.
- 3. Accident potentials that have been revamped should be reported to administrative departments for acceptance.

Section Two Recommendation Implementation

1. Accident potentials management

1.1 Have accident potentials been obviated? If yes, fill in the following table.

Yes	No	Not applicable
-----	----	----------------

No.	Items	Impacts	Measures	Remarks

1.2 Is there a follow-up project established for revamping the detected accident potentials as described in the above 1.1?

Yes No Not applicable

1.3 Can the hierarchical and dynamic management be realized for accident potentials?

Yes

No

Not applicable
<u>Short-term:</u>

- 1. Settle down the revamping proposal for the detected accident potentials.
- 2. Develop a revamping proposal that includes the target and task; methods and measures, finance and materials; responsible organization and staff, schedule and requirements as well as an emergency plan.
- 3. Revamping of accident potentials should be assigned to full-time employees with specification on the execution staff and finance, and work out the schedule.

Environmental risk co	onfirmation	
Have all the detail po	ints in recommendation	ons been taken into account and implemented?
Yes	Partially	No
	,	
KC=1	KC=5	KC=10

2. Accident potentials monitoring

2.1 The accident potential should be monitored by appropriate measures before revamping completes.

Yes	No	Not applicable
-----	----	----------------

Me	easures:
<u>Sh</u>	<u>ort-term:</u>
1.	All the accident potentials should have three levels of monitoring: workplace, bottom
	unit, and the upper unit.

Environmental risk cor	nfirmation	
Have all the detail poir	nts in recommendation	ons been taken into account and implemented
Yes	Partially	No
RC=1	RC=5	RC=10

3. Acceptance

3.1 Has the acceptance of the accident potentials revamping been done after it completes?

Yes	No	Not applicable
-----	----	----------------

Environmental risk confirm	nation	
Have all the detail points i	n recommendations t	been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

Checklist Summary

Detail Points of Recommendations	Potential Risks	Risk Classification (RC)
1	1/5/10	
2	1/5/10	
3	1/5/10	

Average Risk of Checklist(ARC)	

4.7 Accident Management

Section One Recommendations

- 1. Clarify the reporting regulations and procedures of environmental incidents.
- After receiving environmental incident reports, responsible persons should take care of the incident to avoid it from getting worse, especially be mindful of the secondary incidents. Moreover, genuinely report it to the local government or environmental protection authority according to the national relevant regulations.
- 3. After environmental incidents happen, enterprises should follow the national relevant regulations to organize an investigation team that accords to the incident classification and level to undertake incident investigation or to cooperate with upper department's investigation.
- 4. Compose an investigation report of the incidents, including the background, incident progress, reason analysis, lesson learned and preventive measures, as well as responsibility analysis and punishment advice.
- 5. File and save the environmental incidents afterwards.

Section Two Recommendation Implementation

1. Reporting system and procedure.

1.1 Has a reporting system for environmental incidents been established?

Yes No Not applicable

1.2 Does the reporting of environmental incidents follow corresponding procedures?

Yes No Not applicable

Short-term:

- 1. Establish a reporting system and procedure according to the state and local relevant regulations.
- "State Environmental Incident Emergency Plan" specifies the environment incident classification, reporting system and procedures and is an important reference for enterprises to establish their own reporting system and procedures.

Environmental risk con	firmation	
Have all the detail poin	ts in recommendati	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

2. Counter-measures

2.1 After receiving environmental incident reports, do the responsible persons take adequate and effective action to stop them from spreading and to control the impacts of secondary incidents on human and the environment?

Yes No Not applicable

2.2 Has the emergency response ability of the responsible persons and relevant departments been inspected by periodical drills or other means?

Yes No Not applicable

2.3 Has the enterprise established a communication and coordination system with the local government or environmental authority?

Yes No Not applicable

2.4 Have the environmental incidents been genuinely reported to local government or environmental authority according to national relevant regulations?

Yes Not Not applicable

Remarks:

Measures: Short-term: 1. Measures include the ability to classify environmental incidents, an initiation program for emergency response, communication with local government, an emergency response team, and relevant technology and materials supplies. 2. Examine and improve, by drills, trainings and exams, enterprise's ability to respond to the environmental incidents and preparation of system, materials and technologies. 3. Establish a communication and coordination system with the local government and environmental authority. 4. Investigate the layout of surrounding residential areas, especially schools, hospitals, etc. Investigation scope includes the distance, contact details, etc. 5. Establish an effective information publication and announcement system. Inform surrounding citizens immediately once environmental incidents happen. 6. Report to the local government of the classification, level and possible impacts of incidents and negotiate with local government about counter-measures once environmental incidents happened.

Environmental risk cor	nfirmation	
Have all the detail poir	nts in recommendation	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

3. After environmental incidents happen, does the enterprise follow the national relevant regulations to organize an investigation team that undertakes incident investigation or to cooperate with upper department's investigation based on the incident classification and level?

Yes No Not applicable

Remarks:

Environmental risk co	onfirmation	
Have all the detail po	ints in recommendation	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

4. Investigation report

4.1 Has the reason been analyzed after the environment incident, and follow-up revamping measures proposed?

Yes No Not applicable

4.2 Is the investigation report of the environmental incident composed according to the requirements including the incident background, progress, reason analysis, lesson learned and preventive measures, as well as responsibility analysis and punishment advice?

Yes No Not applicable

Environmental risk co	onfirmation	
Have all the detail po	ints in recommendation	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

5. Have the environment incidents been filed and saved afterwards?

Yes No Not applicable

Environmental risk co	onfirmation	
Have all the detail po	pints in recommendation	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

Checklist Summary

Detail Points of Recommendations	Potential Risks	Risk Classification (RC)
1	1/5/10	
2	1/5/10	
3	1/5/10	
4	1/5/10	
5	1/5/10	

Average Risk of Checklist (ARC)

4.8 Emergency Management

Section One Recommendations

- Establish an emergency response command system and execute hierarchical management. Set up and improve an emergency management system and organization structure.
- 2. Prepare enough emergency supplies according to the relevant national regulations, and maintain them well.
- 3. Develop emergency plans for the accident potentials and emergencies according to the relevant state and local laws and risk management results.
- 4. Enterprises should manage emergency plans and put in place step-wised initiation programs and enhance the inspection on composition, distribution, training, practices, alternation, initiation, termination, reporting and filing of environmental emergencies.
- Organize practitioners to have trainings and periodical practices about emergency response plans. Evaluate the effectiveness of the practice and the emergency response plans.
- 6. Negotiate with local government or environmental protection authority about sudden and major environmental incidents that may possibly have impacts on surrounding areas and public safety. Take essential measures to complete emergency drills that concern response and rescue action.
- 7. Periodically evaluate the emergency plans, especially after the potential incident and sudden accident happen.

Section Two Recommendations' Implementation

1. Emergency management system

1.1Has the enterprise established an emergency management system for environmental incidents, including emergency management regulations and organization?

Yes No Not applicable

If yes, describe the emergency management system.

Emergency management regulations:

Emergency management organization:

1.2 Does the existing emergency management system meet the requirements of state and local laws and regulations?

Yes No Not applicable

1.3 Is the existing emergency management system adequate and complete to deal with the impacts of sudden environmental incidents?

Yes No Not applicable

Remarks:

Measures:

Short-term:

- Improve the enterprise's emergency management regulations. References are National General Emergency Response Plan for Sudden Public Incident", "State Emergency Plan for Sudden Environmental Incidents" and "Composition Guideline of Environmental Emergency Plan for Petrochemical Industry".
- 2. Fully negotiate with environmental and safety authorities to identify each party's duty and the reporting and cooperation system.

Medium-term:

- 1. Improve enterprise emergency management organization.
- 2. Improve enterprise emergency response system, like emergency communication, supplies, etc.

Environmental risk co	nfirmation	
Have all the detail poi	nts in recommendation	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

2. Emergency supplies

2.1 Are the emergency supplies prepared as required by the state and local laws and regulations? If yes, fill in the following table.

Yes No Not applicable

Emergency Supplies	Qtv (set, pair)		Inspection Date	Maintained well or not?	
	Qtv in demand	Current Qtv		Yes	No

2.2 Are the emergency supplies kept in good conditions?

Yes No Not applicable

Short-term:

- 1. Periodically inspect the emergency supplies to make sure they are intact and effective.
- 2. Prepare emergency supplies according to the Checklist of Enterprise Environmental Risk and Chemicals for State Key Industries.

Medium-term:

1. Prepare the emergency supplies according to the state and local laws and regulations.

ation	
recommendations b	een taken into account and implemented?
Partially	No
RC=5	RC=10
	ation recommendations b Partially RC=5

3. Emergency plan

3.1 Is the emergency plan composed according to the requirements of state and local laws and regulations?

Yes No Not applicable

3.2 Does the composition of the emergency plan consider the requirements of environmental impact assessment report and its approval content?

Yes No Not applicable

Short-term:

- 1. The composition of the emergency plan should consider the requirements of the environmental impact assessment report and approval content
- 2. The composition of the emergency should be based on the "Composition Guideline of Emergency Plan for Hazardous Chemicals Accidents (Company Edition)", "National General Emergency Plan for Sudden Public Incidents", "State Emergency Plan for Sudden Environmental Incidents" and "Composition Guideline of Environmental Emergency Plan for Petrochemical Industry".

Medium-term:

- According to state and local laws and regulations as well as the enterprise characteristics, develop environmental emergency plans. Compose emergency plans that are in line with the "Composition Guideline of Emergency Plan for Hazardous Chemicals Accidents (Company Edition)", "General Emergency Plan of State Sudden Public Incident", "Emergency Plan of State Sudden Environmental Incidents" and "Composition Guideline of Environmental Emergency Plan for Petrochemical Industry".
- 2. When changes are made to the processes, equipments and materials, timely update the emergency plan.

Environmental risk co	onfirmation	
Have all the detail po	ints in recommendation	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

4. Emergency plan initiation

4.1 Has the implementation program of the emergency plan been developed, like composition, granting, training, practices, alternation, initiation, termination, reporting and filing?

Yes No Not applicable

<u>Short-term:</u>

- 1. Develop effective system to enhance the composition, granting, training, practices, alternation, initiation, termination, reporting and filing of the emergency plans.
- 2. Improve initiation program for emergency plan.
- 3. Communicate with local environmental and safety authorities and work out an environmental incident reporting system and procedures.
- 4. Management and initiation program of enterprise emergency plan should be integrated with systems of all levels to make sure the effectiveness of emergency plan in case of environmental incidents.

Medium-term:

1. Periodically inspect management system and initiation program of the emergency plan to make them better fitted for changes in the enterprises.

ion	
ecommendations be	en taken into account and implemented?
Partially	No
RC=5	RC=10
F F	on ecommendations be Partially RC=5

5. Training and drills of emergency plan

5.1 Does the enterprise have regulations to train practitioners of emergency plan?

Yes No Not applicable

5.2 Does the enterprise undertake periodical drills of emergency plan based on the enterprise characteristics?

Yes	No	Not applicable
-----	----	----------------

5.3 Does the enterprise evaluate the results of emergency drills, like the integrity and the effectiveness of the emergency plan?

Yes No Not applicable

Remarks:

Measures:

<u>Short-term</u>:

1. Train practitioners of emergency drills based on enterprises' own characteristics.

<u>Medium-term</u>:

- 1. Periodically undertake emergency drills and evaluate the process and results.
- 2. Adjust the emergency plans according to the evaluation results to make sure its adequacy and effectiveness.

P		
Environmental risk confi	rmation	
Have all the detail points	s in recommenda	tions been taken into account and implemented?
Yes	Partially	No
	-	
RC=1	RC=5	RC=10

6. Thorough negotiation

6.1 Have the surrounding environmental sensitive zones been identified? If yes, fill in the following table.

Yes No Not applicable

No.	Sensitive Zones	Characteristics of Sensitive Zones	Distances from Enterprises	Remarks

6.2 Has the enterprise negotiated with local government or environmental protection authorities to deal with the potential environmental incidents that are likely to affect surrounding sensitive zones, including initiation of emergency plan, drills, reporting, cooperation, etc.?

Yes No Not applicable

Me	asures:
Sh	ort-term:
1.	Fully negotiate with local government and environmental protection authorities to
	identify the surrounding sensitive zones and special requirements.
2.	Fully negotiate with local government and environmental protection authorities about
	environmental risk management on sensitive zones, including initiation program of
	emergency plan, cooperation in reporting when environmental incidents happen,
	emergency drill, etc.

Environmental risk co	nfirmation		
Have all the detail points in recommendations been taken into account and implemented?			
Yes	Partially	No	
RC=1	RC=5	RC=10	

7. Emergency plan adjustment

7.1 Describe the environmental accident potentials (If they are included in the list of accident potentials management already, no need to fill in the table below).

No.	Items	Impacts	Measures	Remarks

7.2 Based on the environmental accident potentials in 7.1, does the enterprise have corresponding arrangements to evaluate and adjust the existing emergency plans?

