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Environment Management Plan of
Liaoyuan City Food Quality and Safety Testing Center Construction
Project

Jilin Research Academy of Environmental Science

July 5th, 2009

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1 The background and purpose of establishing Environment Management Plan (EMP)

1.1 Project background

Jilin Province Agricultural Produce Quality and Safety Project of the World Bank loan (hereafter referred to as “Jilin Province World Bank project”), plans to use “Good Agricultural Practices” (GAP), “Good Manufacturing Practices” (GMP) and “Hazard Analysis Critical Control Point” (HACCP) and so on advanced safety control technology to produce and process agricultural produce, increase the coverage area of standardized demo zone (base) in order to make the agricultural produce production in our province gradually enter standardized track.

Around agricultural produce quality and safety control system, this project conducts study design on whole-process demo promotion, whole-process quality supervision and administration, quality tracing, publicity and training and agricultural produce quality and safety etc. related problems, including five sub projects, that is, promotion of agricultural produce quality and safety good agricultural practices, public monitoring of agricultural produce quality and safety, practical study, training and publicity on agricultural produce quality and safety, safe agricultural produce production chain demo mode (transferred loan project) and project management. This project is Liaoyuan City food quality and safety testing center construction project of the second sub project public monitoring of agricultural produce quality and safety project.

The project site is located in Xianqing Alley, Xi’ an District, Liaoyuan City, Jilin Province, and it is planned to build four inspection center lab buildings in the original number 15 middle school of Liaoyuan City. The covered area is about 23,535 m², and total construction area is about 9,450 m². The lab building will be three floors, with construction area of 4120m²; sample receiving integrated building of one floor, with construction area of 4210m²;

pesticide analysis building will be one floor, with construction area of 340m²; auxiliary lab building will be one floor, with construction area of 780m². After completion, it will be used as the highest authoritative organization of food safety inspection of Liaoyuan City, and at the same time, it will provide follow-up training to all the inspection personnel of food inspection organizations and companies of the whole city.

1.2 The purpose of environment management plan (EMP)

The environment impact assessment of this project shows that the environment impact of this project is mainly produced in the implementation and run stage. This environment management plan will specifically state the environment relieving measures, environment management, environment supervising, and environment monitoring etc, and it will be a guiding document for implementing these activities. Its role is as follows:

(1) Provide guiding document on environment. After examination of the World Bank, this environment management plan will be provided to the implementation supervising unit, environment monitoring unit and other related units in the implementation stage and run stage of the project as an environmental protection document.

(2) Clarify the responsibilities and roles of related units. Clarify the responsibilities and roles of related functional departments and management departments, and put forward the communication channel and manner between each department.

(3) Put forward environment monitoring plan in implementation stage and run stage.

1.3 Compilation foundation and implementation standard

1.3.1 Compilation foundation

1.3.1.1 Related laws and regulations of China on environmental protection

- (1) “Environment Protection Law of the People’s Republic of China”, 1989.12.26;
- (2) “Law of the People’s Republic of China on Air Pollution Prevention and Control”, 2000.4.29;
- (3) “Law of the People’s Republic of China on Water Pollution Prevention and Control”, 2008.2.28;
- (4) “Implementing Rules of Water Pollution Prevention and Control of the People’s Republic of China”, Decree of the State Council No.284;
- (5) “Law of the People’s Republic of China on Prevention and Control of Pollution of the Environment by Solid Wastes”, 2005.4;
- (6) “Environment Noise Prevention and Control Law of the People’s Republic of China”, 1997.3.1;
- (7) “Law on Promoting Cleaner Production of the People’s Republic of China”, 2003.1.1;
- (8) “Law of the People’s Republic of China on Environmental Impact Assessment(EIA)”, 2002.10.28;
- (9) “Energy Conservation Law of the People’s Republic of China”, 1998.1.1;
- (10) “Law on Promoting Cleaner Production of the People’s Republic of China” (2002) ;
- (11) “Regulations on Environmental Protection Management for Construction Projects”, Decree of the State Council [1998] No.253; 1998.11.29;
- (12) “List of Construction Projects Subject to Environmental Protection Supervision”, State Environmental Protection Administration, issued on 2003.1.1;

(13) “Several Opinions on Environment management Issues of Construction Projects”, the State Environmental Protection Administration, 1988.3.21;

(14) “Notice of the State Council on Strengthening City Water Supply and Conservation and Water Pollution Prevention Work”, 2000, number 36 document;

(15) “Notice on Strengthening Environmental Impact Assessment Management Work of International Financial Organization Loan Construction Project” (HJ[1993] number 324 document) ;

(16) State Environmental Protection Administration “Interim Measures on Public Participation in Environmental Impact Assessment” (year 2006) ;

(17) GJMZY [2000]number 1015 “Opinions on Strengthening Industrial Water Conservation Work” (year 2000) ;

(18) “Code for design of scientific experiment buildings” (JGJ91-93) ;

(19) “Universal principles on biological safety of microorganism and biosecure laboratory ” (WS 233-2002) ;

(20) “Technical regulations of biosecure laboratory buildings” (GB-50346-2004)

1.3.2 Requirements of the World Bank

Requirements of the World Bank mainly include ten safety insurance policies, that is, business policy, World Bank procedure, business principles, etc., the details are as follows:

(1) Environmental assessment (OP/BP/GP4.01)

(2) Forestry (OP /GP4.36)

(3) Natural habitat (OP/BP4.04)

- (4) Dam safety (OP/BP4.37)
- (5) Pesticide management (OP4.09)
- (6) Involuntary resettlement (OP4.30)
- (7) Minorities (OP4.20)
- (8) Cultural relic (OP4.11)
- (9) Project in controversial area (OP/BP/GP7.60)
- (10) International waterway project (OP/BP/GP7.50)

1.3.3 Technical regulations and guide rules

- (1) “Environmental Impact Assessment Technical Guide Rules·General Principle” (HJ/T2.1-93) ;
- (2) “Environmental Impact Assessment Technical Guide Rules·Air Environment” (HJ/T2.2-93) ;
- (3) “Environmental Impact Assessment Technical Guide Rules·Surface Water Environment” (HJ/T2.3-93) ;
- (4) “Environmental Impact Assessment Technical Guide Rules·Noise Environment” (HJ/T2.4-1995) ;
- (5) “Environmental Impact Assessment Technical Guide Rules·Non-pollution ecological impact” (HJ/T19-1997) ;
- (6) “Environment Risk Assessment Technical Guide Rule of Construction Projects” (HJ/T169-2004) ;
- (7) “Standard of Surface Water Functional Area of Jilin Province” DB22/388—2004;
- (8) “Technical Method for Formulating Local Air Pollutant Discharge Standard” (GB/T13201-91) .

1.3.4 Implementing standard

According to environment function area division of Changchun City, this project implements the following standards.

1.3.4.1 Environment quality standard

(1) Ambient air

The ambient air in the assessment area implements grade two standard in “Ambient Air Quality Standard” (GB3095-1996), and the details are shown in table 1.3-1.

Serial number	Pollutant	Implemented standard	Daily average	Hourly average	Assessment object
1	SO ₂	“Ambient Air Quality Standard” GB3095-1996 grade two	0.15	0.5	Ambient air in the project area
2	TSP		0.3		
3	PM ₁₀		0.15		
4	NO ₂		0.12	0.24	

(2) Surface water

The discharged waste water in this project enters waste water processing factory in the north suburb of Changchun city, and is finally discharged into Yitong River. According to “Jilin Province Surface Water Functional Area” (DB22/388-2004), Changchun upstream of Yitong River city- around highway bridge to Sihua section water quality assessment implements type III standard in GB3838-2002 “Standard of Surface Water Environment Quality”; Sihua Bridge to Wanjin Tower highway section implements V type standard. The details are in table 1.3-2.

Evaluate factors	Unit	Type III	Type V
pH	-	6-9	GB3838-2002, *

COD _{Cr}	mg/L	≤20	Refer to “Songhua River Water System Environment Quality Standard”
BOD ₅	mg/L	≤4	
NH ₃	mg/L	≤1.0	
SS*	mg/L	<25*	
石油类	mg/L	≤0.05	

(3) Sound environment

The Sound environment quality in the project area implements GB3096-2008 “Sound environment Quality Standard” type II standard. The specific information is in table 1.3-3.

Table 1.3-3 Sound Environment Quality Standard

Evaluate factors	Unit	Period of time	Standard limit	Standard source
Equivalent noise level	dB (A)	Day time	60	Factory area that will be constructed GB3096-2008“type II”
		Night time	50	

1.3.4.2 Pollutant discharge control standard

(1) Air pollutant

The waste air pollutant discharge standard of lab implements the grade two standard in “Integrated Discharge Standard of Air Pollutant” (GB16297-1996) ; The specific information is shown in table 1.3-4 to table 1.3-6.

Table 1.3-4 Air Pollutant Integrated Discharge Standard (GB16297-1996)

Pollutant	Highest allowed discharge density mg/m ³	Highest allowed discharge rate kg/h		Highest allowed discharge rate kg/h	
		Height of exhaust funnel m	Height of exhaust funnel m	Monitoring point	Density mg/m ³
Particulate matter	120	15	3.5	Highest density point in the surroundings	Not visible to the naked eyes
		20	5.9		
Sulfuric acid mist	45	15	1.5	Highest density point in the surroundings	1.2
		20	2.6		
Mercury and its compound	0.7	15	0.0015	Highest density point in the surroundings	0.0012
		20	0.0026		
Phenols	100	15	0.10	Highest density point in the surroundings	0.080
		20	0.17		

Table 1.3-5 Boiler Gas Air Pollutant Discharge Standard (GB13271-2001)

Type of boiler		Applicable area	Fume discharge density (mg/Nm ³)	SO ₂ discharge density (mg/Nm ³)	Fume blackness (Ringelmann blackness, grade)
			II time period	II time period	
Coal-burning boiler	Natural draft furnace	Type two and three area	120	900	1
	Others	Type two area	200		

Table 1.3-6 GB13271-2001“Boiler Fume Air Pollutant Discharge Standard” (lowest allowed height of coal-burning boiler room chimney)

Total installed capacity of boiler room	MW	<0.7	0.7-<1.4	1.4-<2.8	2.8-<7	7-<14	14-<28
	t/h	<1	1-<2	2-<4	4-<10	10-<20	20-<40

Lowest allowed height of chimney	m	20	25	30	35	40	45
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(2) Water pollutant discharge standard

The waste water in this project will be discharged into city network of drains, and after being processed by Liaoyuan Waste Water Processing Factory, it will finally run into Dongliao River. The common pollutant discharge density of life sewage and waste water discharged from lab implement the grade three standard of GB8978-1996 “Integrated Discharge Standard of Waste Water” ; heavy metal discharge density implements the highest allowed discharge standard type I pollutant in GB8978-1996 “Integrated Discharge Standard of Waste Water” . The details are shown in table 1.3-7.

Table 1.3-7 Discharge Standard of Water Pollutant

Type of pollution source	Pollution factor	Unit	Control standard	Source of standard
			Grade three	
Waste water	pH	-	6~9	GB8978-1996 “Integrated Discharge Standard of Waste Water” grade three standard
	COD	mg/L	500	
	BOD ₅	mg/L	300	
	SS	mg/L	400	
	Ammonia nitrogen	mg/L	-	
	Phenylamine	mg/L	5.0	
	Animal and vegetable butter	mg/L	100	
	Nitrobenzene	mg/L	5.0	

Anionic surfaceactive agent (LAS)	mg/L	20	Highest allowed discharge standard type I pollutant in GB8978-1996 “Integrated Discharge Standard of Waste Water”
Organophosphorus pesticide (calculated according to P)	mg/L	0.5	
Total mercury	mg/L	0.05	
Total arsenic	mg/L	0.5	
Total lead	mg/L	1.0	
Total chromium	mg/L	1.5	

(3) Noise discharge standard in factory environment

In the run period, the factory noise implements type II standard in GB12348-2008 “Noise Discharge Standard in Factory Environment of Industrial Companies”, and the construction factory noise implements (DB22/272-2001) “Noise Limit of Construction Site”. The details are shown in table 1.3-8.

Table 1.3-8 Noise Discharge Standard

Pollution source type	Pollution factor	Day and night limit dB (A)	Night limit dB (A)	Related regulations	Source of standard
Building construction (factory)	Equivalent noise level	75	55	Earthwork stage	DB22/272-2001 ”Construction factory noise standard”
		70	55	Structural stage	
		65	55	Fitment stage	
Run stage (factory)	Equivalent noise level	60	50		Type II standard in GB12348-2008 “Noise Discharge Standard in Factory Environment of Industrial Companies

1.3.5 Classification foundation of labs

According to “Microorganism and Biological and Medical Lab Biological Safety Universal Principle of Hygiene Industrial Standard (WS 233-2002) of the People’ s Republic of China”, the classification of labs is as follows in table 1.3-9.

