

# Environmental Monitoring Report

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5th Annual Report  
January 2014–March 2015

## People's Republic of China: Songhua River Basin Water Pollution Control and Management Project

Prepared by Heilongjiang Project Management Office (with assistance from NREM International Inc.) for the People's Republic of China and the Asian Development Bank.

## **CURRENCY EQUIVALENTS**

(as of 1 March 2015)

Currency unit	–	yuan (CNY)
CNY1.00	=	\$0.1596
\$1.00	=	CNY6.2671

## **ABBREVIATIONS**

ADB	–	Asian Development Bank
AP	–	affected person
BOD	–	biological oxygen demand
COD	–	chemical oxygen demand
EA	–	executing agency
EMP	–	environmental management plan
EPB	–	Environmental Protection Bureau
FYP	–	five year plan
HPDRC	–	Heilongjiang Provincial Development and Reform Commission
HPFD	–	Heilongjiang Provincial Finance Department
HPG	–	Heilongjiang Provincial Government
HPMO	–	Heilongjiang Provincial Management Office
IA	–	implementing agency
IDC	–	interest during construction
O&M	–	operation and maintenance
PAM	–	project administration manual
PIA	–	project implementation agencies
PLG	–	project leading group
PMO	–	project management office
PPMS	–	project performance management system
PPTA	–	project preparatory technical assistance
PRC	–	People's Republic of China
RP	–	resettlement plan
RRP	–	report and recommendation of the President
SRB	–	Songhua River Basin
WTP	–	willingness to pay
WWTP	–	wastewater treatment plant

## **NOTE**

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## Environmental Monitoring Report

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Project Number: 40665  
April 2015

### PRC: Songhua River Basin Pollution Control and Management Project (Heilongjiang component)

Prepared by the Project Management Office of Heilongjiang Provincial Government,  
with assistance of NREM International Inc.

For: Heilongjiang Provincial Government  
Tangyuan County Water Supply Company; Tonghe County Water Supply and Drainage Company; Yanshou County Water Supply Company; Fangzheng County Water Supply and Drainage Company; Harbin City Inland River Comprehensive Development Company; New Era Urban Infrastructure Construction Investment Jiamusi Company Limited; Nenjiang County Water Supply Company; Qiqihaer City Hecheng Wastewater Treatment Company Limited; Qitaihe City Qingyuan Drainage Company Limited; Shuangyashan City Changyuan Drainage Company Limited; and Tangyuan County Xingyuan Urban Construction Investment Company Limited.

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**ENVIRONMENTAL MONITORING REPORT**  
**(COVERING THE PERIOD OF JANUARY 2014- MARCH 2015)**

**People's Republic of China:**  
**Songhua River Basin Pollution Control and Management Project**  
**(Heilongjiang Component)**

2487  
ADB Loan No.: ~~2360~~-PRC

*Submitted to:*  
Heilongjiang Provincial Government  
and  
Asian Development Bank

*Prepared by:*  
Heilongjiang Project Management Office  
With assistance from NREM International Inc.

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## ABBREVIATIONS

ADB	— Asian Development Bank
APs	— Affected Persons
BOD	— Biological Oxygen Demand
COD	— Chemical Oxygen Demand
CQS	— Cost and Quality System
DD	— Due Diligence
DMF	— Design and Monitoring Framework
EA	— Executing Agency
ECACHP	— Engineering Consulting & Appraisal Centre of Heilongjiang Province
EMP	— Environmental Management Plan
EPB	— Environmental Protection Bureau
ERP	— Effluent Reuse Plant
FCWSDC	— Fangzheng Water Supply & Drainage Co.
FCZWC	— Fujin City Zhongfu Water Co.
FYP	— Five Year Plan
GDP	— Gross Domestic Product
HCIRDCC	— Harbin City Inland River Development Construction Co.
HPDRC	— Heilongjiang Provincial Development and Reform Commission
HPFD	— Heilongjiang Provincial Finance Department
HPG	— Heilongjiang Provincial Government
HPMO	— Heilongjiang Project Management Office
IA	— Implementing Agency
IDC	— Interest during Construction
IMA	— Independent Monitoring Agency
LAR	— Land Acquisition and Resettlement
LCDBGD	— Luobei County Drainage Business Management Division
MIS	— Management Information System
MLG	— Minimum Living Guarantee
M&E	— Monitoring and Evaluation
MCWAB	— Mudanjiang City Water Affairs Bureau
NCWSO	— Nenjiang County Water Supply Co.
O&M	— Operation and Maintenance
QQDC	— Qitaihe City Qingyuan Drainage Company
PAM	— Project Administration Manual
PIAs	— Project Implementation Agencies
PLG	— Project Leading Group
PMO	— Project Management Office
PPMS	— Project Performance Management System
PPTA	— Project Preparatory Technical Assistant
PRC	— People's Republic of China
QCHWTC	— Qiqihar City Hecheng Wastewater Treatment Co., Ltd.
QCQDC	— Qitaihe City Qingyuan Drainage Co., Ltd.
RP	— Resettlement Plan
RRP	— Report and Recommendation to the President
SCDC	— Shuangyashan Changyuan Drainage Co., Ltd.
SLWRC	— Songhua-Liao River Water Resources Commission

SPIA	—	Social and Poverty Impact Assessment
SRB	—	Songhua River Basin
SRBWPCMP	—	Songhua River Basin Water Pollution Control Master Plan
TCXUCIC	—	Tangyuan County Xingyuan Urban Construction Investment Co., Ltd.
TCWS	—	Tangyuan County Water Supply Co.
WHO	—	World Health Organization
WTP	—	Willingness to Pay
WWT	—	Wastewater Treatment
WWTP	—	Wastewater Treatment Plant
YCWSC	—	Yanshou County Water Supply Co.

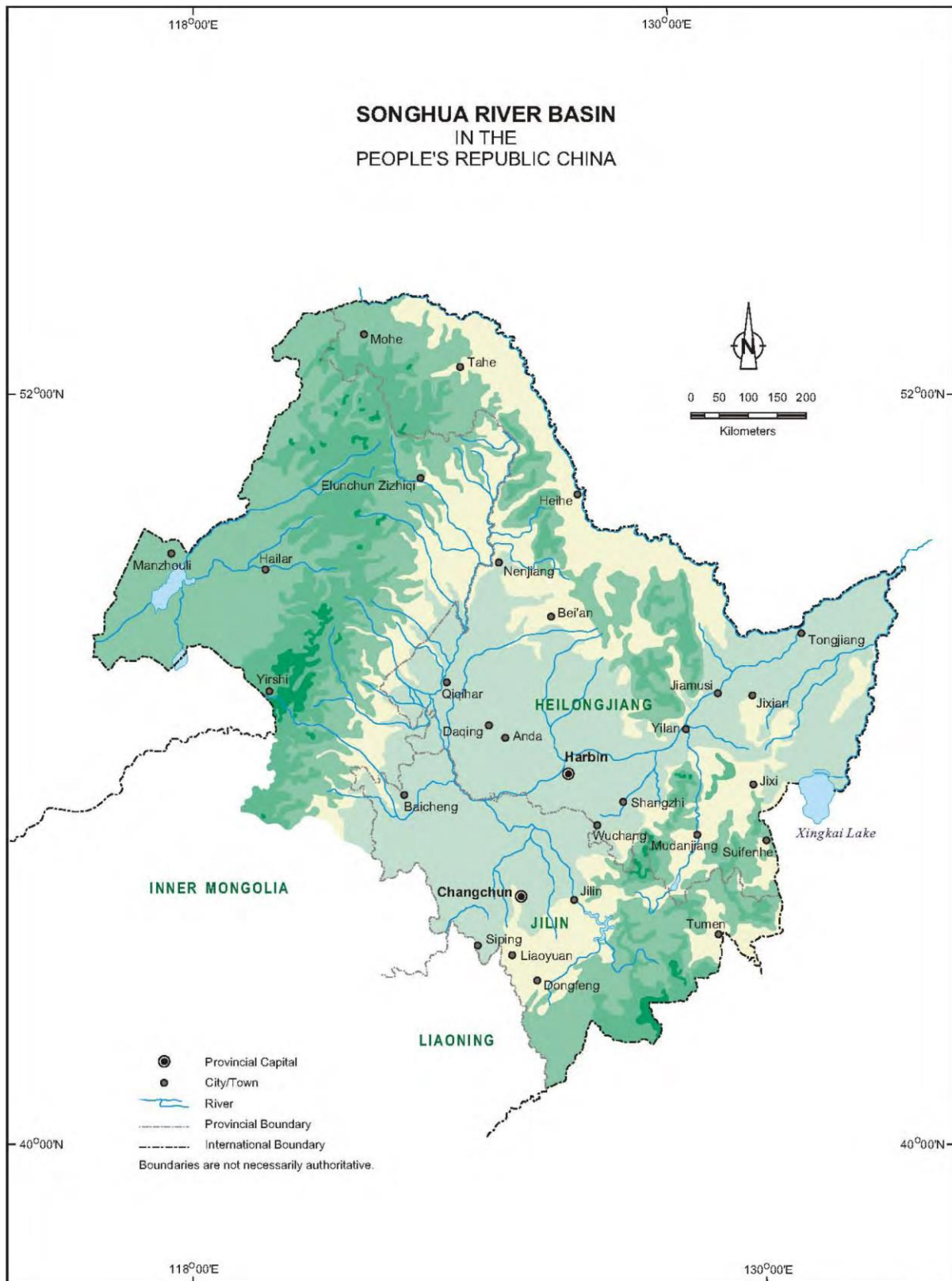


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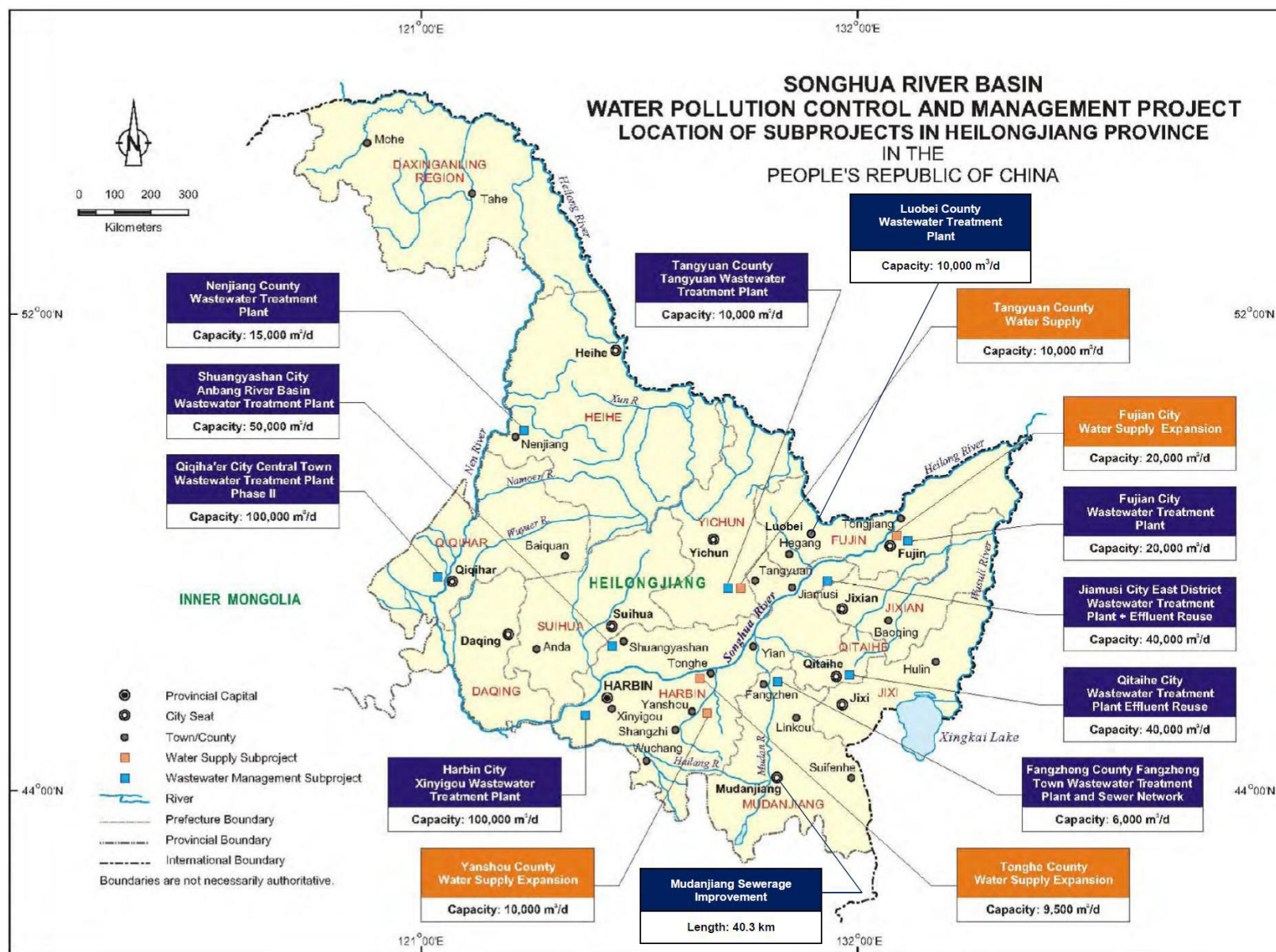












# 1. Introduction

## 1.1 Background

1. This report is the fifth environmental monitoring report for the Songhua River Basin Pollution Control and Management Project (the Project, SRBPCMP) covering the period of January 2014 to March 2015. It is prepared by the Heilongjiang Project Management Office (HPMO) with the assistance of NREM International Inc. as the loan implementation consultant. Some data date back earlier to cover the missing information from earlier reports.

2. This report is prepared in accordance with the environmental monitoring program as part of the environmental management plan (EMP). The field sampling and lab analysis were undertaken by the respective municipal environmental monitoring stations. It is the last EMR to assess the status of compliance with the EMP and the residual operational impacts.

## 1.2 Project Summary

3. The basic information about the Loan Project is provided in **Table 1**.

**Table 1: Basic Information**

	Description
ADB Loan Number	L2487-PRC
Project Title	Songhua River Basin Water Pollution Control and Management Project – Heilongjiang Component
Borrower	People's Republic of China
Executing Agency	Heilongjiang Provincial Government
Implementing Agencies	1) Fujin City Zhongfu Water Supply Company Limited for Fujin City Water Supply Project (Canceled); 2) Tangyuan County Water Supply Company for Tangyuan County Water Supply Project; 3) Tonghe County Water Supply and Drainage Company for Tonghe County Water Supply Expansion; 4) Yanshou County Water Supply Company for Yanshou County Water Supply Expansion; 5) Fangzheng County Water Supply and Drainage Company for Fangzheng County WWTP; 6) Harbin City Inland River Comprehensive Development Company for Harbin City Xinyigou District WWTP; 7) Fujin City Zhongfu Water Supply Company Limited for Fujin City WWP; 8) Luobei County Drainage Management Division, Luobei County Housing and Urban and Rural Construction Bureau for Luobei WWTP; 9) Mudanjiang City Urban Drainage and Sewerage Project Management Department, under the Mudanjiang Drainage Bureau for Mudanjiang Sewerage Improvement; 10) New Era Urban Infrastructure Construction Investment Jiamusi Company Limited for Jiamusi Effluent Reuse; 11) Nenjiang County Water Supply Company for Nenjiang County WWTP; 12) Qiqihar City Hecheng Wastewater Treatment Company Limited for Qiqihar City WWTP (Phase II); 13) Qitaihe City Qingyuan Drainage Company Limited for Qitaihe City Effluent Reuse; 14) Shuangyashan City Changyuan Drainage Company Limited for Shuangyashan City WWTP; and, 15) Tangyuan County Xingyuan Urban Construction Investment Company Limited for Tangyuan County WWTP.
Total Estimated Cost:	\$196 Million

	<b>Description</b>
ADB Loan	\$100 Million
Counterpart funds	\$96 Million
Date of Loan Approval	11 December 2008
Date of Loan Effectiveness	24 August 2009
Date of Implementation Completion	31 December 2013
ADB Loan Closing Date	30 June 2014
Months Elapsed Since Date of Loan Effectiveness	66
Type of This Report	Fifth Environmental Monitoring Report, Covering Jan 2014 - Mar 2015

4. The Fujin City Water Supply Expansion is financed exclusively with domestic funds and therefore is removed from the ADB loan. The cost savings from the cancellation and from other projects are used to finance two additional projects: Luobei County (Fengxiang Town) WWTP; and Mudanjiang Sewerage Network Improvement Project. Application for the cancellation and additions received the final approval by the ADB on 20 July 2012.



## **2. Description of the Project**

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### **2.1 Project Components**

5. The Heilongjiang Component of the Songhua River Basin Water Pollution Control and Management Project includes the following three major subcomponents of work:

- ✧ Water Supply Subcomponent;
- ✧ Wastewater Treatment Subcomponent; and,
- ✧ Institutional Capacity Development.

6. The Project will contribute to and support the 11<sup>th</sup> FYPs of the provincial governments in Heilongjiang and the Songhua River Basin Water Pollution Prevention and Control Master Plan (SRBPCMP) by: (i) reducing pollutant loading to the Songhua River Basin (SRB) through direct collection and treatment of wastewater (point sources) in the Project counties and cities of Heilongjiang Province; (ii) addressing the water shortage problem through effluent reuse in the Project counties and cities of Heilongjiang Province; (iii) providing a supply of reliable and high quality potable water in four Project counties and cities of Heilongjiang Province; (iv) reducing the incidence of waterborne diseases; (v) increasing the efficiency and management capacity of the IAs; (vi) integrating approaches for basin-wide pollution prevention and control; and (vii) improving cost recovery through a better tariff structure, with gradual increases to achieve full cost recovery.

7. The Project implementation is scheduled for completion by 31 December 2013.

#### **1) Water Supply Subcomponent**

8. The water supply subcomponent includes construction of 3 water treatment plants (WTPs) with a cumulative capacity of 29,500 m<sup>3</sup>/day in the Project area to improve water supply conditions. This subcomponent also includes the construction of approximately 83.2 kilometers (km) of water transmission pipelines in the Project counties and cities across Heilongjiang Province. Within the original project scope there were four water supply components, with 49,500 m<sup>3</sup>/day cumulative capacity. The Fujin City Water Supply Expansion component is now financed exclusively with domestic funds and therefore has been removed from the ADB loan. The cost savings from this cancellation are used to finance two additional project subcomponents (see below for the wastewater treatment subcomponent).

#### **2) Wastewater Treatment Subcomponent**

9. Within the original project scope, the wastewater treatment subcomponent includes the construction of 9 wastewater treatment plants (WWTPs) and associated sewers in the Project counties and cities in Heilongjiang Province with a cumulative treatment capacity of 291,000 m<sup>3</sup>/day. A total length of approximately 199 km of associated sewer pipelines will also be constructed. With the newly added Luobei County WWTP and the Mudanjiang Sewerage Network Improvement Subproject, the number of the WWTPs for the Project increases from 9 to 10 with cumulative treatment capacity of 301,000 m<sup>3</sup> / day, and the total length of the sewer pipelines increases by 62.6 km to 162.6 km.

#### **3) Institutional Capacity Development Component**

10. The institutional capacity building subcomponent is intended to provide:

- ✧ training to strengthen organizational structures for efficiently implementing, operating, and maintaining the project components;
- ✧ strengthening management practices in human resources, finance, and corporate planning; and,
- ✧ support for the public awareness programs to ensure the sustainability of project benefits.

11. In addition to the construction of WTPs, WWTPs, and the institutional capacity enhancement, the Project also includes a consulting service contract. The PMO of Songhua River Basin Water Pollution Control and Management Project Financed by ADB (Heilongjiang Component), thereafter called Heilongjiang Project Management Office (HPMO) contracted NREM International Inc. (the Consultant) to provide consulting services in support of the implementation of the Project. The scope of the consulting services covers the areas of environment, resettlement, engineering design, procurement, and construction management, project performance monitoring system (PPMS), institutional strengthening and financial management enhancement. The objective of the consulting services is to support the HPMO and project implementation agencies (PIAs) in project implementation and capacity building over the project implementation period.

12. Upon completion, the Songhua River Basin Water Pollution Control and Management Project in Heilongjiang Province is expected to result in improved water supply and wastewater services and enhanced institutional capacity. As a result, the public health and quality of life for the urban residents in the Project counties and cities in Heilongjiang Province along the Songhua River Basin (SRB) are expected to be enhanced and improved after the implementation of the Project.