Yes No Not applicable

Me	easures::
<u>Sh</u>	ort-term:
1.	Analyze environmental accident potentials. Involve special organization to carry out
	this work, if necessary.
2.	Periodically evaluate the enterprise's emergency plans.
3.	Adjust emergency plans according to the evaluation results to make sure their
	adequacy and effectiveness.

Environmental risk confirmation						
Have all the detail points in recommendations been taken into account and implemented?						
Yes	Partially	No				
RC=1	RC=5	RC=10				

Checklist Summary

Detail Points of Recommendations	Potential Risks	Risk Classification (RC)
1	1/5/10	
2	1/5/10	
3	1/5/10	
4	1/5/10	
5	1/5/10	
6	1/5/10	
7	1/5/10	

Average Risk of Checklist (ARC)

4.9 Change Management

Section One Recommendations

- Establish a well-developed change management system, and adjust it according to temporary and permanent alternations in personnel, management, process, technology and facilities.
- Alternation implementation should follow the approval and acceptance procedures with a stress on environmental risk management.
- 3. Evaluate and control the risks that are caused by the alternation.

Section Two Recommendation Implementation

1. Management system

1.1 Has the enterprise developed a change management system?

Yes No Not applicable

Remarks:

Measures:

Short-term:

- 1. Control the temporary and permanent changes in personnel, management, process, technology, facilities, etc.
- 2. Make a feasibility study before implementing the changes.

Environmental risk confirmation						
Have all the detail points in recommendations been taken into account and implemented?						
Yes	Partially	No				
RC=1	RC=5	RC=10				

2. Approval and acceptance

2.1 Has the implementation of changes been approved by the administrative department?

Yes	No	Not applicable						
2.2 Has the implementation of the changes been inspected and accepted?								
Yes	No	Not applicable						
2.3 With process a been correspondi	and materials altered,	have the enterprise's risk management measures						
Yes	No	Not applicable						
Remarks:								
Measures:								
<u>Short-term</u> :								

 Improve environmental management measures to deal with changes in process materials, facility and products.

Environmental risk confirmation Have all the detail points in recommendations been taken into account and implemented? Yes Partially No RC=1 RC=5 RC=10

3. Risk analysis and control

3.1 Have the risks caused by changes been analyzed and controlled?

Yes No Not applicable

Environmental risk confirmation						
Have all the detail points in recommendations been taken into account and implemented?						
Yes	Partially	No				
RC=1	RC=5	RC=10				

Checklist Summary

Detail Points of Recommendations	Potential Risks	Risk Classification
(RC)		
1	1/5/10	
2	1/5/10	
3	1/5/10	

Average Risk of Checklist(ARC)

Chapter Five

Preventive measures

5.1 Pollutants Discharge Calculation

Fill in the following table.

Table 1 waste gas

Pollutants	Production (t/a)	Reduction (t/a)	Discharge (t/a)	Removal Rate (%)	Remarks
SO2					
NO2					
Dust					
Hydrocarbon					
HCN					
Acrylonitrile					

Table 2 Wastewater

Pollutants	Production (t/a)	Reduction (t/a)	Discharge (t/a)	Removal Rate (%)	Remarks
Petrol oil					
COD					
Sulfate					
Ammonia					

Xylene			

Table 3 Solid Waste

Pollutants	Production (t/a)	Reduction (t/a)	Discharge (t/a)	Removal Rate (%)	Remarks
Waste					
Catalyst					
Waste					
Absorbent					
Three					
Sludge					

5.2 Water Quality and Quantity

Water quality requirements here include influent and effluent wastewater quality required by treatment facilities. Influent quality requirements include requirements on process unit/production and on wastewater before entering wastewater pipe and wastewater treatment facilities. The water quality of the above three refers to "Water Quality Standard of Water Supply and Drainage in Petrochemical Industry" (SH 3099-2000). Effluent of wastewater treatment facilities refers to the general enterprise outlet. "Integrated Wastewater Discharge Standard" (GB 8978-1996) and updated COD parameters in petrochemical industry standard are applicable here.

Water quantity includes design capacity of treatment facilities and general enterprise outlet. Design capacity should consider producing wastewater, municipal wastewater, and first flush and unexpected wastewater, etc.

Section One Recommendations

- Effluent from production process equipment/unit and influent to wastewater treatment facilities should meet the requirements of "Water Quality Standard of Water Supply and Drainage in Petrochemical Industry" (SH 3099-2000) and enterprise environmental impact report.
- 2. The quality of influent to the wastewater treatment facilities should be determined by the quality and quantity of the discharged water from all equipment/units. Or the quality can be tested at the inlet of wastewater treatment facilities. When there's little information, refer to actual operation data from similar enterprise.
- Treated effluent quality should meet relevant state and local standards. (The main standard is "Integrated Wastewater Discharge Standard" (GB 8978-1996). Moreover, "Discharge standard of pollutants for ammonia synthesis industry", "Discharge standard of water pollutants for phosphate fertilizer industry", etc may also apply here. Enterprise should also comply with local discharge standards.)

4. General outlet quantity from petrochemical enterprise should follow "Integrated Wastewater Discharge Standard" (GB 8978-1996). The designed capacity of wastewater treatment facilities should include process wastewater, municipal wastewater, and first flush and unexpected wastewater.

Section Two Recommendation Implementation

1. Water quality requirements on influent into wastewater treatment facilities include water from process equipment/unit, influent into wastewater pipe network and general effluent of wastewater treatment facilities.

1.1 Can pollutants from process equipment/unit reach the requirements of 3.0.1 in the "Water Quality Standard of Water Supply and Drainage in Petrochemical Industry" (SH 3099-2000). If yes, fill in the following table.

Yes	No	Not applicable
-----	----	----------------

Pollutants	Required	Actual	Exceeding Amount
	Concentration	Concentration	(By multiple)

Remarks: Special pollutants in "Water Quality Standard of Water Supply and Drainage in Petrochemical Industry" (SH 3099-2000) mainly include acid, alkaline, sulfate, cyanide, organics, suspended solids, petroleum, etc.

1.2 Does the effluent of process equipment/unit reach the requirements in environmental impact assessment?

Yes No Not applicable

1.3 As for equipment/unit, if pollutants concentration exceeds the limit, are there any pre-treatment facilities or equipments to deal with the concentration?

Yes No Not applicable

1.4 If oil concentration cannot reach the requirement described as above, are there any oil removal facilities to deal with it?

Yes No Not applicable

1.5 Can the water quality at general inlet of wastewater treatment facilities reach 3.0.1 of "Water Quality Standard of Water Supply and Drainage in Petrochemical Industry" (SH 3099-2000)? If yes, fill in the following table.

Yes No Not applicable

Parameters	Limits	Actual Value	Exceeding Amount (By multiple)

Remark: Parameters listed in "Water Quality Standard of Water Supply and Drainage in Petrochemical Industry" (SH 3099-2000) mainly include pH, petroleum, COD, sulfate, water temperature, etc.

1.6 Does the water quality at general inlet of wastewater treatment facilities reach the requirements of environmental impact assessment report?

Yes

No

Not applicable

Remarks:

Measures:

<u>Short-term:</u>

- Train practitioners to strictly follow operation manuals. Reduce pollutant leaks in the production process and decrease the types and amount of pollutants into the wastewater pipe network.
- Undertake clean production training for management staff and production operators, establish the concept of whole process pollution control, and reduce pollutants at the source.

Medium-term:

- Improve the water quality testing system. Appoint specialists to monitor the types and concentration of pollutants at process equipment/unit, inlet of wastewater pipe network, and inlet of wastewater treatment facilities.
- Construct an equalization tank for wastewater before they are disposed into treatment facilities.

Long-term:

- At production equipment/unit, put in place necessary pre-treatment facilities/equipments to treat pollutants mentioned above. Thus the load on wastewater treatment facilities can be reduced.
- 2. Construct essential oil removal devices to reduce the oil in the pipe before wastewater goes into the pipe network.

3. If pretreatment facilities as mentioned above or oil removal devices cannot effectively reduce the pollutant concentration, technical revamping of production equipment/unit should be considered to reduce the types and amount of pollutants.

Environmental risk confirmation			
Have all the detail points in recommendations been taken into account and implemented?			
Yes	Partially	No	
RC=1	RC=5	RC=10	

2. Quality test of the influent into wastewater treatment facilities

2.1 Are there enough instruments to test the water quality at the inlet of wastewater treatment facilities? (Parameters listed in "Water Quality Standard of Water Supply and Drainage in Petrochemical Industry" (SH 3099-2000) mainly include pH, petroleum, COD, sulfate, water temperature, etc.)

Yes No Not applicable

2.2 Can the water quality at inlet be tested according to the water quality and quantity from the process equipment/unit, if monitoring at inlet cannot be realized?

Yes No Not applicable

2.3 If neither conditions in 3.1 nor 3.2 can be achieved, can the influent quality from similar industry be used as reference?

Yes Not Not applicable

Remarks:

Measures:

Short-term:

1. Gather water quality and quantity data from all equipment/units to finalize water quality at inlet of wastewater treatment facilities.

Medium-term:

1. Have essential instruments to monitor various parameters of water quality.

Environmental risk confirmation			
Have all the detail points in recommendations been taken into account and implemented?			
Yes	Partially	No	
RC=1	RC=5	RC=10	

3. Quality of enterprise effluent

3.1 Are there enough instruments to monitor water quality at the general outlet of the enterprise?

("Integrated Wastewater Discharge Standard" GB 8978-1996, and amended COD in petrochemical industry standards are applicable here).

Yes No Not applicable

3.2 Is it necessary for enterprise to construct wastewater treatment facilities to treat industrial and municipal wastewater?

Yes No Not applicable

3.3 Does the general effluent from enterprises reach the requirements?

(For discharge limits, refer to "Integrated Wastewater Discharge Standard" GB 8978-1996 and amended COD in petrochemical industry standards. Comply with any local discharge standards available).

Yes No Not applicable

Remarks:

Mea	asures:
<u>Shc</u>	ort-term:
1.	Put in place essential instruments to monitor general enterprise effluent.
Lor	na-term:

1. Construct appropriate wastewater treatment facilities to make sure that the quality of

enterprise effluent reaches the requirements.

2. Undertake inspections of clean production to reduce the types and amount of pollutants flowing into the wastewater treatment facilities.

Environmental risk confirmation			
Have all the detail points in recommendations been taken into account and implemented?			
Yes	Partially	No	
RC=1	RC=5	RC=10	

4. Water Quantity

4.1 Does the enterprise's effluent meet the requirements of "Integrated Wastewater Discharge Standard" GB 8978-1996?

(Enterprises established before 31/12/1997 should comply with the parameters in Table 3 of GB8978-1996, and the ones after 01/01/1998 should comply with the parameters in Table 5 of GB8978-1996.)

Yes No Not applicable

Environmental risk confirmation			
Have all the detail points in recommendations been taken into account and implemented?			
Yes	Partially	No	
RC=1	RC=5	RC=10	

Checklist Summary

Detail Points of Recommendations	Potential Risks	Risk Classification (RC)
1	1/5/10	
2	1/5/10	
3	1/5/10	
4	1/5/10	

Average Risk of Checklist (ARC)
5.3 Wastewater Pretreatment

Pretreatment here covers the facilities at the production equipment/unit and treat pollutants with appropriate methods according to their chemical or physical characteristics so that they can meet the requirements of the end treatment facilities.

Section One Recommendations

- 1. Following pretreatments can be applied to effluent from equipments/units:
 - Steam stripping can be applied to ammonia-typed sulfate-containing wastewater. The effluent should contain ammonia ≤ 100mg/L and Hydrogen sulfide≤50mg/L;
 - (2) Air oxidation can be applied to sodium-typed sulfate-containing wastewater.
 - (3) Wastewater with CN ≥50mg/L can apply pressurized hydrolysis;
 - (4) Neutralization should be applied to alkaline or acid wastewater;
 - (5) Wastewater containing solids (product or waste) can use sedimentation, particle-trapping, etc.
 - (6) Wastewater with oil concentration of over 500mg/l can use oil-liquid separation method to reduce its oil content.

2. Following pretreatment methods can be applied to water draining and the washing water for oil tanks:

- Water draining of oil tanks with oil density over 0.95 g/ml should adopt two times of automatic dehydration.
- (2) Water draining of oil tanks by alkaline wash but not water wash can be discharged into the wastewater treatment system for wastewater containing alkaline residue.
- (3) The washing water for oil tanks can use oil separator to remove oil.
- Alkaline and acid wastewater in the chemical water treatment station should adopt neutralization method to adjust their pH to 6-9, and then be discharged into the grey wastewater system.

Section Two Recommendation Implementation

1. Process wastewater

1.1 Has the wastewater from process equipment/unit that doesn't reach the requirements of the treatment system, been pretreated?