Table 1.3-9

The classification foundation of labs

CLASSIFICATION	CODE	FOUNDATION
Grade one biological safety protection lab	BSL—1	Lab structure and facilities, safety operation regulations, safety facilities applicable to microorganism without pathogenic effect to healthy adults, for example, ordinary microorganism lab used for teaching, etc.
Grade two biological safety protection lab	BSL—2	Lab structure and facilities, safety operation regulations, safety facilities applicable to microorganism with moderate potential harm to people and the environment.
Grade three biological safety protection lab	BSL—3	Lab structure and facilities, safety operation regulations, safety facilities applicable to pathogenic microorganism and its toxin that make people infect serious even pathogenic disease through respiratory pathways, generally with vaccine that can prevent infection. Study on AIDS virus (except serology experiment) should be conducted in grade three biological safety protection lab.
Grade four biological safety protection lab	BSL—4	Lab structure and facilities, safety operation regulations, safety facilities applicable to pathogenic microorganism and its toxin that has high danger to people, communicated through aerosol, or don't have clear communication path. At present, there is still not effective vaccine or treatment method against it. The unclear microorganism similar with the above condition should also be conducted in grade four biological safety protection lab. When there is enough evidence, decide this kind of microorganism should be treated in grade four or lower level grade lab.

According to project analysis, the physics and chemistry lab in this project belongs to ordinary lab, and ordinary

microorganism lab belongs to BSL1 grade one biological safety protection lab, mildew/pathogenic bacteria lab belongs to BSL2 grade two biosecure laboratory . We should carry on design according to the requirement of biosecure laboratory design requirement in “Technical regulations of biosecure laboratory buildings” GB50346–2004.

1.3.6 Technical Indexes of Biosecure Laboratory

The technical indexes of biosecure laboratory are shown in table 1.3-10.

Table 1.3-10

Major technical indexes of secondary barrier of biosecure laboratory

Name	Grade of purification	Minimal air changes (time/h)	Minimal negative differential pressure with nearby room of outdoor direction (Pa)	Temperature°C	Relative humidity (%)	Noise dB(A)	Minimum illumination lx
Grade one	-	Can open door and window	-	18-28	≤70	≤60	300
Grade two	-	Can open	-	18-27	30-70	≤60	300

		door and window					
Grade three	7 or 8	15 or 12	-10	18-25	30-60	≤60	300
Grade four	7 or 8	15 or 12	-10	18-24	30-60	≤60	300

Notes: the noise in this table does not include biosecure cabinet, noise of animal insulation, and if include the above noise, then the noise should not exceed 68 dB(A); the parameters of animal biosecure lab should conform to related requirements in “Experiment animal environment and facilities” GB14925.

2 Major environmental impact and relieving measures

2.1 Analysis of environmental impact assessment

2.1.1 Analysis of environmental impact in the construction period

(1) Analysis of environment air impact

1) Dust during construction

Dust during construction mainly comes from the following aspects: ① demolishing house, land excavation, land leveling etc. construction process, when in windy weather, it will cause powder and dust etc. air pollution; ② transport, loading and unloading of cement, stone, and concrete etc. , improper warehouse storage method, which can cause leakage and produce dust pollution; ③ lime soil mixture and concrete mixing and processing will produce dust and powder; ④ material transporting vehicle will produce large amount of dust in run process.

The occurrence of dust in construction is closely linked with powder moisture content, dust grain, wind direction, wind speed, air

humidity and garbage piling time. According to actual measurement result of analogous files, under the condition of strong wind unfavorable weather, the dust of new project construction will exceed grade two national standard within the 100 m range, which caused unfavorable impact on air quality of the nearby surrounding area. Therefore, we request to equip related spraying facilities in project construction process, spray water at regular time, reduce the amount of dust; at the same time, cover the raw material piling site in order to avoid dust.

Besides, in the transporting process of stone, cement etc. powder materials and construction garbage, dust pollution will also occur, and the transporting dust shows lineal pollution belt distribution, and the impact range is relatively broad. Thus the construction unit should use shed covering in the transporting process of powder materials, reduce speed of transporting vehicles, and maximally reduce the pollution to the surrounding air quality in transporting process.

2) End gas of construction machinery

The construction machinery in construction stage includes bulldozer, loading machine, blender, and automobiles etc. The end gas of construction machinery will also cause certain pollution, and the harmful substances in the discharged waste gas are CO₂, CO, NO_x, and HC etc. The end gas discharge height of construction machinery is relatively low, and the diffusion range of end gas is relatively small, which causes certain impact on the nearby air environment. But with the ending of construction period, these impacts will disappear accordingly.

(2) Analysis of surface water environment impact

The discharged waste water in construction period is mainly construction waste water and daily life waste water of construction personnel. The construction waste water mainly comes from cleaning tools and mixing materials and water, and discharge amount is little. The pollutant in construction waste water is mainly mud, and stone etc. suspended matter. They should be precipitated in the sedimentation tank of the construction site, and the clarified water should be used for spraying

and dust decreasing in the construction site, and the remaining part will be discharged in the municipal network of drains.

The project chooses local construction team, and no construction camp is set; in construction stage, dry pail latrine should be built, and excrement can be collected and transported outside.

Due to the waste water amount in construction period is not big, and its impact on surface water body belongs to short-term impact, and after ending of construction, it will terminate, and will not cause big impact on surface water body.

(3) Construction noise

During construction of the project, the transporting vehicle, bulldozer, digger, concrete mixer, vibrator, electric saw will cause relatively strong noise. Although these noises belongs to non-continuous intermittent discharge, due to relatively concentrated noise source, and most of which is exposed noise source, the noise radiation range and impact range are all very big, and construction period will produce certain impact on the surrounding sound environment. According to forecast, in the range within 30m to the construction site, it exceeds 65dB in the day time, and within 55m range, it exceeds 55dB in the night time. According to on-the-spot investigation, in the eastern side and south side of the factory it is farmland, and beyond 50m of northern side and western side, there is residential area, and construction noise will basically not produce impact on it.

(4) Solid wastes

Project construction will produce certain construction garbage and the life of construction personnel will also produce certain life garbage. In the transporting and treatment, they will produce certain impact on the environment. According to estimate, because it is only repairing and flattening the soil, and can balance it when fetching and throwing soil, which will not produce large amount of thrown earth and stones, and the produced thrown earth and construction garbage is about 100m³. If pile it randomly, it will form water loss and soil erosion. The project area is on city center, and water loss and soil erosion will bring inconvenience to local walkers, and dust will be

produced in windy weather. The transport of waste slag needs large amount of vehicles, and if carried on in day time, it will influence local transport, and make transport become congested. If there are too many loading vehicles, it will cause dirt spill on the way; wheels stuck with dirt make the road filled with dust; in sunny day, dust is stirred, and in rainy day, road surface is muddy, which influences the environment quality of walkers and drive of vehicles.

If life garbage is not treated in time, it will breed mosquito and fly, and produce stink, bringing bad impact on the surrounding environment.

In order to avoid impact of solid wastes on the environment, the construction garbage produced in construction period should be cleaned timely, and transported to be piled at the place designated by municipal department or be used as road building materials; the construction site should set specialized life garbage box, and collect life garbage in a unified manner, and transport it to city waste landfill regularly in order to avoid random throwing.

Through proper treatment, the unfavorable impact of solid wastes on external environment will be eliminated.

(5) Social environment

The social environment impact of project construction period is mainly impact on city transport and noise interruption and transport inconvenience to the life of surrounding residents.

2.1.2 Environmental impact analysis in run period

(1) Waste gas

The major waste gas discharged in this project is waste gas produced in experiment and fume produced in heat supply boiler in winter.

1) Waste gas in lab

The major waste gas discharged in this project is little amount of acid smog, NO₂ and little amount of waste gas and

mercury-containing waste gas in organic solvent; the waste gas discharged in biosecure of BSL-2 lab (be used for virus and bacteria cultivation), and the waste gas discharged in the air discharging system of labs may contain living virus; high temperature waste gas discharged in the transporting process of high pressure sterilizer etc.

According to preliminary statistics, we plan to carry on blast and air discharging design according to design requirement of BSL1 and BSL2 grade two biosecure lab in “Industrial Standard (WS 233-2002) of People’s Republic of China on Biosecure Universal Principle of Microorganism and Bio-medical Lab”, JGJ91-93 “Design regulations of scientific lab buildings”, GB50346-2004 “Technical regulations of biosecure lab buildings” and GB 19489—2004 “Universal requirement on lab bio-security”. The specific control measures we plan to adopt are shown in section 2.2.3.1.

Adopt measures by strictly conforming to national regulations, the waste gas in lab will not cause big impact on the surrounding environment under normal condition.

2) Boiler fume

According to current situation investigation, in the project area, there is not heat supply, and a 4t/h boiler room should be temporarily built. After the centralized heat supply network covers the area, remove the boiler, and adopt centralized heat supply.

The heat supply area of lab in winter and pollutants discharge condition is shown in table 2.1-1.

Table 2.1-1 Statistics table of boiler fume discharge density and discharge amount

Emission source	Heat supply area	Tonnage t/h	Coal consumption amount	Pollutant					Dust prevention measure
				Name	Production amount (t/a)	Produce density (mg/m ³)	Discharge amount (t/a)	Discharge density (mg/m ³)	
City Quality and Inspection Center	9450	4	590	SO ₂	6.6	551.6	3.3	275.8	High efficient wet method desulfurization dust catcher
				Fume and dust	42	1866	2.1	177.3	

This assessment suggests boiler fume be treated by high efficient wet method desulfurization dust catcher, and dust discharge amount can reach type II standard in II time period of “Discharge standard of boiler air pollutants” (GB13271-2001), and the impact on surrounding environment is relatively small.

(2) Waste water

After project construction, the total water consumption amount is 43.5m³/d, and total discharge amount of waste water is 43m³/d, among it, discharge amount of lab and testing waste water is 41m³/d, and life sewage discharge amount is 2m³/d. The discharge density of all kinds of pollutants in life sewage is COD250mg/L, BOD200mg/L, SS200mg/L, and water quality can meet the grade three standard in GB8978-1996 “Integrated Discharge Standard of Waste Water”, which can be directly discharged into city network of drains.

The major pollutants in experiment waste water discharged in assay and inspection process are acid base, heavy metal and all kinds of chemical agent, and all kinds of additive etc. Although the discharge amount of waste water in labs is little, the composition is complicated.

Moreover, the waste water of BSL2 lab may contain pathogenic virus and pathogen, and we should carry on thorough sterilization to toxic waste water in lab, prevent virus and pathogen be discharged outside the lab, and through discharging waste water, it can enter underground water or surface water without diffusion communication, and ensure the extermination rate of virus and pathogen to exceed 100%.

Through analogous investigation, the discharge density of pollutants in experiment waste water is about COD600mg/L, BOD₅ 400mg/L, SS210mg/L, containing different degrees' heavy metal. If discharging it to surface water body without treatment, it will produce negative impact, and it should be discharged into city network of drains after reaching grade three standard in GB8978-1996 "Integrated Discharge Standard of Waste Water".

In lab project design process, we will diffluence the production waste water and life sewage, and discharge it to city network of drains after reaching standard . Under normal condition, its impact on water environment is small.

(3) Noise

The noise produced in this project mainly comes from the blast and air discharging machine, air-conditioner, vacuum pump, heat pump unit in the lab, and noise source intensity is about 75-90dB. In order to make noise in factory reach standard, when purchasing facilities, we try preferentially choose low noise facilities, and at the same time, install these facilities indoor, and install double-layer sound insulation window etc., which can maximally reduce the impact of noise. When installing high-noise facilities such as air blower, vacuum pump etc., adopt correspondent silencer and shock absorber, as well as acoustic hood. By adopting the above measures of source eliminating and reducing, and constructing enclosure structures, the noise will be reduced greatly, and the factory noise can reach type II standard requirement (day time <60dB(A), night time <50dB(A)).

Therefore, after this project construction, it will not produce big impact on the surrounding sound environment.

(4) Solid wastes

After project completion, the major solid wastes are food, vegetable, fruit, grain, livestock produce etc. testing samples, experiment devices and facilities (one-time), waste liquid produced in experiment, and life garbage etc.