**Table 2: Subprojects and Outputs**

No.	Subcomponent	Description
<b>Water Supply Subcomponents</b>		
1	Fujin City Water Supply Expansion (Fujin City Zhongfu Water Supply Co.) (Cancelled)	<ul style="list-style-type: none"> <li>Capacity: 20,000 m<sup>3</sup>/d</li> <li>36.828 km of water distribution networks</li> <li>5 Deep pumped wells</li> <li>Service population: 137,000 (2012), 165,000 (2020) This component on Fujin City</li> <li>Water Supply Expansion is financed exclusively by domestic funds and has been cancelled from the ADB loan.</li> </ul>
2	Tangyuan County Water Supply (Tangyuan County Water Supply Co.)	<ul style="list-style-type: none"> <li>Capacity: 10,000 m<sup>3</sup>/d</li> <li>5 pumped wells</li> <li>1 km of water supply pipelines from wells</li> <li>15.48 km of water distribution networks</li> <li>Service population: 80,000 (2010), 100,000 (2020)</li> </ul>
3	Tonghe County Water Supply Expansion (Tonghe County Water Supply and Drainage Co.)	<ul style="list-style-type: none"> <li>Capacity: 9,500 m<sup>3</sup>/d</li> <li>10 deep pumped wells with 10 pump stations</li> <li>26.758 km of distribution networks</li> <li>Service population: 90,000 (2015), 120,000 (2020)</li> </ul>
4	Yanshou County Water Supply Expansion (Yanshou County Water Supply Co.)	<ul style="list-style-type: none"> <li>Capacity: 10,000 m<sup>3</sup>/d</li> <li>39.727 km of distribution networks with pipelines</li> <li>Service population: 95,000 (2010), 100,000 (2020)</li> </ul>
<b>Wastewater Treatment Subcomponents:</b>		
5	Fangzheng County	<ul style="list-style-type: none"> <li>6,000 m<sup>3</sup>/d of wastewater treatment plant with high-density</li> </ul>

No.	Subcomponent	Description
	WWTP + Sewerage Network (Fangzheng County Water Supply and Drainage Co.)	sedimentation tanks and biological aerated filter technology <ul style="list-style-type: none"> <li>• 24.995 km of sewer networks</li> <li>• Service population: 60,000 (2010), 85,000 (2020)</li> </ul>
6	Fujin City WWTP (Fujin City Zhongfu Water Supply Co.)	<ul style="list-style-type: none"> <li>• 20,000 m<sup>3</sup>/d of wastewater treatment plant with high-density sedimentation tanks and biological aerated filter technology</li> <li>• Service population: 137,000 (2012), 165,000 (2020)</li> </ul>
7	Harbin City Xinyigou District WWTP (Harbin City Inland River Comprehensive Development Co.)	<ul style="list-style-type: none"> <li>• 100,000 m<sup>3</sup>/d of wastewater treatment plant with Modified A2/O technology</li> <li>• 34.35 km of sewer networks;</li> <li>• Service population: 3,940,000 (2010), 4,600,000(2020).</li> </ul>
8	Jiamusi City East District WWTP + Effluent Reuse (New Era Urban Infrastructure Construction Investment Jiamusi Co., Ltd.)	<ul style="list-style-type: none"> <li>• 40,000 m<sup>3</sup>/d of effluent reuse plant with air filtration technology</li> <li>• 18.67 km of reuse water supply pipeline</li> <li>• Used as supplementary supply of cooling water for a power plant</li> </ul>
9	Nenjiang County WWTP + Sewerage Network (Nenjiang County Water Supply Co.)	<ul style="list-style-type: none"> <li>• 15,000 m<sup>3</sup>/d of wastewater treatment plant with Modified A2/O technology</li> <li>• 11.728 km of sewer networks</li> <li>• Service population: 150,000 (2010), 194,000 (2020)</li> </ul>
10	Luobei County WWTP (Luobei County Drainage Management Division)	<ul style="list-style-type: none"> <li>• 10,000 m<sup>3</sup>/d of wastewater treatment plant with TF technology (effluent meeting Class 1A)</li> <li>• 23.13 km of sewer network (storm-sewerage separate)</li> </ul>
11	Mudanjiang Sewerage Network Improvement (Mudanjiang City Water Affairs Bureau)	<ul style="list-style-type: none"> <li>• 40.3 km of sewer network</li> </ul>
12	Qiqihar City WWTP (Phase II) (Qiqihar City Hecheng Wastewater Treatment Co., Ltd.)	<ul style="list-style-type: none"> <li>• 100,000 m<sup>3</sup>/d of wastewater treatment plant with CASS technology</li> <li>• 2.5 km of sewer network</li> <li>• Service population: 1,344,000 (2010), 1,564,000 (2020)</li> </ul>
13	Qitaihe City Effluent Reuse (Qitaihe City Qingyuan Drainage Co., Ltd.)	<ul style="list-style-type: none"> <li>• 40,000 m<sup>3</sup>/d of effluent reuse plant with CASS technology</li> <li>• 8.5 km of reuse water supply pipeline</li> <li>• Used as supplementary supply of cooling water for Qitaihe Datang Power Generation Co., Ltd.</li> </ul>
14	Shuangyashan City WWTP (Shuangyashan City Changyuan Drainage Co., Ltd.)	<ul style="list-style-type: none"> <li>• 50,000 m<sup>3</sup>/d of wastewater treatment plant with Modified A2/O technology</li> <li>• 21.8 km of sewer networks</li> <li>• Service population: 342,500 (2010), 425,000 (2020).</li> </ul>
15	Tangyuan County WWTP (Tangyuan County Xingyuan Urban Construction Investment Co., Ltd.)	<ul style="list-style-type: none"> <li>• 10,000 m<sup>3</sup>/d of wastewater treatment plant with high-density sedimentation tanks and biological aerated filter technology</li> <li>• 48.53 km of sewer networks</li> <li>• Service population: 80,000 (2010), 100,000 (2020)</li> </ul>

## 2.2 Project Investment Plan

13. The Borrower of the loan is the People's Republic of China (PRC). The Government of the PRC will relend 100 million US dollars of the loan proceeds to Heilongjiang Provincial Government (HPG). The loan will have a 25-year term, including a grace period of 5 years.

14. The loan became effective on 24 August 2009. The closing date is 30 June 2014. The Provincial Finance Bureau is responsible for: 1) loan lending and disbursement; 2) loan re-lending to each IA; 3) preparing disbursement documents, loan record and reporting on disbursement and account balance. The Finance Bureau has established the impress account.

15. The Project investment of the Heilongjiang Component of the Songhua River Basin Water Pollution Control and Management Project is estimated to be approximately \$196 million equivalent, including taxes and duties with a breakdown shown in **Table 3**.

**Table 3: Cost Estimates**

Component	Cost (\$ M)
<b>A. Basic cost</b>	
Water Supply	19.4
Waste Water Treatment	132.5
<b>Sub-total</b>	<b>151.9</b>
<b>B. Capability Development and Institutional Strengthening</b>	<b>1.40</b>
<b>C. Contingencies</b>	
Physical	12.2
Price	20.2
<b>Sub-total</b>	<b>32.4</b>
<b>D. Financial Charges during Implementation (IDC)</b>	<b>10.5</b>
<b>Total (A+B+C+D)</b>	<b>196.0</b>

Sources: ADB, PAM, September 2009.

NREM International Inc.: "PPTA Final Report: Songhua River Basin Water Pollution Control and Management Project", August 2008.

**Table 4: Allocation of Loan Proceeds by Subproject**

Subproject	PIA	Allocation
Fujin City Water Supply Expansion and Fujin City WWTP	Fujin City Zhongfu Water Supply Company Limited	\$3,500,000
Tangyuan County Water Supply	Tangyuan County Water Supply Company	\$3,170,000
Tonghe County Water Supply Expansion	Tonghe County Water Supply and Drainage Company	\$4,000,000
Yanshou County Water Supply Expansion	Yanshou County Water Supply Company	\$3,000,000
Fangzheng County WWTP	Fangzheng County Water Supply and Drainage Company	\$3,500,000
Fujin City WWTP	Fujin City Zhongfu Water Supply Co., Ltd.	\$ 4,000,000
Harbin City Xinyigou District WWTP	Harbin City Inland River Comprehensive Development Company	\$33,700,000
Jiamusi City East District WWTP and Effluent Reuse	New Era Urban Infrastructure Construction Investment Jiamusi Company Limited	\$5,000,000
Luobei County WWTP	Luobei County Drainage Management Division, Luobei County Housing and Urban and Rural Construction Bureau	\$5,000,000
Mudanjiang Sewerage Network Improvement	Mudanjiang City Urban Drainage and Sewerage Project Management Department, under the Mudanjiang Drainage Bureau	\$9,000,000
Nenjiang County WWTP and Sewerage Network	Nenjiang County Water Supply Company	\$4,000,000

Subproject	PIA	Allocation
Qiqihar City WWTP (Phase II)	Qiqihar City Hecheng Wastewater Treatment Company Limited	\$14,000,000
Qitaihe City Effluent Reuse	Qitaihe City Qingyuan Drainage Company Limited	\$6,000,000
Shuangyashan City WWTP	Shuangyashan City Changyuan Drainage Company Limited	\$10,130,000
Tangyuan County WWTP	Tangyuan County Xingyuan Urban Construction Investment Company Limited	\$6,000,000
	<b>TOTAL</b>	<b>\$110,500,000</b>

Note: The approved loan amount is \$100 million. The contract prices will be lower than the loan allocations. The final allocations will be adjusted to be consistent with the approved loan amount of \$100 million.

## 2.3 Financing Plan

16. The ADB loan is budgeted to finance 51% of the Project cost including the contingencies and financial charges during the implementation. The remaining cost of the Project is financed locally in the PRC through State Bonds, local governments, private sectors, water tariffs, wastewater treatment fees and domestic loans from the PRC banks. HPG has issued a commitment letter confirming that the counterpart funds including the equity injection will be available for the Project. Sources of financing are shown in **Table 5**.

**Table 5: Financing Plan (million US dollar)**

Sources	Amount	Percentage (%)
A. ADB Loan	100.0	51.0
B. State Bonds	46.4	23.7
C. Local Government	44.6	22.8
D. Private Sector	3.4	1.7
E. Others	1.6	0.8
<b>Total</b>	<b>196.0</b>	<b>100.0</b>

Sources: ADB, PAM, September 2009.

ADB, "RRP: Songhua River Basin Water Pollution Control and Management Project", November 2008.

## 2.4 Flow of Funds and Onlending Arrangements

17. The flow of funds and relending arrangements are shown in **Figure 1**.

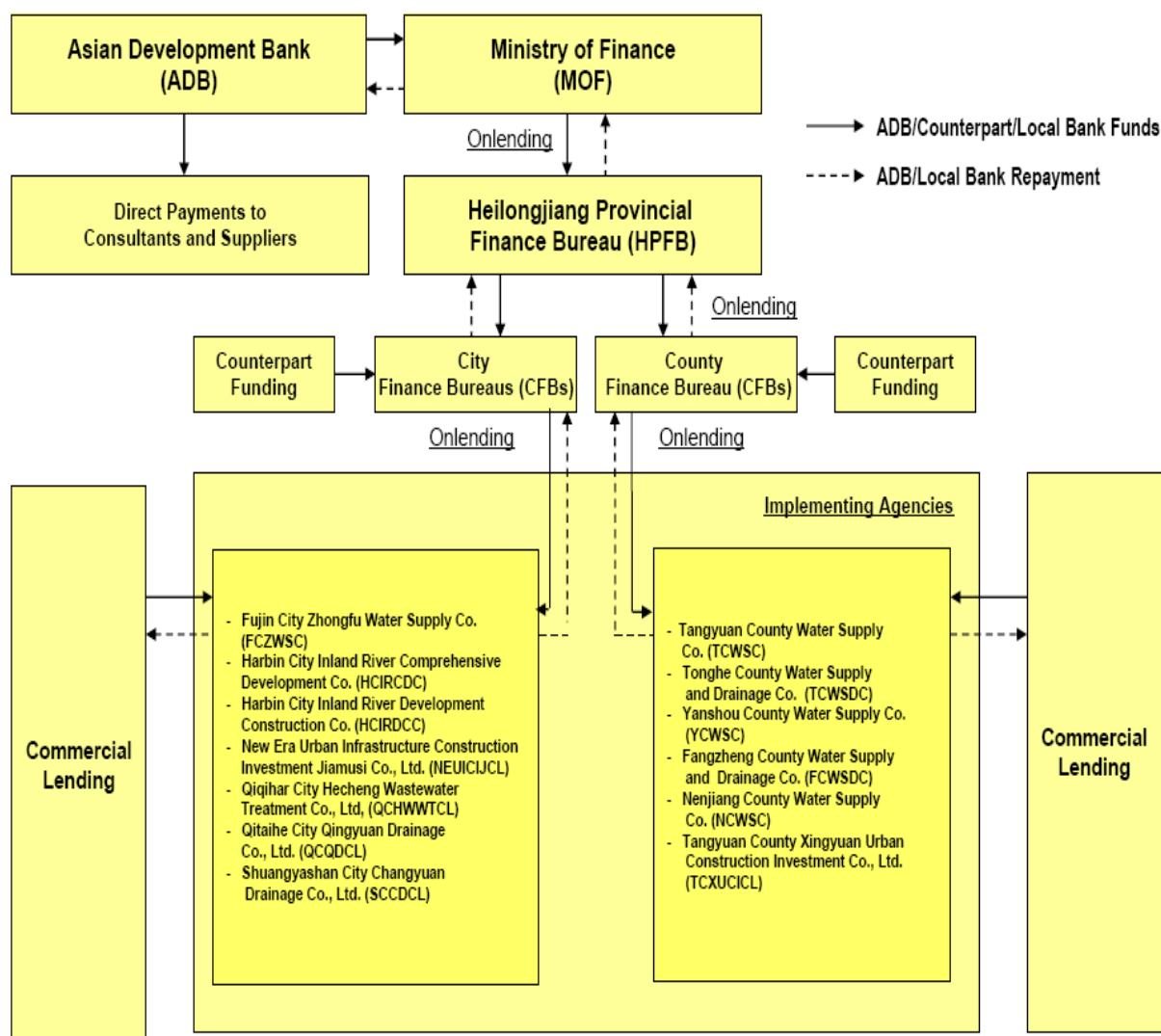


Figure 1: Flow of Funds and Onlending Arrangements

## 2.5 Implementation Arrangements

18. The Heilongjiang Provincial Government (HPG) is the executing agency (EA) for the Heilongjiang Component. The Project Leading Group (PLG) established by the HPG provides overall policy guidance, facilitate inter-agency coordination, and resolves any institutional problems affecting project implementation of the Heilongjiang Component. The PLG is chaired by a Vice Governor and is consisted of members from Heilongjiang Provincial Development and Reform Commission (HPDRC), Heilongjiang Provincial Finance Department (HPFD), Heilongjiang Provincial Audit Bureau, and Heilongjiang Provincial Environmental Department.

19. All of the IAs are limited liability companies incorporated under the PRC company law. A board of directors oversees the financial and operational matters of each IA including (i) hiring/firing of senior management, (ii) reviewing staffing and remuneration plans, (iii) reviewing the progress of construction and approving annual construction plans, (iv) reviewing and approving annual financial budgets, (v) reviewing the investment plans and accounts of the IAs, and (vi) approving the procurement of major equipment and civil works contracts.

20. The IAs retain the services of design institutes, procurement agencies and construction supervision companies to assist in the implementation activities. The PMOs and IAs have a number of staff trained in project management and relevant ADB procedures during implementation of the Project.

### 1.1.1 Heilongjiang Project Management Office (PMO)

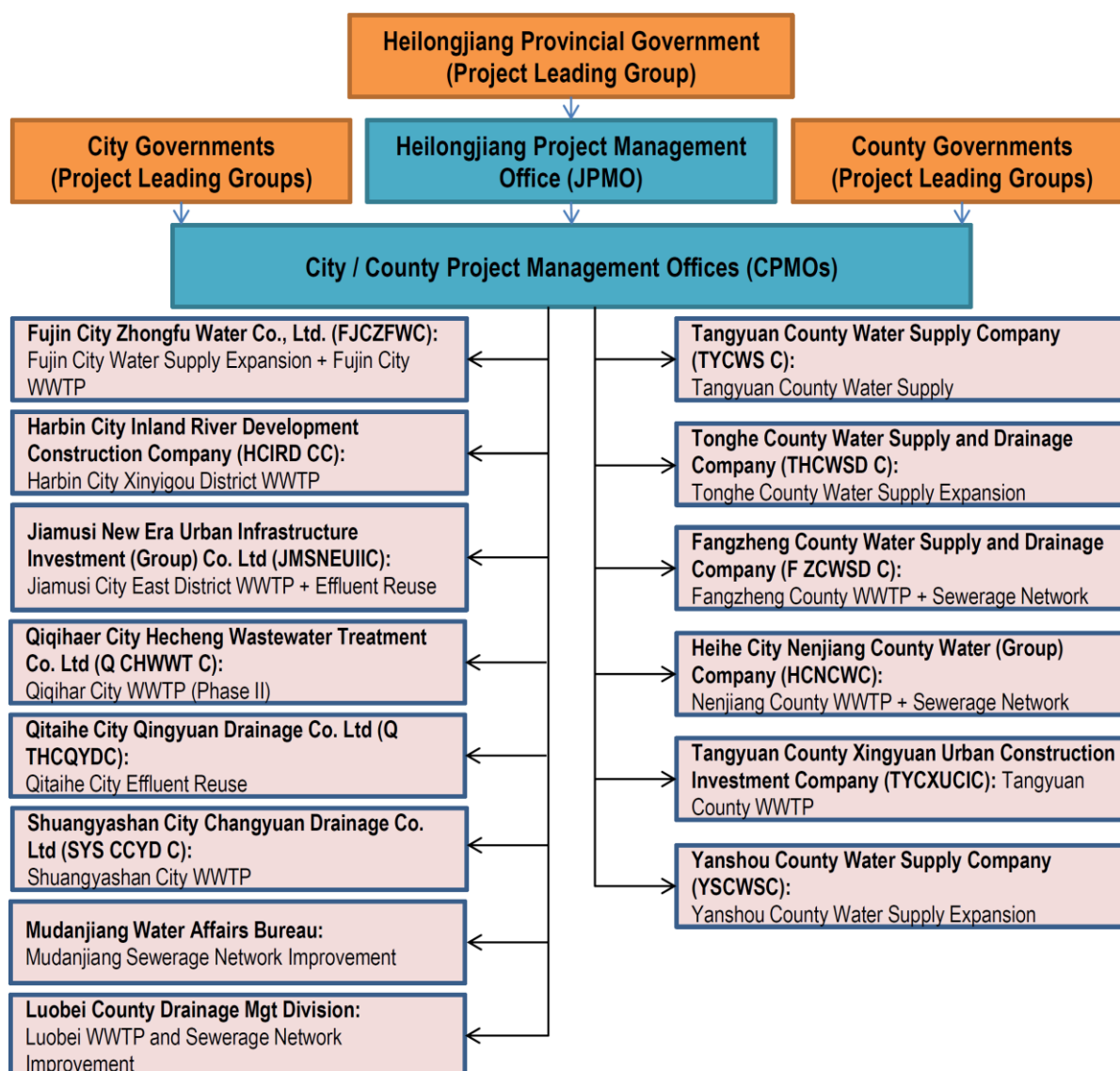
21. The PMO established by the HPG, led by a Director and equipped with sufficient staff is responsible for daily implementation work. The Project counties and cities governments have set up local project management offices (county/city PMOs) with the similar organizational structures chaired by their vice mayors. Responsibilities of the county/city PMOs include interdepartmental coordination in each county or city and working closely with the Heilongjiang PMO at the provincial level.

### 1.1.2 Implementation Agencies

22. The following IAs are responsible for day-to-day implementation activities of the Heilongjiang Component:

- ✧ Fujin City Zhongfu Water Supply Co., Ltd. for Fujin City Water Supply Expansion + Fujin City WWTP;
- ✧ Tangyuan County Water Supply Co. for Tangyuan County Water Supply;
- ✧ Tonghe County Water Supply and Drainage Co. for Tonghe County Water Supply Expansion;
- ✧ Yanshou County Water Supply Co. for Yanshou County Water Supply Expansion;
- ✧ Fangzheng County Water Supply and Drainage Co. for Fangzheng County WWTP;
- ✧ Harbin City Inland River Comprehensive Development Co. for Harbin City Xinyigou District WWTP;
- ✧ Luobei County Drainage Management Division, Luobei County Housing and Urban and Rural Construction Bureau for Luobei County WWP;
- ✧ Mudanjiang City Urban Drainage and Sewerage Project Management Department, under the Mudanjiang Drainage Bureau for Mudanjiang Sewerage Network Improvement;

- ✧ New Era Urban Infrastructure Construction Investment Jiamusi Co., Ltd. for Jiamusi City East District WWTP + Effluent Reuse;
- ✧ Nenjiang County Water Supply Co. for Nenjiang County WWTP + Sewerage Network;
- ✧ Qiqihar City Hecheng Wastewater Treatment Co., Ltd. for Qiqihar City WWTP (Phase II);
- ✧ Qitaihe City Qingyuan Drainage Co., Ltd. for Qitaihe City Effluent Reuse;
- ✧ Shuangyashan City Changyuan Drainage Co., Ltd. for Shuangyashan City WWTP; and,
- ✧ Tangyuan County Xingyuan Urban Construction Investment Co., Ltd. for Tangyuan County WWTP.



**Figure 2: Implementation Arrangements**



### **3. Description of the Environment**

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23. Heilongjiang Province lies in the northeast of the PRC, at the highest latitudes and the northernmost end of the country. It neighbours the Russian Federation across the Heilongjiang and Wusuli rivers running in its north and east, respectively; in the west, it adjoins the Inner Mongolia Autonomous Region; and to its south is Jilin Province. The province covers an area of 454,000 km<sup>2</sup>, accounting for 4.7% of the nation's total. Under its jurisdiction are 13 prefectures and cities, 66 counties and county-level cities, 1,211 townships (towns), and 14,488 villages.

#### **3.1 Meteorology**

24. Heilongjiang has a continental monsoon, subarctic climate. Winters are long and frigid, with the lowest average temperature of –28°C to –18°C in January, and summers are short and cool with an average of 18°C to 23°C in July. Annual average temperatures range from –4°C to 4°C. The temperature difference between the northern and southern parts of the province is 8°C. The annual average rainfall is 500 to 600 millimeters (mm), concentrated in the summer months.

#### **3.2 Topography**

25. The topography of Heilongjiang Province is characterized by mountains in the northwest, north, and the southeast, and lowland in the northeast and southwest. In its northwest are the Greater Hinggan Mountains, and in the north, the Lesser Hinggan Mountains. In the southeast are the ridges of Zhangguangcai, Laoye, and Taiping, in addition to the Wanda Mountains. The Nenjiang and Songhua rivers run across the province from south to north, forming the Sanjiang (“three rivers”) Plains in the northeast and the Songhua–Nenjiang Plains in the southwest. The well-known Xingkai Lake lies in the southeast. Hills and mountainous areas, with heights ranging from 300 to 1,780 meters (m) above sea level, account for 70% of the total land mass of the province. Plains, lying 50–250 m above sea level, make up about 30% of the total area.

#### **3.3 Hydrology**

26. The Songhua River originates from two main sources, the Nenjiang and Second Songhua rivers, which meet near Songyuan to form the Songhua River. From this confluence, the Songhua River flows easterly to join the Heilongjiang River on the boundary between the Russian Federation and the PRC. About 54% (300,000 km<sup>2</sup>) of the area is in the Nenjiang River catchment area and 13% (73,000 km<sup>2</sup>) in the Second Songhua catchment area. The remaining 33% (184,000 km<sup>2</sup>) is immediately adjacent to the Songhua River main channel. The average annual rainfall in the SRB is low, varying from less than 400 mm in the west to more than 800 mm in the east. Most rainfall occurs in June–September, and average rainfall in a wet year may be three times that in a dry year.

27. The SRB is demarcated by three mountain ranges—the Greater Hinggan Mountain Range, which lies along the west and southwest border of the basin in Inner Mongolia; the Lesser Hinggan Mountain Range, which limits the north and northeast part of the basin; and the Changbaishan Mountain Range, which serves as the divide for the south and southeast part of the basin. The forest cover in these ranges provides good protection for the water resources of the area and the cascade multipurpose reservoirs developed along the Second Songhua River. The other significant landforms are the Songhua–Nenjiang and Sanjiang floodplains.

### 3.4 Ecological Resources

28. In 1999 and 2001, the Government of the PRC selected Jilin and Heilongjiang provinces to become two of the country's three experimental "ecological provinces," acknowledging their rich biodiversity and potential for sustainable management of natural resources.