Yes No Not applicable

If yes, briefly describe the pretreatment methods:

1.2 Does the ammonia-typed sulfate-containing wastewater adopt steam stripping as its pretreatment?

Yes No Not applicable

If other method is in use, briefly describe it and its performance:

1.3 Does the sodium-typed sulfate containing wastewater use air oxidation as pretreatment?

Yes No Not applicable

If other method is in use, briefly describe it and its performance:

1.4 Does the wastewater with CN⁻≥50mg/L uses pressurized hydrolysis as pretreatment?

Yes No Not applicable

If other method is in use, briefly describe it and its performance:

1.5 Does the alkaline or acid wastewater use neutralization as pretreatment?

Yes No Not applicable

If other method is in use, briefly describe it and its performance:

1.6 Does the wastewater containing solids (product or waste) adopt sedimentation or particle-trapping as pretreatment?

Yes No Not applicable

If other method is in use, briefly describe it and its performance:

1.7 Does the wastewater with oil concentration of over 500mg/l adopt oil-liquid separation method to reduce oil content?

If other method is in use, briefly describe it and its performance:

Remarks:

Measures:

Short-term:

- 1. Train production operators to strictly follow the operation rules and regulations and avoid materials from leaking during production.
- 2. Periodically inspect process equipment/unit and obviate accident potentials to prevent material leakage.
- Enterprises should have open communications and negotiations, excellent teamwork, and rationally stipulated discharge volume of process equipment/unit. Deal with the limits and standards of influent.
- 4. Comprehensively use wastewater from production equipment/unit to reduce the load on wastewater treatment facilities.
- Control the quality of water after being pretreated according to the "Water Quality Standard of Water Supply and Drainage in Petrochemical Industry" SH 3099.

Medium-term:

 Production equipment/unit should be equipped with metering device and sampling control system to constantly monitor the quality and quantity of effluent and file the results.

- 2. Equipment/unit should undertake separation of freshwater and wastewater. Reduce freshwater usage by creating closed recycling systems according to the water usage requirements and effluent quality.
- 3. Increase the concentration of recycling cooling water to reduce its discharge amount.

Long-term:

- According to the effluent's quality and quantity from each equipment/unit, respectively construct pretreatment facilities based on the current technology and equipment level, for examples, steam stripping for ammonia-typed sulfate-containing wastewater and air oxidation for sodium-typed sulfate-containing wastewater, etc.
- Construct oil removal facilities at equipment/unit or at pipe network to reduce oil content in the wastewater so that they won't create great impact on the centralized treatment system.

Environmental risk confirmation		
Have all the detail points in recommendations been taken into account and implemented?		
Yes	Partially	Νο
RC=1	RC=5	RC=10

2. Oil-draining and washing water for oil tanks

2.1 Does the oil draining for the oil tanks with oil density higher than 0.95 g/ml adopt two times of automatic dehydration?

Yes No Not applicable

If other method is in use, briefly describe it and its performance:

2.2 Does the oil draining for the oil tanks, which went through the alkaline wash instead of water wash, get discharged into the treatment system for wastewater containing alkaline residue?

Yes No Not applicable

If other method is in use, briefly describe it and its performance:

2.3 Does the washing water of the oil tanks use oil separator to remove oil?

Yes No Not applicable

If other method is in use, briefly describe it and its performance:

Short-term:

1. Collect and transfer the wastewater with alkaline residue content which has been through alkaline wash but not water wash to the treatment system.

<u>Medium-term</u>:

- 1. Apply automatic dehydrator twice to drain oil out of the oil tanks.
- 2. Collect and transfer washing water for the oil tanks to oil separator for oil removal.

Long-term:

1. Construct a treatment system for treating wastewater with alkaline residue.

Environmental risk confirmation		
Have all the detail points in recommendations been taken into account and implemented?		
Yes	Partially	No
RC=1	RC=5	RC=10

3. Acid wastewater

3.1 Has the neutralization method been applied to treat the alkaline and acid wastewater from chemical water treatment station?

Yes No Not applicable

If other method is in use, briefly describe it and its performance:

3.2 Is the alkaline and acid wastewater discharged into grey wastewater system after neutralization?

Yes No Not applicable

If other method is in use, briefly describe it and its performance:

Remarks:

Measures:

Short-term:

1. Collect alkaline and acid wastewater from chemical water treatment station. Consider self-neutralization or aiding with lime or alkaline neutralization for pretreatment. Direct discharge into the sewerage system is prohibited to avoid corrosion on the pipe network.

Environmental risk confirmation		
Have all the detail points in recommendations been taken into account and implemented?		
Yes	Partially	No
RC=1	RC=5	RC=10

Checklist Summary

Detail Points of Recommendations	Potential Risks	Risk Classification (RC)
1	1/5/10	
2	1/5/10	
3	1/5/10	

Average Risk of Checklist (ARC)

5.4 Wastewater Treatment Plant

Section Recommendations

- Determine the treatment depth and process flow of the treatment plant according to the discharge permits and total control objectives, surrounding geography and topography, capacity of the receiving water body, quality and quantity of the wastewater, recycling requirements and other factors.
- Treatment capacity should not be lower than the required amount by the production system.
- 3. Treated effluent should reach national or local discharge standards.
- Oily sludge, froth and activated sludge produced by wastewater treatment should adopt dewatering, dehydration, landfill, incineration or other appropriate methods to dispose.
- Wastewater treatment plant management should be incorporated into the enterprise's management system. Deploy necessary operators and management staff; develop regulations for formulating operation manuals, calculating operation cost and monitoring/checking, etc.
- The wastewater treatment plant should have metering and monitoring instruments at the outlet.

Section Two Recommendation Implementation

1. Treatment capacity

1.1 Do the treatment depth and process flow of the treatment plant consider the discharge permits and total control objectives?

Yes No Not applicable

1.2 Does the treatment depth and process flow of the treatment plant consider the capacity of the receiving water body?

Yes No Not applicable

1.3 Does the treatment depth and process flow of the treatment plant consider the requirements of the quality and quantity of the influent?

Yes No Not applicable

Remarks:

Measures:

Short-term:

- 1. Fully communicate with environmental protection authorities to make sure that the enterprise's effluent meets the requirements of the receiving water body.
- 2. Strictly monitor the effluent to reach the state or local discharge standards and total control objectives.

Medium-term:

- 1. Unify the entire plant planning and rationally set targets for pretreatment of production unit and the wastewater treatment plant.
- Develop accessory management and operation regulations. Have qualified staff to manage the treatment and disposal of pollutants.
- Build emergency tanks to collect wastewater that's unable to reach the requirements during shutdown and maintenance periods.

Environmental risk co	onfirmation	
Have all the detail points in recommendations been taken into account and implemented?		
Yes	Partially	No
RC=1	RC=5	RC=10

2. Can the capacity of wastewater treatment plant cover all the wastewater that is to be treated?

Yes	No	Not applicable
Yes	NO	Not applicat

Remarks:

ΝЛ	00	CIII	00.
111	ca	Sui	63.

Short-term:

1. Calculate the quantity of the enterprise's wastewater.

Medium-term:

- 1. Revamp wastewater treatment facilities to meet the required capacity.
- 2. Build emergency tanks to collect wastewater that is unable to reach the requirements during shutdown and maintenance periods.

Environmental risk confirmation		
Have all the detail points in recommendations been taken into account and implemented?		
Yes	Partially	No
RC=1	RC=5	RC=10

3. Can the treated effluent reach state or local discharge standards?

Yes No Not applicable

Remarks:

Measures:

Short-term:

- Wastewater treatment plant should determine the controlling parameters of water quality for all pollutant-discharging units according to the treatment depth and performance. For wastewater that is unable to reach the requirements, single or several pretreatment measures should be taken.
- 2. Periodically inspect wastewater treatment facilities to prevent discharging wastewater that is unable to reach the requirements.

Environmental risk confirmation		
Have all the detail points in recommendations been taken into account and implemented?		
Yes	Partially	No
RC=1	RC=5	RC=10

4. Can the oily sludge, froth and activated sludge produced by wastewater treatment be treated properly?

No

Not applicable

<u>Short-term</u>:

1. Monitor and gather information on the processes that produce oily sludge, froth, and excessive sludge, and their chemical and physical properties.

<u>Medium-term</u>:

1. Build treatment facilities to dispose oily sludge, froth, and activated sludge produced by wastewater treatment through dewatering, dehydration, landfill, incineration, etc.

Environmental risk confirmation		
Have all the detail points in recommendations been taken into account and implemented?		
Yes	Partially	No
RC=1	RC=5	RC=10

5. Is the management of wastewater treatment plant incorporated into the enterprise's management system?

Yes

No

Not applicable

Short-term:

- 1. Deploy necessary operators and management staff in the wastewater treatment plant.
- 2. Develop regulations for formulating operation manuals, calculating operational costs, monitoring checking, etc.

Environmental risk confirmation		
Have all the detail poin	nts in recommendation	ons been taken into account and implemented?
Yes	Partially	Νο
RC=1	RC=5	RC=10

6. Are metering and monitoring instruments installed at the outlet of the wastewater treatment plant?

Yes No Not applicable

Short-term:

1. Install a water quality and quantity monitoring system at outlet.

Medium-term:

- 1. Construct a basin for effluent monitoring.
- 2. Put in place sufficient metering and monitoring instruments.

Environmental risk confirmation		
Have all the detail poi	nts in recommendation	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

Checklist Summary

Detail Points of I	Recommendations	Potential Risks	Risk	Classification
(RC)				
1		1/5/10		
2		1/5/10		
3		1/5/10		
4		1/5/10		
5		1/5/10		
6		1/5/10		

Average Risk of Checklist(ARC)	

5.5 Sludge Disposal

Section One Recommendations

- 1. Sludge gravity thickening can use vertical or radial sludge thickeners. The radial ones should be installed with scrapper.
- Oily sludge and froth can use centrifugal water separator while activated sludge can adopt belt filter press; adding flocculants before dewatering.
- Dewatered sludge can be disposed in sanitary landfill, by incineration or comprehensive recycling. Rotary drying furnace and the deodorizing furnace should be equipped.
- 4. Sludge recycling
 - Waste oil collected by oil removal tank, storage tank or other oil collecting devices should be recycled;
 - (2) Wastewater from dewatering tanks should be further treated;

Section Two Recommendation Implementation

1. Sludge thickening

1.1 Is the sludge tank installed with rinsing devices to prevent blockage?

Yes No Not applicable

Environmental risk confirmation		
Have all the detail points in recommendations been taken into account and implemented?		
Yes	Partially	Νο
RC=1	RC=5	RC=10

2. Is flocculants added before dewatering of sludge?

Yes No Not applicable

Remarks:

Environmental risk confirmation		
Have all the detail poi	nts in recommendation	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

3. Sludge disposal

3.1. Are both rotary drying furnace and deodorizing furnace been equipped?

Yes No Not applicable

Short-term:

 Sanitary landfill design can refer to "Chemical Waste Landfill Design Regulation" HG20504.

2. Oily sludge and froth can be used for brick, and activated sludge can be used as comprehensive fertilizer.

Environmental risk co	nfirmation	
Have all the detail poi	nts in recommendation	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

4. Sludge recycling

4.1 Is the oil collected from oil separation tanks, storage tanks or other oil collection devices recycled?

Yes No Not applicable

4.2 Will the wastewater from dewatering tanks be further treated?

Yes

No

Not applicable

Environmental risk confirmation		
Have all the detail points in recommendations been taken into account and implemented?		
Yes	Partially	Νο
RC=1	RC=5	RC=10

Checklist Summary

Detail Points of Recommendations	Potential Risks	Risk Classification (RC)
1	1/5/10	
2	1/5/10	
3	1/5/10	
4	1/5/10	

Average Risk of Checklist (ARC)

5.6 Waste Gas

Section One Recommendations

- Waste gas from production process should be recycled or comprehensively used. Waste gas that is unable to be recycled or compressively used should be purified.
- 2. When selecting waste gas treatment proposal, avoid secondary pollution or adopt secondary pollution prevention if necessary.
- Equipments or facilities releasing waste gas like exhaust pipes should have sampling connection. The location, specification and number, etc should comply with current national regulations.
- 4. The height of exhaust pipes should comply with current national standards—"Integrated Emission Standard of Air Pollutants" GB16297 and meet the requirements of atmospheric environmental risk assessment and feedbacks.
- 5. The pollution concentration for protected buildings or residential areas that are around exhaust pipes cannot exceed the limits in "Ambient air quality standards" and "Sanitary Standards of Industrial Enterprise Design". The flow speed at exhaust pipes should not be lower than one and half of the average wind speed at that height.
- Equipment producing toxic gas, dust, odor, acid fog and other gas substances should use sealed process devices to avoid open operation.
- The storage of volatile liquid raw materials, products, intermediate product, liquid fuels, etc. Sealing measures like condensation, intake, absorption, spraying, nitrogen-sealing and so on should be taken.
- Loading/unloading of the volatile liquid materials should use submerged system or other sealed equipment with gas recycling devices installed.
- Take treatment measures like dust removal, condensation, intake, absorption, separation, recycling and so on before discharging toxic and noxious industrial waste gas, flue gas, dust, acid mist, etc.