① Waste food, livestock produce and aquatic produce samples

This part of solid wastes mainly include food after experiment (meat and meat product, cold food, drinks, wine, bean products, flour product, pastry, water quality and others), livestock produce, aquatic produce, and invested products etc. testing samples. The production amount is 7.3t/a, and can be sent to garbage processing factory for treatment after being collected by dust bin.

②Waste agricultural (livestock, fishery) pesticide, fertilizer etc. samples

According to the documents provided by the construction unit, the production amount of waste pesticide and fertilizer of the project construction unit is about 82 kg/a, belonging to dangerous wastes, and must be dispatched to the unit with dangerous waste treatment qualification for uniform treatment.

③Experiment facility and device (one-time), waste liquor produced in experiment etc.

Experiment drugs and reagent is generally purchased when needed, and there are basically no overdue and damaged samples. After project construction, the one-time experiment facility and device, consumables (test paper etc.) and damaged appliance (glass vessel) production amount is about 134.2kg/a. The production amount of waste liquor in experiment is about 63.9kg/a. All belong to dangerous wastes, and should be sent to Changchun Lantian Dangerous Wastes Processing Center Co., Ltd. for uniform treatment.

④Waste filter material or active carbon replaced in high efficient air filter

In order to ensure the filtering effect of high efficient air filter, generally the waste filter material or waste active carbon board of filter

should be replaced for every six months, and the production amount of them is about 1.0t/a. The replaced waste filter material or waste active carbon board will be sent to the original production unit or to Changchun Lantian Dangerous Wastes Processing Center Co., Ltd. for burning treatment.

⑤Dirt produced in waste water treatment

The dirt production amount of the waste water treatment station is about 1.02t/a, and the produced dirt contains heavy metal dangerous wastes, and should be properly stored, and sent to Changchun Lantian Dangerous Wastes Processing Center Co., Ltd. for treatment.

⑥Life garbage

Calculated according to 0.5kg/d per capita, the daily production amount of life garbage is 6.25t/d, and 6.25t/a, and the environment and health department will send them to city garbage factory for treatment.

According to “List of dangerous wastes of China” (2008), the solid wastes in this produce contains general solid wastes and dangerous wastes, and if treated improperly, they will produce harmful impact on the surrounding environment, and we should adopt different treatment method according to different natures, and general solid waste and dangerous waste should not be treated together. By treating them properly, we can effectively avoid secondary pollution caused by improper treatment of dangerous wastes.

2.2 Environmental protection measures

This project construction will implement “Management Measures on Environmental Protection of Construction Projects” of the State Council number 253 decree (1998) of the People’s Republic of China in order to ensure the simultaneous design, simultaneous implementation and simultaneous run of the environmental protection measures and main body project of this project.

2.2.1 Environment impact relieving measures in planning and design stage

According to project analysis, the physics and chemistry lab in this project belongs to ordinary lab, and ordinary microorganism lab belongs to BSL1 grade one biological safety protection lab, mildew/pathogenic bacteria lab belongs to BSL2 grade two biosecure laboratory. We should carry on design according to the design requirement of BSL1 and BSL2 grade two biosecure lab in “Industrial Standard (WS 233-2002) of People’s Republic of China on Biosecure Universal Principle of Microorganism and Bio-medical Lab”, JGJ91-93 “Design regulations of scientific lab buildings”, GB50346-2004 “Technical regulations of biosecure lab buildings” and GB 19489—2004 “Universal requirement on lab bio-security”.

In project selection and design stage, we will comprehensively analyze all kinds of impact factors, and consider maximally reducing the environment impact in project design. The environment impact relieving measures and specific implementation unit adopted in project design stage is shown in table 4.3-1.

2.2.2 Environmental impact relieving measures in construction stage

By using bidding method, select construction unit with certain strength. When the project unit signs construction contract with contractor, the environmental impact relieving measures in construction period will be listed into the construction contract, and the contractor promises to implement it. And the contractor and construction supervisor must accept training relating to environment protection and environment management before construction. The province and city project office must designate or invite environment experts to go to the construction site regularly to check the “implementation condition of construction environmental protection regulations”, and correct problems timely.

The environmental impact relieving measures in construction period is in table 2.2-1.

Table 2.2-1 Environmental impact relieving measures in construction period

Type	Environmental impact factor	Pollution prevention and control measures
Construction period	Environment air	<p>(1) Strengthen management, civilized construction, light loading and unloading of building material; try to remove the surface dirt on vehicles before leaving the construction site; the vehicles that transport lime, ballast truck, cement, and fly ash etc. dusts should be covered with tarpaulin.</p> <p>(2) Lime and sandy soil etc. should not be piled in open air, and if they have to be piled openly, we should spray them, enhance the surface moisture content, which can also play the role of preventing dust.</p> <p>(3) When removing wall, properly spray water to reduce dust.</p> <p>(4) The waste earth should be timely cleaned and transported to low-lying site designated by city management department for filling treatment, or be transported to garbage landfill. When loading, strictly prohibit overloading, and the earth loading vehicle cannot spill on the way. When going through the city center, the vehicle should drive according to the route and time period regulated by the municipal government.</p> <p>(5) The construction site area does not allow random burning wastes and garbage.</p> <p>(6) Do well labor protection of construction personnel, and match dust prevention respirator etc.</p>
	Water environment	<p>(1) The pollutants in construction waste water are mainly suspended matter, and we should use the clarified water for spraying and reducing dust after being precipitated in the sedimentation tank of the construction site, and the remaining part will be discharged to city network of drains.</p> <p>(2) The project chooses local construction team, and no construction camp is set; in construction stage, dry pail latrine should be built, and excrement can be collected and transported outside.</p>
	Sound environment	<p>(1) Reasonably arrange construction time.</p> <p>In order to reduce the impact of construction noise on the sound environment of the surrounding residential area, we should formulate scientific construction plan, and try to avoid simultaneous use of large amount of high noise facilities. The construction time of facilities with big noise, strong impact and strong vibration (such as churn drill etc.) should be at day time, and night construction (22:00 – 6:00 of the next day) should</p>

		<p>not be allowed.</p> <p>(2) Put forward requirement on the bidding unit, and the construction machinery and facilities should choose those with small noise.</p> <p>(3) Strengthen publicity training to construction workers and reduce man-made noise.</p>
	Solid waste	<p>(1) Construction garbage should be treated according to category, and the construction garbage with recycling value should be recycled by specific personnel in time, and the construction garbage and waste earth that cannot be recycled should be timely transported to designated site for piling or be used as road building material according to the requirement of the city government and planning department.</p> <p>(2) The life garbage produced in construction should be collected in life garbage recycling box, and the environment and health department will send them to Changchun City garbage treatment field for sanitary landfill in order to avoid random throwing.</p>

2.2.3 Environmental impact analysis in run period

2.2.3.1 Relieving measures of environment air impact

(1) Lab ventilation and air discharging system

1) Ordinary lab sets mechanic air discharging, at the same time, add additional air. Under normal condition, the lab maintains negative pressure compared with corridor and non-lab area. The airstream flows from low-danger area to high-danger area. Compared with corridor and lab, the administrative area in the lab building must maintain positive pressure.

The whole building must maintain positive pressure compared with the outside in order to prevent the penetration of unfiltered air and liquid.

2) Acid waste gas and small amount of organic solvent, air discharging in poisonous lab must be discharged to upper air through high efficient filter. For animal lab to discharge stink, it can be absorbed by active carbon before being discharged.

3) The air discharging of experiment part in the lab building mainly includes biological safety cabinet, fume hood and room air discharging, among them, the air discharging of BSL2 biosecure cabinet should adopt two-pass high efficient filter, and after filtering, discharge it in high speed to upper air. The high efficient filter in BSL-2 lab includes a set of high efficient filter, a set of active carbon filter, and at the front and end of each set of filter, there is interdiction valve and sterilization system in the filter, which supervise the air pressure difference between the two valves – that is, the effectiveness of filter, and once the pressure difference changes, the system automatically interdict air leakage, and warn workers to replace it. The worker should start the self-contained high pressure steam sterilization system in the filter before changing the filter core, and replace it after sterilization to ensure active poison not to leak.

4) For the lab that uses special chemical reagent or that has biological pollution, before connecting the air discharging system to the lab ventilation system, or before discharging into the air, carry on purification or filtering treatment.

5) All the bathrooms are equipped with exhaust fan, and discharge it to shaft, collect it to ceiling machine room and discharge it outside.

6) Equipment room, refrigerating station, boiler room, warehouse etc. rooms should be equipped with mechanic air discharging, and design ventilation time according to related regulations.

7) For the evacuation aisle of over 20 m in each building, set mechanic fume discharge, and in the internal aisle of fume discharge, set normally closed fume discharge outlet.

8) In the room that people often stay in or with many combustibles and area is over 300 square meters, set mechanic fume discharge.

(2) High pressure sterilizer: in order to keep the flexibility, set high pressure sterilizer area in each floor. The installation and use of

high pressure sterilizer needs practical and effective decision-making. Air quality has its own control requirement on cleanliness and pollution, and we should set the area of clean high pressure sterilizer (purify microorganism lab instrument) and non-clean high pressure sterilizer (remove dirt). When designing, design personnel should take this into consideration. The area of high pressure sterilizer should reserve enough space for the convenience of transporting equipments and sterilized materials. High pressure sterilizer does not set acoustical ceiling, but the ceiling should spray epoxy coating for the convenience of cleaning and avoiding pest residual. The area adopts whole-sealed treatment. Air discharging of the area should fully consider removing the produced heat, steam and foreign odor when using high pressure sterilizer. The upper sterilizer door of high pressure sterilizer should set tent type exhaust hood. The place of high pressure sterilizer is negative pressure area.

(3) Vacuum system: set correspondent filter (0.2 micron water filter or similar device) in order to protect the vacuum system to try to reduce the potential pollution on vacuum pump. And the filter should be set at the place near the lab. Some purified and filtered air-conditioning facilities should also be included in the design of vacuum system. Moreover, the design also fully considers the safety of building and people and the adaptability of system. The vacuum discharge system must discharge the air out of the construction, instead of letting it form recycling in air-conditioning room. We also need to set the sample collecting place for air discharging.

(4) Risk precaution measures

If the air purification system has accidents or the pollution area is under positive pressure, the alarm system will be started immediately. The experimenting work should be stopped immediately, and at the same time, emergent accident plan should be started immediately.

The lab should establish strict safety accountability system.

(5) Biosecure protection

For the area that can contact biologically harmful matters when working in the lab, we should consider adopting biosecure protection.

The biologically harmful matters refer to infectious reagent and microorganism etc. Generally speaking, high quality microorganism lab should be able to ensure to try to reduce the contact of workers with biologically harmful matters, and purchasing good construction design to carry on biosecure protection of pollutants are also essential.

2.2.3.2 Relieving measures of water environment impact

(1) Design principle of waste water treatment station

- 1) Carry on control to the whole-process of lab waste water production, treatment and discharge.
- 2) Practice diffluence of clear water and filthy water, and set independent pipe lines for life sewage and production waste water.
- 3) After treatment of septic tank, life sewage and be directly discharged.
- 4) BSL2 lab waste water may contain pathogenic virus and pathogen, , and poison-containing waste water can be collected at local place, and carry on high pressure sterilization before treatment. Prevent virus and pathogen be discharged outside the lab, and through discharging waste water, it can enter underground water or surface water without diffusion communication, and ensure the extermination rate of virus and pathogen to exceed 100%.

5) Design reliable and safe control system to realize technologically reliable and economically reasonable. According to actual condition, adopt self-control manner; at the same time, consider all kinds of contingency measures, and all kinds of automatic protection equipments under the condition of emergent accidents.

6) In order to ensure normal operation of the system, forbid malfunction repair of main facilities in sewage processing process. According to the uniqueness of waste water, waste water processing facilities should operate stably and repair amount should be reduced.

- 7) In order to ensure no leakage and air spill in facility operation process, the equipment itself should have good tightness.
- 8) The processing facilities have relatively big flexibility and adjusting space in operation in order to adapt to change.
- 9) Before entering waste water system, lab waste water should be pre-sterilized, and the contact time with pre-sterilization tank should not be less than 0.5h.
- 10) After being collected by rain strainer and roadside gully, the roof rainwater and surface rainwater is discharged into municipal rainwater network.

(2) Designed water amount and water quality of the waste water treatment station

The production amount of lab waste water in this project is about $41\text{m}^3/\text{d}$, and suggested design capacity of waste water design station is $45\text{m}^3/\text{d}$. Considering that the waste water treatment station can have malfunction accident, it is suggested build an accident storage tank, with the volume of 100m^3 to used for discharging waste water in storage accident.