29. Heilongjiang Province has 44.37 million hectares (ha) of soiled land with rich organic matter, of which 40% is suitable for farming. It is known as one of the world's three major black-soil zones—67.6% of its total farmland of 11.80 million ha is cultivated on black soil, marshland, or black calcium soil. Furthermore, the province has 4.33 million ha of pastures and 4.793 million ha of farmland reserves. Heilongjiang ranks first among the PRC provinces in farmland and forest area, seventh in pasture area, and second in farmland reserves. Its total farmland area and land reserves together account for one tenth or more of the country's total. The average per-capita farmland and the average per-capita area of farmland operated by individual farmers are three times the country's average. With 41.9% of its land covered with forest, Heilongjiang ranks first among all the PRC provinces in forested area, forest resource reserves, and timber output. The province has the largest forest industry in the country, occupying a very important position in the PRC's forest ecosystems. It is the most important state-owned forest area and the largest timber center in the PRC. In its forests are more than 100 species of trees, including 30 of high use value. Natural forests are mainly distributed in the Greater and Lesser Hinggan Mountains and the Changbaishan Mountains.

30. Forests in the SRB are mostly secondary-growth and man-made. The forest resources include larch, lime, mulberry, birch, Korean pine, spruce, Manchurian ash, camphor, and other economically valuable trees. Shrubs include hazel, *M. baccata Borkh*, wild siris (*Albizia kalkora Prain*), and wild rose. Grasses include five-flowered herbosa, meyer sedge (*Carex meyeriana Kunth*), little-leaf camphor and reeds. Wild fruits include grapes, wild pears, walnuts, hazelnuts, and pine nuts. Edible wild herbs include brake, needle-beard edible fungi, and day lily.

31. Fauna found in the SRB includes bears, wild boar, deer, foxes, and wolves. Common wild animals include squirrels, chipmunks, hares, voles, frogs, and snakes. Bird species include chickadees, magpies, cuckoos, bulbuls, pheasants, and owls. Fish species include carp, pike, spotted silver carp, loach, catfish, northern grunter, willow-root fish, calabash fish, grass-root fish and other cold-water species. Livestock breeding plays an important role in the agricultural economy. Domesticated animals and poultry include cattle, horses, mules, donkeys, pigs, sheep, rabbits, dogs, chickens, and geese.

32. Heilongjiang province is nationally important commodity grain and soybean producers. In the agricultural areas, the main farm crops are corn, soybean, paddy rice, wheat, barley, and sorghum. Other important crops are beans, sugar beet, flax, and tobacco.

### 3.5 Water Quality and Pollution

33. Because of rapid population growth, industrialization, and urbanization, the Songhua River is heavily polluted, primarily by organic pollutants. A basin-wide water quality assessment made in 2005 indicated that 34% of the monitored sections had water quality at or below the class V of the *PRC Surface Water Quality Standard (GB3838-2002)*; this percentage jumps to 45% during the low-flow, frozen season. The tributaries with pronounced pollution include the Hulan, Anbang, Namo'er, Huifa, Yinma, Yitong, Ashi, Woken, and Mudanjiang rivers, whose water quality is class V. These tributaries contribute significantly to pollution in the mainstream Songhua.

34. In the SRB, there are 48 major drinking water supply source areas that serve a total population of about 13.9 million. These include 32 surface water supply source areas, which account for about 90% of the volume of water supply in the basin, and 16 groundwater supply source areas, which account for the remaining 10%. In the past few years, a number of drinking water supply sources—such as the Sifangtai Water Supply Source Area for Harbin City in Heilongjiang Province, Hailong Reservoir for Meihekou in Jilin Province, and Zhuo'erhe River for Xing'an Prefecture in the Inner Mongolian Autonomous Region—have experienced water pollution, which threatens the safety of the drinking water supply.

35. The major water pollutants in the SRB include potassium permanganate index, ammonia nitrogen ( $\text{NH}_3\text{-N}$ ), total phosphor (TP), oils, and chemical oxygen demand (COD). Water quality at four state-monitored sections does not meet the prescribed standards for designated uses. During the 10th FYP (2001–2005) period, water quality in the mainstream Songhua deteriorated further, as the pollutants discharged in the SRB increased yearly. By 2005, the volume of wastewater discharged in the SRB amounted to 1.98 billion cubic meters ( $\text{m}^3$ ), and COD 784,000 tons, making the SRB the largest recipient of organic pollution among the PRC's top seven river basins. The seven largest cities in the SRB, including Harbin, Changchun, Mudanjiang, Qiqiha'er, Daqing, and Jiamusi, each discharged more than 100 million  $\text{m}^3$  of wastewater yearly. They accounted for 68% of the COD discharged in the entire basin.

36. As expected, water pollution is more pronounced in sections passing by or through urbanized areas, indicating that municipal sewage is a primary source of pollution. In fact, urban sewage accounts for about 60% of the total wastewater discharged by volume in the entire SRB. However, sewage treatment facilities seriously lag behind. At the end of 2004, only 14 wastewater treatment plants (WWTPs), with a total capacity of 1.57 million cubic meters per day ( $\text{m}^3/\text{d}$ ) and actual treatment of 0.70 million  $\text{m}^3/\text{d}$ , were operating. The rate of sewage treatment stood at less than 15%. For large cities with a population of more than 500,000, including Harbin, Changchun, Daqing, and Mudanjiang, the sewage treatment rate was below 40%. Most, if not all, medium-sized and small cities and towns discharge their raw sewage directly into the river, becoming the major sources of pollution for the Songhua.

37. As part of the SRBPCMP, pollution source and water quality monitoring in the SRB is being strengthened to cover the major polluters and sections. Online 24-hour monitoring equipment will be installed at more than 200 of the most polluting enterprises to closely monitor their effluent discharges. Provincial and key municipalities will have the equipment to regularly monitor toxic substances. Environmental monitoring stations at the county level will be fitted with monitoring equipment that will meet national standards. The existing 41 state-controlled monitoring stations in the SRB will be consolidated into 28, and 10 automated water quality stations will be established. This basin-wide complete monitoring network, the first of its kind in the PRC, is expected to be operating by the end of the 11th FYP (2010), providing full coverage and simultaneous monitoring of the drinking water supply sources and interprovincial and inter-municipal waterways in the SRB.

38. An environmental emergency response system is taking shape in the SRB. The system meets the standards prescribed in the *National Environmental Emergency Response Plan (2006)*<sup>1</sup>. The system entails command, coordination, response, and decision making. It is led by the Ministry of Environmental Protection, and involves the State Council Emergency Response Office; the Ministries of Communications, Public Security, Water Resources, and Construction; the State Safety Supervision Administration and the State Meteorological

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<sup>1</sup> State Environmental Protection Administration. 2006. *National Environmental Emergency Response Plan*. Beijing, PR China.

Administration; and their provincial and municipal counterparts. Drill exercises are conducted regularly.

### **3.6 EIA Classification**

39. The Project was assessed during the TA fact-finding as environmental “Category A”. A summary of the environmental impact assessment (SEIA) was posted at the ADB website on 11 July 2008.

40. The Chinese EIAs were prepared by certified EIA institutes. They were prepared in accordance with relevant laws, regulations, and standards applicable in PRC and following ADB *Environment Policy (2002)* and *Environmental Assessment Guidelines (2003)*. All of the subcomponent EIAs were approved by the relevant environmental administrative authorities.

## 4. Implementation Progress

### 4.1 Final Project Scope

41. The Heilongjiang component was originally scheduled to include 13 subcomponents (4 water supply subprojects and 9 wastewater treatment subprojects) at the commencement of the Songhua River Basin Water Pollution Control and Management Project in Heilongjiang Province.

42. The Project has some savings that are used for financing additional two subcomponents: i) Mudanjiang Sewerage Improvement; and ii) Luobei County WWTP. The two subcomponents are located within the Songhua River Basin. With consultations with National Development and Reform Commission, relevant provincial management departments and ADB, an evaluation on adding the two subcomponents was conducted according to the requirements by ADB, and an analysis on the project variation and capital re-allocation adjustment was conducted. The total amount of investment on the two additional subcomponents is in line with the amount of savings from the Heilongjiang component of the Songhua River Project.

43. As a result, the updated scope of the Heilongjiang component consists of 15 subprojects (4 water supply subcomponents and 11 wastewater treatment subcomponents) as shown in **Table 6**. The subcomponent of Fujin City Water Supply Expansion (listed as Subcomponent #1 in **Table 6**) was cancelled in consideration of the sufficiency of domestic funding and other construction constraints. For Fujin City WWTP (listed as Subproject #6 in **Table 6**) from 20,000 m<sup>3</sup>/d into 15,000 m<sup>3</sup>/d. Now all subprojects have been completed and the finalized scope is as follows:

**Table 6: Summary of Final Scope of Subcomponents**

No.	Subcomponent	Key Subcomponent Components
	Water Supply	
1	Fujin City Water Supply Expansion (Fujin City Zhongfu Water Supply Co.)	(Cancelled)
2	Tangyuan County Water Supply (Tangyuan County Water Supply Co.)	<ul style="list-style-type: none"> <li>• Design capacity: 10,000 m<sup>3</sup>/d</li> <li>• Present operating capacity: 10,000 m<sup>3</sup>/d</li> <li>• Pipes: 16.48 km</li> <li>• Wells: 5</li> <li>• Pump station: 1</li> <li>• Date of completion / trial operation: 2012.02</li> </ul>
3	Tonghe County Water Supply Expansion (Tonghe County Water Supply and Drainage Co.)	<ul style="list-style-type: none"> <li>• Design capacity: 9,500 m<sup>3</sup>/d</li> <li>• Present operating capacity: 10,000 m<sup>3</sup>/d</li> <li>• Pipes: 26.76 km</li> <li>• Wells: 6</li> <li>• Pump stations: 6</li> <li>• Date of completion / trial operation: 2012.12</li> </ul>
4	Yanshou County Water Supply Expansion (Yanshou County Water Supply Co.)	<ul style="list-style-type: none"> <li>• Design capacity: 10,000 m<sup>3</sup>/d</li> <li>• Present operating capacity: 10,000 m<sup>3</sup>/d</li> <li>• Pipes: 39.73 km</li> <li>• Wells: 0</li> <li>• Pump station: 0</li> <li>• Date of completion / trial operation: 2011.12</li> </ul>

	WWTP	
5	Fangzheng County WWTP + Sewerage Network (Fangzheng County Water Supply and Drainage Co.)	<ul style="list-style-type: none"> <li>• Design capacity: 6,00 m3/d</li> <li>• Present operating capacity: 6,000 m3/d</li> <li>• Sewers: 24.29 km</li> <li>• Date of completion / trial operation: 2013.03</li> </ul>
6	Fujin City WWTP (Fujin City Zhongfu Water Supply Co.)	<ul style="list-style-type: none"> <li>• Design capacity: 20,000 m3/d</li> <li>• Present operating capacity: 15,000 m3/d</li> <li>• Sewers: 0 km</li> <li>• Date of completion / trial operation: 2010.12</li> </ul>
7	Harbin City Xinyigou District WWTP (Harbin City Inland River Comprehensive Development Co.)	<ul style="list-style-type: none"> <li>• Design capacity: 100,000 m3/d</li> <li>• Present operating capacity: 82,000 m3/d</li> <li>• Sewers: 22.00 km</li> <li>• Date of completion / trial operation: 2013.11</li> </ul>
8	Jiamusi City Effluent Reuse (New Era Urban Infrastructure Construction Investment Jiamusi Co., Ltd.)	<ul style="list-style-type: none"> <li>• Design capacity: 40,000 m3/d</li> <li>• Present operating capacity: not yet operational</li> <li>• Sewers: 5.00 km</li> <li>• Date of completion: 2011.05</li> <li>• Date of trial operation: Q1/2016 (planned)</li> </ul>
9	Luobei County WWTP (Luobei County Drainage Business Management Division)	<ul style="list-style-type: none"> <li>• Design capacity: 10,000 m3/d</li> <li>• Present operating capacity: 10,000 m3/d</li> <li>• Sewers: 23.13 km</li> <li>• Date of completion / trial operation: 2012.02</li> </ul>
10	Mudanjiang Urban WWTP Phase II & Intercepting Drainage Pipeline Network (Mudanjiang City Water Affairs Bureau)	<ul style="list-style-type: none"> <li>• Sewers: 39.00 km</li> <li>• Date of completion / trial operation: 2014.12</li> </ul>
11	Nenjiang County WWTP + Sewerage Network (Nengjiang County Water Supply Co.)	<ul style="list-style-type: none"> <li>• Design capacity: 15000 m3/d</li> <li>• Present operating capacity: 15,000 m3/d</li> <li>• Sewers: 20.80 km</li> <li>• Date of completion / trial operation: 2013.12</li> </ul>
12	Qiqihaer City WWTP (Phase II) (Qiqihaer City Hecheng Wastewater Treatment Co., Ltd.)	<ul style="list-style-type: none"> <li>• Design capacity: 100,000 m3/d</li> <li>• Present operating capacity: 100,000 m3/d</li> <li>• Sewers: 2.50 km</li> <li>• Date of completion / trial operation: 2010.12</li> </ul>
13	Qitaihe City Effluent Reuse (Qitaihe City Qingyuan Drainage Co., Ltd.)	<ul style="list-style-type: none"> <li>• Design capacity: 40,000 m3/d</li> <li>• Present operating capacity: 40,000 m3/d</li> <li>• Sewers: 8.50 km</li> <li>• Date of completion / trial operation: 2012.10</li> </ul>
14	Shuangyashan City WWTP (Shuangyashan City Changyuan Drainage Co., Ltd.)	<ul style="list-style-type: none"> <li>• Design capacity: 50,000 m3/d</li> <li>• Present operating capacity: 50,000 m3/d</li> <li>• Sewers: 0 km</li> <li>• Date of completion / trial operation: 2012.02</li> </ul>

15	Tangyuan County WWTP (Tangyuan County Xingyuan Urban Construction Investment Co., Ltd.)	<ul style="list-style-type: none"> <li>• Design capacity: 10,000 m<sup>3</sup>/d</li> <li>• Present operating capacity: 10,000 m<sup>3</sup>/d</li> <li>• Sewers: 32.12 km</li> <li>• Date of completion / trial operation: 2011.06</li> </ul>
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## 4.2 Dates of Subproject Completion

44. The Project was scheduled to be implemented over a period of 5 years from 2009 to 2013 inclusive, although some of the subcomponents are planned for earlier completion. The implementation period was established based on the scope of project work, the duration of time required for complying with the central and local governmental regulations and procedures, and the constraints of construction work conditions. The actual implementation schedule is shown as follows:

**Table 7: Project Completion Dates**

<b>Subproject</b>	<b>Completion Date</b>
Fujin City Water Supply Expansion	Cancelled
Tangyuan County Water Supply	2012.02
Tonghe County Water Supply Expansion	2012.11
Yanshou County Water Supply Expansion	2011.12
Fangzheng County WWTP	2013.03
Fujin City WWTP	2010.12
Harbin City Xinyigou District WWTP	2013.11
Luobei County Fengxiang Town Drainage and WWTP	2011.05
Mudanjiang Sewerage Improvement	2014.03
Jiamusi City Effluent Reuse	2014.12
Nenjiang County WWTP	2013.12
Qiqihaer City WWTP (Phase II)	2012.12
Qitaihe City Effluent Reuse	2012.10
Shuangyashan City WWTP	2010.12
Tangyuan County WWTP	2011.06





## **5. Implementation of the EMP**

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### **5.1 Objectives**

45. The objective of establishing an EMP is not only to propose appropriate mitigation measures, but also to recommend establishment of institutions or mechanisms to monitor and ensure compliance with environmental regulations and implementation of the proposed mitigation measures. Such institutions and mechanisms will seek to ensure continuously improving environmental protection activities during preconstruction, construction, and operation in order to prevent, reduce, or mitigate adverse impacts. The EMP drew on the individual EIA reports and on the PPTA discussions and agreements with the relevant government agencies.

46. An evaluation of the implementation of the EMP is summarized in the following sections.

### **5.2 Implementation of Mitigation Measures**

47. The important aspects of the implementation of mitigation measures are highlighted as follow.

#### **1) Environmental Clauses in Civil Works Contracts**

48. All civil works contracts contain provisions on workers' and community, environmental protection and protection of physical and cultural relics. The environmental clauses are summarized below.

##### Workers' and Community Safety

49. The contractor will take precautionary measures to ensure workers' safety. Protective equipment will be worn at all times for any person entering the construction site. Safety training shall be undertaken for workers and staff. In case of bodily harm to any worker, the contractor will have full responsibility for medical care and compensation according to PRC labour law. The contractor will also be responsible for any bodily harm and property damage caused by construction activities on site or in the vicinities, including land occupation.

50. The contractor is required to strengthen safety management, especially in regard to the use of flammables, explosives, toxic and corrosive substances. Before the start of construction, the contractor shall submit to the independent construction supervision agency an emergency preparedness and response plan.

##### Environmental Protection

51. The contractor will comply with all relevant laws and regulations on environmental protection, and will take precautionary measures to minimize any potential impact on the environment. It will be responsible for restoring and rehabilitating the environment to its original state at its own costs. An environmental management plan (EMP) with mitigation measures will be prepared and submitted to the construction supervision agency for approval before the commencement of construction.

52. The contractor will treat and dispose its construction wastewater, sewage from workers' camps and solid wastes properly so as not to cause any damage to the environment, drinking water sources and public health. The disposal of spoils and solid wastes shall not obstruct flood ways and risk public safety. All slopes shall be protected with retention walls, proper drainage systems and vegetation to avoid geological hazards. Noise,

dust, air emissions, wastewater and waste oils will be controlled to minimize annoyance to local communities.

#### Physical and Cultural Relics

53. All physical and cultural relics discovered at the construction sites are owned by the state. The contractor will report any such discoveries immediately to the local relics protection authority and in the meantime immediately inform the construction supervision agency. The contractor shall take effective measures to protect the unearthed physical and cultural relics. The contractor will be held responsible for any loss of damage to the discovered relics, and prosecuted for any delayed and fraudulent reporting.

## **2) Pollution Control Measures**

#### Construction Wastewater

54. The major pollutant in construction wastewater is suspended solids. At the construction sites, natural and constructed settlement ponds are used to retain the sediments in the construction wastewater before they are discharged into municipal storm sewers. The settlement ponds are cleaned when they are filled up with sediments. Tires of construction vehicles are cleaned with water sprays before they leave the construction site. The construction camps are located in rural and peri-urban areas. Septic tanks are used to treat the sewage.

#### Air Pollution Control

55. The major sources of air emissions are construction equipment and construction vehicles. The vehicles delivering granular and/or fine materials to the sites are covered with tarpaulin sheets. Overloading of these vehicles has been avoided. Vehicle speeds are controlled on construction sites. All construction vehicles are certified by the transportation bureau to meet the applicable emissions standards. Besides, construction contractors are required to undertake proper maintenance of vehicles and diesel equipment, and avoidance of unnecessary running of vehicle and equipment engines.

56. All the roads on the construction sites are sprayed by water trucks to suppress dust, according to a daily schedule and taking weather conditions into consideration. These roads are kept clean, solid, smooth, and clear of all dust, mud, or extraneous materials dropped from transportation vehicles. The construction sites are enclosed by the appropriate walls and sprayed with water twice a day. Dust suppression equipment has been installed in concrete-batching plants. Materials storage sites are sited 300 m from residential areas. The materials in the storage site are organized, such as separate stone and sand materials; store concrete in separate storage place and reduce the on-site storage time of the construction. The transportation distance from the storage site to the construction site has been optimized to minimize disturbance to local communities.

57. When construction takes places during dry and windy days, water is sprayed on earth piles and exposed surfaces to suppress dust. Construction is suspended during strong winds and the stockpile be covered. Tires of construction vehicles are also cleansed before the vehicles leave the construction site.

#### Noise Control

58. Construction facilities and equipment will include bulldozers, air picks, air compressors, excavators, graders, stabilizers, concrete mixers, drills, stone-crushing and screening, rollers, poker vibrations, concrete pumps, loading machines, and other heavy machineries. The noise intensity levels of these machines are listed below.

**Table 8: Noise Intensity of Heavy Machines on Construction Sites**

Machinery	Noise Level	Machinery	Noise Level
Bulldozer	78~96		
Concrete-mixer	75~88		
Air hammer	80~98	(≥ten tons)	85~94
Concrete-crushing machine	80~90	Excavator	80~93

Unit: dB(A).

59. It is estimated that noise intensity from these activities are in the range of 75~105 dB (A). The noise levels can be calculated according to the noise source intensity and distance from the noise source. The results are shown below.

**Table 9: Projected Results of Noise Attenuation of Main Point Sources**

Noise Source		Distance From Noise Intensity (m)					Limit	
Machine	Noise Intensity	10	50	100	200	300	Day	Night
Bulldozer	78~96	58~76	44~62	38~56	32~50	28.5~46.5	75	55
Concrete-mixer	75~88	55~68	41~54	35~48	29~42	25.5~38.5	75	55
Air hammer	80~98	60~78	46~64	40~58	34~52	30.5~38.5	65	55
Concrete-crushing machine	80~90	60~70	46~56	40~50	34~44	30.5~40.5	75	55
	95~105	75~95	61~71	55~65	49~59	45.5~55.5	75	55
Hoist roller	75~88	55~68	41~54	35~48	29~42	25.5~38.5	70	55
Compressor	85~94	65~74	51~60	45~54	39~48	35.5~44.5	75	55
Cargo truck								
Excavator	80~93	60~73	46~59	40~53	34~47	30.5~43.5	65	55

Note: i) The data in the table represents situation that the noise level of the outdoor work with no hoardings around the construction site. The sound reduction function of the hoardings is not considered in the calculation; ii) limit refers to the Noise Limits for Construction Site (GB12523-90); and iii) unit is dB(A).

60. The contractors have undertaken a series of measures to reduce noise levels. Equipment that generates low levels of noise has been selected, and all machinery is properly maintained to minimize noise. Noise reduction devices or methods (e.g., hoarding) have been applied where piling equipment is operating within 500 m of sensitive sites such as schools. Concrete-mixing plants and similar activities are located at least 300 m away from sensitive areas such as residences, schools, and hospitals. To reduce noise at night, the operation of machinery generating high levels of noise, such as piling, is restricted to between 6:00 a.m. and 10:00 p.m. in accordance with PRC regulations. The movement of heavy vehicles along urban and village roads has also been restricted to between 6:00 a.m. and 10:00 p.m.

#### Solid Waste Management

61. Small quantities of garbage from construction camps is collected by the municipal sanitation bureau and disposed of in the municipal sanitary landfill.

#### Soil Erosion Control

62. The civil works contractors have taken measures to control soil erosion. Soil erosion measures during construction include minimizing land surface disturbance and exposure and use of settlement ponds. For those projects whose construction is completed, the plants are re-vegetated proper landscaping.