- 10. All kinds of flammable industrial off gas can be recycled or reused, lowering or no discharge to the thermal waste gas treatment system.
- 11. Flammable industrial off gas below can be discharged into the flame system:
 - (1) Temporary emission for stable production;
 - (2) Emission in accidents or from safety valves;
 - (3) Emission during start-up, shut-down, inspection, leakage and vent.
 - (4) Emission in batch and for a short period from operating equipment;
 - (5) Emission with low heat value and hard to recycle.
- 12. Condensate separated from drip pot of fuel system should be recycled or treated.
- 13. Odorous gas must be discharged under limits and can use high temperature incineration, catalytic incineration, rinsing and other treatment methods.
- 14. Synthesis process of ammonia with coal as raw material, coking, and coal gasification should use sulfate removal or recycling devices.
- 15. All boilers and industrial furnace should site-specifically adopt highly efficient devices for dust and sulfate removal.
- 16. Equipments in wastewater treatment plant that releases noxious gases should better be sealed. Releasing noxious gases should better take purifying measures or be discharged into upper air.

Section Two Recommendation Implementation

1. Comprehensive utilization

1.1 Is the noxious gas from the production process recycled?

Yes No Not applicable

If yes, briefly describe the applied measures:

1.2 Is the noxious gas that cannot be recycled used comprehensively?

Yes No Not applicable

If yes, briefly describe the applied measures:

1.3 Is the noxious gas that cannot be recycled or comprehensively used purified?

Yes No Not applicable

If yes, briefly describe the applied measures:

Me	Measures:		
Short-term:			
1.	Develop material flow diagram to designate the waste gas outlet and illustrate the		
	emission amount, intensity and direction with chart and table.		
2.	Have full-time employees responsible for the utilization and discharge of waste gas		
	from the production process.		
3.	Periodically train responsible persons.		
Lo	Long-term:		
1.	Use advanced and economical process and equipment, and apply clean production		
	process to reduce air pollution generation.		

- 2. Select raw materials with high concentration and fewer impurities to reduce waste gas generation.
- 3. Construct purification devices to make sure emission of gas pollutants is under limits.
- 4. Install metering instruments.

Environmental risk confirmation		
Have all the detail poi	nts in recommendation	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

2. Secondary Pollution

2.1 Can the selected treatment methods for waste gas avoid secondary pollution?

Yes No Not applicable

2.2 If secondary pollution cannot be avoided, are there any preventive measures?

Yes No Not applicable

If yes, briefly describe the applied measures:

Short-term:

- 1. Conduct general inspection for production process and equipment. Record the processes that are likely to generate secondary pollution.
- 2. Appoint full-time employees to control secondary pollution.

Long-term:

1. Install enough facilities and devices to control the discharge of the secondary pollutants.

Environmental risk confirmation		
Have all the detail points in recommendations been taken into account and implemented?		
Yes	Partially	No
RC=1	RC=5	RC=10

3. Sampling connection

3.1 Do the equipment, facilities and exhaust pipes releasing waste gas have sampling connections?

Yes No Not applicable

3.2 Has the enterprise adopted the state and local regulations about sampling?

Yes No Not applicable

If yes, briefly describe the adopted state and local laws, regulations and standards:

3.3 Does the location, specification, number, etc of the sampling connections comply with the current national regulations?

Yes No Not applicable

Remarks:

Measures:

Short-term:

 The requirements of exhaust pipes can refer to "Integrated Emission Standard of Air Pollutants" and "Exhaust Pipe Design Code in Chemical Enterprises".

Environmental risk confirmation		
Have all the detail poi	ints in recommendation	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

4. Exhaust pipes

4.1 Does the height of the exhaust pipe comply with current national standard—"Integrated Emission Standard of Air Pollutants" GB16297? (The exhaust pipe should be 5 meters higher than the constructs within 200 meter radius. The ones that cannot reach this height should strictly execute 50% of the discharge speed corresponding to its height. See clause 4,5,6,7 of the "Integrated Emission Standard of Air Pollutants" GB16297)

Yes No Not applicable

4.2 Can the height of exhaust pipe meet the requirements of atmospheric environmental impact assessment and its feedbacks?

Yes No Not applicable

4.3 Is the flow speed at the exhaust pipe higher than one and half of the average wind speed at that height?

Yes No Not applicable

Environmental risk confirmation			
Have all the detail poin	nts in recommendation	ons been taken into account and implemented?	
Yes	Partially	No	
RC=1	RC=5	RC=10	

5. Discharge concentration

5.1 Can it be guaranteed that the emission concentration from the exhaust pipe is under the limits of "Ambient Air Quality Standard" to protect nearby constructs or residential areas?

Yes No Not applicable

Remarks:

Environmental risk confirmation			
Have all the detail poi	ints in recommendation	ons been taken into account and implemented?	
Yes	Partially	No	
RC=1	RC=5	RC=10	

6. Production equipment

6.1 Does the Equipment producing toxic gas, dust, odor, acid fog and other gas substances use sealed process devices?

Yes No Not applicable6.2 Can open operation be avoided?

Yes No Not applicable

Remarks:

Environmental risk confirmation				
Have all the detail poir	nts in recommendation	ons been taken into account and implemented?		
Yes	Partially	No		
RC=1	RC=5	RC=10		

7. Materials storage

7.1 Does the storage of volatile liquid raw materials, products, intermediate product, liquid fuels, etc. adopt site-specific soft sealing measures like condensation, intake, absorption, spraying, nitrogen-sealing, etc?

Yes No Not applicable

Environmental risk confirmation			
Have all the detail poi	nts in recommendati	ons been taken into account and implemented?	
Yes	Partially	No	
RC=1	RC=5	RC=10	

8. Loading/Unloading devices

8.1 Does the Loading/unloading of volatile liquid material use submerged system or other sealed equipment?

Yes No Not applicable

If yes, briefly describe the applied measures:

8.2 Is the device for recycling oily gas installed?

Yes No Not applicable

Environmental risk confirmation			
Have all the detail poin	nts in recommendation	ons been taken into account and implemented?	
Yes	Partially	No	
RC=1	RC=5	RC=10	

9. Waste gas emission

9.1 Are the treatment measures like dust removal, condensation, intake, absorption, separation, recycling, and others applied before emitting toxic and noxious industrial waste gas, flue gas, dust, acid mist.

Yes	No	Not applicable

Environmental risk confirmation		
Have all the detail point	ts in recommendati	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

10. Off gas from processes

10.1 Is flammable off gas of all kinds recycled?

Yes	3	No	Not applica	ble					
10. obt	2 Can emissior ained?	n reduction or r	non-emission to	the thermal	waste	gas	treatment	system	be
Yes	3	No	Not applica	ble					
Re	marks:								
_									_
	Environmental	risk confirmatio	n						
	Have all the detail points in recommendations been taken into account and implemented?								
	Yes	Pa	artially	No					

RC=1 RC=5 RC=10

11. Off gas that needs to go into thermal waste gas treatment system

11.1 Does the temporary emission for stable production flow into the thermal treatment system?

Yes

No

Not applicable

11.	1.2 Does the accidental or safety valves emission flow into the thermal treatment system?					
Ye	5	No	Not applicat	Not applicable		
11. the	3 Does the em	ission during st	art-up, shut-down	, inspection, leakage and vent flow into the		
Ye	5	No	Not applicat	ble		
11. trea	4 Does the bat atment system?	ch emission in a	a short period from	n operating equipments flow into the thermal		
Ye	5	No	Not applicat	ble		
11.	5 Does the emi	ssion with low he	eat and hard to rec	cycle flow into the thermal treatment system?		
Ye	5	No	Not applicat	ble		
Re	marks:					
	Environmental	risk confirmation	n			
	Have all the de	atail points in rec	commendations be	en taken into account and implemented?		
	Yes	Pa	artially	No		
	RC=1	R	C=5	RC=10		

12. Condensate

12.1 Is the condensate separated from the drip pot of fuel gas system recycled or further treated?

Yes No Not applicable

Remarks:

Environmental risk confirmation		
Have all the detail po	ints in recommendation	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

13. Odorous gas

13.1 Does odorous gas use treatment methods of high temperature incineration, catalytic incineration, rinsing, etc?

Yes No Not applicable

13.2 Does emission reach the limits?

Yes No Not applicable
Environmental risk confirmation		
Have all the detail poi	nts in recommendation	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

14. Desulfurization

14.1 Does the synthesis process of ammonia with coal as raw material, coking and coal gasification use desulfurization method or recycling devices?

Yes No Not applicable

Remarks:

Environmental risk confirmation		
Have all the detail poin	its in recommendati	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

15. Industrial furnaces

15.1 Do all boilers and industrial furnaces site-specifically adopt highly efficient devices for dust removal and desulfurization?

Remarks:

Environmental risk confi	rmation	
Have all the detail points	s in recommenda	tions been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

16. Waste gas from wastewater treatment plant

16.1 Are equipments releasing noxious gases in the wastewater treatment plant sealed?

Yes	s No	D	Not applicable	
16.	2 Does the noxiou	s gas take purificat	ion measures or release into the upper air?	
Ye	s No	D	Not applicable	
Po	marka			
кe	marks.			
	Environmental ris	k confirmation		
	Have all the detail	l points in recomme	endations been taken into account and implemented?	
	Yes	Partially	v No	
	RC=1	RC=5	RC=10	

Checklist Summary

Detail Points of Recommendations	Potential Risks	Risk Classification (RC)
1	1/5/10	
2	1/5/10	
3	1/5/10	
4	1/5/10	
5	1/5/10	
6	1/5/10	
7	1/5/10	
8	1/5/10	
9	1/5/10	
10	1/5/10	
11	1/5/10	
12	1/5/10	
13	1/5/10	
14	1/5/10	
15	1/5/10	
16	1/5/10	
Average Risk of Checklist (ARC)		

5.7 Solid waste

Section One Recommendations

- With regard to solid waste pollution prevention, implement rules to reduce the generation and the hazard of solid waste and decontaminating solid waste to propel clean production and circular economy development.
- 2. Establish regulations and systems to monitor solid waste and to provide pollution alert to prevent solid waste pollution.
- 3. Projects that generate waste solid and projects that construct waste solid storage, utilization, and treatment facilities must conduct an environmental impact assessment and comply with state relevant regulations for environmental protection management.
- 4. According to their duties, environment authorities have the right to investigate enterprises on solid waste pollution prevention in their administrative area. The investigated enterprise should genuinely report the facts and submit essential information.
- 5. Some measures should be taken to prevent or reduce environmental pollution caused by waste solid. Environmental pollution prevention measures like anti-scattering, anti-loss, anti-permeation, etc must be taken. Dumping, piling, throwing and dropping solid wastes are forbidden.
- 6. Devices, equipment and places for solid waste collection, storage, transportation and treatment should be enhanced and maintained to ensure normal operation.
- 7. Enterprise should establish a developed responsibility system for environmental pollution prevention and take preventive measures for solid waste pollution.
- Enterprises should rationally select and utilize raw materials, energy and other resources.
 Apply advanced production process and equipment to reduce solid waste and decrease the hazard.
- 9. Enterprises must develop management plans according to the relevant state regulations and provide environmental protection authorities with relevant information like waste types,

production quantity, flow direction, storage, treatment, etc. If the declared items change greatly, timely report it.

- 10. Enterprises should recycle solid waste according to their financial and technical conditions.
- 11. Shutdown, layoff or deconstruction of solid waste pollution prevention measures and facilities are forbidden.
- 12. Containers and packages, devices and places for hazardous materials collection, storage, transportation and treatment must have identification signs.
- Collection and storage of hazardous materials must be based on hazardous materials classifications.
- 14. Preventive measures and emergency plans should be developed for production, collection, storage, transportation, utilization and treatment of hazardous materials.
- 15. Enterprises that caused significant environmental pollution with hazardous materials by accidents or other sudden incidents must immediately take actions to eliminate or alleviate the damage.
- 16. Decommissioning fees for centralized treatment facility or place for key hazardous materials should be drawn in advance and listed in the cost estimation or operational cost.

Section Two Recommendation Implementation

1. Prevention strategy

1.1 Does the solid waste prevention follow the rules of reduction, recycle and decontamination? If yes, fill in the following table.

Place, Activity,		Measures		
Equipment,				
Material	Reduction	Recycle	Decontamination	Remarks

1.2 Do the rules and measures of reduction, recycle and decontamination cover all aspects of the

solid waste treatment?

Yes

No

Not applicable

Measures:
<u>Short-term:</u>
1. Apply economical and technical policies and measures in favor of comprehensively
utilizing solid waste to fully recycle and reuse it.
2. Train responsible persons and practitioners to strictly implement the rules of
reduction, recycle and decontamination in solid waste treatment process.
<u>Medium-term</u> :
1. Apply centralized solid waste treatment measures in favor of environmental
protection.

Environmental risk confirmation			
Have all the detail poin	nts in recommendation	ons been taken into account and implemented?	
Yes	Partially	No	
RC=1	RC=5	RC=10	

2. Monitoring

2.1 Is the system for solid waste monitoring and pollution alert established?

Yes No Not applicable

Remarks:

piles.