(3) Experiment waste water treatment plan:

According to the requirement of discharged waste water quality, water amount and discharge requirement, combing the recommendation of the feasibility study plan, this environmental impact assessment carries on economic, technological and operation effect analysis and comparison to the following kinds of waste water treatment plans

Plan I: bio-chemical method (H/O)

Bio-chemical method is a widely adopted waste water bio-chemical treatment method, and it treats high density organic waste water. The covered area is small, running is stable, operation is convenient, and impact resistant ability is strong.

Its process flow is shown in table 2.3-1.

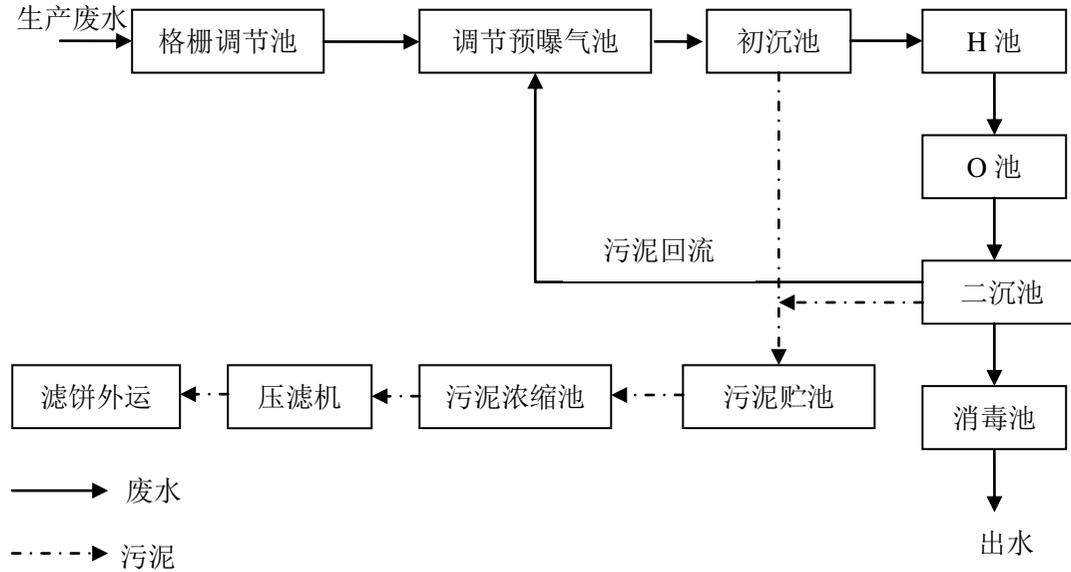


图 2.3-1 生化法污水处理流程图

生化法污水处理流程图 process flow of bio-chemical method waste water treatment

生产废水 waste water from production

格栅调节池 grating adjusting tank

调节预曝气池 preaeration adjusting tank

初沉池 initial sedimentation tank

H池 H tank

O池 O tank

二沉池 second sedimentation tank

污泥回流 dirt return flow

滤饼外运 filtering pile outbound logistics

压滤机 filter press

污泥浓缩池 dirt condensation tank

污泥贮池 dirt storage tank

消毒池 sterilization tank

出水 water out

废水 waste water

污泥 dirt

Plan II: whole-set small scale integration lab waste water treatment facilities

According to the situation of this project, we entrust producer to design, and directly purchase whole-set facilities to do treatment. At present, many waste water treatment factories produce “lab series waste water treatment machine”. This series waste water machine mainly adopts neutralization, coagulation and sedimentation, active carbon catalysis-ozon oxidation, chemical active carbon attachment etc. technologies, with features of small covered area, high automation degree, good treatment effect, and small operation expense etc. and can basically require no worker to watch. It has obtained the scientific technology fruit appraisal certification (YKJZ [2005] number 287) of

Guangdong Province Science and Technology Department, and through the inspection and certification of Guangzhou Geo-chemical Institute of the Chinese Academy of Sciences. The treatment can meet the requirement of related national discharge standard, and has gained good effect in the practical application of Guangzhou University, Guangzhou Medical College, Chongqing Environment Monitoring Center, Zhongshan Medicine Inspection Institute, Yuexiu Disease Control Center etc. units.

1) Process flow and principle

It may contain pathogenic virus and pathogen, and carry on sterilization and disinfection treatment to poisonous polluted water in lab, and then discharge it to waste water processing station.

Waste water first enters adjusting tank through collecting system, and through adjusting of water quality and water amount, and will be evenly and constantly sent to waste water processing machine reaction tank, and through pH control meter, accurately add certain amount of NaOH aqueous solution using metering pump, and adjust pH value between 8-9; at the same time, add coagulating agent PAC and coagulant aid PAM.

Under the alkali condition, the acid in waste water will be neutralized, and iron, cadmium, bronze, manganese, nickel, and lead etc. heavy metal ion happens chemical reaction with OH^- and form precipitation of hydroxide. At the same time, under the condensation and flocculation effect of PAC and PAM, the sediment in reaction mutually condenses, and the suspended grain and part of inorganic and organic matter in waste water is absorbed, and form massive floccus floc.

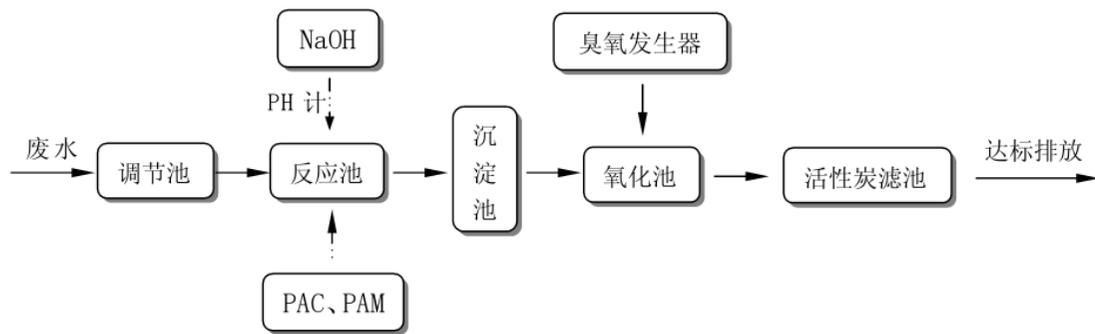
The waste water then flows to inclined sedimentation tank by itself, and depending on gravitation effect, these floccus floc sediments naturally, thus reaching the purpose of removing suspended matter, heavy metal ion and part of organic matter in waste water. The dirt in

dirt hopper will be cleaned regularly, sent to related department for burning, burying or other treatment.

The water-out of sedimentation tank then is sent to active carbon ozone oxidation tank through the pump, and due to the resistance effect of filling, waste water is evenly distributed, and slowly leaks up down. At the same time, with air as the raw material, the ozone made by the ozone reaction machine penetrates the active carbon filling through the emitting air system from the bottom of oxidation tank bottom up, or through Venturi Ejector it will be absorbed into water in the form of negative pressure. In the process of full contact of air and liquid, for the organic matter, bacteria, chroma and stink etc., one part runs through structure with big hole and will be removed through the absorption, retention, impaction, and rewinding etc. physical and chemical effect of active carbon; the other part will be removed by ozone with strong oxidation property, good sterilization and stink removing, color purification and removal, and organic matter disintegration etc. under the catalysis effect of active carbon.

The waste water finally enter active carbon biological filtering tank, and for the fine and small suspended matter, little amount of metal and organic matter that is not removed, one part runs through structure with big hole and will be removed through the physical and chemical effect of active carbon; the other part will be decomposed and removed by the anaerobe, aerobe and amphimicrobe etc. that is absorbed on microorganism film of active carbon. Retention and absorption of active carbon will be conducted interludely, alternately and in circulation with the decomposition and absorption process of microorganism. Till here, the waste water reaches standard and can be discharged.

The whole waste water treatment process is automatically controlled by PLC programming. The adjusting tank sets ball float type lever controller, and it will automatically stop at low liquid level, and automatically start at high liquid level; the dosing tank sets liquid indicator, and it will start alarm if there is lack of medicine, and will stop operation. The whole machine can basically require no people to watch.



Process flow chart of waste water treatment

废水 waste water

调节池 adjusting tank

PH 计 pH meter

反应池 reaction tank

沉淀池 sedimentation tank

臭氧发生器 ozone reaction device

氧化池 oxidation tank

活性炭滤池 active carbon filtering tank

达标排放 discharge after reaching standard

2) Features of product

★ Adopt neutralization, coagulation and sedimentation, chemical oxidation, film separation, active carbon catalysis – ozone oxidation

method, biological active carbon absorption etc. technology to treat all kinds of pollutants in waste water

★Micro computer program just-in-time monitors, and controls waste water quality change and treatment procedure, realizes whole-day automatic operation, and requires no worker to watch;

★Uses PH meter, ORP meter and imported measurement pump to accurately control dosage, set liquid level control, alarming system when lacking medicine, and automatic dirt discharge etc. devices;

★Adopt advanced Venturi jet oxygenator, and bring full contact of air and water and full reaction;

★Convenient operation, stable operation, long use life, low expense of operation and maintenance;

★Small covered area, can be placed indoor or outdoor according to different conditions;

★Carry on customized design and manufacture according to different requirement of users.

3) Applicable range

Be widely applicable to colleges and universities, scientific research organizations, and lab waste water integrated treatment of chemical labs.

4) Major technical parameters

Table 2.2-2 Table of major technical parameters

Patent number: 200710027913.2 ZL200720051202.4

Item		Technical parameters
Processed flow amount (m ³ /d)		45
Removing rate (%)	Heavy metal (total lead, total manganese, total zinc, total mercury, and total arsenic etc.)	≥96
	Chemical oxygen demand	≥93
	Chloroform	≥93
	Toluene	≥93
	Phenol	≥93
	Organophosphorus pesticide	≥90
Efficiency of disinfection (%)		≥91
Fecal coliforms (mpn/L)		≤220
Total bacteria (cfu/L)		≤7500
Noise (dB)		≤65
Price (including drainage network laying)		1,000,000 Yuan

According to plan comparison, this assessment thinks that lab waste water discharge is interlude discharging, and due to different monitoring contents, the quality of discharged waste water is also different, which is not suitable to adopt bio-chemical (plan I) treatment. Under the same waste water amount and water quality, the treatment effect of plan II is stable, with good impact resistant ability, widely application, and is specialized lab waste water treatment whole-set facilities, therefore we recommend adopting plan II.

2.2.3.3 Relieving measures of sound environment impact

This project mainly adopts the following measures for noise prevention and control:

- (1) Adopt low noise facilities in design.
- (2) Independently set sound insulation room for the air blower and water pump etc. facilities with relatively big noise, install sound insulation door etc.
- (3) Adopt vibration reducing processing to basic facilities.

After treatment, noise can reach type two standard in GB12348-2008 “Noise Standard of Industrial Companies Factory”

2.2.3.4 Relieving measures of solid wastes environment impact

The solid wastes produced in this project are generally divided into general solid waste and dangerous waste two kinds.

The lab solid wastes include agricultural produce after experiment, mainly vegetables, fruits, grain, livestock produce etc. testing sample, and they can be collected into dust bin and sent to garbage processing factory for treatment.

The solid wastes produced in this project are generally divided into solid waste and dangerous waste two kinds, and should be treated according to category.

(1) Treatment of general solid waste:

The waste food (meat and meat product, cold food, drinks, wine, bean product, flour product, pastry, water quality and others), livestock produce, aquatic produce, invested products etc. testing samples, and life garbage etc. general solid wastes can be centrally collected and then sent by environment and health department to city garbage treatment factory for sanitary landfill.

Boiler slag will be sent to building material factory for making bricks.

(2) Treatment of dangerous waste

1) Waste agricultural (livestock, fishery) pesticide, fertilizer sample belongs to dangerous and after uniform recycling, they will be sent to the original production unit for uniform treatment;

2) Experiment facilities (one-time), culture solution, overdue experiment medicine or reagent, dirt containing heavy metal

produced in waste water treatment station, waste active carbon, animal excrement and feed waste residual etc. dangerous waste should be collected according to category, and sent to Changchun Lantian Dangerous Waste Treatment Center Co., Ltd. for treatment.

The transporting process should strictly conform to “dangerous wastes transfer, double draft management method”.

The treatment methods of different solid wastes are in table 2.2-4.