63. The implementation status of the mitigation measures, as proposed in the SEIA, is presented in the right column of the **Table 9** (this table and the tables for this chapter thereafter are placed at the end of this chapter). In summary, the mitigation measures have to date been implemented effectively. Site inspections showing the status of implementation can be found at the end of this report.

### 5.3 Implementation of Environmental Monitoring Program

64. Internal environmental monitoring consists of two types. The first type requires field sampling and lab analysis that is undertaken by a licensed environmental institute (LEI), for such environmental parameters such water quality, air quality and noise levels. The second type refers to visual inspections of such things as soil erosion, restoration of vegetation, solid waste disposal and so on. The field sampling and lab analysis has been conducted, according to the environmental monitoring program as stipulated in the SEIA, by the respective municipal environmental monitoring stations under contract to the IAs. Field inspections have been undertaken by the on-site environmental engineers (OEEs) of the contractors, EMU officers and PMO officers on a regular basis.

65. External monitoring is undertaken by the environmental safeguard specialists of the loan implementation consultancy. The external monitor is responsible for advising the PMOs, IAs, EMSs and construction contractors on the environmental monitoring requirements, reviewing the monitoring activities and results, and assisting the PMOs and IAs to meet the environmental reporting requirements.

66. The detailed results of field sampling and lab analysis are presented in the ensuing chapter. In summary, the environmental monitoring program has to date been implemented properly although the supply of information to the HPMO is delayed for some subprojects.

### 5.4 Implementation of Disclosure, Consultation and Grievance Redress

#### 1) Information Disclosure

67. A project information bulletin board has been erected at each construction site. The bulletin board contains a description about the project, layout map, construction safety, labour standards, environmental and health standards, name of the contractor(s) and names and contact information of the on-site managers and company executives.

#### 2) Public Consultation and Grievance Redress

68. The implementation status of the public consultation program, as proposed in the SEIA, is presented in the right column of the **Table 10**. In summary, the public consultation program has to date been implemented. Questionnaire surveys have been completed for some subprojects, and are planned for others.

69. At the beginning of project implementation, a grievance redress mechanism (GRM) was established. The environmental officers in PMOs and EMUs also serve as the grievance focal points (GFPs). The GFPs have visited construction sites on a regular basis. During the site visits, the GFPs have interviewed the local residents living near the construction sites. The informal interviews have focused on public complaints about community annoyances from construction activities, such as construction noise and dust, as well as public concerns about the environment and resettlement.

70. Contact information for the contractor and on-site project managers has been posted at each construction site (see above). Public complaints and concerns can also be channeled through the hotlines of local EPBs. During site visits, the loan implementation consultants met with local EPB officials who advised of no recipient of complaints.

71. According to information from the local EPBs, EMUs/IAs and OEEs/construction contractors, no complaint has been received through the formal grievance mechanisms (EPB hotline, and posted hotlines of construction contractors at the construction sites). The other consultation activities, including informal interviews during site visits and workshops, have received a series of comments and suggestions from the local residents. The results of consultations are summarized in **Table 10**.

## **5.5 Fulfilment of Environmental Responsibilities**

72. An environmental management system, consisting of inspection, monitoring, reporting, and initiating corrective actions or measures, was set up prior to project implementation. In the design stage, HPMO and IAs passed the EMP to the design institutes for incorporating mitigation measures into the detailed designs of the subprojects. The EMP was reviewed and confirmed at the end of the detailed design, and was finally passed onto selected contractors. To ensure that contractors will comply with the EMP's provisions, HPMO and IAs prepared and provided the following specification clauses for incorporation into the bidding procedures: (i) a list of environmental items to be budgeted by the bidders in their proposals; and (ii) environmental clauses for contract conditions and specifications.

73. EMUs were established within the IAs prior to the start of the project implementation. It is charged with the responsibility of coordinating and supervising the EMP implementation. The EMU is headed a deputy general manager of the IA. The IA has also recruited an environmental officer who also serves as the focal point for grievance redress. Meanwhile, the IAs have used the local environmental protection bureaus in supervising the environmental management system.

74. The status of fulfilment of environmental responsibilities is summarized in **Table 11**.

## **5.6 Status of Compliance with Loan Covenants**

75. All environmental safeguard provisions and covenants have been complied with. A summary is provided in **Table 12**.



**Table 10: Status of Implementation of Mitigation Measures**

Impact Factor/ Stage	Potential Impact and Issues	Mitigation Measures	Implementing Agency	Supervising Agency	Status of Implementation
<b>A. Pre-construction</b>					
1. EIAs and Feasibility Study Stage	Site and alignment selection	<ul style="list-style-type: none"> <li>The recommended sites and pipeline routes for the individual subprojects were selected from various alternatives to minimize adverse impact on the environment.</li> </ul>	Design institute and EIA institutes, IA	HPMO, HEPB, MEPB	Undertaken at EIA and FSR stage
	Treatment technology selection	<ul style="list-style-type: none"> <li>For each WWTP, three to five alternative treatment technologies were evaluated on the basis of predefined environmental and economic criteria.</li> </ul>	Design institute, EIA institutes, IA	HPMO, HEPB, MEPB	Undertaken at EIA and FSR stage
	Public consultations	<ul style="list-style-type: none"> <li>Two rounds of public consultations on environmental issues, poverty, and resettlement were conducted during the feasibility studies, and during EIA and SEIA preparation.</li> </ul>	EIA institutes, IA, PPTA consultants	HPMO, HEPB, MEPB	Undertaken at EIA and FSR stage
2. Design Stage	EMP updating	<ul style="list-style-type: none"> <li>Mitigation measures defined in each individual EMP will be reviewed, updated, and incorporated into the detailed design to minimize adverse environmental impact.</li> </ul>	Design institute, IA	HPMO, HEPB, MEPB	Undertaken at design stage
3. Biding and Construction Preparation	Bidding documents and contractors' qualifications	<ul style="list-style-type: none"> <li>Environmental provisions will be included in RFPs.</li> <li>An environmental section will be included in the TOR for bidders.</li> <li>Environmental clauses for contractors in reference to the EMP and monitoring plan will be included in the construction and supply contracts.</li> </ul>	Environmental management consultants or companies contracted by IA	HPMO, HEPB, MEPB	Undertaken at bidding and construction preparation stage
	Environmental operation and supervision manual	<ul style="list-style-type: none"> <li>Contractors will be required to prepare an environmental operation and supervision manual, for approval by IAs.</li> </ul>	Contractors	IA, HPMO, HEPB, MEPB	Undertaken at bidding and construction preparation stage
	Complaint and information office or appointed person	<ul style="list-style-type: none"> <li>A complaint and information office will be established or a responsible person appointed before the start of construction.</li> </ul>	Contractors	IA, HPMO	Undertaken at bidding and construction preparation stage

Impact Factor/ Stage	Potential Impact and Issues	Mitigation Measures	Implementing Agency	Supervising Agency	Status of Implementation
		<ul style="list-style-type: none"> <li>Staff at the office must be well trained to handle conflicts with residents arising from environmental impact.</li> </ul>			
	Environmental protection training	<ul style="list-style-type: none"> <li>Environmental specialists and HEPB and MEBP officials will be invited to provide training in the implementation and supervision of environmental mitigation measures to relevant persons, especially construction engineers and managers.</li> </ul>	HPMO	HPLG	Undertaken at bidding and construction preparation stage
	Resumption of land and property	<ul style="list-style-type: none"> <li>A resettlement office comprising local government officials will be established to manage the resettlement process.</li> <li>Community consultation programs will be conducted and information about entitlements based on PRC Land Administration Law disseminated.</li> <li>Resettlement activities must be reasonably completed before the start of construction on any subproject.</li> </ul>	IA	HPMO	Undertaken at bidding and construction preparation stage
<b>B. Construction Phase</b>					
1. Water	Wastewater from construction camps	<ul style="list-style-type: none"> <li>Sewage and other wastewater from construction camps will be collected and treated in septic tanks before being discharged to avoid contamination of the surrounding areas.</li> </ul>	Contractors	IA, OEE, IEM, HPMO, HPEB, MEPB	Septic tanks have been used to treat construction camp wastewater
	Spill of hazardous and toxic substances	<ul style="list-style-type: none"> <li>A construction materials handling protocol (e.g., storage away from watercourses and provision of retention areas to contain accidental spills of toxic, hazardous, and harmful construction materials such as caustic and acidic substances, oil and petroleum products, and asphalt materials) will be prepared and applied to prevent the pollution of soil and of surface water and groundwater.</li> </ul>	Contractors	IA, OEE, IEM, HPMO, HEPB, MEPB	Protocol is followed.
2. Air	Generation of dust	<ul style="list-style-type: none"> <li>Vehicles delivering granular or fine materials to the</li> </ul>	Contractors	IA, OEE, IEM,	Undertaken



Impact Factor/ Stage	Potential Impact and Issues	Mitigation Measures	Implementing Agency	Supervising Agency	Status of Implementation
		<p>sites must be covered.</p> <ul style="list-style-type: none"> <li>Materials storage sites must be 300 m from residential areas and covered or sprayed with water.</li> <li>Water will be sprayed on construction sites and access roads twice a day.</li> <li>All roads and pavements used by vehicles of the contractors, subcontractors, and suppliers will be kept clean and clear of all dust, mud, or extraneous materials left behind by the construction vehicles. Such cleaning must be completed regularly.</li> </ul>		HPMO, HEPB, MEPB	
	Emissions from vehicles and equipment	<ul style="list-style-type: none"> <li>Vehicle emissions must comply with GB18352-2005, GB17691-2005, GB11340-2005, GB3847-2005, and GB18285-2005.</li> <li>Equipment and machinery emissions must comply with GB16297-1996.</li> <li>A regular inspection and certification system will be initiated.</li> </ul>	Contractors	IA, OEE, IEM, HPMO, HEPB, MEPB	All vehicles are certified by local transportation bureau to comply with PRC emission standards.
3. Noise	Noise from equipment, vehicles, and plants	<ul style="list-style-type: none"> <li>Noise from equipment and machinery must comply with GB12523-1990.</li> <li>An adequate route will be provided for large trucks to keep them away from residential areas.</li> <li>At construction sites within 500 m of the nearest habitation, noisy construction work will be stopped between 10 p.m. and 6 a.m. the next day.</li> </ul>	Contractors	IA, OEE, IEM, HPMO, HEPB, MEPB	All equipment is certified to comply with PRC standards; trucks are kept away from residential areas; and construction is suspended during night time if close to residential areas.
4. Solid Waste	Domestic waste from workers' camps	<ul style="list-style-type: none"> <li>Multi-compartment collection bins will be provided to facilitate reuse, recycling, and composting of solid waste.</li> <li>Waste will be stored away from water bodies and will be regularly hauled to landfills or designated dumping sites.</li> <li>Appropriate waste storage containers will be provided by contractors.</li> <li>Where appropriate, agreements will be signed with</li> </ul>	Contractors	IA, OEE, IEM, HPMO, HEPB, MEPB	Garbage bins are provided at construction sites; garbage is collected on a regular basis and disposed in local landfills.

Impact Factor/ Stage	Potential Impact and Issues	Mitigation Measures	Implementing Agency	Supervising Agency	Status of Implementation
		local suppliers for waste disposal through local facilities. These arrangements will be made before the works begin.			
5. Soil Erosion and Ecology	Soil erosion	<ul style="list-style-type: none"> <li>Topsoil will be stripped and stockpiled, and retaining walls built where necessary, before dumping.</li> <li>Temporary detention ponds or containment will be provided to control silt runoff.</li> <li>Intercepting ditches and chutes will be built to prevent outside runoff from entering disposal sites, and runoff from sites will be diverted to existing drainage or ponds.</li> <li>Existing vegetation will be preserved where no construction activity is planned, or preserved temporarily where activity is planned for a later date.</li> <li>Disposal and borrow sites will be rehabilitated into grassland, woodland, or farmland after closing.</li> </ul>	Contractors	IA, OEE, IEM, HPMP, HWRB, MWRB, HEPB, MEPB	Cut-and-fill is balanced at construction sites. Detention ponds are used to control sediment runoff. Intercepting ditches are used to prevent outside runoff. Existing trees and grasses are kept to maximum when practical. Construction sites are vegetated immediately after construction is over.
	Vegetation	<ul style="list-style-type: none"> <li>In compliance with the PRC Forestry Law, IAs will undertake compensatory planting of an equivalent or larger area of affected forest trees.</li> <li>The reforestation will comprise a selection of species that are suitable for the area and have the most appropriate attributes to survive and serve their designated functions.</li> <li>All disposal sites and borrow sites will be restored, where possible, to productive agricultural land or grass- and woodland.</li> <li>New plantings will be maintained during the operation period.</li> </ul>	Contractors, IA	IA, OEE, IEM, HPMP, HWRB, MWRB, HEPB, MEPB	Compensation is paid by the IA into the reforestation fund administration by the forestry bureau who undertakes "compensatory reforestation".
6. Social	Resettlement	<ul style="list-style-type: none"> <li>All affected persons will be compensated and resettled in a timely and adequate manner, in accordance with the resettlement plans.</li> </ul>	IA, municipal resettlement office	PLG, HPMP	APs are compensated in accordance with the RPs.
	Traffic jams or blocks	<ul style="list-style-type: none"> <li>Interim roads will be built.</li> </ul>	Contractors, IA	OEE, IEM, HPMP,	Construction has minimized

Impact Factor/ Stage	Potential Impact and Issues	Mitigation Measures	Implementing Agency	Supervising Agency	Status of Implementation
		<ul style="list-style-type: none"> <li>Transport routes will be selected to reduce disturbance to regular traffic.</li> <li>Traffic will be diverted at peak traffic hours, and the area reinstated to its original condition on completion of construction.</li> </ul>		municipal traffic bureaus	traffic jams and blocks.
	Cultural heritage	<ul style="list-style-type: none"> <li>Cultural heritage sites will be preserved where identified. In accordance with PRC regulations, no person shall destroy, damage, deface, conceal, or otherwise interfere with a relic.</li> <li>If an important site is unearthed, work should be stopped immediately and the matter promptly referred to the county, municipal, provincial, or state agencies for evaluation and decision on appropriate actions.</li> </ul>	Contractors, IAs	OEE, IEM, HPMO, local and provincial cultural heritage bureaus	To date no relics have been discovered.
<b>C. Operation Phase</b>					
1. Water	Wastewater from management office	<ul style="list-style-type: none"> <li>For water supply subprojects, a septic tank or on-site wastewater treatment device for each subproject will be installed. Wastewater from the management offices will be treated before being discharged into receiving water bodies.</li> <li>Wastewater from the management office will be collected and conveyed directly to the waste treatment facilities.</li> </ul>	IA	IEM, HPMO, HEPB, MEPB	For WWTPs, office and staff quarter wastewater is diverted to the wastewater treatment facilities. For water supply plants, septic tanks are used to treat the small quantities of wastewater.
	WWTP malfunction	<ul style="list-style-type: none"> <li>Dual power supply will be used.</li> <li>O&amp;M manuals will be prepared and adequate training provided to operators to ensure proper operation and maintenance of the facilities.</li> <li>Appropriate internal and external protocols will be set up for communicating with EPB and health authorities, effluent reuse users, and other agencies as determined to be suitable.</li> </ul>	IA	IEM, HEPB, MEPB, HPMO	All WWTPs meet the PRC national design standards for proper functioning.
	Illegal industrial	<ul style="list-style-type: none"> <li>Industrial pollution control and management plans,</li> </ul>	IA, MEPB	IEM, HEPB,	Major industrial facilities are

Impact Factor/ Stage	Potential Impact and Issues	Mitigation Measures	Implementing Agency	Supervising Agency	Status of Implementation
	discharges	requiring adequate treatment of industrial waste before discharge into the sewer system, will be developed. <ul style="list-style-type: none"> <li>An industrial wastewater monitoring system will be set up, and prohibitions against illegal industrial discharges strictly enforced.</li> <li>Adequate process controls for the WWTPs will be selected.</li> </ul>		HPMO	fitted with temper-free online monitoring equipment whereby data are directly fed into the environmental monitoring network. Local EPBs conduct regular and unannounced visits to ensure they meet PRC discharge standards.
	Effluent impact on receiving water bodies	<ul style="list-style-type: none"> <li>A project environmental acceptance audit by a licensed consultant will be conducted before the formal start of operations to ensure the effluents meet the PRC's WWTP Discharge Standards (GB18918-2002, SEPA).</li> <li>An effluent monitoring program will be set up and carried out.</li> </ul>	IA, licensed environmental companies contracted by IA	MEPB, HEPB, HPMO, IEM	WWTPs in trial operation stage are undertaking environmental audit according to PRC law.
2. Air	Odor from WWTP	<ul style="list-style-type: none"> <li>A buffer zone and vegetation around the plants will be provided.</li> <li>Potential odor sources such as the sludge dewatering area will be enclosed.</li> <li>Storage of dewatered sludge in plants should be avoided.</li> <li>Enclosed transportation and haul to landfill for final disposal will be ensured.</li> <li>An adequate layout will be ensured to minimize odors to potential receptors.</li> </ul>	IA	MEPB, HEPB, HPMO, IEM	All WWTPs have a forest buffer zone. After dewatering, sludge is transported in sealed trucks to local landfill. WWTPs without industrial effluent are contemplating the beneficial use of the sludge. Layout design has taken into consideration of distance to sensitive receptors.
	Emission from heating boilers	<ul style="list-style-type: none"> <li>Dust removers will be installed for heating boilers so that emissions meet class II emission standards for air pollutants for coal-burning, oil-burning, and gas-fired boilers (GB13271-2001, SEPA).</li> </ul>	IA	MEPB, HEPB, HPMO, IEM	Dust removers and scrubbers are used to control dust and SO <sub>2</sub> emissions.
3. Noise	Noise from pumps and	<ul style="list-style-type: none"> <li>Low-noise equipment and vehicles will be selected.</li> </ul>	IA	MEPB, HEPB,	Pumps are placed in semi-

Impact Factor/ Stage	Potential Impact and Issues	Mitigation Measures	Implementing Agency	Supervising Agency	Status of Implementation
	equipment operation	<ul style="list-style-type: none"> <li>High-noise equipment will be installed indoors.</li> <li>Pumping stations will be constructed in semi-buried structures.</li> <li>Trees will be planted around pump stations and plants.</li> <li>Adequate facility layouts will be ensured to minimize noise impact on potential receptors.</li> </ul>		HPMO, IEM	buried structures. Compressors are placed in indoor structures. Low-noise equipment has been selected. Noise-generating equipment is sited away from sensitive receptors.
4. Solid Waste	Sludge from WWTP	<ul style="list-style-type: none"> <li>Sludge will be sent to municipal sanitary landfill for safe disposal.</li> <li>For WWTPs whose sludge is to be composted and used as agricultural or urban landscaping fertilizer, chemical tests of sludge will be carried out to determine whether the quality of sludge complies with pollutant limits in Discharge Standards for Urban Waste Water Treatment (GB18918-2002, SEPA).</li> </ul>	IA	MEPB, HEPB, HPMO, IEM	At present, all sludge is disposed in local landfills. In the future, some plants intend to use the sludge for composting. Lab testing will be conducted as a first step.
5. Ecology	Vegetation	<ul style="list-style-type: none"> <li>No less than 30% space will be provided for landscaping and vegetation within the sites.</li> <li>Vegetation will be properly maintained.</li> </ul>	IA	MEPB, HEPB, HPMO, IEM	Site inspections have shown that all plants have at least 50% green space.
6. Environmental Risks	Accidental release of chlorine disinfectant	<ul style="list-style-type: none"> <li>An alarm and adsorption facility will be installed.</li> <li>Storage volume will be controlled.</li> <li>A buffering zone will be provided.</li> <li>Personal protection gear will be provided.</li> <li>Emergency response plans will be developed.</li> </ul>	IA	MEPB, HEPB, local health authorities	The chemicals room has proper operating safety, and emergency response procedures.
	Leaking or bursting of pipes	<ul style="list-style-type: none"> <li>Adequate supervision and management will be provided.</li> <li>Proper maintenance will be ensured.</li> <li>Operation monitoring will be enhanced.</li> <li>An emergency response plan will be provided.</li> </ul>	IA	Local government, MEPB, HEPB, HPMO, IEM	No occurrence. Supervision, management and emergency response plans are in place.
	Facility malfunction	<ul style="list-style-type: none"> <li>Environment facilities will be maintained regularly.</li> </ul>	IA	MEPB, HEPB,	All WWTPs have a closed-

Impact Factor/ Stage	Potential Impact and Issues	Mitigation Measures	Implementing Agency	Supervising Agency	Status of Implementation
		<ul style="list-style-type: none"> <li>Emergency response plans will be prepared.</li> </ul>		HPMO, IEM	circuit monitoring in the central control room where malfunctioning is reported real-time. Alarm will sound off if malfunction occurs. Emergency plans are in place.
	Insufficient environmental management capacity	<ul style="list-style-type: none"> <li>Environmental management training will be conducted, and facility and staff setup will be developed.</li> </ul>	IA	MEPB, HEPB, HPMO, IEM	All staff, including managers and operators receive training before being allowed to work in the plants.

EIA = environmental impact assessment, EMP = environmental management plan, GB = *Guo Biao* (national standards), HEPB = Heilongjiang Environmental Protection Bureau, HPLG = Heilongjiang project leading group, HPMO = Heilongjiang project management office, HWRB = Heilongjiang Water Resources Bureau, IA = implementing agency, IEM = independent environmental monitor (as part of the implementation consultancy), m=meter, MEMC = municipal environmental monitoring center, MEPB = municipal environmental protection bureau, MWRB = municipal water resources bureau, O&M = operation and maintenance, OEE = on-site environmental engineer, PLG = project leading group, PPTA = project preparatory technical assistance, PRC = People's Republic of China, RFP = request for proposal, SEIA = summary environmental impact assessment, SEPA = State Environmental Protection Administration, TOR = terms of reference, WSP = water supply plant, WWTP = wastewater treatment plant.