Measures:
<u>Short-term:</u>
1. Establish monitoring and alarming regulations; strictly monitor the types, amount and
treatment results of solid waste.
2. Have full-time employees monitor the types and flow direction of the solid waste and
prevent it from entering the environment.
<u>Medium-term</u> :
1. Have enough instruments to establish a monitoring and alarming system and monitor
the generation, flow direction, types and quantity of solid waste.
2. Install essential monitoring devices to test air quality at leeward side of solid waste

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Environmental risk cc	nfirmation	
Have all the detail po	ints in recommendation	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

3. Environmental risk assessment

3.1 Does the enterprise file projects of solid waste production and of constructing solid waste storage, utilization and treatment? If yes, fill in the following table.

		Preventive	Persons in	
Solid Waste	Weight	measures	Charge	Remarks

3.2 Have an environmental risk assessment been carried out for the item in 3.1 or it is included in an exclusive chapter of enterprise environmental impact assessment?

Yes No Not applicable

3.3 Have the feedbacks from environmental risk assessment been implemented?

Yes No Not applicable

Remarks:

Measures:

Short-term:

- The accessory preventive facilities for solid waste pollution treatment which is determined by the environmental impact assessment for projects need to be built, together with the main construction.
- The pollution prevention facilities for solid waste must be inspected and accepted by the same environmental authority which approved the environmental impact assessment report. Up until then, the project can be put into commissioning or use.
- The inspection and acceptance of pollution prevention facilities for solid waste should be conducted at the same time as the main construction.

<u>Medium-term</u>:

 Enterprises should improve facilities for solid waste prevention according to the requirements of environmental impact assessment and state and local laws and regulations. 2. Prohibit constructing centralized solid waste storage, treatment facilities and place, and garbage landfill in natural reserves, places of interest, water resource protection zone, farmland protection zone and other protected zones designated by state council, relevant authorities, municipal governments, autonomous regions, and municipalities under central government.

Environmental risk confirmation			
Have all the detail poi	ints in recommendation	ons been taken into account and implemented?	
Yes	Partially	No	
RC=1	RC=5	RC=10	

4. Inspection

4.1 When environmental protection authority is investigating environmental risks, is the real situation reported with essential information? If yes, fill in the following table.

Yes

No

Not applicable

			Suggestion from the Inspection	
Inspection Unit	Date	Inspection Content	Unit	Measures

(Remarks: State the recent inspection results as required.)

4.2 Is the suggestion of environment protection departments thoroughly implemented?

Yes No

Not applicable

Remarks:

Measures: <u>Short-term:</u> 1. Implement the preventive measures of solid waste according to the environmental protection departments.

Environmental risk confirmation			
Have all the detail poir	nts in recommendation	ons been taken into account and implemented?	
Yes	Partially	No	
RC=1	RC=5	RC=10	

5. Preventive measures

5.1 Have the preventive measures like anti-scattering, anti-loss, anti-permeation been taken?

Yes No Not applicable

If other measures have been taken, briefly describe them:

5.2 Can no dumping, piling, throwing or dropping solid waste be achieved?

Yes No Not applicable

Me	asures:
<u>Sh</u>	<u>ort-term:</u>
1.	Prohibit dumping and piling up of solid waste where laws and regulations don't allow
	like in rivers, lakes, canals, channels, reservoirs, beaches and slopes under the
	highest water level.
2.	Some measures should be taken to prevent or reduce solid pollutant from entering
	the environment.
3.	Construct solid waste landfills or dumping fields according to the state and local laws
	and regulations.

Environmental risk confirmation			
Have all the detail poin	nts in recommendation	ons been taken into account and implemented?	
Yes	Partially	No	
RC=1	RC=5	RC=10	

6. Facilities and equipment

6.1 Are the facility, equipment and place for solid waste collection storage, transportation and treatment in use?

Yes No Not applicable

6.2 Can the above facility, equipment and place be periodically inspected and maintained to keep their functions and integrity?

Yes No Not applicable

Me	easures:
<u>Sh</u>	ort-term:
1.	Prohibit dumping and piling up of solid waste where laws and regulations don't allow
	like in rivers, lakes, canals, channels, reservoirs, beaches and slopes under the
	highest water level.
2.	Some measures should be taken to prevent or to reduce solid pollutant from enter the
	environment.
3.	Develop regulations for solid waste collection, storage, transportation and treatment
	according to the state and local laws and regulations.
4.	Train staff that's in charge of solid waste collection, storage, transportation and
	treatment.

Environmental risk confirmation			
Have all the detail poir	nts in recommendation	ons been taken into account and implemented?	
Yes	Partially	No	
RC=1	RC=5	RC=10	

7. Responsibility system

7.1 Has a responsibility system of environmental pollution prevention been developed?

Yes	No	Not applicable		
7.2 Is the solid waste going in and coming out of the facilities, equipment and devices monitored by full-time employees?				
Yes	No	Not applicable		
7.3 Are responsible persons clear about their work content, especially the emergency measures				
In case of aphorma	a situation?			
Yes	No	Not applicable		
- -				

Measures:

Short-term

- 1. Each set of equipment that is related to solid waste production should have full-time employees in charge.
- 2. For accident potentials, environmental incidents and accidents caused by delinquency, enterprises must strictly execute responsibility system.

Environmental risk confirmation			
Have all the detail poi	ints in recommendation	ons been taken into account and implemented?	
Yes	Partially	No	
RC=1	RC=5	RC=10	

8. Raw materials selection

8.1 Have the process equipment, raw materials, energy and other resources that the state promotes been clarified?

Yes No Not applicable

8.2 Have the production process and equipment promoted by the state and region been applied?

Yes	No	Not applicable
-----	----	----------------

8.3 Have the production operators been trained with solid waste pollution prevention?

Remarks:

Measures: <u>Short-term</u>

- 1. Do not use backward production technology and equipment that state and region has claimed to eliminate?
- 2. Select appropriate raw materials, auxiliary materials, energy and other materials to reduce solid waste discharge.

Environmental risk confirmation				
Have all the detail po	ints in recommendation	ons been taken into account and implemented?		
Yes	Partially	No		
RC=1 RC=5 RC=10				

9. Hazardous waste management and declaration

9.1 Is it required to compose the hazardous waste management plans according to the relevant state regulations?

Yes No Not applicable

If yes, briefly describe the management plan:

9.2 Has the relevant information like the type, amount, flow direction, storage, and treatment method of solid waste been genuinely reported to the environmental protection authority?

Yes No Not applicable

If yes, briefly describe it (including date, administrative department, declaration content, and if the declaration involves all aspects?):

9.3 Are there any major alternations in declaration items? If yes, fill in the following table.

Yes

No

Not applicable

				Quantity	Alternation	Persons
			Original	after	in	in
Solid Wastes	Alternation	Date	Quantity	Alternation	Measures	charge

9.4 Has the altered item been genuinely declared?

Yes

No

Not applicable

Measures:

Short-term

- 1. Hazardous waste management plans should include the measures to reduce the amount and hazardness of the waste and its storage, utilization and treatment.
- 2. Enterprises producing hazardous waste should be filed at the local municipal environmental protection authority or above.
- 3. It should be timely declared if major changes are made to the management plan.
- 4. The altered preventive measures should be able to prevent solid waste from entering the environment.
- 5. Management staff and production operators must be clear about the measures after alternation.

Environmental risk confirmation			
Have all the detail poir	nts in recommendati	ons been taken into account and implemented?	
Yes	Partially	No	
RC=1	RC=5	RC=10	

10. Comprehensive utilization

No

10.1 Can the solid waste be recycled by any means? If yes, fill in the following table.

			Quantity for		
	Comprehensi		compressive	Persons in	
Solid Waste	ve utilization	Amount	utilization	Charge	Remarks

Not applicable

10.2 Can enterprise afford comprehensive utilization in terms of finance and technology?

Yes

Yes

No

Not applicable

Me	asures:				
<u>Sh</u>	<u>Short-term</u>				
1.	As for solid waste that is temporarily unable or unable to be used, construct storage				
	facilities and places to store them by classification according to the regulations of the				
	environmental protection ministry or to take decontamination treatment measures.				
2.	Constructing of solid waste storage, and treatment facilities and places must comply				
	with the state environmental protection standards.				

Environmental risk confirmation				
Have all the detail poi	ints in recommendation	ons been taken into account and implemented?		
Yes	Partially	No		
RC=1	RC=5	RC=10		

11. Shutdown of prevention facilities

11.1 Are there regulations and systems established for the shutdown and deconstruction of solid waste prevention facilities?

Yes No Not applicable

11.2 Has the shutdown, layoff or deconstruction of solid waste prevention facilities been reported to and approved by relative departments?

Yes No Not applicable

11.3 Does the shutdown, layoff or deconstruction of the solid waste prevention facilities use effective measures to stop pollutants from entering the environment?

Yes No Not applicable

11.4 Is the shutdown, layoff or deconstruction of the solid waste prevention facilities done by specialists or special organizations?

Remarks:

Measures:

Short-term

- If shutdown, layoff or deconstruction is needed, it is required to have the approval of environmental protection authorities at local government or above. And take preventive measures.
- 2. Enterprises that are short of specialists can consider third-party specialized organizations or individuals.
- 3. Take enough measures to avoid pollutants from entering the environment during the shutdown, layoff and deconstruction period.
- 4. File the shutdown, layoff, and reconstruction of the solid waste prevention facilities.

Environmental risk confirmation					
Have all the detail points in recommendations been taken into account and implemented?					
Yes	Partially	No			
RC=1 RC=5 RC=10					

12. Sign

12.1 Are there identification signs at the collection, storage, transportation and treatment facilities of hazardous waste?

Yes No Not applicable

12.2 Are the signs mentioned in 2.1 clear and legible?

Yes No Not applicable

Remarks:

Environmental risk confirmation				
Have all the detail poi	nts in recommendation	ons been taken into account and implemented?		
Yes	Partially	No		
RC=1	RC=5	RC=10		

13. Physical and chemical properties

13.1 Are the physical and chemical properties of hazardous waste identified? If yes, fill in the following table.

		Main Physical	Main Chemical	Persons	
Solid Waste	Quantity	Property	Property	in Charge	Remarks

13.2 Is the hazardous waste collected and stored according to their properties?

Yes

No

Not applicable

Remarks:

Measures:

Short-term

- 1. Prohibit mixed collection, storage, transportation and treatment of incompatible or raw hazardous substances.
- 2. Stored hazardous waste must have implemented preventive measures that comply with state environmental protection standards, and cannot be longer than one year. If extension is needed, it is required to be approved by environmental protection departments which authorized the business certificate.
- 3. Prohibit mixed storage of hazardous and non-hazardous waste.

- 4. Establish enterprise compliances to carry out storage, transportation and treatment of hazardous waste according to the state and local laws, regulations and standards.
- Collection, storage, transportation and treatment of hazardous waste should be managed by full-time employees.

Environmental risk confirmation				
Have all the detail poi	ints in recommendation	ons been taken into account and implemented?		
Yes	Partially	No		
RC=1	RC=5	RC=10		

14. Emergency plans

14.1 Is there an emergency plan developed for hazardous waste production, collection, storage, transportation, utilization and treatment or it is included in the enterprise's overall emergency plan?

Yes No Not applicable

14.2 Has the risk analysis been done for hazardous waste production, collection, storage, transportation, utilization and treatment to deal with any possible environmental incidents?

14.3 Has the emergency drill been done to examine the organizing and responding capability of management staff and production operators?

Yes No Not applicable

14.4 Has an emergency department equipped with a group of specialists been established?

Yes

No

Not applicable

Remarks:

Measures

Short-term

- 1. Emergency plans should be filed at environmental protection authority at local government.
- 2. Regularly keep in contact with local government and environmental protection authority.
- 3. Establish emergency communication systems.
- 4. When alternation is made, the emergency plan should be timely updated and relevant people informed of the alternation.

Environmental risk confirmation				
Have all the detail poi	ints in recommendation	ons been taken into account and implemented?		
Yes	Partially	No		
RC=1	RC=5	RC=10		

15. Environmental incidents

15.1 Is there enough people, technology and material storage to control the impacts of environmental incidents?

Yes No Not applicable

15.2 Have the surrounding sensitive zones been identified?

Yes No Not applicable

Remarks:

Magaura	
measures	5.

Short-term

- 1. When environmental incidents happen, immediately inform the companies and citizens who may possibly be affected.
- 2. When environmental incidents happen, report to the environmental protection authority at local government or above in no time and accept investigation or inspection.

Environmental risk confirmation				
Have all the detail poin	nts in recommendation	ons been taken into account and implemented?		
Yes	Partially	No		
RC=1	RC=5	RC=10		

16. Are the decommissioning fees of centralized treatment facilities for key hazardous waste included in the cost estimation?