Table 2.2-3

Production amount of solid wastes and treatment plan

	Name of solid waste	Waste type	Industry source and waste code	Packaging and storage method	Treatment plan
1	Waste food, livestock produce, aquatic produce, invested products etc. testing sample	General solid waste		Original package	Be sent to original unit or environment and health department recycle it and sent it to city garbage landfill for sanitary land filling
2	Waste agricultural (livestock, fishery) pesticide, fertilizer sample			Original package, seal up	Be sent to original unit
3	One-time experiment facilities, consumables and damaged devices			Sealed container	
4	Waste liquid, waste culture solution produced in experiment	HW49 dangerous waste	Non-specific industry 900-047-49 wastes produced in chemical and biological lab	Contained in 10kg glass bottle, be sent for every half year of one year	According to "List of Dangerous Wastes of China" (year 2008), the wastes produced in lab belong to dangerous waste, and after being sealed and packed, send it to Changhacun Lantian Dangerous Waste Treatment Center Co., Ltd. for burning treatment
5	Waste filter material and active carbon replaced in high efficient filter			Replace filtering board for every 3-6 months	
6	Dirt in waste water treatment station			After being filtered and sterilized, transport it through	

				sealed tank car	
7	Life garbage	General solid waste		Stored at the designated dust bin	Environment and health department recycle it and sent it to city garbage landfill for sanitary land filling
8	Boiler slag	General solid waste		Centralized piling	Sent to building material factory to make bricks

Lantian Dangerous Waste Treatment Center Co., Ltd. is located in Weizigou Village, Yingjun Township, Erdao District, Changchun City, and is the first company in Jilin Province that specializes in dangerous waste treatment and integrated use, constructed according to related national standard and approved by Jilin Province Development and Reform Commission and Jilin Province Environmental Protection Department. It mainly engaged in collecting, transporting, storage, treatment and comprehensive utilization etc. of industrial solid wastes (including dangerous waste, chemical/industrial wastes/waste dangerous chemicals/ fake and inferior food and medicine fixed treatment and destroying company designated by the government), and annually it can process dangerous wastes of 6,000 tons. It has obtained dangerous waste operation qualification conferred by Jilin Province Environmental Protection Department. The construction unit has already signed dangerous waste treatment agreement with Lantian Dangerous Waste Treatment Center Co., Ltd., and the company is commissioned to treatment the dangerous wastes discharged in this project.

2.2.4 Risk prevention measures and contingency plan

According to “Preliminary Design of Liaoyuan City Food Quality and Safety Inspection Center Lab”, pathogenic virus testing lab, high pressure sterilization room, mildew laboratory, incubator placing room, acute toxicity lab, long-term toxicity lab, etc. labs can become

source of environment risk.

(1) Analysis of environment risk impact

Under normal condition, the lab will not produce harmful impact, but during project run stage, it may become potential pollution source and communication source of virus, endangering the surrounding environment and public safety. The biosecure lab has certain risk during run stage.

The risk factors of biosecure lab are generally divided into three kinds: safety accidents due to man-made factor, damage due to natural factor and environment risk accident.

Safety accident is the pathogenic microorganism explosion or leakage due to violation of operation regulations in work, which causes infection of workers, thus causing pollution.

The natural factor has unpredictability and overpoweringness, such as earthquake and flood etc.

The environment risk accident includes abnormal operation of facilities, water cut-off or power off, quality problem of fire disaster or pipeline, and leakage due to stealing etc., as well as pathogenic microorganism leakage.

(2) Prevention and control measures of environment risk

Safety is the direct goal for repairing lab, and all the design unfavorable to safety should be forbidden, and all the parameter design that has conflict with biological safety should be subjected to the requirement of safety. For example: purification should be subjected to safety, convenience of use should be subjected to safety, and individualized service should be subjected to safety. The lab design should be carried on by strictly according to “Design Requirement of Biosecure Lab”.

1) Design requirement of biosecure lab

① Biosecure protection

For the area that can contact biologically harmful matters when working in the lab, we should consider adopting biosecure protection.

The biologically harmful matters refer to infectious reagent and microorganism etc. Generally speaking, high quality microorganism lab should be able to ensure to try to reduce the contact of workers with biologically harmful matters, and purchasing good construction design to carry on biosecure protection of pollutants are also essential.

This part provides engineers and design and construction contractor with some design parameters on biosecure protection of lab buildings.

Biosecure lab experiment of the Ministry of Health puts forward biosecure protection requirement for all levels of labs. According to the processed microorganism and the harm degree of toxin, biosecure protection lab divides them into four grades, and their requirements are: grade one is lowest, and grade four is the highest. The structure facilities of each grade of lab and safety operation requirement requests workers to limit the harm to people and environment to the lowest level. The grade division is as follows:

② Grade one biosecure protection

The grade one biosecure protection is the lowest requirement on biosecure protection. Each lab should set washing tank.

③ Grade two biosecure protection

◎ Pollution control: pollution control requirement of biosecure grade two lab is applicable to other labs. In order to try to ensure the flexibility of each lab room, the ordinary lab should at least reach the pollution control requirement of grade two lab. The lab should be equipped with facilities and equipments for sterilization of air and surface of articles.

◎Direct airstream: all labs should ensure one-way airstream. The direction of airstream is: clean area → potential pollution area → low-danger area → high-danger area. Blast sprayer should be set at the direct airstream place far away from fume exhaust hood and biosecure cabinet in order to reduce interruptive airstream.

◎Ceiling: biosecure grade two lab requires the surface to be smooth and easy to clean in the aspect of cleanliness and decontamination. We suggest adopting easy-to-clean ceramic tile (the surface plated with smooth mylar) to be used as the ceiling material of labs. If the pipeline is little, ceiling surface is smooth and easy to clean, it can also not used as ceiling. When finally determining standard of ceiling material for newly constructed or renovated project, the engineers should also consider the safety protection of people.

◎Floor slab: considering biosecure grade two lab may appear spills of biological reagent, and the material of floor slab must adopt resistible form that is convenient for decontamination of liquid disinfectant in order to try to avoid damage caused by reagent spill.

◎Lab furniture: biosecure grade two lab should adopt furniture that conforms to working requirement, and the materials must be easy to clean and can be sterilized.

◎Caulking, fender, and arch part: when there is reagent spill, the seam between cabinet and floor slab and wall surface is hard to clean. Therefore, the seam treatment of these parts needs to adopt smooth and easy-to-clean materials.

In construction design, treat these seam part in order to effectively control toxic harm.

◎Purification requirement: refer to related requirement and standard of Jilin Province. Different labs select disinfectants of different standards and types. Workers must adopt disinfectant differently when treating different spilled reagents. The interior decoration of lab must adopt wear-resistant materials that are resistant to disinfectant and other chemical reagents.

©High pressure sterilizer: in order to keep the flexibility, set high pressure sterilizer area in each floor. The installation and use of high pressure sterilizer needs practical and effective decision-making. Air quality has its own control requirement on cleanliness and pollution, and we should set the area of clean high pressure sterilizer (purify microorganism lab instrument) and non-clean high pressure sterilizer (remove dirt). When designing, design personnel should take this into consideration. The area of high pressure sterilizer should reserve enough space for the convenience of transporting equipments and sterilized materials. High pressure sterilizer does not set acoustical ceiling, but the ceiling should spray epoxy coating for the convenience of cleaning and avoiding pest residual. The area adopts whole-sealed treatment. Air discharging of the area should fully consider removing the produced heat, steam and foreign odor when using high pressure sterilizer. The upper sterilizer door of high pressure sterilizer should set tent type exhaust hood. The place of high pressure sterilizer is negative pressure area.

©Vacuum system: set correspondent filter (0.2 micron water filter or similar device) in order to protect the vacuum system to try to reduce the potential pollution on vacuum pump. And the filter should be set at the place near the lab. Some purified and filtered air-conditioning facilities should also be included in the design of vacuum system. Moreover, the design also fully considers the safety of building and people and the adaptability of system. The vacuum discharge system must discharge the air out of the construction, instead of letting it form recycling in air-conditioning room. We also need to set the sample collecting place for air discharging.

©Maintenance: design should make it easy to maintain buildings. The importance of it is especially shown in designing special pollution control facilities (such as high speed filter, heating ventilating & air conditioning system and vacuum system etc.). Moreover, we should also consider the safety of people.

© Once there is leakage, quickly evacuate people in leakage area to windward place, and immediately isolate 150m. Strictly control

walking in and out, and contingency treatment personnel are suggested wearing positive pressure breather and wearing antitoxic clothing. Try to cut off leakage source, ventilate reasonably, and quicken diffusion. If possible, discharge the residual air or leaked air to water scrubber and other fume hood connected with scrubber by using the air exhauster. The storage tank farm should better set dilute acid spraying facilities, and air leaking container should be properly treated, and used after being restored and tested.

2.2.5 Contingency plan

1) The lab should formulate environment pollution contingency plan, and report to local and county level people's government environmental protection administrative department in charge for recording, and practice drilling regularly.

2) If leakage or diffusion occurs in labs, and causes or possibly causes serious environment pollution, we should adopt immediate emergent measures, and report to the unit and residents that can be harmed, and report to local and county level people's government environmental protection administrative department in charge, security, health etc. departments and other related departments for recording, and receive investigation treatment. Each department should not postpone and shuffle, and should adopt necessary measures to reduce loss in accidents.

3) When the lab produces dangerous wastes, we should formulate prevention measures and contingency plan for accidents according to regulations of China on environment pollution control by dangerous wastes, and report to local and county level people's government environmental protection administrative department in charge for recording.

Ordinary lab should not engage in experiments of high pathogenicity pathogenic microorganism.

4) If here is injury of people, organize salvage, and at the same time, organize people in dangerous area to evacuate.

5) Quickly control source of harm, and based on the harm of discharged matter to people and the environment, adopt closing, isolation and pollution control etc. measures in order to reduce impact range.

6) Carry on environment monitoring (air, soil, surface water etc.) when there is accident, and monitoring result should be put on record. The environment pollution information caused by accident should be announced by environmental protection department in a uniform manner.

3 Implementation organizations

3.1 Environment management organizations

3.1.1 Structure chart of environment management organizations

The environment management organization structure chart in construction stage and run stage of this project is shown in diagram 3.1-1 and 3.1-2.

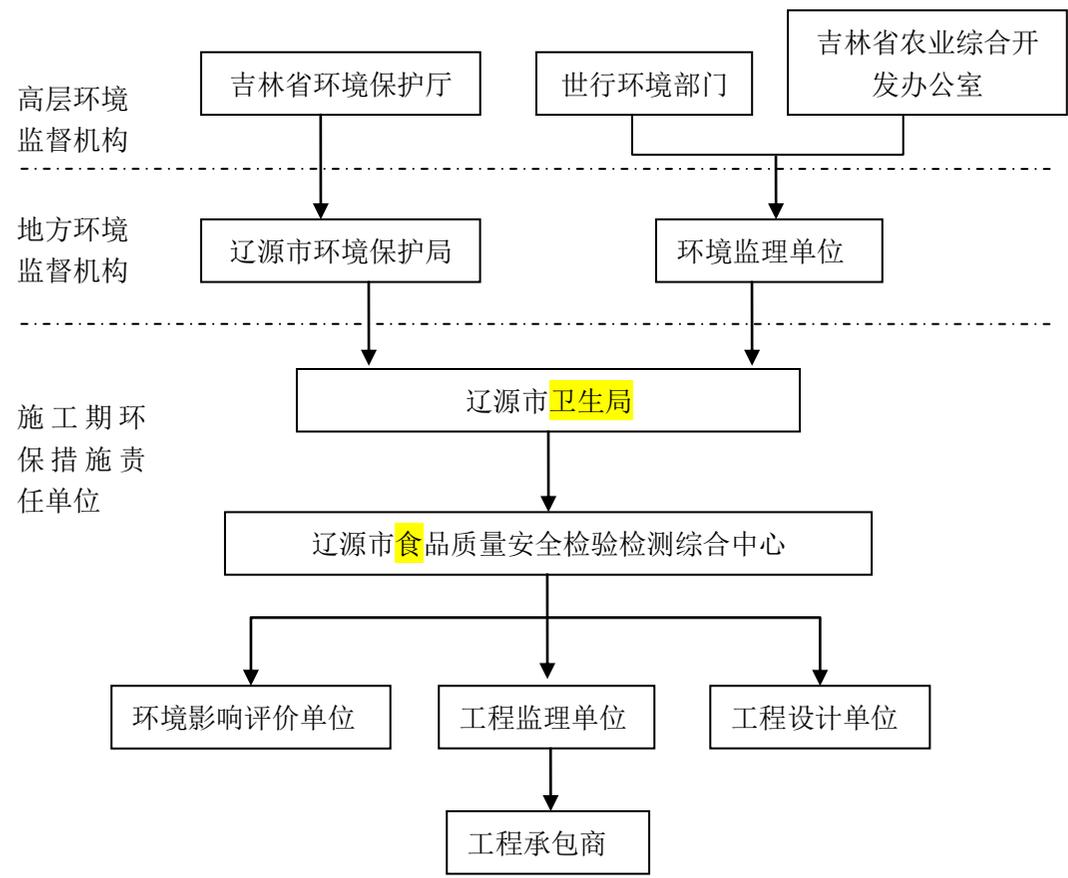


图 3.1-1 施工期环境管理机构图

图 3.1-1 施工期环境管理机构图 Diagram 3.1-1 Structure chart of environment management organization in construction stage