**Table 11: Public Consultation Program**

Organizer	Approach/Frequency	Subjects	Participants	Status
<b>1. Project Preparation</b>				
HPMO, IAs, design institutes, EIA institutes, resettlement plan institutes, HEPB	<ul style="list-style-type: none"> <li>EIA public opinion surveys: once for each subproject</li> <li>Expert panel review: once for each subproject</li> <li>Socioeconomic surveys and surveys of affected persons</li> <li>Public consultation meeting + questionnaire: once for overall Project</li> <li>Site visits: several times</li> </ul>	Priority, design, environmental benefits and impact, social benefits and impact, mitigation measures, attitudes toward subproject, and suggestions	HPMO, IAs, design institutes, EIA institutes, HEPB, MEPBs, other provincial and municipal government stakeholders, community representatives	Completed during project preparation.
<b>2. Construction</b>				
HPMO, IAs, IEM	<ul style="list-style-type: none"> <li>Public consultation and site visits: at least once a year</li> </ul>	Adjustments needed in mitigation measures, construction impact, comments and suggestions	Residents within construction area	PMO and PIU officers visit the nearby residents regularly. No complaints have been received.
	<ul style="list-style-type: none"> <li>Expert workshop or press conference: at least once</li> </ul>	Comments and suggestions on mitigation measures, public opinions	Experts from various sectors, media	Conducted in October 2013.
	<ul style="list-style-type: none"> <li>Public information session: at least once a year</li> </ul>	Adjustments needed in mitigation measures, construction impact, comments and suggestions	Representatives of residents and social sectors	This is done through village committees.
	<ul style="list-style-type: none"> <li>Survey on resettlement: as required in the resettlement plan</li> </ul>	Comments and suggestions	People affected by land acquisition and resettlement	See resettlement monitoring report.
<b>3. Test Operation</b>				
HPMO, IAs, IEM	<ul style="list-style-type: none"> <li>Questionnaire survey: at least once during test operation</li> <li>Site visits: several, depending on results of project completion environmental audit</li> </ul>	Comments and suggestions on impact of operations, public suggestions on corrective actions	Local residents and social sectors, EPBs	PMO and PIU officers conduct regular visits to local communities. No complaints have been received.
<b>4. Operation</b>				

Organizer	Approach/Frequency	Subjects	Participants	Status
PMO, IAs, IEM	<ul style="list-style-type: none"> <li>Public opinion survey: once per year in the first 5 years of operation</li> </ul>	Effects of mitigation measures, impact of operation, comments and suggestions for corrective actions	Residents adjacent to plant	Conducted in March 2015.
	<ul style="list-style-type: none"> <li>Site visits: once every 6 months, by IEM and HPMO</li> </ul>	Plant operating performance, informal interviews with local residents	Plant managers and workers, local residents adjacent to plant	Done.
	<ul style="list-style-type: none"> <li>Public workshop: as needed, depending on results of public opinion survey and public complaints received</li> </ul>	Public comments and suggestions on corrective measures	Representatives of residents and social sectors	No required
	<ul style="list-style-type: none"> <li>Expert workshop or press conference: as needed, depending on results of public consultation and workshop</li> </ul>	Expert comments and suggestions on corrective measures	Experts from residents, social sectors, media	Not required



**Table 12: Summary of Fulfillment of Environmental Responsibilities**

Phase	Responsible Agencies	Environmental Responsibility	Status of Fulfilment
Preparation	Environmental Institutes	Preparation of EIAs	Fulfilled
	The PMOs, EPBs	Review and approval of the individual EIA including the EMP	Fulfilled
	HPMO, ADB	Review and approval of the SEIA including the EMP	Fulfilled
Design	Dis	Updating the EMP in cooperation with environmental institutes, and incorporate mitigation measures in engineering detail designs and contracts	Fulfilled
	PMOs, IAs,	Review and approval of environmental measures	Fulfilled
Tendering	PMOs, Contractors, IAs	Incorporate EMP clauses in the bids	Fulfilled
Construction	PMOs, IAs, EPBs	Advise on implementation of mitigation measures	Fulfilled
	Contractors	Implementation of mitigation measures	Fulfilled
	IAs, and EMCs to be contracted by IAs	Internal inspection and monitoring	Fulfilled
	EMCs	External monitoring and inspection of implementing mitigation measures.	Fulfilled
Test Operation	IAs and contracted monitoring institutes	Preparation of environmental acceptance monitoring and audit report of the project completion and operation	Fulfilled
	EPBs	Environmental acceptance approval of the project operation	Fulfilled
Operation	IAs, and environmental monitoring institutes contracted by IAs	Internal environmental monitoring and inspection	Fulfilled
	EPBs	Periodically and randomly environmental monitoring and inspection of environmental compliances	Fulfilled

DI = Design Institute, EMC = environmental management consultant, EPB = Environmental Protection Bureaus, PMO = Project Management Office, IA = implementing agency.

**Table 13: Status of Implementation of Environment-Related Loan Covenants**

	<b>Loan Covenant</b>	<b>Reference</b>	<b>Status of Compliance</b>
	<b>Loan Agreement (Signed between ADB and PRC on 25 May 2009)</b>		
	The Borrower shall cause HPG and JPG, and through HPG and JPG cause the IAs, to carry out the Project with due diligence and efficiency and in conformity with sound administrative, financial, engineering, environmental, water supply, solid waste management, wastewater treatment and river improvement practices.	Section 2.01. (a)	In compliance
	HPG shall be the executing agency (EA) for the Heilongjiang Component. The Project Leading Group (PLG) established by HPG, chaired by a Vice Governor and consisting of members from Heilongjiang Provincial Development and Reform Commission (HPDRC), Heilongjiang Provincial Finance Department (HPFD), Heilongjiang Provincial Audit Bureau, and Heilongjiang Provincial Environmental Department, shall provide overall policy guidance, facilitate inter-agency coordination, and resolve any institutional problems affecting project implementation for implementation of the Heilongjiang Component.	Schedule 5 (1)	In compliance. HEPD is represented in the PLG.
	The Borrower shall ensure that HPG and JPG to undertake effective coordination in implementation of the Project.	Schedule 5 (6)	In compliance. HPMO reports regularly to MOF and NDRC who also conduct inspections.
	The Borrower shall cause HPG, JPG and the concerned city and county governments, to ensure respectively that each IA under its control be maintained as separate legal entity with full financial and managerial autonomy as provided for under the relevant laws of the Borrower to be (a) responsible for day to day implementation activities for the concerned Subcomponent(s), (b) responsible for operating the project infrastructures of the concerned Subcomponent(s) developed in the concerned municipality and city; and (c) entitled to receive all monies collected by levying the appropriate water, wastewater, solid waste tariffs and fees, as applicable.	Schedule 5 (7)	In compliance. The composite water tariff consists of the water resource fee, water supply fee and wastewater treatment fee. It is collected by the water supply company, but the water resource fee remitted to the water resource bureau and wastewater treatment fee transferred to the wastewater treatment company.
	<b>Project Agreement Signed between HPG and ADB on 25 May 2009</b>		
	HPG and each IA shall carry out the Project with due diligence and efficiency, and in conformity with sound administrative, financial, engineering, environmental, water supply, management, wastewater treatment and river improvement practices.	Section 2.01. (a)	In compliance
	In the carrying out of the Project and operation of the Project facilities, HPG and each IA shall perform all obligations set forth in the Loan Agreement to the extent that they are applicable to HPG and the concerned IA and all obligations set forth in the Schedule to this Project Agreement.	Section 2.01. (b)	In compliance
	In the carrying out of the Project, each IA shall employ competent and qualified consultants and contractors,	Section 2.03. (a)	In compliance

	acceptable to ADB, to an extent and upon terms and conditions satisfactory to ADB.		
	Without limiting the generality of the foregoing, each IA undertakes to insure, or cause to be insured, the Goods to be imported for the concerned Subproject(s) under its implementation and to be financed out of the proceeds of the Loan against hazards incident to the acquisition, transportation and delivery thereof to the place of use or installation, and for such insurance any indemnity shall be payable in a currency freely usable to replace or repair such Goods.	Section 2.05. (b)	In compliance
	Without limiting the generality of the foregoing, HPG through Heilongjiang PMO shall furnish to ADB semiannual reports on the execution of the Project and on the operation and management of the Project facilities. Such reports shall be submitted in such form and in such detail and within such a period as ADB shall reasonably request, and shall indicate, among other things, progress made and problems encountered during the six (6) months under review, steps taken or proposed to be taken to remedy these problems, and proposed program of activities and expected progress during the following six (6) months.	Section 2.08. (b)	In compliance
	Each IA shall at all times conduct its business in accordance with sound administrative, financial, environmental, or as may be applicable, water supply, wastewater treatment, management or river improvement practices, and under the supervision of competent and experienced management and personnel.	Section 2.11. (b)	In compliance
	Each IA shall at all times operate and maintain its plants, equipment and other property, and from time to time, promptly as needed, make all necessary repairs and renewals thereof, all in accordance with sound administrative, financial, engineering, environmental, and maintenance and operational practices, or as may be applicable, water supply, wastewater treatment, management or river improvement.	Section 2.11. (c)	In compliance
	HPG shall be the executing agency (EA) for the Heilongjiang Component of the Project. The Project Leading Group (PLG) established by HPG, chaired by a Vice Governor and consisting of members from Heilongjiang Provincial Development and Reform Commission (HPDRC), Heilongjiang Provincial Finance Department (HPFD), Heilongjiang Provincial Audit Bureau, and Heilongjiang Provincial Environmental Department shall provide overall policy guidance, facilitate inter-agency coordination, and resolve any institutional problems affecting project implementation for implementation of the Heilongjiang Component.	Schedule, 1	In compliance
	The PMO established by HPG (Heilongjiang PMO), led by a Director and equipped with sufficient staff shall be responsible for daily implementation work. The project city and county governments in Heilongjiang Province shall set up project management offices (City/County PMOs) with the similar organization structures chaired by their Vice Mayors. The City/County PMOs shall maintain interdepartmental coordination and work closely with Heilongjiang PMO.	Schedule, 2	In compliance

	<p>The following IAs shall be responsible for day-to-day implementation activities of the Subprojects under the Heilongjiang Component:</p> <ul style="list-style-type: none"> <li>(i) Fujin City Zhongfu Water Supply Company Limited for Fujin City Water Supply Expansion and Fujin City WWTP;</li> <li>(ii) Tangyuan County Water Supply Company for Tangyuan County Water Supply;</li> <li>(iii) Tonghe County Water Supply and Drainage Company for Tonghe County Water Supply Expansion;</li> <li>(iv) Yanshou County Water Supply Company for Yanshou County Water Supply Expansion;</li> <li>(v) Fangzheng County Water Supply and Drainage Company for Fangzheng County WWTP;</li> <li>(vi) Harbin City Inland River Comprehensive Development Company for Harbin City Xinyigou District WWTP;</li> <li>(vii) New Era Urban Infrastructure Construction Investment Jiamusi Company Limited for Jiamusi City East District WWTP and Effluent Reuse;</li> <li>(viii) Nenjiang County Water Supply Company for Nenjiang County WWTP and Sewerage Network;</li> <li>(ix) Qiqihar City Hecheng Wastewater Treatment Company Limited for Qiqihar City WWTP (Phase II);</li> <li>(x) Qitaihe City Qingyuan Drainage Company Limited for Qitaihe City Effluent Reuse;</li> <li>(xi) Shuangyashan City Changyuan Drainage Company Limited for Shuangyashan City WWTP; and</li> <li>(xii) Tangyuan County Xingyuan Urban Construction Investment Company Limited for Tangyuan County WWTP.</li> </ul>	Schedule, 3	In compliance
	HPG shall ensure that close coordination be carried out by each IA with the existing public environmental awareness and hygiene education program of the environmental protection bureaus and health bureaus. Appropriate public awareness campaigns shall be undertaken through media, public announcements, households, and schools to familiarize people living in the Songhua river basin area with issues related to water supply and sanitation.	Schedule, 7	In compliance
	HPG shall cause the concerned city and county governments to ensure that from 2014, the tariffs for treated water, and from 2016, the tariffs for wastewater services, and from 2018, the tariffs for solid waste management charged by the concerned IAs are set at a level that ensures full cost recovery of operation and maintenance, depreciation, and financial costs, which means debt service obligations, and a reasonable profit margin for the IAs. HPG shall cause the concerned city and county governments to undertake a review of the regulation on tariff regimes prior to the midterm review of Project implementation, and will ensure that public hearing be conducted on tariff increases with key stakeholders including representatives of the poor. Such a review will include: (i) recalculation of minimum cost recovery tariffs based on the actual Project costs, affordability and willingness-to-pay surveys, (ii) financial/economic benefits, and (iii) extension of the price escalation mechanism to household and commercial users and other potential fees, and charges to encourage water conservation and sound environmental behaviour. The findings shall be submitted to ADB for review and discussion during the midterm review of Project implementation.	Schedule, 14	Not yet due

	HPG shall cause the concerned city and county governments to ensure that no entity, whether a government agency, institution, or enterprise, regardless of ownership, be granted an exemption from tariffs established above, or granted a preferential rate or allowed to make late payments without penalties.	Schedule, 15	In compliance
	HPG shall cause the concerned city and county governments to review the impact of tariff adjustments for water, wastewater, and on the poor to protect the basic living standards of the urban poor.	Schedule, 16	In compliance
	HPG shall cause the concerned city or county governments to ensure and each IA shall ensure that the IA construct, operate, maintain, and monitor the Project facilities in strict conformity with: (a) all applicable laws and regulations of the Borrower, including national and local regulations and standards for environmental protection, health, labour, and occupational safety; and (b) ADB's <i>Environment Policy</i> (2002) and the environmental mitigation and monitoring measures detailed in the approved EIAs, SEIA, and the EMP for the Subprojects under the implementation of the IA.	Schedule, 20	In compliance
	HPG shall cause the concerned city and county governments to ensure, and each IA shall ensure, that (a) all civil works in the Project including water treatment plants and associated pipelines, water treatment and related pipelines, wastewater treatment plants, wastewater collection systems, and systems, be constructed and operated in accordance with all applicable environmental laws, policies, procedures and guidelines of the Borrower, and ADB's <i>Environment Policy</i> and related operational procedures; (b) any adverse environmental impacts arising from the Project be minimized by implementing the mitigation measures prescribed in the EIAs and the EMP for the Heilongjiang Component; (c) civil work contracts entered into with contractors under the Project include provisions relating to the environment including obligating contractors to carry out the mitigation and monitoring measures specified in the EIAs and the EMP for the Heilongjiang Component; and (d) a budget be allocated for all such mitigation and monitoring measures.	Schedule, 21	In compliance
	HPG shall through the concerned city and county governments to ensure, and each IA shall ensure, that (a) the Project Facilities be constructed, operated, maintained and monitored in strict conformity with all relevant laws and regulations of the Borrower, including all applicable national and local environmental protection laws, regulations and standards for water and wastewater treatment, treatment, sediment and sludge disposal, and the environmental mitigation measures recommended in the EMP and the EIAs for the Heilongjiang Component of the Project be implemented; (b) the mitigation measures be incorporated into the design and bidding documents; (c) justification be provided to ADB for any proposed changes to the mitigation measures required during design, construction, operations and maintenance and provided to ADB within 60 days if any changes to the EIA have to be implemented for safety or emergency reasons; and (d) environmental monitoring programs be monitored and recorded under the guidance and supervision of Heilongjiang Environmental Protection Department, and the concerned city and county governments Environmental Protection Bureaus and the monitoring information be submitted to ADB in the Heilongjiang	Schedule, 22	In compliance

	PMO's semi-annual Project progress reports.		
	HPG shall through the concerned city and county governments ensure that all sludge and dredged material generated in the course of implementation of the Project is disposed of in accordance with national and local laws and regulations, and that such disposal creates no significant risk of secondary pollution.	Schedule, 23	In compliance. Sludge is disposed of in local sanitary landfills. Beneficial use is done for most plants.
	HPG shall through the Heilongjiang PMO submit to ADB annual environmental reports commencing from the start of the Project implementation until one year after the commencement of operation of the Project Facilities. The reports shall include (i) progress made on mitigation measures and monitoring; (ii) problems encountered; (iii) data collected; (iv) any research results; (v) a corrective action plan if any violation of the Borrower's environmental laws, regulations, standards, rules, policies, or guidelines shall have occurred; and (vi) records of Environment Management Plan implementation.	Schedule, 24	There is delay in submitting monitoring data for some projects.
	HPG shall through the concerned city and county governments ensure, and each IA shall ensure, that: (a) all land and rights-of-way required by the Project are made available in a timely manner; (b) the RPs be implemented promptly and efficiently in accordance with their terms; and the provisions of the RPs, be implemented in accordance with all applicable laws and regulations of the Borrower, and ADB's <i>Involuntary Resettlement Policy</i> (1995); (c) all affected persons are given adequate opportunity to participate in resettlement planning and implementation; and that they will be at least as well off as they would have been in the absence of the Project; (d) timely provision of counterpart funds be paid for land acquisition and resettlement activities; and (e) any obligations in excess of the RP budget estimates shall be met.	Schedule, 25	In compliance
	HPG shall cause the concerned city and county governments to, and each IA shall, ensure that each RP be updated based on the final detailed design, including detailed measurement surveys, for the respective subcomponent of the Project, and such updated RPs be submitted to ADB for its concurrence prior to commencement of any related civil works; and disclosed to affected people in accordance with ADB's applicable information disclosure requirements for resettlement.	Schedule, 26	In compliance
	HPG shall cause the concerned city and county governments to, and each IA shall, also ensure that: (a) adequate staff and resources are committed to supervising and internally monitoring the implementation of each Subproject RP and that ADB is provided with semi-annual monitoring reports during resettlement implementation, followed by a resettlement completion report for each Subproject; (b) an independent agency acceptable to ADB has been contracted to carry out monitoring and evaluation, including data disaggregated by gender where applicable, and forward reports to ADB semi-annually; (c) ADB is promptly advised of any substantial changes in the resettlement impacts and, if necessary, a revised RP is submitted to ADB for its approval; (d) civil works contractors' specifications include requirements to comply with the RPs and entitlements for permanent and temporary impacts to affected persons; and (e) the contractors are supervised to ensure compliance with requirements of the RPs, applicable law and ADB's <i>Involuntary</i>	Schedule, 27	In compliance

	<i>Resettlement Policy.</i>		
	HPG shall, and shall cause the concerned city and county governments to, ensure that the impact of increased water, wastewater, and tariffs on the poor is reviewed and the provision of tariff subsidy or tariff waiver and minimum living standard scheme are maintained to protect the basic living standard of the poor. HPG shall, and shall through the concerned city and county governments to ensure, and each IA shall cause each of the contractors involved in project implementation to, maximize employment of local poor persons, including ethnic minorities, who meet the job and efficiency requirements, provide training opportunities, and adopt pro-active measures, such as quota systems and training programs for the vulnerable group, and monitor the Project's impact on poverty and submit annual monitoring reports to ADB during Project implementation.	Schedule, 28	In compliance
	HPG shall ensure that the concerned city and county governments, and each IA shall, comply with all employment and labour standards set forth in applicable laws, regulations and policies of the Borrower. In addition, HPG shall, and shall cause the concerned city and county governments to, ensure that all civil works contracts under the Project contain provisions requiring all civil works contractors engaged under the Project to: (a) provide timely payment of wages and safe working conditions to all workers including male and female workers (with such requirements being included in civil works contracts); (b) provide at least 20% of the total employment opportunities generated from the Project during construction and operation phases, and pay equal wages to the women employees for the equivalent work; (c) not employ child labour (as defined in the applicable Borrower's law) in the Project activities; and (d) monitor the effects of the Project on women through collection and compilation of gender-disaggregated data, where applicable, including in the RPs and project performance monitoring system (PPMS). HPG shall, and cause the concerned city and county governments to, require compliance to be monitored by the construction supervision consultants.	Schedule, 29	In compliance
	HPG shall cause that the concerned city and county governments to, and each IA shall, in coordination with the responsible agencies, (a) ensure that contractors disseminate information on the risks of transmitting and contracting socially and sexually transmitted diseases, including HIV/AIDS, to their employees during Project implementation; and (b) in coordination with other appropriate agencies, ensure that public environmental awareness and education programs on health and hygiene behaviour and managing wastewater and disposal will be conducted in project area to increase the likelihood that the Project health benefits are realized especially among the poor and vulnerable populations.	Schedule, 30	In compliance
	HPG shall cause the concerned city and county governments to, and each IA shall, ensure that construction and operational health and safety measures be incorporated into the design and bidding documents, and that health and safety information disseminated to contractors who will in turn disseminate such information to those employed during Project implementation and facility operations. Such measures shall, at a	Schedule, 31	In compliance

	minimum, be sufficient to comply with the applicable national laws, and shall also be designed to generate a safe work environment.		
	HPG shall cause the concerned city and county governments to, and each IA shall monitor and evaluate project impact through PPMS, as agreed to by the Borrower and ADB, to ensure that Project facilities are managed efficiently, benefits are maximized, and social impacts are monitored, including data disaggregated by gender and ethnic group, wherever possible. HPG shall cause the concerned city and county governments to, and each IA shall collect the necessary information and data on project performance before Project implementation, during midterm, and at completion of the Project.	Schedule, 32	In compliance
	HPG shall, and shall cause the concerned city and county governments to, and ADB, in conjunction, shall carry out reviews of the Project during Project implementation. The reviews shall include an examination of budgetary allocations for the Project, operation and maintenance costs, staffing, implementation arrangements, any environmental, resettlement, gender and indigenous people impacts and other achievements under the Project. The review shall include assessing progress for each Subcomponent or Subproject, identifying difficulties and constraints, and determining ways to overcome them.	Schedule, 34	In compliance





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## **6. Environmental Monitoring**

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### **6.1 Introduction**

76. Environmental monitoring here involves two levels of environmental monitoring: (i) regular internal environmental monitoring carried out by the contractors and supervised by the construction supervision engineers at sites at all time; and (ii) periodical external environmental monitoring by the municipal environmental monitoring stations which take samples and conduct analysis according to the stipulated procedures and guidelines.

77. Internal monitoring is primarily qualitative, based on visual observations, as a tool to supplement external monitoring. On the other hand, external monitoring is quantitative and serves as a legal obligation to demonstrate regulatory compliance.

78. All plants have fulfilled the environmental monitoring requirements during construction, trial operation and operation stages. To date, nine of fourteen subprojects have completed the environmental auditing. Following shows the relevant environmental monitoring data during this reporting period. The monitoring data contained in this EMR cover the operational phase, including the project completion environmental audits.

### **6.2 Environmental Monitoring Results**

79. The monitoring data are presented in **Appendix 1**. They have shown that: 1) the project facilities have met the design criteria; 2) the EMP has been properly implemented; 3) the operational impacts are within the acceptable limits.

## 7. Public Opinion Survey

### 7.1 Introduction

80. A public opinion survey with a structured questionnaire was conducted in April 2015 to assess the operational environmental impacts. The survey covered a total of xx respondents that live adjacent to the project facilities, including 60 nearby the water supply plants and 160 nearby the WWTPs.

81. Overall, the respondents reported no serious negative operational impacts and are satisfied with the operation of project facilities.