Yes No Not applicable

Environmental risk confirmation				
Have all the detail poi	nts in recommendation	ons been taken into account and implemented?		
Yes	Partially	No		
RC=1	RC=5	RC=10		

Checklist Summary

Detail Points of Recommendations	Potential Risks	Risk Classification (RC)
1	1/5/10	
2	1/5/10	
3	1/5/10	
4	1/5/10	
5	1/5/10	
6	1/5/10	
7	1/5/10	
8	1/5/10	
9	1/5/10	
10	1/5/10	
11	1/5/10	
12	1/5/10	
13	1/5/10	
14	1/5/10	
15	1/5/10	
16	1/5/10	

Average Risk of Checklist (ARC)

Chapter Six Pipe Network System

6.1 Pipes

Section One Recommendations

- 1. When hazardous chemicals are transferred by pipes, sealing and anti-permeation measures are required. The air tightness must be tested by general methods for verification.
- 2. As for buried pipes, adjustable joints and other parts should be periodically inspected in terms of air tightness.
- 3. Piping design, installation, inspection, maintenance and alternation should be monitored by full-time employees and put in files.
- 4. Pipes should be appropriately labeled.

Section Two Recommendation Implementation

Fill in the following form. If there are many pipes, fill them in respectively according to the form structure.

General description of pipes:				
1. F	Properties description:			
(Ground:	Underground:		
2. N	1edium:			
3.	Pipe material:			
4.	Diameter(mm):			
5.	Design pressure(Pa):			
6.	Max. operating pressure(Pa):			
7.	Operating temperature(°C):			

1. Sealing

1.1 Can the air tightness of pipes be guaranteed and that there is no leakage? Conduct inspections regularly.

1.2 Is there a collection system to prevent leaking materials from entering the environment?

Yes No Not applicable

1.3 Is the collection system sufficient to make sure that no leaked materials enter the environment before leakage is fixed?

Yes No Not applicable

1.4 Do staff know well of the properties of the chemicals in transit and fully consider them in application?

Yes No Not applicable

Me	asures:	
Sh	ort-term:	
1.	Periodically conduct inspection, and timely repair leaking pipes.	
2.	When inspecting, pay attention to the valves and connecting parts.	
<u>Me</u>	<u>dium-term</u> :	
1.	Put in place enough instruments to conduct pressure and air tightness test.	
2.	Construct a collection system such as a storage basin.	
3.	Periodically inspect pipes in terms of their pressure tolerance and air tightness and	
file the results.		
4.	Take anti-collision measures to prevent damage from collision.	

Environmental risk confirmation				
Have all the detail points in recommendations been taken into account and implemented?				
Yes	Partially	No		
RC=1	RC=5	RC=10		

2. Underground pipes

2.1 Are there any underground pipes?

Yes: No:

2.2 Are there any measures taken to make sure no accident potentials exist in the pipe system? The measures include double-walled pipes, pipe rake in the ditches and monitoring system to control the pipe safety.

Yes No Not applicable

Remarks:

Mea	asures:
<u>Sho</u>	ort-term:
1.	Inspect the pressure and air tightness of single-walled underground pipes.
2.	Estimate the lifespan of the pipe by common methods to make sure its reliability.
Me	<u>dium-term</u> :
1.	Replace the underground pipes with ground pipes.
2.	Periodically inspect the air tightness of typical sections in the pipes like joints, the
mid	Idle part of the pipe, etc.

Long-term:

1. Install a monitoring system so as to promptly find leakage and other risks.

Environmental risk confirmation				
Have all the detail points in recommendations been taken into account and implemented?				
Yes	Partially	No		
RC=1	RC=5	RC=10		

3. Maintenance

3.1 Is the performance of the pipes periodically inspected and kept on file, including air tightness, corrosion rate, aging degrees, chemical resistance, biological resistance, etc.

Yes	No	Not applicable
3.2 Is the alternat saved as files?	ion of the pipes con	ducted by specialists or special organizations, and
Yes	No	Not applicable
3.3 Is the pipe mai	ntenance managed b	y full-time employees and kept in files?
Yes	No	Not applicable
Remarks:		

Measures:

Short-term:

- 1. Pipe alternation and maintenance must be filed.
- 2. Have periodical inspections and file a report including testing points, date, objects, results, etc.

Medium-term

1. Establish a filing system for documents related to pipes to record all relevant activities.

Environmental risk confirmation				
Have all the detail points in recommendations been taken into account and implemented?				
Yes	Partially	No		
RC=1	RC=5	RC=10		

4. Are the pipes labeled according to the physical and chemical properties of the substances that run through them?

Yes	No	Not applicable
-----	----	----------------

Me	easures:				
<u>Sh</u>	<u>ort-term</u> :				
1.	Conduct labeling	g according to the rele	vant regulations.		
2.	Mark the physic	al and chemical prop	erties of the substances, responsible persons,		
	contact methods, etc on the label.				
En	vironmental risk c	onfirmation			
Have all the detail points in recommendations been taken into account and implemented?					
	Yes	Partially	No		
	RC=1	RC=5	RC=10		

Checklist Summary

Detail Points of Recommendations	Potential Risks	Risk Classification (RC)
1	1/5/10	
2	1/5/10	
3	1/5/10	
4	1/5/10	

Average Risk of Checklist (ARC)

6.2 Wastewater collection and drainage

Section One Recommendations

- 1. Drainage should be separated according to water quality.
- 2. The domestic wastewater from the plant should have a separate sewerage system.
- 3. The classification of sewerage system should be determined in accordance with the water quality and quantity of each discharge stream and be combined with treatment methods. Generally, it can be classified as grey wastewater system, process wastewater system, domestic wastewater system, water drainage system, etc. The systems should not be connected to each other.
- The effluent polluted by accidents must be controlled at the source as much as possible. It cannot be discharged together with other wastewater.
- 5. Flammable or explosive substances are not allowed to be discharged into the sewerage system.
- Sewerage system must be anti-permeation and have a concrete structure, and at the same time meet the requirements of chemical, physical, thermal, biological and stress resistance.
- 7. When the performance of the end treatment facilities decreases, corresponding measures must be taken to prevent the impact on the receiving water body.

Section Two Recommendation Implementation

1. Drainage separation based on quality

1.1 Have the wastewater collection and discharge fully considered the separation based on water quality to reduce the amount to be treated and improve the efficiency?

Yes	No	Not applicable

1.2 Based on stream separation, is the process wastewater further classified so as to choose the specific treatment?

Yes	No	Not applicable
-----	----	----------------
Measures:

<u>Short-term</u>:

- 1. The partial pretreatment should be integrated with the final wastewater treatment, and the recycling of valuable components or wastewater itself should be implemented together with the treatment and discharge.
- 2. Wastewater should be purified to qualify for reuse on the basis of scientific experiment, production practices and cost-benefit comparisons.
- 3. Develop the wastewater distribution plan for abnormal circumstances, like shutdown or accidents.

<u>Medium-term</u>:

1. Conduct desulfurization treatment separately for the sulfur containing effluent from oil separators in the distillation towers.

2. Cyanide wastewater from propylene or carbon black recovery devices should be treated separately.

3. Enterprises should construct emergency tanks to deal with abnormal situations, like shutdown, breakdown, or when wastewater treatment facilities cannot work properly to prevent over-discharge.

 Environmental risk confirmation

 Have all the detail points in recommendations been taken into account and implemented?

 Yes
 Partially

 RC=1
 RC=5

 RC=10

2. Does the domestic wastewater coming from the plant have a separate sewerage system?

Yes No Not applicable

Environmental risk confirmation			
Have all the detail points in recommendations been taken into account and implemented?			
Yes	Partially	No	
RC=1	RC=5	RC=10	

3. Sewerage system separation

Genuinely fill in appendix 1 and 2 about the whole plant discharge situations as well as the appendix 3 for the equipment/unit discharge situation.

- 3.1 Has the sewerage system separation considered the following factors:
- (1) Effluent quality

Yes	No	Not applicable			
(2) Effluent amou	(2) Effluent amount				
Yes	No	Not applicable			
(3) Expected treat	ment requirements				
Yes	No	Not applicable			
(4) Treatment methods					
Yes	No	Not applicable			
3.2 Does the enterprise sewerage system include:(1) Grey wastewater system					
Yes	No	Not applicable			
(2) Process wastewater system					
Yes	No	Not applicable			

(3) Domestic wastewater sewerage system

Yes No Not applicable

- (4) Water drainage sewerage system
- Yes No Not applicable

3.3 Are these sewerage systems isolated from each other, no inter-connection?

Yes No Not applicable

Remarks:

Measures:

Short-term:

- 1. Unpolluted rainwater, boiler blow down, neutralization water from demineralized water station, clear water tank depletion and overflow should be directed to rainwater or grey water system.
- 2. Blow down from cooling water recycling system can be directly discharged to grey water system. When pollution found in that system, it should be directed into the process wastewater system.
- 3. Rainwater from production facilities, filling area, and oil loading/unloading area should be discharged into process wastewater system or a separated treatment system.
- 4. Effluent from canteen and bathroom should be discharged into domestic sewerage system. If the effluent from bathroom is very little and the bathroom is far away from the domestic sewerage system, it is discharged to the nearby process sewerage system via septic tanks.
- 5. According to the different effluent quality and treatment requirements, sewerage systems can be incorporated or new ones can be constructed as addition. For an example, rainwater system and grey water system can be combined as rain-grey wastewater system.
- 6. If external recycling water pipe network from the production unit is distributed as a loop, essential check valves should be installed.

- Discharge of process effluent should use covered pipes or conduits with soil coverage no less than 200mm thick. If open conduits are required inside of facilities, it should be constructed step-wisely.
- 8. Wastewater pipes of the whole plant should not cross the production facilities, tank groups or residential areas.
- 9. When a building is separated into many rooms by firewalls, the process wastewater pipe from each room should have individual outlet with water sealer.
- 10. Process wastewater pipes in tank groups should have individual outlets and install water sealer outside of the fire bund. In addition, it's better to install isolation valves with easy switches.

<u>Medium-term</u>:

1. Separate effluent according to the water quality, flow rate, and treatment requirements. Put in place different sewerage systems.

2. Have periodical inspection to prevent inter-connection between sewerage systems.

3. Make sure each sewerage system has one outlet equipped with sampling and metering instruments.

 Environmental risk confirmation

 Have all the detail points in recommendations been taken into account and implemented?

 Yes
 Partially

 RC=1
 RC=5

 RC=10

4. Source control

- 4.1 How many different types of wastewater are there?
- (1) Process wastewater

Yes	Not available	Don't know
Yes	Not available	Don't kno

(2) Wastewater from collection devices in production areas

Not available	Don't know
	Not available

(3) Wastewater from collection devices in storage and transportation areas

Yes	Not available	Don't know	
(4) Other wastewa	ater		
Yes	Not available	Don't know	
If there are any oth	er types of wastewate	er, please list here.	
4.2 Can it be guara material leakage ca	inteed that there will b aused by accidents?	e no impacts on the wastewater discharge in case of	
Yes	No	Not applicable	
If yes, briefly descr	ibe the applied measu	ires:	
4.3 Are there enoug	gh monitoring system	s to timely detect polluted discharge in 4.2?	
Yes	No	Not applicable	
If yes, briefly descr	ibe the monitoring sys	stems:	
4.4 If pollution goe make sure that the	es into the normal di re will be no impacts o	scharge, are there enough preventive measures to on the receiving water body?	
Yes	No	Not applicable	
If yes, briefly describe the applied measures:			

4.5 Can the polluted wastewater be controlled at the source?

Yes No Not applicable

If yes, briefly describe the applied measures:

Remarks:

Measures:

Short-term:

- 1. Periodically inspect and randomly check the wastewater collection and drainage system. On finding unorganized discharge, timely connect it with a feasible drainage conduit.
- 2. Establish regular monitoring system to periodically test outlets of production and discharge units, making sure discharge is under limits.

Medium-term:

- 1. Add isolators to collection system to prevent leaking materials from entering directly into the drainage system.
- 2. Add monitoring system to monitor materials at production and storage areas and prevent them from being directly discharged into the drainage system.
- 3. Construct pretreatment facilities in production area. Only by meeting the requirements of the end treatment facilities can it be discharged.
- 4. Production area should install isolators to prevent leaking substances from entering directly into the drainage system.
- The outlet of the towers, furnaces, pumps and heat exchangers in process equipment areas should install separation devices like the water sealer, with height no less than 250mm
- 6. Gravity recycling water pipes should install separation devices at the general outlet of process facilities, with height no less than 250mm.

Environmental risk confirmation			
Have all the detail points in recommendations been taken into account and implemented?			
Yes	Partially	No	
RC=1	RC=5	RC=10	

5. Fire and explosion risks

5.1 In case of incidents or accidents, can it be ensured that flammable and explosive materials would not enter the drainage system?

Yes No Not applicable

5.2 If flammable or explosive substances mentioned above enter the drainage system, are there enough prevention measures to avoid harm on the environment?

Yes No Not applicable

If yes, briefly describe the applied measures.