高层环境监督机构 Senior environment supervision organization

吉林省环境保护厅 Jilin Province Environmental Protection Department

世行环境部门 World Bank Environment Department

世行吉林省项目办 World Bank Jilin Province Project Office

地方环境监督机构 Local environment supervision organization

辽源市环境保护局 Liaoyuan City Environmental Protection Bureau

环境监理单位 Environment supervision unit

施工期环保措施责任单位 Accountability unit of environmental protection measures in construction stage

辽源市卫生局 Liaoyuan City Health Bureau

辽源市食品质量安全检验检测综合中心 Liaoyuan City Food Quality and Safety Inspection and Testing Comprehensive Center

环境影响评价单位 Environmental impact assessment unit

工程监理单位 Engineering supervision unit

工程设计单位 Engineering design unit

工程承包商 Project contractor

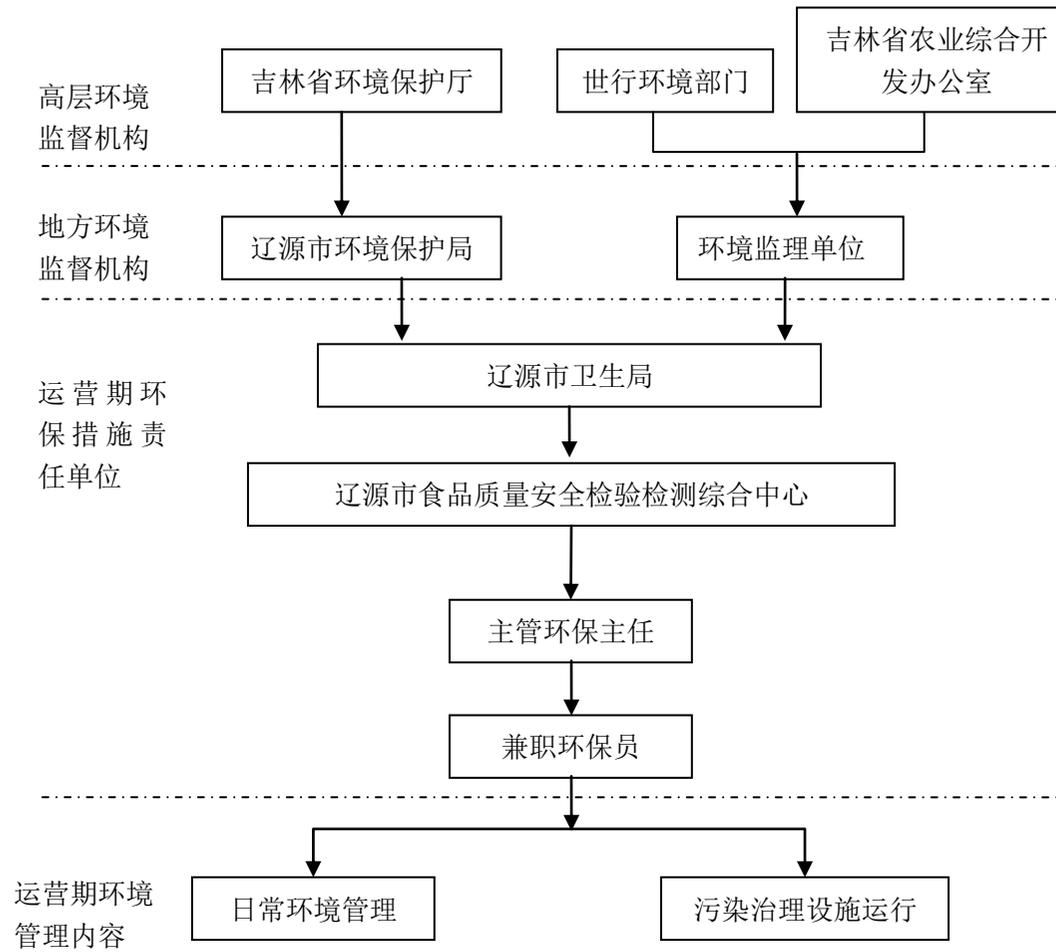


图 3.1-2 运营期环境管理机构图

图 3.1-2 运营期环境管理机构图 Diagram 3.1-2 Structure chart of environment management organization in run stage

高层环境监督机构 Senior environment supervision organization

吉林省环境保护厅 Jilin Province Environmental Protection Department

世行环境部门 World Bank Environment Department

世行吉林省项目办 World Bank Jilin Province Project Office

地方环境监督机构 Local environment supervision organization

辽源市环境保护局 Liaoyuan City Environmental Protection Bureau

环境监理单位 Environment supervision unit

运营期环保措施责任单位 Accountability unit of environmental protection measures in run stage

辽源市卫生局 Liaoyuan City Health Bureau

辽源市食品质量安全检验检测综合中心 Liaoyuan City Food Quality and Safety Inspection and Testing Comprehensive Center

主管环保主任 Environmental protection director in charge

兼职环保员 Part-time environmental protection worker

运营期环境管理内容 Environment management contents in run stage

日常环境管理 Daily environment management

污染治理设施运行 Operation of pollution control measures

3.1.2 Responsibilities of environment management organizations

According to the features of the project, the environmental protection implementation of the project is not only supervised and managed by Jilin Province Environmental Protection Department and Changchun Environmental Protection Bureau, but also the supervision and management of related departments of the World Bank. During the project construction period, we should appoint environment supervision personnel to assist the construction party in on-the-spot supervision and examination.

The responsibilities of each related environment management departments are as follows:

World Bank Environment Department: be responsible for the whole-process supervision and administration of the project according to the requirement of the World Bank on related environmental protection, and put forward requirement on environmental protection of the project.

Jilin Province Environmental Protection Department: according to the requirement of related laws and regulations of China, be responsible for the whole-process supervision and administration of the project, and put forward requirement on environmental protection of the project. At the same time, be responsible for the “three simultaneous” final acceptance of construction of the project; check the implementation of environment management plan, check the environment monitoring plan and environment monitoring report.

Jilin Province World Bank Loan Project Leaders’ Group Office (provincial project office): assist the World Bank environment department in the environment supervision and management of the project.

Liaoyuan City Environmental Protection Bureau: according to the requirement of the World Bank Environment Department and provincial Environmental Protection Department, carry on whole-process supervision and administration of the project. Carry on supervision and examination to the pollution control condition of waste water, waste gas, noise, and dangerous wastes produced in the lab. If there is case of violation, order it to correct it within certain time. The examination case and treatment result should be recorded, and after being signed by the inspector, archive it and feed back to the inspected unit.

Liaoyuan City Health Bureau: carry on uniform planning to the project, arrange and coordinate the pre-stage preparation, project construction and supervision and management of the project. Carry on environment supervision and management to the project in construction and run stage, and supervise the condition of environmental protection facilities “three simultaneous” project construction to ensure the smooth progress of the project.

Liaoyuan City Agricultural Produce Quality and Safety Testing and Inspection Center: ensure the implementation of related

environment management measures of the environment management department and World Bank, at the same time, assist the environment management department in the daily supervision and management.

Environment supervisor: assist the construction unit in supervising the implementation condition of environmental protection measures on the construction site, at the same time, assist environment management department in daily environment supervision.

The major responsibilities of environment supervising engineers are:

(1) Ensure all the project consent and requirement as well as environment management plan be implemented before the start of construction.

(2) Check that all the employees from the construction unit and operation unit implement environmental protection measures according to contract agreement.

(3) Carry on communication with construction staff, and the purpose is to help to explain the environment requirement on-the-spot; provide suggestion for remedy measures, provide remedy measures for solving the project that does not conform to the goal of the project; issue formal guideline to the construction unit and operation unit according to requirement.

(4) Carry on communication with the construction unit and operation unit as well as construction consultants, and the purpose is to increase exchange; obtain other opinions on some special issues, and the purpose is to quickly feed back the problems in construction process to construction management engineers to assist in the solving of problems.

(5) Implementation of environment monitoring plan in supervision and construction stage, supervise environmental protection facilities “three simultaneous” project construction condition, ensure to meet the time limit finally, and smoothly pass environmental protection acceptance.

Environmental protection worker: implement regulations and standards on environmental protection, master the environmental

condition of the inspection center, summarize and analyze the pollutant discharge condition, organize to formulate the environmental protection plan and annual plan, and organize implementation; be responsible for the environment management, publicity and education of environmental protection knowledge as well as promotion of new technology; regularly inspect the function condition of environmental protection facilities, and timely solve the emerged problems; master the run condition of the environmental protection facilities, establish files of pollution source, files of environmental protection facilities function, and carry on statistics of environmental protection; establish and keep experiment files, and experiment files should accurately record the experiment activities and working conditions of facilities and devices, as well as the intoxic treatment, concentrated treatment and inspection condition of waste water, waste gas and dangerous waste produced in experiment; formulate environmental protection monitoring plan according to the requirement of upper level environmental protection department, and organize and coordinate to finish monitoring task. Coordinate to process pollution accidents and pollution disputes, supervise and check the “three simultaneous” system implementation condition of new, renovated and expanded projects as well as the final acceptance of construction of environmental protection facilities, etc.

3.2 Environment monitoring organization and its responsibilities

According to the nature of this project, the construction unit should not set environment monitoring organization, and the environment monitoring can be done by entrusting Liaoyuan City Environment Monitoring Station.

Liaoyuan City food quality and safety testing and inspection center and environment supervising engineers are responsible for the supervising work of construction site, the environment monitoring work in construction stage and run stag; the environment monitoring in construction stage and run stage is mainly monitored according to the monitoring plan in environment assessment.

The major responsibilities are: carefully implement the laws and regulations of China on environmental protection, establish and perfect each regulation system, and finish monitoring task; establish monitoring and analysis data to summarize file and fill in environment

report; finish the environment monitoring work given by testing center; strengthen the maintenance and adjusting work of environment monitoring instruments to ensure normal operation of monitoring work.

Monitoring personnel should go on duty by providing certification, and be responsible for all kinds of environment monitoring files; monitoring personnel should be familiar with production technique, continuously enhance skill and quality, and accept assessment of the upper level authority.

3.3 Responsibilities of contractor

Select contractor with strength, and environment impact relieving measures in construction stage should be included in the bidding documents of contractor, and finally it should be included in the construction contract. As the contract requirement on project contractor, it can ensure the effective implementation of environment management plan. The responsibilities of contractor are as follows:

(1) Require the contractor and construction supervisor to accept training on environmental protection and environment management before construction; the contractor needs to equip one full-time environment worker for the project. These environment workers should receive training in training plan in order to be qualified for their work.

(2) In construction process, the contractor should carry on communication and negotiation with the mass in the project area, and establish announcement board in each construction unit to notice the public about specific construction activity and construction time. At the same time, provide the contact person and contact telephone in order to make it convenient for the public to complain and provide suggestions.

(3) Environmental protection management on the spot. Construction unit should do well the prevention and control measures of waste water, waste gas, noise and solid wastes, and at the same time, it should equip professional environmental protection personnel to be responsible for the environment management in the construction period. And equip noise meter to test the sensitive point in the project

surrounding area in order to ensure the sound environment in the environment sensitive point be controlled within the sound environment quality standard.

(4) Reasonably arrange construction time. The transport of building material should avoid transport peak period, and vehicles should drive according to designated route. The construction that produces noise such as removing wall or decorating should be carried on in day time and night construction is strictly prohibited.

(5) Do well the professional sanitary management, safety management and social management of construction workers.

3.4 Training of workers

Before project construction, the construction unit, construction contractor and supervising engineers are required to participate in compulsory training on environment, health and safety.

3.4.1 Training of newly added environmental protection full-time and part-time workers during construction period

The construction unit commissions qualified unit to carry on training to the full-time and part-time workers in the construction and supervising unit. The training subjects are the engineering technical person in charge and full-time managerial personnel of each construction and supervision unit.