82. Details of the survey results are summarized below.

### 7.2 Survey Results for Water Supply Plants

Question	Responses				
	No	Slight	Some-what	Quite	Very
Does the WWTP cause smell where you live?	59	1			
Does the WWTP cause noise pollution in daytime where you live?	59	1			
Does the WWTP cause noise pollution in nighttime where you live?	59	1			
Does the WWTP vehicles cause traffic jams where you live?	60				
Does the WWTP cause traffic safety risks where you live?	60				
Does the WWTP affect sanitation where you live?	60				
Question	Responses				
	Very Unsatisfied	Not Satisfied	Satisfied	Quite Satisfied	Very Satisfied
Are you satisfied with the quality of your family's drinking water?		1	16	4	37
Are you satisfied with your drinking water pressure?			9	25	24
Question	Responses				
	Often	Some-times	Seldom	Very Rare	Never
Are there interruptions to			3	53	2

your drinking water supply?					
<b>Question</b>	<b>Responses</b>				
	Very High	Quite High	High	Slightly High	Not High
Are you happy with the drinking water tariff?			2	3	53

### 7.3 Survey Results for WWTPs

**Table xx: Public Opinion Survey Results for WWTPs**

<b>Question</b>	<b>Responses</b>				
	No	Slight	Some-what	Quite	Strong
Does the WWTP cause smell where you live?	149	10	1		
Does the WWTP cause noise pollution in daytime where you live?	160				
Does the WWTP cause noise pollution in nighttime where you live?	158	1			
Does the WWTP vehicles cause traffic jams where you live?	154	6			
Does the WWTP cause traffic safety risks where you live?	159	1			
Does the WWTP affect sanitation where you live?	154	5			
<b>Question</b>	<b>Responses</b>				
	Very Abnormal	Abnormal	Average	Normal	Very Well
Do you think the WWTP is operating normally?			1	62	92
<b>Question</b>	<b>Responses</b>				
	Definite No	Basically No	No	Some-what	A Lot
Does the WWTP improve the water quality of the rivers and lakes nearby?				30	125
<b>Question</b>	<b>Responses</b>				
	Very High	Quite High	High	Slightly High	Not High
Are you happy with the wastewater tariff?			5	14	136

## 8. Conclusion and Recommendations

83. The Heilongjiang component has the following accomplishments:

Total volume of water supply: 25,900 m<sup>3</sup>/d  
 Total length of water supply pipelines: 82.97 km  
 Total service population as of April 2015: 245,000  
 Total service population at full capacity: 270,000

Total volume of wastewater treatment: 291,000 m<sup>3</sup>/d  
 Total length of sewers: 177.34 km  
 Total service population as of April 2015: 6.70 million  
 Total service population at full capacity: 6.94 million

84. The environmental benefits are summarized as follows:

Parameter	Fang-zheng	Fujin	Xinyi-gou	Luobei	Nen-jiang	Qiaihar	Qitaihe	Shuang-yashan	Tang-yuan	Total in April
COD influent concentration	94	254.4	584.9	206.4	548.2	335.9	365	175.0	281	/
COD effluent concentration	29.5	26.26	45.83	51.3	41.3	40.2	28.5	40.0	41.8	/
COD removal rate	68.6%	89.7%	92.2%	75.1%	92.5%	88.0%	92.2%	77.1%	85.1%	/
<b>COD removal total (t/a)</b>	<b>141.3</b>	<b>1,249.1</b>	<b>15,780.2</b>	<b>566.1</b>	<b>2,775.3</b>	<b>10,793.1</b>	<b>4,912.9</b>	<b>2,463.8</b>	<b>873.1</b>	<b>39,554.9</b>
NH <sub>3</sub> -N influent concentrat'n	5.14	27.44	48.06	47.2	46.1	39.5	32	18.1	26.7	/
NH <sub>3</sub> -N effluent concentrat'n	0.276	1.24	1.56	5.1	6.9	5.85	2.9	2.9	3.9	/
NH <sub>3</sub> -N removal rate	94.6%	95.5%	96.8%	89.2%	85.0%	85.2%	90.9%	83.8%	85.4%	/
<b>NH<sub>3</sub>-N removal total (t/a)</b>	<b>10.7</b>	<b>143.4</b>	<b>1,361.2</b>	<b>153.7</b>	<b>214.6</b>	<b>1,228.2</b>	<b>424.9</b>	<b>276.9</b>	<b>83.2</b>	<b>360.1</b>
TN influent	29.3	35.35	56.47	50.8	58.2	49.5	36	25.0	38.4	/
TN effluent	7.83	12.33	13.01	16.6	16.5	14.1	10	13.6	11.4	/
TN removal rate	73.3%	65.1%	77.0%	67.3%	71.6%	71.5%	72.2%	45.6%	70.3%	/
<b>TN removal total (t/a)</b>	<b>47.0</b>	<b>126.0</b>	<b>1,272.2</b>	<b>124.8</b>	<b>228.3</b>	<b>1,292.1</b>	<b>379.6</b>	<b>208.1</b>	<b>98.6</b>	<b>2,949.5</b>
TP influent	2.11	3.56	6.15	2.26	1.26	6.87	2.25	2.1	3.81	/
TP effluent	0.483	0.31	0.70	0.54	0.56	0.48	0.08	0.7	0.31	/
TP removal rate	77.1%	91.3%	88.6%	76.1%	55.6%	93.0%	96.4%	65.6%	91.9%	/
<b>TP removal total (t/a)</b>	<b>3.6</b>	<b>17.8</b>	<b>159.5</b>	<b>6.3</b>	<b>3.8</b>	<b>233.2</b>	<b>31.7</b>	<b>25.4</b>	<b>12.8</b>	<b>494.1</b>

85. The operational monitoring data have shown that: 1) the project facilities have met the design criteria; 2) the EMP has been properly implemented; 3) the operational impacts are within the acceptable limits.

## Appendix 1: Environmental Monitoring Data

### 1. Tangyuan Water Supply Plant:

#### Tangyuan WSP Completion Environmental Audit (Approved 19 Sep 2012)

Item	Measurement	Remark
Volume of wastewater produced	365,000 m <sup>3</sup> /a	
SS	20 mg/l	Meeting standard
Volume of wastewater discharged	1,140.5 t/a	
COD	300 mg/l	
BOD	30 mg/l	
NH <sub>3</sub> -N	15 mg/l	
Air emissions	1 t/hr boiler with use of coal at 144 t/a	Minor impact on air quality
Noise	Equipment noise at 80-90 dB(A)	
Solid waste	36 t/a of spent coal; 11.88 t/a of garbage; 180 t/a of sludge	
Mitigation		
Boiler: multi-cyclone-membrane	96% removal; 20 m chimney	
Wastewater	Discharge to municipal sewers	
Noise abatement	Sound-repression equipment; green belt	Meeting standards at borders
Solid waste	Sludge: landscaping; domestic waste: collected by sanitation bureau; spent coal: reuse	
Emissions after Mitigation		
TSP	0.115 t/a	
SO <sub>2</sub>	0.368 t/a	
COD	0.342 t/a	

## 2. Tonghe Water Supply Plant:

### Tonghe Water Supply Plant: Water Analysis Results (Unit: mg/l)

No.		Sampling point		Note
		Chalin River Bridge	Chalin River Estuary	
1	COD	3.26	0.24	
2	BOD <sub>5</sub>	2.00	1.51	
3	NH <sub>3</sub> -N	0.22	0.19	
4	pH	7.60	7.67	(Dimensionless)
5	TN	1.04	1.08	
6	TP	0.20	0.21	
7	SS	276	298	
8	Conductivity	180	0.21	(μs/cm)
9	Petroleum	0.01L	0.01L	

### Tonghe Water Supply Plant: Air Quality Monitoring Results

No.	Time	TSP (mg/m <sup>3</sup> )
D	8:30-9:30	0.144
	10:30-11:30	0.159
	13:30-14:30	0.166
	Day Average	0.156
E	8:30-9:30	0.171
	10:30-11:30	0.169
	13:30-14:30	0.170
	Day Average	0.170
F	8:30-9:30	0.167
	10:30-11:30	0.183
	13:30-14:30	0.166
	Day Average	0.172

### Tonghe Water Supply Plant: Noise Monitoring Sites and Monitoring Results

No.	Date: 2014.9.1		Status
	Daytime	Nighttime	
1	54.1	44.2	Compliance
2	53.6	44.1	Compliance
3	54.0	43.7	Compliance
4	56.4	43.5	Compliance
5	55.4	44.6	Compliance
6	54.3	44.6	Compliance
7	54.3	44.3	Compliance
8	54.7	44.4	Compliance
9	55.1	45.1	Compliance
10	55.1	45.3	Compliance

### 3. Fangzheng WWTP

#### Fangzheng WWTP: Surface Water Monitoring Results (Oct 20, 2013) (mg/l) (pH value is dimensionless)

Location		pH Value	COD	BOD	SS	Oil	TP	Ammonia	TN
Dongailian Village	Left	6.93	10	2L	24	0.02L	0.16	0.32	1.88
	Middle	6.93	10	2L	21	0.02L	0.17	0.27	1.77
	Right	6.95	10	2L	22	0.02L	0.17	0.37	1.84
Mujiatun Village	Left	6.91	5L	2L	17	0.02L	0.14	0.13	1.51
	Middle	6.93	5L	2L	16	0.02L	0.14	0.12	1.53
	Right	6.95	5L	2L	18	0.02L	0.12	0.17	1.53
Chengbei New Area	Left	6.73	10	2L	15	0.02L	0.16	0.12	1.47
	Middle	6.81	10	2L	18	0.02L	0.17	0.16	1.34
	Right	6.82	13	2L	17	0.02L	0.16	0.14	1.60

#### Fangzheng WWTP Surface Water Monitoring Results (Oct 21, 2013) (mg/l) (pH value is Dimensionless)

Location		pH Value	COD	BOD	SS	Oil	TP	Ammonia	TN
Dongailian Village	Left	6.79	10	2L	20	0.02L	0.17	0.30	1.67
	Middle	6.87	10	2	23	0.02L	0.17	0.31	1.75



Mujiatun Village	Right	6.84	10	2L	22	0.02L	0.17	0.28	1.75
	Left	6.93	10	2L	17	0.02L	0.14	0.14	1.56
	Middle	6.90	6	2L	20	0.02L	0.14	0.12	1.64
	Right	6.93	10	2L	18	0.02L	0.14	0.14	1.75
Chengbei New Area	Left	6.74	10	2L	16	0.02L	0.16	0.12	1.66
	Middle	6.80	13	2L	17	0.02L	0.16	0.15	1.54
	Right	6.74	13	2L	20	0.02L	0.16	0.16	1.72

**Fangzheng WWTP: Surface Water Monitoring Results (Oct 22, 2013) (mg/l) (pH value is Dimensionless)**

Location		pH Value	COD	BOD	SS	Oil	TP	Ammonia	TN
Dongailian Village	Left	6.83	10	2L	24	0.02L	0.17	0.47	1.72
	Middle	6.84	13	2L	26	0.02L	0.17	0.48	1.72
	Right	6.81	10	2L	24	0.02L	0.17	0.49	1.62
Mujiatun Village	Left	6.92	6	2L	20	0.02L	0.14	0.44	1.66
	Middle	6.90	6	2L	23	0.02L	0.14	0.45	1.72
	Right	6.91	6	2L	19	0.02L	0.14	0.45	1.57
Chengbei New Area	Left	6.76	10	2L	21	0.02L	0.16	0.41	1.53
	Middle	6.83	13	2L	18	0.02L	0.16	0.44	1.49
	Right	6.78	10	2	19	0.02L	0.16	0.42	1.65

**Fangzheng WWTP: Surface Water Monitoring Results (Nov 20, 2013) (mg/l) (pH value is Dimensionless)**

Location		pH Value	COD	BOD	SS	Oil	TP	Ammonia	TN
Dongailian Village	Left	6.85	10	2L	24	0.03	0.14	0.43	1.76
	Middle	6.75	10	2L	25	0.04	0.14	0.45	1.79
	Right	6.80	13	2L	26	0.03	0.14	0.45	1.77
Mujiatun Village	Left	6.77	10	2L	22	0.04	0.12	0.44	1.41
	Middle	6.82	13	2L	21	0.03	0.13	0.44	1.45
	Right	6.91	10	2L	24	0.04	0.13	0.44	1.43
Chengbei New Area	Left	6.76	10	2L	19	0.03	0.13	0.41	1.59
	Middle	6.77	10	2L	18	0.04	0.13	0.40	1.67
	Right	6.83	13	2L	19	0.04	0.13	0.41	1.61

**Fangzheng WWTP: Surface Water Monitoring Results (Nov 21, 2013) (mg/l) (pH value is Dimensionless)**

Location		pH Value	COD	BOD	SS	Oil	TP	Ammonia	TN
Dongailian Village	Left	6.83	10	2L	21	0.03	0.14	0.44	1.62
	Middle	6.76	13	2L	24	0.04	0.14	0.42	1.67

Mujiatun Village	Right	6.81	13	2L	19	0.04	0.14	0.44	1.61
	Left	6.78	6	2L	17	0.03	0.13	0.44	1.51
	Middle	6.81	6	2L	16	0.03	0.13	0.43	1.53
	Right	6.88	10	2L	14	0.03	0.13	0.43	1.53
Chengbei New Area	Left	6.73	10	3	14	0.03	0.12	0.40	1.59
	Middle	6.71	6	2	14	0.02	0.13	0.41	1.62
	Right	6.82	10	2	13	0.02	0.13	0.41	1.59

**Fangzheng WWTP: Surface Water Monitoring Results (Nov 22, 2013) (mg/l) (pH value is Dimensionless)**

Location		pH Value	COD	BOD	Suspended Solids	Oil	TP	Ammonia	TN
Dongailian Village	Left	6.79	10	2L	21	0.02	0.14	0.44	1.62
	Middle	6.77	10	2L	19	0.02	0.14	0.42	1.64
	Right	6.83	13	2L	21	0.02L	0.14	0.44	1.62
Mujiatun Village	Left	6.76	10	2L	18	0.03	0.14	0.44	1.54
	Middle	6.83	10	2L	17	0.02L	0.14	0.43	1.53
	Right	6.67	10	2L	19	0.02L	0.14	0.43	1.51
Chengbei New Area	Left	6.74	10	2L	15	0.02	0.14	0.40	1.60
	Middle	6.72	10	2L	14	0.02	0.14	0.41	1.62
	Right	6.79	13	2L	15	0.02	0.13	0.41	1.57

**Fangzheng WWTP: Air Quality Monitoring Results in 2013 (Daily Average Concentration)**

Location	Date	TSP(mg/m <sup>3</sup> )	PM <sub>10</sub> (mg/m <sup>3</sup> )
(A) Dongailian Village	2013.11.26	0.216	0.164
	2013.11.27	0.243	0.175
	2013.11.28	0.191	0.161
	2013.11.29	0.288	0.154
	2013.11.30	0.300	0.160
(B) Xiailian Village	2013.11.26	0.209	0.135
	2013.11.27	0.306	0.160
	2013.11.28	0.207	0.168
	2013.11.29	0.311	0.152
	2013.11.30	0.275	0.168
(C) Mujiatun	2013.11.26	0.248	0.136
	2013.11.27	0.230	0.144

Village	2013.11.28	0.296	0.141
	2013.11.29	0.251	0.134
	2013.11.30	0.295	0.166
(D) Administrative Center	2013.11.26	0.223	0.145
	2013.11.27	0.268	0.147
	2013.11.28	0.229	0.111
	2013.11.29	0.274	0.117
	2013.11.30	0.261	0.157
(E) Power Administration	2013.11.26	0.236	0.169
	2013.11.27	0.213	0.131
	2013.11.28	0.227	0.151
	2013.11.29	0.271	0.166
	2013.11.30	0.228	0.154
(F) Fire Department	2013.11.26	0.208	0.129
	2013.11.27	0.209	0.132
	2013.11.28	0.270	0.174
	2013.11.29	0.283	0.153
	2013.11.30	0.288	0.158

**Fangzheng WWTP: Noise Monitoring Results (Oct 11, 2013) Unit: dB(A)**

Location	Date	Cumulative Percentile Sound Level			Leq	Standard Deviation ( $\sigma$ )	Noise Source
		L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>			
Dongailian Village	10.11 (Day)	52.0	49.8	43.7	53.0	5.0	Domestic
	10.11 (Night)	50.8	44.6	42.9	47.5	3.3	Domestic
Xiailian Village	10.11 (Day)	54.3	46.9	43.4	51.0	4.3	Domestic
	10.11 (Night)	46.8	46.3	44.5	46.9	1.8	Domestic
Mujiatun Village	10.11 (Day)	52.0	46.2	43.2	48.8	3.5	Domestic
	10.11 (Night)	49.1	44.6	42.1	46.3	2.7	Domestic
Administrative Center	10.11 (Day)	58.5	52.4	47.7	55.0	4.1	Domestic
	10.11 (Night)	51.0	46.8	44.2	48.2	2.6	Domestic
Power Administration	10.11 (Day)	53.3	48.6	45.6	50.3	3.1	Domestic
	10.11 (Night)	51.6	46.3	44.1	48.5	3.1	Domestic
Fire Department	10.11 (Day)	50.8	48.2	46.2	52.2	2.7	Domestic
	10.11 (Night)	52.0	46.2	44.0	49.3	3.4	Domestic
Zihai Communicity	10.11 (Day)	52.5	49.3	47.6	51.0	2.5	Domestic
	10.11 (Night)	44.8	42.1	40.7	42.8	1.6	Domestic
Health Bureau	10.11 (Day)	63.4	58.5	55.7	60.5	3.4	Domestic
	10.11 (Night)	51.9	46.6	44.6	49.1	3.1	Domestic
Civil Affairs Bureau	10.11 (Day)	63.6	59.2	56.5	60.7	2.9	Domestic

	10.11 (Night)	51.4	47.3	45.0	49.7	3.0	Domestic
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**Fangzheng WWTP: Noise Monitoring Results (Oct 12, 2013) Unit: dB(A)**

Location	Date	Cumulative Percentile Sound Level			Leq	Standard Deviation ( $\sigma$ )	Noise Source
		L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>			
Dongailian Village	10.12 (Day)	52.0	49.8	45.5	52.1	3.8	Domestic
	10.12 (Night)	49.9	46.0	44.3	47.4	2.3	Domestic
Xialian Village	10.12 (Day)	54.1	47.5	44.4	51.0	3.9	Domestic
	10.12 (Night)	46.9	45.3	43.6	46.3	2.8	Domestic
Mujiatun Village	10.12 (Day)	53.1	47.0	42.9	49.3	3.8	Domestic
	10.12 (Night)	49.7	45.6	43.6	47.1	2.5	Domestic
Administrative Center	10.12 (Day)	57.3	51.6	48.8	54.1	3.4	Domestic
	10.12 (Night)	51.9	46.1	43.9	48.5	3.2	Domestic
Power Administration	10.12 (Day)	54.9	48.2	43.8	50.9	4.2	Domestic
	10.12 (Night)	50.8	46.7	44.4	48.2	2.5	Domestic
Fire Department	10.12 (Day)	55.2	48.8	45.0	52.2	3.9	Domestic
	10.12 (Night)	51.1	47.1	44.5	49.2	2.9	Domestic
Zihai Communicity	10.12 (Day)	53.1	48.4	46.4	50.7	3.0	Domestic
	10.12 (Night)	44.3	42.9	40.5	42.8	1.4	Domestic
Health Bureau	10.12 (Day)	63.4	58.3	56.0	60.3	2.9	Domestic
	10.12 (Night)	52.6	46.2	44.4	48.8	3.1	Domestic
Civil Affairs Bureau	10.12 (Day)	64.1	58.6	53.2	60.7	4.1	Domestic
	10.12 (Night)	53.1	45.4	43.9	49.5	3.8	Domestic

**Fangzheng WWTP: Noise Monitoring Results (Nov 29, 2013) Unit: dB(A)**

Location	Date	Cumulative Percentile Sound Level			Leq	Standard Deviation ( $\sigma$ )	Noise Source
		L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>			

Dongailian Village	11.29 (Day)	53.9	46.6	40.5	51.3	3.6	Domestic
	11.29 (Night)	46.1	45.0	42.5	44.5	2.6	Domestic
Xiailian Village	11.29 (Day)	55.2	48.0	43.1	51.6	4.8	Domestic
	11.29 (Night)	47.9	45.0	42.9	46.3	2.0	Domestic
Mujiatun Village	11.29 (Day)	54.3	48.4	42.4	50.8	3.9	Domestic
	11.29 (Night)	48.0	44.2	43.8	45.3	1.2	Domestic
Administrative Center	11.29 (Day)	56.6	49.8	47.3	53.1	4.1	Domestic
	11.29 (Night)	49.3	46.3	44.1	47.0	2.2	Domestic
Power Administration	11.29 (Day)	54.3	49.2	46.2	51.9	2.9	Domestic
	11.29 (Night)	49.8	46.2	44.5	47.4	2.0	Domestic
Fire Department	11.29 (Day)	53.8	47.3	44.0	50.1	3.1	Domestic
	11.29 (Night)	46.9	45.4	44.3	45.8	1.9	Domestic
Zihai Communcity	11.29 (Day)	53.7	50.6	44.9	51.0	4.2	Domestic
	11.29 (Night)	48.9	45.8	44.7	47.4	2.1	Domestic
Health Bureau	11.29 (Day)	63.1	58.4	54.3	60.1	3.5	Domestic
	11.29 (Night)	50.0	47.0	45.5	47.7	2.5	Domestic
Civil Affairs Bureau	11.29 (Day)	64.8	58.2	53.4	60.4	3.8	Domestic
	11.29 (Night)	48.3	45.6	43.8	47.2	2.9	Domestic

**Fangzheng WWTP: Noise Monitoring Results (Nov 30, 2013) Unit: dB(A)**

Location	Date	Cumulative Percentile Sound Level			Leq	Standard Deviation ( $\sigma$ )	Noise Source
		L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>			
Dongailian Village	11.30 (Day)	53.9	50.2	45.2	51.5	3.6	Domestic
	11.30 (Night)	46.8	42.8	41.2	44.8	2.6	Domestic
Xiailian Village	11.30 (Day)	52.6	45.8	41.5	51.3	4.8	Domestic
	11.30 (Night)	49.0	46.5	44.2	47.1	2.0	Domestic
Mujiatun	11.30 (Day)	55.0	49.6	44.7	51.4	3.9	Domestic