Remarks:

Me	easures:
Sh	<u>oort-term</u> :
1.	Take enough measures to stop flammable and explosive substances from entering the
	drainage system.
2.	Wastewater containing flammable liquid or rainwater highly polluted by flammable
	liquid should be discharged into process wastewater pipe system, while the
	condensate of flammable gas and the following type of liquid cannot.
3.	Avoid the mixture of wastewater that is likely to lead to emergency.
4.	Fire should be prevented near the wastewater collection and drainage system.

Medium-term:

- 1. Construct different drainage systems for various requirements and use high temperature resistant and anticorrosion materials.
- 2. Install camera surveillance system to monitor, 24-hour, the production and storage areas to detect timely potentials of fire, explosion and leakage

Environmental risk co	onfirmation	
Have all the detail points in recommendations been taken into account and implemented?		
		'
Yes	Partially	No
	, , , , , , , , , , , , , , , , , , ,	
RC=1	RC=5	RC=10

6. Air tightness and intensity of the wastewater system

6.1 Is the wastewater system permeation-proof and consolidated? Does it fulfill the requirements of the physical, chemical, thermal, biological and stress resistance?

Yes No Not applicable

Remarks:

Measures:

Short-term:

- 1. Have periodical inspection to make sure the normal operation of the drainage system.
- 2. Maintain and replace the broken parts.

<u>Medium-term</u>:

- 1. Replace inappropriate parts.
- 2. Quit using unsuitable equipment.

Environmental risk confirmation			
Have all the detail points in recommendations been taken into account and implemented?			
Yes	Partially	No	
RC=1	RC=5	RC=10	

7. End-of-pipe treatment capacity

7.1 When the treatment capacity of facilities is affected, are there enough measures to prevent the receiving water body from getting affected?

Yes	No	Not applicable

Environmental risk confirmation			
Have all the detail points in recommendations been taken into account and implemented?			
Yes	Partially	No	
RC=1	RC=5	RC=10	

Checklist Summary

Detail Points of Recommendations	Potential Risks	Risk Classification (RC)
1	1/5/10	
2	1/5/10	
3	1/5/10	
4	1/5/10	
5	1/5/10	
6	1/5/10	
7	1/5/10	

Average Risk of Checklist (ARC)

Appendix 1 Main Pollutant Type, Discharge Concentration, Discharged Amount, and Flow Direction---Whole Plant

No.	Equipment	Pollutant	Unit	Discharged Amount	Component	Flow Direction
1						
2						
3						
4						
5						
6						
7						

Appendix 2 Discharge of Waste Gas, Water and Solid----Whole Plant

2.1 Waste Gas Emission

		Poll	lutant Flow	rate/(kg/h)			Parameters		Emission methods and	Remar
No.	Equipment	hydrocarbon	SO2	NO2	Dust	Height/m	Diameter/ m	Temperatu re/°C	flow direction	ks
1										
2										
3										
	Subtotal									

2.2 Wastewater Discharge

No.	Equipment	Discharge/	24		Po	Ilutants Content	t/(kg/h)		Emission Method and Flow Direction	Remarks
NO.	Equipment	(m ³ /h))	рп	Petrol	Sulfate	COD	NH4			Remarks
1										
2										
3										
	Subtotal									

2.3 Solid Waste Discharge

	Equipment		Polluta	ant Content/(kg/	h)		Main	Discharge Methods and Flow Direction	Rema rks
No.	Equipment	Waste Catalyst	Spent solid(liquid)	Waste Absorbent	Three Sludge	Other	Compone nt		
1									
2									
3									
	Subtotal								

Appendix 3 Discharge of Waste Gas, Water and Solid----Unit/Equipment

3.1 Waste Gas Pollutant

			Hydro	ocarbon		602	١	102	E	Dust			Outl	et paramet	ers		Emissi	
N o.	Waste	Emission (10 ⁴ m²/h)	(kg/h)	(mg/m²)	height/ m	diamet er/m	tempera ture/°C	Emiss ion Rules	on Flow Directi on	Remar ks								
1	Reclaimed																	
	Ash																	
2																		
	Subtotal																	

3.2 Waste Water Pollutant

				Pe	tro	Sulf	ate	cc	D	Amm	ionia	Suspend	ed Solids				Disch	
N o.	Wastewater Type	Discharg e/(m ³ /h))	рН	(kg/h)	(mg/L)	(kg/h)	(mg/L)	(kg/h)	(mg/L)	(kg/h)	(mg/L)	(kg/h)	(mg/L)	(kg/h)	(mg/L)	Disch arge Rules	arge Flow Directi on	Rema rks
1	Oil Wastewater																	
2																		
3																		
	Subtotal																	

3.3 Solid Waste

	Solid Waste			Discharge/(t/a)				onent Discharg e Rules	Discharge	Remar
No.	Туре	Waste	Spent Solid	Waste	Three	Other	Main Component	e Rules	Flow	ks
		Catalyst	(Liquid)	Absorbent	Sludge	Ourier			Direction	
1	Waste catalyst									
2										
3										
	Subtotal									

Chapter Seven

Plant External Environment

Section One Recommendations

1. The state executes the environmental impact assessment regulations for construction projects. According to the "Classification Management Catalog of Construction Project Environmental Impact Assessment", petrochemical projects should compose environmental impact assessment reports to make an all-around and specific evaluation on the pollution that the project may produce and its impact on the environment. The environmental impact assessment reports should be done by qualified companies.

Environmental impact assessment report should include:

- (1) General introduction of the project;
- (2) Current surrounding environment's conditions;
- (3) Environmental impact assessment and prediction;
- (4) Environmental protection measures and cost-benefit verification.
- (5) Cost-benefit analysis of environmental impact;
- (6) Suggestions on environmental protection monitoring;
- (7) Conclusions

Projects related to water-soil conservation must have a water-soil conservation proposal approved by relevant administrative departments.

- Use clean production process that uses low energy and material and produces only a few pollutants to:
 - (1) Use non- or low toxic and noxious energy and materials:
 - (2) Use new technologies and processes to fully use resources and discharge the least pollution;
 - (3) Use new types of equipment with no or low pollution, low noise and low energy consumption.
 - (4) Rationalize product structure and develop products with little or no environmental impact.
 - (5) Use advanced, highly efficient and economical materials and energy recycling, and implement "three waste" treatment facilities.

- 3. Pollution prevention should consider the rules of centralized and localized treatment, total and concentration control, end-of-pipe treatment and whole process control, comprehensive utilization and purification. Make sure the general discharge from enterprises comply with the state and local standards. In addition, total control requirements of key pollutant discharge should be reached where it is so required.
- 4. All valuable chemical wastes are either recycled or treated by comprehensive methods
 - Fully take advantage of the remaining heat and combustible air as energy resources for industry and households;
 - (2) Separate and recycle or further process the valuable part of the waste to convert it to new products;
 - (3) Waste that can't be used by the project itself should be shared by other enterprises if they can make use of it.
- 5. The storage, transportation, and usage of radioactive materials and waste should follow the current "Regulations of Radiation Prevention", "Health Protection and Management of Radioisotope Work", and "Radiation Environment Management". Transportation of flammable, explosive and toxic substances should use special transportation vehicles with safety protection devices. Warehouse of radioactive substances should be placed in sparse areas.
- Discharge of toxic and noxious wastewater, waste gas (dust), spent solid(liquid), odor, radioactive waste is not allowed in:
 - (1) Residential, cultural and education areas in cities;
 - (2) Water source protection area;
 - (3) Places of historical interest, scenic spots, hot springs, and healthcare areas;
 - (4) Natural reserves;
 - (5) Other areas that require special protection.
- 7. Chemical construction projects with toxic and noxious waste gas emission should be guaranteed to be away from towns and citizens, at least as far away as required by environmental impact assessment reports, and should be located at the windward side of environmental protection targets like residential areas.

- (1) At offshore or lakeside areas, as the result of thermal property differences between water surface and the continent, partial atmospheric circulation should be considered to avoid the local circle of the emitted waste gas.
- (2) Enterprises in the mountain areas should consider the impacts of the valley wind on the waste gas emission;
- (3) The layout of exhaust pipe, flame, toxic and noxious materials warehouse, loading/unloading station, wastewater treatment plant, landfill, incinerators and other equipment should be distributed at the weather side of minimum frequency wind direction. These facilities, moreover, should not be at unventilated zones which will affect the full combustion and diffusion of the emission.
- 8. Chemical projects with toxic and noxious wastewater discharge should be at the downstream of the local surface water source protection area. The outlets location should be determined according to the environmental impact assessment.
- 9. Plant that produces hazardous solid waste is forbidden at the downstream of water source protection area, and cannot be in the sanitary protection zone designated by the local construction, public health, and environmental protection departments. If there will be scattering pollutant, the plant should be placed at the weather side of annual minimum frequency wind in the residential area.
- 10. Chemical construction projects with fugitive emission of toxic and noxious waste gas should set a sanitary protection distance from the residential areas, preferably with greening plans. Sanitary protection distance should be determined in accordance with the approved environmental impact assessment report.
- 11. The sources of big noise should not be placed close to the civil activity areas.
- 12. When production requirements are fulfilled, the production facility with heavy pollution should be allocated far away from the non-polluting facilities, and then decide on the locations of others. The administrative and residential buildings should be allocated on one side of the plant which is also regarded as the non-expansion end.
- The new chemical construction projects should have an all-round blueprint of greening plans with coverage of no less than 15%. 10-15% for the reconstruction projects.

Section Two Recommendation Implementation

1. Environmental impact assessment report

1.1 Has the enterprise compose the environmental impact assessment reports according to the requirements?

Yes	No	Not applicable						
1.2 Is the report co	mpleted by companie	es with relevant qualifications?						
Yes	No	Not applicable						
1.3 Does the report include:								
(1) General introdu	ction of the project?							
Yes	No	Not applicable						
(2) Current surroun	(2) Current surrounding environment's conditions?							
Yes	No	Not applicable						
(3) Environmental i	mpact assessment a	nd prediction?						
Yes	No	Not applicable						
(4) Environmental p	protection measures a	and cost-benefit verification?						
Yes	No	Not applicable						

(5) Cost-benefit analysis of environmental impact?

Yes	No	Not applicable
(6) Suggestions or	n environmental monit	oring?
Yes	No	Not applicable
(7) Conclusions?		
Yes	No	Not applicable
(8) If projects are proposal approved	related to water-soil I by relevant administ	conservation, is there a water-soil conservation rative departments?
Yes	Not available	don't know
1.4 Does the report	rt contain complete m	easures for pollution control?
Yes	No	Not applicable
1.5 Does the env environmental risk	ironmental impact as assessment?	ssessment report have an exclusive chapter for
Yes	No	Not applicable
Remarks:		

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Measures:

Short-term:

- 1. Organize production to control the pollution by strictly following the requirements of enterprise's environmental impact report.
- 2. Have periodical inspection to make sure about the effectiveness of the measures suggested in the report.

Medium-term:

- Update the measures proposed in the report according to the production and pollution variations.
- 2. Periodically inspect the implementation of environmental impact report.

Environmental risk co	Environmental risk confirmation								
Have all the detail points in recommendations been taken into account and implemented?									
Yes	Partially	No							
RC=1	RC=5	RC=10							

2. Whole process pollution control

- 2.1During production, can the followings be achieved?
- (1) Use non- or low toxic and noxious energy and materials;

Yes No Not applicable

(2) Use new technologies and processes to make full use of and discharge the least pollution.

Yes	No	Not applicable
-----	----	----------------

(3) Use new equipment with no or low pollution, low noise and low energy consumption

Yes	No	Not applicable						
(4) Rationalize p impact	product structure and	develop products with little or no environmental						
Yes	No	Not applicable						
(5) Use advanced, highly efficient and cost-effective materials and energy recycling, and								
"three waste" trea	atment facilities.							
Yes	No	Not applicable						
2.2 Can the clear	n production measure	s reduce the pollution discharge?						
Yes	No	Not applicable						
Remarks:								
Measures:								
Short-term:								
1. Train producti	on operators and ma	anagement staff to establish the concept of whole						
process control.								
2. Control pollutant production and discharge according to the environmental impact								
assessment rep	ort.							

Medium-term:

 Establish a pollutant monitoring system in production phase to monitor the materials' flow direction and amount.

Long-term:

1. Improve pretreatment facilities and devices in production phase to reduce pollution.

Environmental risk confirmation		
Have all the detail po	ints in recommendation	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

3. Pollution prevention rules

3.1 Is the pollution prevention measures conducted according to the following rules?

(1) Centralized and localized treatment;

Yes	No	Not applicable
(2) Total and conce	entration control;	
Yes	No	Not applicable
(3) End-of-pipe trea	atment and whole pro	cess control;
Yes	No	Not applicable

(4) Comprehensive utilization and purification.

Yes No Not applicable

3.2 Does the pollutant discharged by the enterprise comply with the state and local standards?

Yes No Not applicable

3.3 Does the discharge of key pollutant comply with the total control requirements if there's any?

Yes No Not applicable

Me	asures:
Sh	ort-term:
1.	Install instruments at the enterprise's general outlet to monitor online the effluent
	quality and quantity.
2.	Install a camera surveillance system to detect abnormal situation and address it
	immediately.
Lor	ng-term:
1.	Construct monitoring tanks to prevent over-discharge.