The contents of training include:

- 1) Laws and regulations, documents and related requirement of China and Jilin Province on environmental protection of construction project management;
- 2) The environmental protection measures and environmental protection requirement in construction period put forward in design

period of this project;

3) The environmental protection guideline in construction period of this project.

The training may invite environmental protection bureau, the environmental protection person in charge of the design unit, environment assessment unit related experts of the monitoring and controlling unit.

3.4.2 Training of newly added environmental protection full-time and part-time workers during run period

The training of newly added environmental protection part-time (for full-time) workers will be organized and implemented by environmental protection department, and we can invite related environmental protection experts from universities, scientific institutes and operational management unit to give lectures, or trainees can participate in short-term training seminars.

The total expense during construction stage and run stage is 67,000 Yuan.

Table 3.4-1 List of training plan of environmental protection workers

Stage	Type	Number of people (person)	Time	Expense (10,000 Yuan)
Design, planning stage	Observe and study the advanced domestic laboratories and pollution prevention and control project	1	Design, planning stage	1.0
Construction stage	Environmental protection personnel of the construction unit and project undertaker	One person, respectively	After determining the contractor, before construction	0.6
	Environment supervising engineer	One person from the construction unit, one person from the operation unit		0.6
	All the construction workers	100 persons		1.5
Before run stage	Environment management personnel of the operation unit	1	After construction completion, before project operation	0.5
	Environment workers of the operation unit	2		1.0
	Publicity, education and training of experiment technical personnel on environmental protection of the operation unit	40		1.5
				6.7

Table 3.4-2 Training contents in construction stage

Contents of training	Training time
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		limit
General environment common knowledge of construction workers	<p>Introduce environment impact factors and environment protection measures relating to the environment;</p> <p>Introduction to the environment sensitive area in the construction area and the problems that should be paid attention to, introduction to the nearby area in the construction area;</p> <p>Environment management design engineer, environment supervisor, the role and responsibility of construction supervisor as well as the key points of report on environment issues;</p> <p>The waste management in the construction camp and site;</p> <p>Pollution control measures in the construction site;</p> <p>Illegal regulations, fine of violation against laws and regulations;</p>	Hold half-day seminar on the spot
General health and safety knowledge of construction workers	<p>Include means of communication and protection, prevent HIV/AIDS and STD;</p> <p>Alcohol prohibition and drug control;</p> <p>The process of seeking medical assistance under emergent and non-emergent condition, and the process of seeking other related medical assistance; (such as STD inspection, consultation)</p> <p>Health and safety knowledge includes certain basic processes: transportation safety, safety of using electricity, explosion, fire, dangerous waste management;</p> <p>Use personal protection device;</p> <p>Fine for violation against laws and regulations.</p>	Hold half-day seminar on the spot

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Table 3.4-3

Training of environment management personnel of the operator

Subject	Contents of training	Training time limit
Environment management personnel	Management procedure of World Bank project; Environment information archiving, opening, exchanging and reporting system; Environment risk contingency; Checking and applying process of health and safety.	1 day
	Inspection of advanced technique and environment management	Inspection of advanced domestic lab and pollution control project
Environment workers	The use of equipments includes standard, testing, method, sample transport, data quality control monitoring and reporting requirement; Environment risk contingency: Potential leakage and spill, and the environment and body health impact of leakage and spill, and contingency reaction process include preferential reaction, the location and use of reaction facilities.	2 days
All the experiment	Management procedure of World Bank project The treatment of “three wastes” in experiment	Before project

personnel	process, and matters needing attention in treatment; The correct use of environmental protection equipments; Environment risk contingency: Potential leakage and spill, and the environment and body health impact of leakage and spill, and contingency reaction process include preferential reaction, the location and use of reaction facilities.	construction completion and run, one day.
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4 Environment monitoring plan

4.1 The purpose of environment monitoring

Environment monitoring includes construction stage and run stage, and the purpose is to comprehensively and timely master the pollution tendency of the project that will be built, understand the environment quality change degree, impact range of the construction project on the project area as well as the environment quality tendency in run stage, feed back the information to department in charge, and provide scientific foundation for the environment management of the project.

4.2 Implementation of monitoring

According to the environmental impact forecast result, the sensitive point with obvious pollution will be used as monitoring point, and according to the pollution condition in construction and run stage, the monitoring contents will choose sound environment, environment air,

surface water environment, underground water environment that is under relatively big influence, and monitoring factors will be determined according to the pollution feature factor in project analysis; monitoring analysis method will adopt the monitoring analysis method of correspondent project in “Technical Regulations of Environment Monitoring” issued by the State Administration of Environmental Protection, and the assessment standard implements the national standard determined in the environment assessment. Monitoring organization is local environment monitoring station, and organization in charge is project environmental protection department, and supervising organization is Liaoyuan City Environmental Protection Bureau.

4.3 Environment monitoring Plan

The monitoring plan is shown in table 4.3-1 to table 4.3-3.

Table 4.3-1 Environment monitoring plan in planning/design stage

Consideration/ problem/impact	Management/relieving measures	Monitoring			Expense (10,000 Yuan)
		Monitoring item	Time/frequency/duration	Organization in charge	
1. Waste water	<p>1.1 The plan and design practices diffluence of clear and filthy water in the drainage system, and sets independent pipeline to discharge life sewage and production waste water respectively.</p> <p>1.2 In SBL-2 lab design, there is live virus waste water sterilization and disinfection treatment facilities.</p> <p>1.3 Design a lab waste water processing station, and after being processed, the common pollutant discharge density in lab waste water meets the grade three standard in GB8978-1996 “Integrated Discharge Standard of Waste Water”; discharge density of heavy metal meets the highest allowed discharge standard of type I pollutant in GB8978-1996 “Integrated Discharge Standard of Waste Water”.</p>	Examine design	Be included in project design and examination and approval procedure	Design and examination and approval department	Be included in the design fee

<p>2. Waste gas</p>	<p>2.1 Lab waste gas: carry on blast and air discharging and waste gas process system design according to design requirement of JGJ91-93</p> <p>“Design regulations of scientific lab buildings”, “Industrial Standard (WS 233-2002) of People’ s Republic of China on Biosecure Universal Principle of Microorganism and Bio-medical Lab” and BSL1 and BSL2 grade two biosecure lab in GB50346-2004</p> <p>“Technical regulations of biosecure lab buildings” and GB 19489—2004</p> <p>“Universal requirement on lab bio-security”, and the discharged air should meet regulations in</p> <p>“Integrated discharge standard of air pollutants” .</p> <p>2.2 Sets mechanic fume discharge ventilation system in corridor, stair well and toilet etc. places, can discharge polluted air at any time.</p>	<p>Examine design</p>	<p>Be included in project design and examination and approval procedure</p>	<p>Design and examination and approval department</p>	<p>Be included in the design fee</p>
	<p>In certain labs and inspection laboratories, also set mechanic ventilation system in order to solve the ventilation problem under the condition without experiment and inspection</p>	<p>-64-</p>			

3. Noise	<p>3.1 In design, select low noise facilities, practice vibration reducing treatment to basic facilities, the air blower and pump that produces high noise should be installed in cellar and be sealed.</p> <p>3.2 Window should designed into double-layer sound insulation window.</p> <p>3.3 Blast and air discharging blower should in installed indoor, and if they need to be installed in building ceiling, simple sound insulation board room should be built in order to reduce the impact on the surrounding sound environment.</p>	Examine design	Be included in project design and examination and approval procedure	Design and examination and approval department	Be included in the design fee
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Table 4.3-2

Environment monitoring plan in construction stage

Consideration/ problem/impact	Management/relieving measures	Monitoring			Expense (10,000 Yuan)
		Monitoring item	Time/frequency/duration	Organization in charge	
1. Waste water in construction	1.1 Use the toilet in the original building, life sewage will be discharged in city network of drains. 1.2 Little amount of construction waste water will be discharged into underground drainage after sedimentation.	1.1.1 Check whether there is non-harmful dry pail latrine, excrement is collected and transported outside. 1.1.2 Check whether there is sedimentation tank, and whether construction waste water is discharged after being precipitated.	Construction stage	Construction unit, construction supervisor	Expense will be calculated into construction expense and supervision expense
2. Dust in construction	2.1 Spray water to reduce dust, piling of powder raw material, covered with tarpaulin in transport	2.1.1 Check whether there is dust.	Strong wind and dry weather in construction stage	Construction unit, construction supervisor	

3.Noise	<p>3.1 Choose low noise facilities, reasonably plan construction time, and avoid strong noise working mechanics to influence the surrounding residents.</p> <p>3.2 Replace backward high noise construction technique with advanced low noise construction technique</p>	<p>3.1.1 Construction site meets the noise limit of “Noise limits for construction site” (GB12523-90) .</p>	<p>Construction stage, four-direction boundary, 1time/month, 2 times 1 day (day time, night time)</p>	<p>Construction unit, construction supervisor</p>	<p>1.5</p>
4. Construction garbage	<p>4.1 Construction and building garbage should be treated according to category, and the construction garbage with recycling value should be timely recycled by specific person;</p> <p>4.2 The construction garbage that can not be recycled should be transported to local construction garbage landfills.</p>	<p>4.1.1 Check whether there is categorized recycling.</p> <p>4.1.2 Check whether is transported to designated landfill.</p>	<p>Construction stage</p>	<p>Construction unit, construction supervisor</p>	<p>Expense will be calculated into construction expense and supervision expense</p>

5. Life garbage of workers	5.1 After collecting it, transport to Liaoyuan life garbage landfills.	5.1.1 Check whether life garbage is collected and transported to Liaoyuan life garbage landfill.	Construction stage	Construction unit, construction supervisor	
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Table 4.3-3

Environment monitoring plan in run stage

Consideration/ problem/impact	Management/relieving measures	Monitoring			Expense (10,000 Yuan)
		Monitoring item	Time/frequency/duration	Organization in charge	

<p>1. Lab waste gas</p>	<p>1.1.For the lab that carries on experiment that produces harmful gas, steam, odor, smoke, volatile matters etc. should set fume hood; the lab that contains mercury should set special fume hood; for the lab that must store daily used chemical dangerous things, should set special chemical storage cabinet or fume hood for 24h continuous ventilation. The above experiments should be conducted indoor, and collect the waste gas under negative pressure, and discharged it after being processed and purified by high efficient active carbon filter.</p> <p>1.2 The operation that involves pathogenic microorganism or that may produce pathogenic microorganism aerosol or spill should be conducted in biosecure cabinet. The air discharging in SBL-2 lab and II biosecure cabinet will be conducted after being filtered by high efficient filter, and then discharge it to upper air. The</p>	<p>1.1.1 Lab waste gas discharge reach the grade two standard in “Integrated emission standard of air pollutants” (GB16297-1996). Monitoring item of air discharging pipe outlet: particulate matter 120 mg/m³; sulfuric acid mist 45 mg/m³; mercury and its compound 0.7 mg/m³; phenols 100 mg/m³.</p> <p>1.1.2 Boiler: discharge of fume reaches II time period grade two standard in “Integrated Emission standard of Boiler Air Pollutants” (GB13271-2001) Monitoring item: fume 200mg/m³, SO₂ 900 mg/m³</p>	<p>Testing four times each year, two days each time</p>	<p>Liaoyuan City Environmental Protection and Monitoring Station</p>	<p>2.0</p>
	<p>discharged waste gas in the air discharging (be used for virus and bacteria cultivation) of biosecure cabinet in BSL-2 lab</p>	<p>-71-</p>			