Village	11.30 (Night)	48.3	46.6	46.0	46.7	1.2	Domestic
Administrative Center	11.30 (Day)	51.5	48.1	41.6	50.9	4.1	Domestic
	11.30 (Night)	49.6	45.8	44.8	47.3	2.2	Domestic
Power Administration	11.30 (Day)	52.2	49.1	47.3	51.5	2.9	Domestic
	11.30 (Night)	47.4	45.1	43.9	46.3	2.0	Domestic
Fire Department	11.30 (Day)	53.4	47.8	46.7	50.6	3.1	Domestic
	11.30 (Night)	48.1	44.6	43.1	45.7	1.9	Domestic
Zihai Communicity	11.30 (Day)	54.3	49.1	43.2	51.2	4.2	Domestic
	11.30 (Night)	49.6	46.3	44.5	47.3	2.1	Domestic
Health Bureau	11.30 (Day)	61.8	58.9	52.7	59.6	3.5	Domestic
	11.30 (Night)	47.5	45.5	43.0	47.4	2.5	Domestic
Civil Affairs Bureau	11.30 (Day)	62.8	57.6	53.9	60.6	3.8	Domestic
	11.30 (Night)	51.1	46.1	43.9	47.9	2.9	Domestic

**Fangzheng WTP: Surface Water Monitoring Results (Jan 20, 2014) (mg/l) (pH value is Dimensionless)**

Location		pH Value	COD	BOD	Suspended Solids	Oil	TP	Ammonia	TN
Dongailian Village	Left	6.93	10	2L	24	0.02L	0.16	0.32	1.88
	Middle	6.93	10	2L	21	0.02L	0.17	0.27	1.77
	Right	6.95	10	2L	22	0.02L	0.17	0.37	1.84
Mujiatun Village	Left	6.91	5L	2L	17	0.02L	0.14	0.13	1.51
	Middle	6.93	5L	2L	16	0.02L	0.14	0.12	1.53
	Right	6.95	5L	2L	18	0.02L	0.12	0.17	1.53
Chengbei New Area	Left	6.73	10	2L	15	0.02L	0.16	0.12	1.47
	Middle	6.81	10	2L	18	0.02L	0.17	0.16	1.34
	Right	6.82	13	2L	17	0.02L	0.16	0.14	1.60

**Fangzheng WWTP: Surface Water Monitoring Results (Jan 21, 2014) (mg/l) (pH value is Dimensionless)**

Location		pH Value	COD	BOD	Suspended Solids	Oil	TP	Ammonia	TN
Dongailian Village	Left	6.79	10	2L	20	0.02L	0.17	0.30	1.67
	Middle	6.87	10	2	23	0.02L	0.17	0.31	1.75
	Right	6.84	10	2L	22	0.02L	0.17	0.28	1.75
Mujiatun Village	Left	6.93	10	2L	17	0.02L	0.14	0.14	1.56
	Middle	6.90	6	2L	20	0.02L	0.14	0.12	1.64
	Right	6.93	10	2L	18	0.02L	0.14	0.14	1.75
Chengbei New Area	Left	6.74	10	2L	16	0.02L	0.16	0.12	1.66
	Middle	6.80	13	2L	17	0.02L	0.16	0.15	1.54
	Right	6.74	13	2L	20	0.02L	0.16	0.16	1.72

**Fangzheng WWTP: Surface Water Monitoring Results (Jan 22, 2014) (mg/l) (pH value is Dimensionless)**

Location		pH Value	COD	BOD	Suspended Solids	Oil	TP	Ammonia	TN
Dongailian Village	Left	6.83	10	2L	24	0.02L	0.17	0.47	1.72
	Middle	6.84	13	2L	26	0.02L	0.17	0.48	1.72
	Right	6.81	10	2L	24	0.02L	0.17	0.49	1.62
Mujiatun Village	Left	6.92	6	2L	20	0.02L	0.14	0.44	1.66
	Middle	6.90	6	2L	23	0.02L	0.14	0.45	1.72
	Right	6.91	6	2L	19	0.02L	0.14	0.45	1.57
Chengbei New Area	Left	6.76	10	2L	21	0.02L	0.16	0.41	1.53
	Middle	6.83	13	2L	18	0.02L	0.16	0.44	1.49
	Right	6.78	10	2	19	0.02L	0.16	0.42	1.65

**Fangzheng WWTP: Surface Water Monitoring Results (Feb 20, 2014) (mg/l) (pH value is Dimensionless)**

Location		pH Value	COD	BOD	Suspended Solids	Oil	TP	Ammonia	TN
Dongailian Village	Left	6.85	10	2L	24	0.03	0.14	0.43	1.76
	Middle	6.75	10	2L	25	0.04	0.14	0.45	1.79
	Right	6.80	13	2L	26	0.03	0.14	0.45	1.77
Mujiatun Village	Left	6.77	10	2L	22	0.04	0.12	0.44	1.41
	Middle	6.82	13	2L	21	0.03	0.13	0.44	1.45
	Right	6.91	10	2L	24	0.04	0.13	0.44	1.43
Chengbei New Area	Left	6.76	10	2L	19	0.03	0.13	0.41	1.59
	Middle	6.77	10	2L	18	0.04	0.13	0.40	1.67
	Right	6.83	13	2L	19	0.04	0.13	0.41	1.61

**Fangzheng WWTP: Surface Water Monitoring Results (Feb 21, 2014) (mg/l) (pH value is Dimensionless)**

Location		pH Value	COD	BOD	Suspended Solids	Oil	TP	Ammonia	TN
Dongailian Village	Left	6.83	10	2L	21	0.03	0.14	0.44	1.62
	Middle	6.76	13	2L	24	0.04	0.14	0.42	1.67
	Right	6.81	13	2L	19	0.04	0.14	0.44	1.61
Mujiatun Village	Left	6.78	6	2L	17	0.03	0.13	0.44	1.51
	Middle	6.81	6	2L	16	0.03	0.13	0.43	1.53
	Right	6.88	10	2L	14	0.03	0.13	0.43	1.53
Chengbei New Area	Left	6.73	10	3	14	0.03	0.12	0.40	1.59
	Middle	6.71	6	2	14	0.02	0.13	0.41	1.62
	Right	6.82	10	2	13	0.02	0.13	0.41	1.59



**Fangzheng WWTP: Surface Water Monitoring Results (Feb 22, 2014) (mg/l) (pH value is Dimensionless)**

Location		pH Value	COD	BOD	Suspended Solids	Oil	TP	Ammonia	TN
Dongailian Village	Left	6.79	10	2L	21	0.02	0.14	0.44	1.62
	Middle	6.77	10	2L	19	0.02	0.14	0.42	1.64
	Right	6.83	13	2L	21	0.02L	0.14	0.44	1.62
Mujiatun Village	Left	6.76	10	2L	18	0.03	0.14	0.44	1.54
	Middle	6.83	10	2L	17	0.02L	0.14	0.43	1.53
	Right	6.67	10	2L	19	0.02L	0.14	0.43	1.51
Chengbei New Area	Left	6.74	10	2L	15	0.02	0.14	0.40	1.60
	Middle	6.72	10	2L	14	0.02	0.14	0.41	1.62
	Right	6.79	13	2L	15	0.02	0.13	0.41	1.57

**Fangzheng WWTP: Air Quality Monitoring Results in 2014 (Daily Average Concentration)**

Location	Date	TSP(mg/m <sup>3</sup> )	PM <sub>10</sub> (mg/m <sup>3</sup> )
(A) Dongailian Village	2014.02.24	0.216	0.164
	2014.02.25	0.243	0.175
	2014.02.26	0.191	0.161
	2014.02.27	0.288	0.154
	2014.02.28	0.300	0.160
(B) Xiailian Village	2014.02.24	0.209	0.135
	2014.02.25	0.306	0.160
	2014.02.26	0.207	0.168
	2014.02.27	0.311	0.152
	2014.02.28	0.275	0.168
(C) Mujiatun Village	2014.02.24	0.248	0.136
	2014.02.25	0.230	0.144

	2014.02.26	0.296	0.141
	2014.02.27	0.251	0.134
	2014.02.28	0.295	0.166
(D) Administrative Center	2014.02.24	0.223	0.145
	2014.02.25	0.268	0.147
	2014.02.26	0.229	0.111
	2014.02.27	0.274	0.117
	2014.02.28	0.261	0.157
(E) Power Administration	2014.02.24	0.236	0.169
	2014.02.25	0.213	0.131
	2014.02.26	0.227	0.151
	2014.02.27	0.271	0.166
	2014.02.28	0.228	0.154
(F) Fire Department	2014.02.24	0.208	0.129
	2014.02.25	0.209	0.132
	2014.02.26	0.270	0.174
	2014.02.27	0.283	0.153
	2014.02.28	0.288	0.158

**Fangzheng WWTP: Noise Monitoring Results (Jan 11, 2014) Unit: dB(A)**

Location	Date	Cumulative Percentile Sound Level			Leq	Standard Deviation ( $\sigma$ )	Noise Source
		L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>			
Dongailian Village	01.11 (Day)	52.0	49.8	43.7	53.0	5.0	Domestic
	01.11 (Night)	50.8	44.6	42.9	47.5	3.3	Domestic
Xiailian Village	01.11 (Day)	54.3	46.9	43.4	51.0	4.3	Domestic
	01.11 (Night)	46.8	46.3	44.5	46.9	1.8	Domestic
Mujiatun	01.11 (Day)	52.0	46.2	43.2	48.8	3.5	Domestic

Village	01.11 (Night)	49.1	44.6	42.1	46.3	2.7	Domestic
Administrative Center	01.11 (Day)	58.5	52.4	47.7	55.0	4.1	Domestic
	01.11 (Night)	51.0	46.8	44.2	48.2	2.6	Domestic
Power Administration	01.11 (Day)	53.3	48.6	45.6	50.3	3.1	Domestic
	01.11 (Night)	51.6	46.3	44.1	48.5	3.1	Domestic
Fire Department	01.11 (Day)	50.8	48.2	46.2	52.2	2.7	Domestic
	01.11 (Night)	52.0	46.2	44.0	49.3	3.4	Domestic
Zihai Communicity	01.11 (Day)	52.5	49.3	47.6	51.0	2.5	Domestic
	01.11 (Night)	44.8	42.1	40.7	42.8	1.6	Domestic
Health Bureau	01.11 (Day)	63.4	58.5	55.7	60.5	3.4	Domestic
	01.11 (Night)	51.9	46.6	44.6	49.1	3.1	Domestic
Civil Affairs Bureau	01.11 (Day)	63.6	59.2	56.5	60.7	2.9	Domestic
	01.11 (Night)	51.4	47.3	45.0	49.7	3.0	Domestic

**Fangzheng WWTP: Noise Monitoring Results (Jan 12, 2014) Unit: dB(A)**

Location	Date	Cumulative Percentile Sound Level			Leq	Standard Deviation ( $\sigma$ )	Noise Source
		L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>			
Dongailian Village	01.12 (Day)	52.0	49.8	45.5	52.1	3.8	Domestic
	01.12 (Night)	49.9	46.0	44.3	47.4	2.3	Domestic
Xiailian Village	01.12 (Day)	54.1	47.5	44.4	51.0	3.9	Domestic
	01.12 (Night)	46.9	45.3	43.6	46.3	2.8	Domestic
Mujiatun Village	01.12 (Day)	53.1	47.0	42.9	49.3	3.8	Domestic
	01.12 (Night)	49.7	45.6	43.6	47.1	2.5	Domestic
Administrative Center	01.12 (Day)	57.3	51.6	48.8	54.1	3.4	Domestic
	01.12 (Night)	51.9	46.1	43.9	48.5	3.2	Domestic
Power Administration	01.12 (Day)	54.9	48.2	43.8	50.9	4.2	Domestic
	01.12 (Night)	50.8	46.7	44.4	48.2	2.5	Domestic

Fire Department	01.12 (Day)	55.2	48.8	45.0	52.2	3.9	Domestic
	01.12 (Night)	51.1	47.1	44.5	49.2	2.9	Domestic
Zihai Communicity	01.12 (Day)	53.1	48.4	46.4	50.7	3.0	Domestic
	01.12 (Night)	44.3	42.9	40.5	42.8	1.4	Domestic
Health Bureau	01.12 (Day)	63.4	58.3	56.0	60.3	2.9	Domestic
	01.12 (Night)	52.6	46.2	44.4	48.8	3.1	Domestic
Civil Affairs Bureau	01.12 (Day)	64.1	58.6	53.2	60.7	4.1	Domestic
	01.12 (Night)	53.1	45.4	43.9	49.5	3.8	Domestic

**Fangzheng WWTP: Noise Monitoring Results (Feb 27, 2014) Unit: dB(A)**

Location	Date	Cumulative Percentile Sound Level			Leq	Standard Deviation ( $\sigma$ )	Noise Source
		L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>			
Dongailian Village	02.27 (Day)	53.9	46.6	40.5	51.3	3.6	Domestic
	02.27 (Night)	46.1	45.0	42.5	44.5	2.6	Domestic
Xialian Village	02.27 (Day)	55.2	48.0	43.1	51.6	4.8	Domestic
	02.27 (Night)	47.9	45.0	42.9	46.3	2.0	Domestic
Mujiatun Village	02.27 (Day)	54.3	48.4	42.4	50.8	3.9	Domestic
	02.27 (Night)	48.0	44.2	43.8	45.3	1.2	Domestic
Administrative Center	02.27 (Day)	56.6	49.8	47.3	53.1	4.1	Domestic
	02.27 (Night)	49.3	46.3	44.1	47.0	2.2	Domestic
Power Administration	02.27 (Day)	54.3	49.2	46.2	51.9	2.9	Domestic
	02.27 (Night)	49.8	46.2	44.5	47.4	2.0	Domestic
Fire Department	02.27 (Day)	53.8	47.3	44.0	50.1	3.1	Domestic
	02.27 (Night)	46.9	45.4	44.3	45.8	1.9	Domestic
Zihai Communicity	02.27 (Day)	53.7	50.6	44.9	51.0	4.2	Domestic
	02.27 (Night)	48.9	45.8	44.7	47.4	2.1	Domestic
Health Bureau	02.27 (Day)	63.1	58.4	54.3	60.1	3.5	Domestic

	02.27 (Night)	50.0	47.0	45.5	47.7	2.5	Domestic
Civil Affairs Bureau	02.27 (Day)	64.8	58.2	53.4	60.4	3.8	Domestic
	02.27 (Night)	48.3	45.6	43.8	47.2	2.9	Domestic

**Fangzheng WWTP: Noise Monitoring Results (Feb 28, 2014) Unit: dB(A)**

Location	Date	Cumulative Percentile Sound Level			Leq	Standard Deviation ( $\sigma$ )	Noise Source
		L <sub>10</sub>	L <sub>50</sub>	L <sub>90</sub>			
Dongailian Village	02.28 (Day)	53.9	50.2	45.2	51.5	3.6	Domestic
	02.28 (Night)	46.8	42.8	41.2	44.8	2.6	Domestic
Xiailian Village	02.28 (Day)	52.6	45.8	41.5	51.3	4.8	Domestic
	02.28 (Night)	49.0	46.5	44.2	47.1	2.0	Domestic
Mujiatun Village	02.28 (Day)	55.0	49.6	44.7	51.4	3.9	Domestic
	02.28 (Night)	48.3	46.6	46.0	46.7	1.2	Domestic
Administrative Center	02.28 (Day)	51.5	48.1	41.6	50.9	4.1	Domestic
	02.28 (Night)	49.6	45.8	44.8	47.3	2.2	Domestic
Power Administration	02.28 (Day)	52.2	49.1	47.3	51.5	2.9	Domestic
	02.28 (Night)	47.4	45.1	43.9	46.3	2.0	Domestic
Fire Department	02.28 (Day)	53.4	47.8	46.7	50.6	3.1	Domestic
	02.28 (Night)	48.1	44.6	43.1	45.7	1.9	Domestic
Zihai Communicity	02.28 (Day)	54.3	49.1	43.2	51.2	4.2	Domestic
	02.28 (Night)	49.6	46.3	44.5	47.3	2.1	Domestic
Health Bureau	02.28 (Day)	61.8	58.9	52.7	59.6	3.5	Domestic
	02.28 (Night)	47.5	45.5	43.0	47.4	2.5	Domestic
Civil Affairs Bureau	02.28 (Day)	62.8	57.6	53.9	60.6	3.8	Domestic
	02.28 (Night)	51.1	46.1	43.9	47.9	2.9	Domestic

#### 4. Fujin WWTP

**Fujin WWTP: Effluent Quality (March 2011-March 2015)**

Date	pH	COD	SS	NH3-N	TN	TP	BOD <sub>5</sub>	Color	Petroleum	Animal + Plant Oils	Coliform count
2011.3	6.92	23.8	7.2	0.23	11.6	0.4	5.35	10	0.05L	0.05L	9.00×10 <sup>2</sup>
2011.4	6.94	35.6	6.1	0.72	13.12	0.32	5.86	11	0.05L	0.05L	8.60×10 <sup>2</sup>
2011.5	6.91	24.2	8	0.89	14.23	0.34	5.46	8	0.05L	0.05L	9.00×10 <sup>2</sup>
2011.6	6.93	25.1	7	0.84	12.66	0.24	5.23	10	0.05L	0.05L	9.10×10 <sup>2</sup>
2011.7	6.99	23.4	8.45	0.33	11.6	0.34	5.76	11	0.05L	0.05L	8.70×10 <sup>2</sup>
2011.8	6.95	26.9	6.3	0.45	13.67	0.38	5.22	12	0.05L	0.05L	8.30×10 <sup>2</sup>
2011.9	7.29	22.1	7.1	0.68	13.69	0.4	6.12	11	0.05L	0.05L	7.80×10 <sup>2</sup>
2011.1	7.31	27.6	8.4	0.27	14.89	0.42	6.03	10	0.05L	0.05L	7.80×10 <sup>2</sup>
2011.11	7.38	22.5	7	0.9	14.25	0.24	6.32	14	0.05L	0.05L	9.10×10 <sup>2</sup>
2011.12	7.32	22.5	8	0.63	13.25	0.35	6.23	12	0.05L	0.05L	8.60×10 <sup>2</sup>
2012.1	7.29	27.1	6.63	0.89	14.65	0.24	5.54	15	0.05L	0.05L	8.30×10 <sup>2</sup>
2012.2	7.22	27.2	7.1	1.1	13.13	0.36	6.06	12	0.05L	0.05L	8.60×10 <sup>2</sup>
2012.3	7.41	25.8	8.2	1.05	14.05	0.27	6.23	12	0.05L	0.05L	9.00×10 <sup>2</sup>
2012.4	7.14	30.2	8.1	1.34	13.85	0.28	6.44	13	0.05L	0.05L	8.10×10 <sup>2</sup>
2012.5	7.33	26.7	7.21	1.71	13.39	0.37	6.94	14	0.05L	0.05L	9.00×10 <sup>2</sup>
2012.6	6.93	19.3	7.2	0.47	9.69	0.35	5.39	15	0.05L	0.05L	8.60×10 <sup>2</sup>
2012.7	6.98	26.1	5.3	0.67	9.36	0.37	6.24	12	0.05L	0.05L	8.70×10 <sup>2</sup>
2012.8	6.96	16	8.2	0.67	9.96	0.38	3.05	12	0.05L	0.05L	9.10×10 <sup>2</sup>
2012.9	7.23	39.1	7.2	0.83	9.49	0.34	5.31	13	0.05L	0.05L	8.60×10 <sup>2</sup>
2012.1	6.93	29.7	5	0.06	10.28	0.3	7.42	14	0.05L	0.05L	8.30×10 <sup>2</sup>
2012.11	7.01	30.9	5	0.89	13.04	0.4	5.09	15	0.05L	0.05L	8.10×10 <sup>2</sup>
2012.12	7.25	22	6	1.85	12.16	0.29	5.86	16	0.05L	0.05L	6.30×10 <sup>2</sup>
2013.1	7.27	27.7	7	1.9	13.17	0.34	6.98	14	0.05L	0.05L	8.70×10 <sup>2</sup>
2013.2	6.92	26.5	6	2.01	12.36	0.33	5.34	12	0.05L	0.05L	8.60×10 <sup>2</sup>
2013.3	6.84	25.6	6	2.15	12.08	0.19	5.64	11	0.05L	0.05L	8.30×10 <sup>2</sup>
2013.4	7.06	27.8	6.66	3.34	11.79	0.15	5.16	12	0.05L	0.05L	8.60×10 <sup>2</sup>
2013.5	7.05	32.2	7.24	3.02	11.39	0.17	8.81	10	0.05L	0.05L	9.00×10 <sup>2</sup>
2013.6	6.98	31.7	7.2	2.5	10.74	0.23	5.6	9	0.05L	0.05L	8.10×10 <sup>2</sup>

2013.7	6.98	25.2	6.7	1.2	11.66	0.21	4.46	8	0.05L	0.05L	9.00×10 <sup>2</sup>
2013.8	7.02	24.4	6.6	0.61	11.53	0.33	3.71	10	0.05L	0.05L	8.60×10 <sup>2</sup>
2013.9	7.01	21	6	0.56	9.8	0.25	2.4	10	0.05L	0.05L	8.70×10 <sup>2</sup>
2013.1	7.09	21.4	6.7	0.74	11.36	0.15	3.7	11	0.05L	0.05L	9.10×10 <sup>2</sup>
2013.11	7.04	27	6.2	0.8	10.82	0.19	5	8	0.05L	0.05L	7.00×10 <sup>2</sup>
2013.12	7.02	26	5.8	2.53	11.75	0.36	3.85	12	0.05L	0.05L	9.00×10 <sup>2</sup>
2014.1	6.99	23.1	5.7	1.66	10.25	0.26	4.14	11	0.05L	0.05L	9.10×10 <sup>2</sup>
2014.2	6.96	23	5.4	0.26	9.76	0.31	2.75	10	0.05L	0.05L	8.70×10 <sup>2</sup>
2014.3	6.95	26.9	6.1	0.35	13.67	0.38	5.22	14	0.05L	0.05L	8.30×10 <sup>2</sup>
2014.4	7.21	22.1	7.2	0.48	13.69	0.41	6.17	15	0.05L	0.05L	7.80×10 <sup>2</sup>
2014.5	6.76	26.8	8.1	0.56	12.89	0.32	6.63	14	0.05L	0.05L	7.80×10 <sup>2</sup>
2014.6	6.78	25.4	7.3	0.78	13.25	0.44	6.52	12	0.05L	0.05L	9.10×10 <sup>2</sup>
2014.7	6.85	24.7	8.2	0.66	12.25	0.33	6.63	11	0.05L	0.05L	8.60×10 <sup>2</sup>
2014.8	6.65	28.7	7.54	0.54	13.24	0.42	6.34	12	0.05L	0.05L	8.30×10 <sup>2</sup>
2014.9	6.65	23.8	6	0.49	13.65	0.22	5.74	14	0.05L	0.05L	8.30×10 <sup>2</sup>
2014.1	6.97	28.2	7.4	1.34	11.13	0.34	6.46	11	0.05L	0.05L	8.60×10 <sup>2</sup>
2014.11	7.01	29.8	8.2	1.35	13.05	0.28	6.73	12	0.05L	0.05L	9.00×10 <sup>2</sup>
2014.12	7.23	31.2	8	1.34	13.85	0.28	6.44	11	0.05L	0.05L	8.10×10 <sup>2</sup>
2015.1	6.96	23.9	6	4.49	12.55	0.32	4.86	10	0.05L	0.05L	7.90×10 <sup>2</sup>
2015.2	6.95	29.1	7.31	4.04	13.66	0.3	8.36	14	0.05L	0.05L	8.60×10 <sup>2</sup>
2015.3	7.11	29.7	6.89	3.4	12.76	0.37	4.35	12	0.05L	0.05L	7.00×10 <sup>2</sup>