Environmental risk confirmation		
Have all the detail po	ints in recommendation	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

4. Comprehensive utilization

4.1Does the enterprise have suitable recycling or comprehensive utilization facilities to dispose valuable chemical waste?

Yes	No	Not applicable
4.2 Does the ente	rprise fully take adva	intage of the remaining heat and combustible gas
for industrial or do	mestic use?	
Yes	No	Not applicable
4.3 Is the enterpris	se able to separate a	and recycle or further process the valuable part of
the waste so that t	hey can be converted	d into new products?
Yes	No	Not applicable
4.4 Is the waste ur	nable to be used by th	ne enterprise itself utilized by other enterprises?
Yes	No	Not applicable

Measures:

Short-term:

1: Optimize production process and comprehensively utilize materials and energy.

Environmental risk confirmation		
Have all the detail poi	nts in recommendation	ons been taken into account and implemented?
Yes	Partially	Νο
RC=1	RC=5	RC=10

5. Hazardous materials' storage and transportation

5.1 Does the storage, transportation, and usage of radioactive materials and waste comply with relevant laws like "Regulations of Radiation Prevention", "Health Protection and Management of Radioisotope Work", and "Radiation Environment Management"?

5.2 Is the warehouse of radioactive substances placed at sparse areas?

Yes No Not applicable

5.3 Does the transportation (excluding railway and ferry) of flammable, explosive and toxic substances use special transportation vehicles with safety protection devices?

Yes No Not applicable

Measures:

Short-term:

1: Optimize production process and comprehensively utilize materials and energy.

Environmental risk confirmation		
Have all the detail points in recommendations been taken into account and implemented		
Yes	Partially	Νο
RC=1	RC=5	RC=10

6. Sensitive protection areas

Genuinely fill in environmental sensitive areas around the enterprise according to the "Chemical Checklist and Environmental Risk of State Key Enterprise and Industry" See appendix 1, 2, 3.

6.1 What are the enterprise's pollution sources?

(1) Toxic and noxious wastewater?

Yes	Not available	Don't know
(2)Waste gas (Du	st) ?	
Yes	Not available	Don't know
(3) Spent solid (lic	quid) ?	
Yes	Not available	Don't know

(4) Odor?

Yes	Not available	Don't know	
(5) Radioactive wa	aste		
Yes	Not available	Don't know	
6.2 Are all the abc	ve pollution sources	avoided from the following areas?	
(1) Residential, cu	Itural and educationa	al areas in cities	
Yes	No	Not applicable	
(2) Water source p	protection area;		
Yes	No	Not applicable	
(3) Places of histo	rical interest, scenic	spots, hot springs, and healthcare areas;	
Yes	No	Not applicable	
(4) Natural protection area;			
Yes	No	Not applicable	
(5) Other areas that demand special protection			
Yes	No	Not applicable	

Measures:

Short-term:

1. Appoint full-time employees to be in charge of the enterprise pollution sources management.

2. Fully communicate with local environmental protection authority and other administrative departments to make sure that pollutant outlets are not in the sensitive areas.

3. Conduct investigation on surrounding environmental sensitive areas according to the "Environmental Risk and Chemicals Checklist of Key Enterprises and Industries".

Medium-term:

1. Establish a monitoring system to make sure that the pollution discharge is under permits.

Environmental risk confirmation		
Have all the detail poin	nts in recommendation	ons been taken into account and implemented?
Yes	Partially	Νο
RC=1	RC=5	RC=10

7. Waste gas diffusion

7.1 Can the protective distance between enterprises and towns or cities be guaranteed as determined by the environmental impact assessment report?

Yes No Not applicable

7.2 Does the enterprise follow the requirements to stand at the windward side of environmental protection targets like residential areas?

Yes No Not applicable

7.3 If the enterprise is located offshore or at lakeside areas, is the partial atmospheric circulation, as the result of thermal property differences between water surface and continent, considered to avoid the local circulation of the emitted waste gas?

Yes No Not applicable

7.4 For the enterprises in the mountain areas, is the impact of the valley wind on the waste gas emission considered?

Yes No Not applicable

7.5 Does the distribution of exhaust pipe, flame, toxic and noxious materials warehouse, loading/unloading station, wastewater treatment plant, landfill, incinerators and other equipment follow the requirements to be at the weather side of minimum frequency wind direction?

Yes No Not applicable

7.6 Do all the above facilities detour from the unventilated zones? (Unventilated zones affect the full combustion and diffusion of the emitted gas)

Yes No Not applicable

Measures:

Short-term:

- 1. Train responsible staff for environmental protection to carry through the requirements and measures in the environmental impact assessment report.
- 2. Fully communicate with local environmental protection authority and other administrative departments to avoid impacting sensitive areas around the enterprise.

Environmental risk confirmation		
Have all the detail poir	nts in recommendation	ons been taken into account and implemented?
Yes	Partially	No
RC=1	RC=5	RC=10

8. Wastewater discharge

8.1 Is the enterprise located at the downstream of the local surface water source protection area?

Yes No Not applicable

8.2 Is the location of enterprise's outlets determined according to the environmental impact assessment report?

Yes No Not applicable

Remarks:

Measures:

Short-term:

- 1. Train staff responsible for environmental protection to carry through the requirements and measures in environmental impact assessment report.
- 2. Fully communicate with local environmental protection authority and other administrative departments to avoid impacting sensitive areas around the enterprise.

Environmental risk confirmation				
Have all the detail points in recommendations been taken into account and implemented?				
Yes	Partially	No		
RC=1	RC=5	RC=10		

9. Solid waste treatment plant

9.1 Does the treatment plant for the hazardous solid waste detour from the underground potable water source protection area?

Yes No Not applicable

9.2 Does the treatment plant for hazardous solid waste detour from the sanitary protection zone designated by local construction, public health, and environmental protection departments?

Yes No	Not applicable
--------	----------------

9.3 Are there any scattering pollutants in the solid waste treatment plant?

Not available

Not known

9.4 If positive to question 9.3, is the solid wastes treatment plant at the wind side of annual minimum frequency wind in the residential areas?

Yes

No

Not applicable

Remarks:

Measures:

Short-term:

- 1. Train staff responsible for environmental protection to carry through the requirements and measures in environmental impact assessment report.
- 2. Fully communicate with local environmental protection authority and other administrative departments to avoid impacting the surrounding sensitive areas.

Environmental risk confirmation				
Have all the detail points in recommendations been taken into account and implemented?				
Yes	Partially	No		
RC=1	RC=5	RC=10		

10. Fugitive discharge

10.1 Is there enough protective distance between pollution sources releasing waste gas and residential areas?

Yes No Not applicable
10.2 Does the distance meet the requirements of the environmental impact assessment report?

Yes No Not applicable

10.3 Are there any greening projects between fugitive pollution sources and residential areas?

Yes No	Not applicable
--------	----------------

Remarks:

Measures:

Long-term:

- 1. Train staff responsible for environmental protection to carry through the requirements and measures in the environmental impact assessment report.
- 2. Fully communicate with local environmental protection authority and other administrative departments to avoid impacting the surrounding sensitive areas.

Long-term:

1. Establish green belts to reduce the impact of fugitive pollutants on the residential areas.

Environmental risk confirmation						
Have all the detail points in recommendations been taken into account and implemented?						
Yes	Partially	Νο				
RC=1	RC=5	RC=10				

11. Noise control

Are the noise sources placed far away from the civil activity areas?

Yes No Not applicable

Remarks:

Measures:

Short-term:

- 1. Train staff responsible for environmental protection to carry through the requirements and measures in the environmental impact assessment report.
- 2. Fully communicate with local environmental protection authority and other administrative departments to avoid impacting the surrounding sensitive areas.

Long-term:

1. Establish green belt to reduce the impact of noise on the residential areas.

Environmental risk confirmation						
Have all the detail points in recommendations been taken into account and implemented?						
Yes	Partially	No				
RC=1	RC=5	RC=10				

12. Production and building layout

12.1 When production requirements are fulfilled, the production facility with heavy pollution should be allocated far away from the non-polluting facilities. And then the enterprise should decide on the location of others. Does the enterprise follow the above

requirement to do the layout?

Yes No Not applicable

12.2 Are the administrative and residential buildings allocated at the side of plant which is also regarded as the non-expansion end?

Yes No Not applicable

Remarks:

Measures:

Short-term:

1. Train staff responsible for environmental protection to carry through the requirements and measures in the environmental impact assessment report.

Environmental risk confirmation					
Have all the detail points in recommendations been taken into account and implemented?					
Yes	Partially	Νο			
RC=1	RC=5	RC=10			

13. Greening requirement

13.1Does the green coverage of the enterprise reaches 15%?

Yes No Not applicable

Remarks:

Measures:

<u>Short-term</u>:

1. Have a rational enterprise greening plan to increase the green area.

Environmental risk confirmation						
Have all the detail points in recommendations been taken into account and implemented?						
Yes	Partially	No				
RC=1	RC=5	RC=10				

Checklist Summary

Detail Points of Recommendations	Potential Risks	Risk Classification (RC)
1	1/5/10	
2	1/5/10	
3	1/5/10	
4	1/5/10	
5	1/5/10	
6	1/5/10	
7	1/5/10	
8	1/5/10	
9	1/5/10	
10	1/5/10	
11	1/5/10	
12	1/5/10	
13	1/5/10	

Average Risk of Checklist (ARC)

Appendix 1 Enterprise Surrounding Environment Status and Environmental Protection Goal

1.1 Water Environment

1. Type code for wastewater's main discharge direction							
2. Receiving Water Body	4. Function of Receiving Water BodySurface Water $\circ I $ $\circ II$ $\circ IV$ $\circ V$						
3.Code for Receiving Water Body	Sea Water ∘ I ∘ II ∘III ∘ V						
5. Receiving Water Body of Grey Wastewater	 Function of Receiving Water Body of Grey Wastewater 						
6. Code for Receiving	Surface Water \circ I \circ II \circ III						
Water Body of Grey Wastewater	Sea Water o I o II oIII o V						

1.2 Targets of Water Environment Protection (within 5 kilometers of the downstream area)

		2.Scale		3.coordinate		4.Distance from	5.Environmen	6.Service Area	7.Contac	t Method
1.Prote	ction larget	Туре	Qtv	Longitude	Latitude	Enterprise (m)	tal Function	(For Intake)	Name	Phone
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

Appendix 2 Enterprise's Surrounding Atmospheric Environment Conditions and Environmental Protection Goals

2.1 Atmospheric Environment Condition

Quality of Atmospheric Environment in the Area $\circ I$ $\circ II$ $\circ II$ $\circ III$

2.2 Targets of Atmospheric Environment Protection (within 5 kilometers of the downstream area)

		2.Scale		3.Coordinate		4.Distance from	5.Environmen	6.Service Area	7.Con	tact Method
1.Protecti	ion larget	Туре	Qtv	Longitude	Latitude	Enterprise (m)	Enterprise (m) tal Function		Name	Phone
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

		2.Scale		3.coordinate		4 Distance from	5 Environmen	6 Service Area	7.Conta	act Method
1.Protecti	on Target	Туре	Qtv /Level	Longitude	Latitude	Enterprise (m)	tal Function	(For Intake)	Name	Phone
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

Appendix 3 Surrounding Environmental Protection Goals (more than 5 kilometers)

Appendix

Risk Classification Calculation

1. Average risk of sub-checklist,

$$ARC = \frac{\sum_{m} RC}{m}$$

m= number of detail points, ARC=average risk of sub-checklist RC= Score of corresponding detail points. For an example, there is a sub-checklist below;

score of all items after double check are shown in the following form:

Detail Points of Recommendations	Potential Risks	Risk Classification (RC)
1	1/5/10	5
2	1/5/10	1
3	1/5/10	10
4	1/5/10	1
5	1/5/10	5

Average Risk of Checklist (ARC)

The average risks of this sub-checklist is: ARC= (5+1+10+1+5)/5=4.4

2. After getting the average risk of sub-checklist, risks of all systems can be calculated.

$$ARP = \frac{\sum_{n} ARC}{n}$$

If one system contains 10 sub-checklists and the average risk of each sub-checklist are shown below, then:

System Sub-checklist

1	4.4
2	1
3	5
4	10
5	4.4
6	10
7	5
8	4
9	3
10	10

Average Risk of Checklist (ARC):

The average risk of this system is ARP= (4.4+1+5+10+4.4+10+5+4+3+10)/10=5.68

3. System Risk Value

$$RRP = \lg(10^{WRI} \times ARP) = \lg(EQ3 \times ARP)$$

RRP=System Risk Value;

WRI=Chemicals Risk Value calculated by chemicals section (See 2.2.4)

- ARP= System Average Risk calculated by caption 2
- EQ3= Sum of WGK3 in chemical section (see 2.2.3)
- 4. Risk Classification
 - RRP≤2 Low Risk 2<RRP≤4 Medium Risk RRP>4 High Risk