<p>2. Waste water: the waste water produced in experiment and life sewage of employees</p>	<p>1.1 The drainage system practices diffluence of clear and filthy water, and sets independent pipeline to discharge life sewage and production waste water respectively.</p> <p>1.2 The waste water that contains active poison discharged in lab should be sent to sewage processing station after sterilization and disinfection treatment.</p> <p>1.3 Maintain the normal function of lab waste water processing facilities.</p> <p>1.4 The dirt produced in treating waste water will be sent to Changchun Lantian Dangerous Waste Processing Center Co., Ltd. for treatment.</p>	<p>1.1.1 The common pollutants discharge in life sewage meets CJ3082-1999 “Water quality standard for waste water being discharged into city underground drainage system”, experiment waste water meets the grade one discharge standard in “Integrated Wastewater Discharge Standard” (GB8978-1996) , and discharge of heavy metal meets the highest allowed discharge standard of type I pollutant.</p> <p>pH, COD, BOD, ammonia nitrogen, heavy metal (according testing contents, measure mercury, arsenic and lead etc.), total coli group (one/L)</p>	<p>Testing four times each year, one day for each time, two samplings each day</p>	<p>Liaoyuan City Environmental Protection and Monitoring Station</p>	<p>1.5</p>
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3. Noise	2.1 Maintain the normal function of sound insulation facilities	2.1.1 Construction site meets type II standard in “Standard of noise at boundary of industrial enterprises” Day time $\leq 60\text{dB (A)}$, night time $\leq 50\text{dB (A)}$	At the surrounding of the factory, 4 times/year, two times/day (day time, night time)	Liaoyuan City Environmental Protection and Monitoring Station	0.5
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<p>4.Solid waste</p>	<p>4.1Treatment of general solid waste: The waste livestock produce, aquatic produce samples, and life garbage etc. general solid wastes can be centrally collected and then sent by environment and health department to city garbage treatment factory for sanitary landfill.</p> <p>4.2 Treatment of dangerous waste</p> <p>4.2.1Waste agricultural (livestock, fishery) pesticide, fertilizer sample belongs to dangerous and after uniform recycling, they will be sent to the original production unit for uniform treatment;</p> <p>4.2.2 Experiment facilities (one-time), culture solution, overdue experiment medicine or reagent, dirt containing heavy metal produced in waste water treatment station, waste active carbon, animal excrement and feed waste residual etc. dangerous waste should be collected according to category, and sent to Changchun Lantian Dangerous Waste Treatment Center Co., Ltd. for treatment.</p>	<p>4.1.1 Check whether different solid wastes are collected and sent to designated processing factory or landfill.</p>	<p>One time a month</p>	<p>Liaoyuan City Environmental Protection and Monitoring Station</p>	
		-74-			

5 Estimate of environment management plan monitoring

Table 5.1-1 Temporary estimate of environment management plan

Monitoring item	Environment management expense	Monitoring expense	Training expense	Total
Budget in construction stage (Yuan)	15000	15000	37000	67000
Budget in run stage (Yuan)		40000	30000	70000

Through estimate, the total EMP expense of the project is 137,000 Yuan.

6 Report

The contractor, monitoring unit and project office should records the project progress condition, management plan (EMP) implementation condition, environment quality monitoring result etc. and reports them to related department. This mainly includes detailed recording on EMP implementation condition of the monitoring unit and contractor, and report them to the project office; project progress report (such as half year report etc.) by the project office must include the contents of EMP progress, such as the implementation progress and implementation effect of EMP; the annual EMP implementation report of the project must be finished within the time regulated by the World Bank and submitted to the World Bank.

The EMP implementation report includes the following contents:

- (1) Project progress condition;
- (2) EMP implementation condition; include monitoring condition and data
- (3) Whether there is public complaint, and if there is complaint, record the main contents of complaint, solving method and public satisfaction.
- (4) EMP implementation plan in the next year.

7 Public participation

7.1 Information openness

According to related regulations in interim measures for public participation in environment impact assessment (HF [2006] number28), the environment assessment unit will issue announcement in the surrounding area of the project on April 23rd, 2009, and issue the environment impact assessment information announcement in “Jilin Environment Information Net” on June 5th, 2009, and will put the simple copy of environment impact assessment report of this report and the initial draft of this environment management plan in the provincial project office and environment science institute, and further ask for the opinion of the public. During the announcement period, we did not receive the report or complaint of the public, nor feedback.

7.2 Public's participation in investigation

The investigation range that the public participates in is mainly the residents in the affected area and local environmental protection and agricultural experts and workers. The whole process of participation of the public conforms to the principle of representation and randomness. We carried on investigation in the form of holding seminar, and listened to the opinions and suggestions of nearby residents and related experts on environmental protection of this project.

(1) Notice residents, prepare for the meeting

On June 27th, 2009, Liaoyuan City food quality and safety inspection center lab project working group noticed the residents to hold public seminar on environment impact assessment of Liaoyuan City food quality and safety inspection center lab project on July 4th, in the form of noticing. Chen Guomei etc. 21 community workers participated in this project seminar. Please look at the photos.



座谈会公告



组织会议人员



座谈会现场



座谈会现场

座谈会公告 announcement of the seminar

组织会议人员 meeting organizers

座谈会现场 scene of the seminar

开座谈会地点：吉林省辽源市西安区仙城街道办事处

Place of seminar: Xiancheng Street Committee of Xi'an District, Liaoyuan City, Jilin Province

时间：2009年6月27日

Time: June 27th, 2009

会议组织人员名单：张国立、孙艳等（见表 7.2-1）

Name list of meeting organizers: Zhang Guoli, Sunyan etc. (look at table 7.2-1)

参加座谈会的人员（居民）名单：陈国梅等（见表 7.2-2）

Name list of seminar participants (residents): Chen Guomei etc. (look at table 7.2-2)

会议记录员：孙艳

Meeting recorder: Sun Yan

Table 7.2-1 Name list of organizers for the public participation in the seminar

Name	Living place/unit	Title	Contact telephone
Zhang Guoli	Xiancheng Street Committee, Liaoyuan City	Secretary	13943778807
Wang Fu	Agricultural Development Office of Liaoyuan Finance Bureau	Director	135008777487
Ji Lin	Liaoyuan Health School	President and Secretary of the Party Committee	13321560111
Sun Yan	Agricultural Development Office of Liaoyuan Finance Bureau	Section chief	5089058
Sun Hailu	TB Control Institute of Liaoyuan	Section chief	13943280618
Gu Xiuli	Liaoyuan Health School	Office director	13384370550
Guan Baoshuai	Liaoyuan Health School	Office deputy director	13604375130

Table 7.2-2

Name list of public participants in the seminar

Name	Living place/unit	Contact telephone	Distance to the construction site
Zhang Jinling	Group 11, Committee 1, Xiancheng Street	13843752814	170m
Gao Yongwei	Group 15, Committee 1, Xiancheng Street	13943701587	200 m
Zhang Jun	Group 9, Committee 1, Xiancheng Street	13843709383	280 m
Li Yufan	Group 9, Committee 1, Xiancheng Street	2801128	280 m
Li Xiaofei	Group 12, Committee 1, Xiancheng Street	2917331	300 m
Jing Lingling	Group 9, Committee 1, Xiancheng Street	2859842	280 m
Sha Wenhua	Group 13, Committee 2, Xiancheng Street	13943748147	300 m
Wang	Group 15, Committee 2, Xiancheng	13766022022	300 m

Jingxin	Street		
Ge Weihua	Group 15, Committee 1, Xiancheng Street	13514375837	200 m
Wang Hongsheng	Group 13, Committee 1, Xiancheng Street	2806575	290 m
Xie Shihua	Group 15, Committee 1, Xiancheng Street	13766024563	300 m
Bai Yinduo	Group 15, Committee 1, Xiancheng Street	13732845915	200 m
Chen Guomei	Group 11, Committee 1, Xiancheng Street	13044371295	210 m
Wang Wenge	Group 15, Committee 1, Xiancheng Street	13104378912	150 m
Yu Yongzhong	Group 11, Committee 1, Xiancheng Street	13943766901	200 m
Wang Limei	Group 11, Committee 1, Xiancheng Street	13344477866	200 m
Yang Zhen	Group 15, Committee 1, Xiancheng Street	13732842820	200 m
He Jinyue	Group 15, Committee 1, Xiancheng Street	2881996	200 m
Yang Baofeng	Group 11, Committee 1, Xiancheng Street	13089208069	200 m
Wang Jixiang	Group 11, Committee 1, Xiancheng Street	13500878917	200 m
Hou Fengjie	Group 11, Committee 1, Xiancheng Street	13732803877	300 m

Records of meeting:

On June 27th, 2009, working group of Liaoyuan City food quality and safety inspection center lab project held residents' seminar in Xiancheng Street Committee, Xi'an District of Liaoyuan City, and the main participants are residents from Xianjing community of Xiancheng Street near the construction site of Liaoyuan City food quality and safety inspection center. Altogether 21 residents participated in the seminar.

The working group of lab project first distributed copies of first draft of environment management plan, then introduces the basic conditions, construction purpose, significance, scale, site and project construction of Liaoyuan City food quality and safety inspection center and the environment management plan in construction

process, introduced the possible environment impact factor, intensity, range and the environment measures that will be adopted. Especially, it asked for the opinion of residents affected by this project in order to deeply understand the residents' suggestion and opinion on project construction significance and effect as well as regional environment quality. They listened to the suggestions and opinions of the residents on environmental protection of this project, and filled in investigation form. They discussed the project progress and the benefit to food (agricultural produce) quality and safety together, and the working group broadly listened to the suggestions and opinions of the public. Part of the residents voiced their opinions on this project and put forward suggestions, which are summarized as follows:

1) Chen Guomei (Group 11, Committee 1, Xiancheng Street)

Question: this project construction site is very near to our living place, and will the noise during construction affects our daily rest? How will you solve it?

Answer of the project group: our project group will formulate strict and scientific construction plan, strengthen management during construction, and will not construct in the night. The impact on the surrounding residents during construction period will be controlled within the minimal limit.

2) Yang Zhen (Group 15, Committee 1, Xiancheng Street)

Question: Will experiments produce harmful gas and odor that influences our health?

Answer of the project group: this lab will be constructed according to national requirements, and no harmful gas will be discharged. For the lab that produces odor, we will set fume hood or biosecure cabinet to collect waste gas under negative pressure, filter it through active carbon filter or high efficient air filter, and then discharge it to upper air through exhaust funnel. Under the condition of standardized discharge, it will not produce impact on the surrounding residents.

3) Li Xiaofei (Group 12, Committee 1, Xiancheng Street)

Question: When experiments are carried on, will they produce unfavorable impact on the health and daily life of the surrounding residents?

Answer of the project group: the air discharging system of the experiment part in

the lab building mainly includes biosecure cabinet, fume hood and room air discharging, and among it, the air discharging system of BSL-2 level lab should be determined according to the usage of lab. The air discharging pipelines are connected to shaft, and air is sent to ceiling machine room, and then is discharged according to exhaust fan. The air discharging of BSL-2 lab and II biosecure cabinet will be filtered by two high efficient filters, and then is discharged to upper air. Under the normal operation of these air discharging systems, the project will not produce unfavorable impact on the body health and daily life of the surrounding residents.

7. Analysis of the statistics result of public investigation forms

The investigation result on satisfaction of agricultural produce quality in Jilin Province shows that only 15% people are satisfied, and 57% show their dissatisfaction; 100% respondents think this project construction is beneficial to improving agricultural produce quality and safety; the issue that residents concern most is noise interruption, making up 57%, then it is solid wastes, accounting for 47%; only 9% people are worried about air pollution; for the environment impact during run stage, the most concerned issue of residents is solid wastes, accounting for 49%; water pollution makes up 42%, and air pollution makes up 14%. 95% people think these impacts can be controlled by adopting affective measures and 100% public support this project construction.

8. Conclusion

The people participating in this seminar unanimously think that this project construction is beneficial to improving food quality, ensuring local people to eat worry-free agricultural produce, and that this project should be constructed as soon as possible.

8 Channel of disputes complaints

8.1 Establishment and composition of complaint organization

In order to better ensure the legal rights of affected people, a complaining mechanism will be established to provide a convenient, transparent, fair and effective complaining channel for the affected people. Therefore, we establish project

environment impact complaint handling leaders' group, and the group leader will be undertaken by director of Liaoyuan Environmental Protection Bureau Supervision Brigade, and group members come from World Bank loan Jilin Province project leaders' group office, Liaoyuan City Environment Monitoring Station, and environment assessment unit etc. The environment impact complaint handling office will collect and arrange the complaints, and after discussing with related accountability units, put forward opinions for handling.

8.2 Complaining procedure

The complaint handling leaders' group and office will start to accept and handle external complaints one week after starting of project, at the same time, a complaint hotline and e-mail will be opened. The specific complaining procedure is as follows:

When the affected people think their own rights are infringed in the aspect of environmental protection, they can complain to the complaint handling office in written or oral form. If it is oral complaint, the complaint handling office member will make detailed record, and arrange it, and submit handling opinions within two weeks.

If the complainer is not satisfied with the handling opinion of the complaint handling office, he can appeal to Jilin Province Environmental Protection Department in written form within one month after receiving the handling opinion. The Environmental Protection Department should give handling opinion within one month.

If the complainer is still not satisfied with the handling opinion of the Environmental Protection Department, he can appeal to local people's court after receiving the handling opinion according to "The Civil Procedural Law of the Peoples Republic of China", and the court will give final judgment.