#### Fujin WWTP: Influent Quality (March 2011-March 2015)

Date	pH	COD	SS	NH3-N	TN	TP	BOD <sub>5</sub>	Color	Petroleum	Animal + Plant Oils	LAS
2011.3	7.18	302	280	24.07	29.64	4.15	123	32	1.56	1.23	1.25
2011.4	7.12	234	242	22.37	26.67	2.46	142	25	1.37	1.12	1.36
2011.5	7.24	231	191	28.7	31.8	2.81	143	36	1.34	1.12	1.42
2011.6	7.21	245	233	24.42	30.37	1.56	91.2	32	1.67	1.23	1.34
2011.7	7.23	311	276	17.83	20.08	3.64	89.9	35	1.24	1.07	1.45
2011.8	7.17	234	227	29.58	34.25	2.43	8.9	32	1.56	1.22	1.34
2011.9	7.24	343	326	26.51	36.41	2.23	121	24	1.78	1.26	1.46
2011.1	7.23	232	198	23.79	35.39	3.67	102	258	1.56	1.32	1.37

2011.11	7.23	234	184	25.87	32.56	3.23	106	28	1.45	1.06	1.48
2011.12	7.43	222	196	26.67	30.75	2.36	116	26	1.43	1.21	1.59
2012.1	7.23	123	115	28.5	31.89	2.75	112	26	1.67	1.09	1.26
2012.2	7.13	183	178	27.79	34.35	3.12	128	25	1.23	1.12	1.54
2012.3	7.54	242	193	38.2	40.64	4.23	146	32	1.56	1.28	1.26
2012.4	7.65	234	218	39.53	44.19	4.67	98.2	37	1.39	1.22	1.19
2012.5	7.41	321	283	41.08	50.84	5.41	114	23	1.25	1.11	1.25
2012.6	6.93	254	240	12.47	19.69	4.25	112	32	1.36	1.07	1.16
2012.7	7.28	207	183	27.38	38.92	4.47	107	35	1.24	1.02	1.14
2012.8	7.36	331	291	32.57	45.07	4.56	105	32	1.36	1.07	1.53
2012.9	7.4	293	209	32.01	42.69	4.82	102	34	1.42	1.02	1.52
2012.1	7.38	284	206	28.92	39.37	4.53	107	30	1.19	1.08	1.19
2012.11	7.3	288	190	29.24	37.71	4.38	104	22	1.39	1.13	1.29
2012.12	7.29	300	160	28.58	37.15	3.86	102	88	1.72	1.28	1.32
2013.1	7.26	299	210	30.46	39.85	3.96	117	32	1.54	1.24	1.54
2013.2	7.22	307	226	28.75	37.44	4.08	132	35	1.81	1.73	1.21
2013.3	7.22	294	245	27.96	38.15	4.33	150	34	1.34	1.34	1.54
2013.4	7.25	298	190	32.57	41.6	3.75	153	36	1.38	1.54	1.23
2013.5	7.08	303	228	40.07	49.64	4.55	145	23	1.24	1.08	1.24
2013.6	7.16	378	252	46.37	52.67	4.46	145	25	1.35	1.11	1.22
2013.7	7.24	261	161	27.7	36.8	3.81	119	21	1.34	1.21	1.32
2013.8	7.14	216	133	24.12	32.37	3.56	96.8	25	1.45	1.4	1.25
2013.9	7.13	174	146	15.83	25.08	3.64	86.9	26	1.56	1.07	1.23
2013.1	7.1	163	127	22.58	32.25	3.43	82.9	24	1.45	1.22	1.45
2013.11	7.21	180	146	23.51	33.41	3.23	127	23	1.22	1.16	1.64
2013.12	7.21	212	158	23.78	33.39	3.25	103	32	1.34	1.28	1.54
2014.1	7.35	234	134	23.87	33.56	3.56	109	21	1.09	1.04	1.43
2014.2	7.45	265	146	24.67	33.75	2.56	112	14	1.45	1.21	1.67
2014.3	7.18	263	185	23.51	31.89	2.77	119	25	1.06	1.01	1.78
2014.4	7.18	259	198	26.79	35.35	3.05	127	36	1.34	1.12	1.86
2014.5	7.25	250	192	24.73	35.14	3.29	113	32	1.56	1.32	1.34
2014.6	7.26	217	182	22.75	37.36	3.85	115	25	1.32	1.12	1.23
2014.7	6.96	190	145	16.04	18.88	2.06	81.5	26	1.09	1.04	1.44
2014.8	7.16	256	131	31.27	41.58	3.63	157	24	1.89	1.23	1.22
2014.9	7.17	234	206	26.33	35.24	3.17	115	29	1.22	1.08	1.21
2014.1	7.21	304	235	30.35	37.18	3.74	151	25	1.44	1.24	1.67



2014.11	7.21	296	221	29.63	39.57	3.46	138	32	1.31	1.13	1.45
2014.12	7.2	279	202	29.01	32.15	3.24	138	26	1.24	1.04	1.67
2015.1	7.2	223	213	24.38	25.08	3.2	115	25	1.23	1.05	1.32
2015.2	7.21	227	194	24.06	37.55	3.76	113	24	1.12	1.08	1.56
2015.3	7.26	237	200	27.58	35	3.25	119	32	1.34	1.34	1.33

### Fujin WWTP: Ambient Water Quality Monitoring

Monitoring Date	Monitoring Location	Parameter	Water Quality Monitoring Results				Standard
			1st	2nd	3rd	Daily Average	
2011.3	Hongqi Pump Station	pH	7.62	7.3	7.75	7.56	6~9
		Conductivity	1546	1584	1583	1571	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.34	0.36	0.37	0.36	1
		TN	0.65	0.65	0.67	0.66	1
		TP	0.06	0.12	0.12	0.1	0.2
		BOD <sub>5</sub>	2.98	2.64	3.4	3.01	4
		COD	17.9	18.3	17.6	17.9	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.5×10 <sup>3</sup>	1.5×10 <sup>3</sup>	1.1×10 <sup>3</sup>	1.4×10 <sup>3</sup>	10000
	Fujin Landfill	pH	6.93	6.75	7.62	7.1	6~9
		Conductivity	1424	1467	1624	1505	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.48	0.54	0.42	0.48	1
		TN	0.75	0.82	0.84	0.8	1
		TP	0.11	0.12	0.15	0.13	0.2
		BOD <sub>5</sub>	3.54	3.7	3.6	3.61	4
		COD	18.8	17.6	16.7	17.7	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.2×10 <sup>3</sup>	1.4×10 <sup>3</sup>	1.5×10 <sup>3</sup>	1.4×10 <sup>3</sup>	10000
2011.8	Hongqi Pump Station	pH	6.98	7.12	7.42	7.17	6~9
		Conductivity	1658	1634	1634	1642	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.43	0.34	0.33	0.37	1
		TN	0.62	0.54	0.51	0.56	1
		TP	0.1	0.06	0.09	0.08	0.2
		BOD <sub>5</sub>	2.3	2.41	2.55	2.42	4
		COD	18.6	18.7	17.2	18.2	20

	Fujin Landfill	Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.1×10 <sup>3</sup>	1.6×10 <sup>3</sup>	1.2×10 <sup>3</sup>	1.3×10 <sup>3</sup>	10000
		pH	7.14	7.12	7.03	7.1	6~9
		Conductivity					
		1030	1065	1077	1057	100~10000	
		NH <sub>4</sub> <sup>+</sup> -N	0.24	0.48	0.41	0.38	1
		TN	0.75	0.82	0.76	0.78	1
		TP	0.12	0.15	0.12	0.13	0.2
		BOD <sub>5</sub>	3.38	3.35	3.6	3.44	4
		COD	17.2	18.2	18.4	17.9	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.2×10 <sup>3</sup>	1.5×10 <sup>3</sup>	1.4×10 <sup>3</sup>	1.4×10 <sup>3</sup>	10000
2011.1	Hongqi Pump Station	pH	7.33	7.15	7.26	7.25	6~9
		Conductivity	1620	1619	1657	1632	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.43	0.45	0.4	0.43	1
		TN	0.62	0.61	0.69	0.64	1
		TP	0.19	0.12	0.15	0.15	0.2
		BOD <sub>5</sub>	3.36	3.14	2.92	3.14	4
		COD	16.8	15.9	16.4	16.4	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.9×10 <sup>3</sup>	1.9×10 <sup>3</sup>	2.1×10 <sup>3</sup>	2.0×10 <sup>3</sup>	10000
	Fujin Landfill	pH	7.23	7.32	7.28	7.28	6~9
		Conductivity	1497	1482	1462	1480	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.32	0.43	0.46	0.4	1
		TN	0.77	0.71	0.69	0.72	1
		TP	0.12	0.15	0.13	0.13	0.2
		BOD <sub>5</sub>	3.69	3.53	3.65	3.62	4
		COD	17.1	16.9	18.1	17.4	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.5×10 <sup>3</sup>	1.5×10 <sup>3</sup>	1.5×10 <sup>3</sup>	1.5×10 <sup>3</sup>	10000
2012.1	Hongqi Pump Station	pH	7.24	7.33	7.15	7.24	6~9
		Conductivity	1567	1531	1576	1558	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.35	0.39	0.32	0.35	1
		TN	0.72	0.55	0.67	0.65	1
		TP	0.12	0.17	0.15	0.15	0.2
		BOD <sub>5</sub>	2.82	2.81	3.25	2.96	4

		COD	15.1	16.1	15.6	15.6	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.4×10 <sup>3</sup>	1.2×10 <sup>3</sup>	1.5×10 <sup>3</sup>	1.4×10 <sup>3</sup>	10000
	Fujin Landfill	pH	6.99	6.95	7.34	7.093	6~9
		Conductivity	1460	1479	1651	1530	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.35	0.42	0.49	0.42	1
		TN	0.64	0.84	0.81	0.76	1
		TP	0.13	0.13	0.12	0.13	0.2
		BOD <sub>5</sub>	3.52	3.63	3.47	3.54	4
		COD	16.3	18.1	17.3	17.2	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.8×10 <sup>3</sup>	1.6×10 <sup>3</sup>	1.7×10 <sup>3</sup>	1.7×10 <sup>3</sup>	10000
2012.4	Hongqi Pump Station	pH	7.32	7.6	7.72	7.55	6~9
		Conductivity	1567	1580	1584	1577	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.33	0.38	0.34	0.35	1
		TN	0.61	0.65	0.64	0.63	1
		TP	0.09	0.11	0.12	0.11	0.2
		BOD <sub>5</sub>	2.98	2.64	3.4	3.01	4
		COD	17.2	18.6	17.8	17.9	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.2×10 <sup>3</sup>	1.5×10 <sup>3</sup>	1.4×10 <sup>3</sup>	1.4×10 <sup>3</sup>	10000
	Fujin Landfill	pH	6.9	6.75	7.62	7.09	6~9
		Conductivity	1435	1449	1624	1503	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.48	0.52	0.45	0.48	1
		TN	0.75	0.82	0.84	0.8	1
		TP	0.11	0.12	0.15	0.13	0.2
		BOD <sub>5</sub>	3.54	3.7	3.6	3.61	4
		COD	18.8	17.6	16.7	17.7	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.2×10 <sup>3</sup>	1.4×10 <sup>3</sup>	1.5×10 <sup>3</sup>	1.4×10 <sup>3</sup>	10000
2012.7	Hongqi Pump Station	pH	6.82	7.2	7.22	7.08	6~9
		Conductivity	1650	1630	1624	1635	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.41	0.35	0.33	0.36	1
		TN	0.62	0.54	0.51	0.56	1
		TP	0.1	0.06	0.09	0.08	0.2

	Fujin Landfill	BOD <sub>5</sub>	2.3	2.41	2.55	2.42	4
		COD	18.6	18.7	17.2	18.1	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.1×10 <sup>3</sup>	1.6×10 <sup>3</sup>	1.2×10 <sup>3</sup>	1.3×10 <sup>3</sup>	10000
		pH	7.24	7.15	7.13	7.17	6~9
		Conductivity	1090	1065	1077	1077	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.44	0.48	0.41	0.44	1
		TN	0.77	0.82	0.76	0.78	1
		TP	0.14	0.15	0.12	0.14	0.2
		BOD <sub>5</sub>	3.33	3.35	3.6	3.43	4
		COD	17.8	18.2	18.4	18.1	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.2×10 <sup>3</sup>	1.5×10 <sup>3</sup>	1.4×10 <sup>3</sup>	1.4×10 <sup>3</sup>	10000
2012 10	Hongqi Pump Station	pH	6.55	7.29	7.21	7.02	6~9
		Conductivity	1636	1627	1625	1629	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.42	0.38	0.32	0.37	1
		TN	0.62	0.52	0.51	0.55	1
		TP	0.12	0.08	0.07	0.09	0.2
		BOD <sub>5</sub>	2.21	2.48	2.71	2.47	4
		COD	15.2	18.1	17.6	17	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.6×10 <sup>3</sup>	1.5×10 <sup>3</sup>	1.7×10 <sup>3</sup>	1.6×10 <sup>3</sup>	10000
	Fujin Landfill	pH	7.25	7.19	7.12	7.18	6~9
		Conductivity	1078	1064	1061	1067	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.48	0.44	0.45	0.46	1
		TN	0.72	0.84	0.72	0.76	1
		TP	0.15	0.15	0.17	0.16	0.2
		BOD <sub>5</sub>	3.37	3.45	3.62	3.48	4
		COD	17.9	18.1	17.9	18	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.9×10 <sup>3</sup>	1.9×10 <sup>3</sup>	2.1×10 <sup>3</sup>	2.0×10 <sup>3</sup>	10000
2013.1	Hongqi Pump Station	pH	7.33	7.7	7.81	7.61	6~9
		Conductivity	1575	1567	1582	1574	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.44	0.37	0.36	0.39	1
		TN	0.54	0.67	0.64	0.62	1
		TP	0.12	0.1	0.12	0.11	0.2

	Fujin Landfill	BOD <sub>5</sub>	2.94	2.86	3.3	3.03	4
		COD	18.6	16.7	19.7	18.3	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.5×10 <sup>3</sup>	1.5×10 <sup>3</sup>	1.5×10 <sup>3</sup>	1.5×10 <sup>3</sup>	10000
		pH	6.93	6.76	7.64	7.11	6~9
		Conductivity	1465	1545	1620	1543	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.47	0.61	0.47	0.52	1
		TN	0.79	0.76	0.85	0.8	1
		TP	0.15	0.17	0.14	0.15	0.2
		BOD <sub>5</sub>	3.53	3.75	3.68	3.65	4
		COD	16.8	14.3	18.7	16.6	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.5×10 <sup>3</sup>	1.5×10 <sup>3</sup>	1.5×10 <sup>3</sup>	1.5×10 <sup>3</sup>	10000
2013.4	Hongqi Pump Station	pH	7.12	7.24	7.48	7.28	6~9
		Conductivity	1680	1670	1668	1673	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.44	0.48	0.42	0.45	1
		TN	0.65	0.64	0.67	0.65	1
		TP	0.14	0.14	0.12	0.13	0.2
		BOD <sub>5</sub>	3.28	3.44	2.8	3.17	4
		COD	17.6	16.8	16.1	16.8	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.3×10 <sup>3</sup>	1.3×10 <sup>3</sup>	1.3×10 <sup>3</sup>	1.3×10 <sup>3</sup>	10000
	Fujin Landfill	pH	7.3	7.22	7.54	7.35	6~9
		Conductivity	1466	1492	1468	1475	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.43	0.43	0.47	0.44	1
		TN	0.73	0.7	0.67	0.7	1
		TP	0.13	0.11	0.11	0.12	0.2
		BOD <sub>5</sub>	3.53	3.5	3.52	3.52	4
		COD	17	16.7	17.2	17	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.3×10 <sup>3</sup>	1.2×10 <sup>3</sup>	1.4×10 <sup>3</sup>	1.3×10 <sup>3</sup>	10000
2013.8	Hongqi Pump Station	pH	7.31	7.42	7.54	7.42	6~9
		Conductivity	1580	1540	1588	1569	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.32	0.35	0.38	0.35	1
		TN	0.72	0.65	0.66	0.68	1
		TP	0.09	0.14	0.1	0.11	0.2

	Fujin Landfill	BOD <sub>5</sub>	2.8	3.1	3.3	3.07	4
		COD	17.4	16.2	18.1	17.2	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.4×10 <sup>3</sup>	1.2×10 <sup>3</sup>	1.3×10 <sup>3</sup>	1.3×10 <sup>3</sup>	10000
		pH	6.9	6.84	7.32	7.02	6~9
		Conductivity	1480	1450	1601	1510	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.56	0.57	0.52	0.55	1
		TN	0.77	0.78	0.71	0.75	1
		TP	0.11	0.14	0.12	0.12	0.2
		BOD <sub>5</sub>	3.4	3.6	3.23	3.41	4
		COD	17.4	16.4	18	17.3	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.8×10 <sup>3</sup>	1.8×10 <sup>3</sup>	1.9×10 <sup>3</sup>	1.8×10 <sup>3</sup>	10000
2013.1	Hongqi Pump Station	pH	7.14	7.22	7.5	7.29	6~9
		Conductivity	1681	1647	1664	1664	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.45	0.46	0.44	0.45	1
		TN	0.66	0.69	0.67	0.67	1
		TP	0.13	0.13	0.13	0.13	0.2
		BOD <sub>5</sub>	3.27	3.44	2.66	3.12	4
		COD	17.1	16.2	15.7	16.3	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.4×10 <sup>3</sup>	1.2×10 <sup>3</sup>	1.3×10 <sup>3</sup>	1.3×10 <sup>3</sup>	10000
	Fujin Landfill	pH	7.32	7.25	7.51	7.36	6~9
		Conductivity	1468	1494	1469	1477	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.45	0.43	0.46	0.45	1
		TN	0.71	0.71	0.64	0.69	1
		TP	0.12	0.12	0.11	0.12	0.2
		BOD <sub>5</sub>	3.55	3.48	3.5	3.51	4
		COD	16.7	16.9	17.2	16.9	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.3×10 <sup>3</sup>	1.3×10 <sup>3</sup>	1.3×10 <sup>3</sup>	1.3×10 <sup>3</sup>	10000
2014.1	Hongqi Pump Station	pH	7.28	7.41	7.6	7.43	6~9
		Conductivity	1549	1560	1571	1560	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.35	0.37	0.36	0.36	1
		TN	0.67	0.68	0.69	0.68	1
		TP	0.09	0.12	0.11	0.11	0.2

	Fujin Landfill	BOD <sub>5</sub>	3	3.2	3.3	3.17	4
		COD	16	15	14	15	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.6×10 <sup>3</sup>	1.6×10 <sup>3</sup>	1.6×10 <sup>3</sup>	1.6×10 <sup>3</sup>	10000
		pH	6.91	6.84	7.41	7.05	6~9
		Conductivity	1439	1452	1633	1508	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.52	0.59	0.51	0.54	1
		TN	0.73	0.81	0.77	0.77	1
		TP	0.16	0.11	0.13	0.13	0.2
		BOD <sub>5</sub>	3.51	3.38	3.44	3.44	4
		COD	15	17	16	16	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.7×10 <sup>3</sup>	1.8×10 <sup>3</sup>	1.6×10 <sup>3</sup>	1.7×10 <sup>3</sup>	10000
2014.4	Hongqi Pump Station	pH	7.12	7.24	7.48	7.28	6~9
		Conductivity	1680	1670	1668	1673	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.44	0.48	0.42	0.45	1
		TN	0.65	0.64	0.67	0.65	1
		TP	0.14	0.14	0.12	0.13	0.2
		BOD <sub>5</sub>	3.28	3.44	2.8	3.17	4
		COD	17.6	16.8	16.1	16.8	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.3×10 <sup>3</sup>	1.3×10 <sup>3</sup>	1.3×10 <sup>3</sup>	1.3×10 <sup>3</sup>	10000
	Fujin Landfill	pH	7.3	7.22	7.54	7.35	6~9
		Conductivity	1466	1492	1468	1475	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.43	0.43	0.47	0.44	1
		TN	0.73	0.7	0.67	0.7	1
		TP	0.13	0.11	0.11	0.12	0.2
		BOD <sub>5</sub>	3.53	3.5	3.52	3.52	4
		COD	17	16.7	17.2	17	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.3×10 <sup>3</sup>	1.2×10 <sup>3</sup>	1.4×10 <sup>3</sup>	1.3×10 <sup>3</sup>	10000
2014.8	Hongqi Pump Station	pH	7.31	7.42	7.54	7.42	6~9
		Conductivity	1580	1540	1588	1569	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.32	0.35	0.38	0.35	1
		TN	0.72	0.65	0.66	0.68	1
		TP	0.09	0.14	0.1	0.11	0.2

	Fujin Landfill	BOD <sub>5</sub>	2.8	3.1	3.3	3.07	4
		COD	17.4	16.2	18.1	17.2	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.4×10 <sup>3</sup>	1.2×10 <sup>3</sup>	1.3×10 <sup>3</sup>	1.3×10 <sup>3</sup>	10000
		pH	6.9	6.84	7.32	7.02	6~9
		Conductivity	1480	1450	1601	1510	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.56	0.57	0.52	0.55	1
		TN	0.77	0.78	0.71	0.75	1
		TP	0.11	0.14	0.12	0.12	0.2
		BOD <sub>5</sub>	3.4	3.6	3.23	3.41	4
		COD	17.4	16.4	18	17.3	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.8×10 <sup>3</sup>	1.8×10 <sup>3</sup>	1.9×10 <sup>3</sup>	1.8×10 <sup>3</sup>	10000
2014 10	Hongqi Pump Station	pH	6.65	7.21	7.13	7	6~9
		Conductivity	1669	1645	1656	1657	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.48	0.31	0.37	0.39	1
		TN	0.67	0.72	0.58	0.66	1
		TP	0.16	0.12	0.06	0.11	0.2
		BOD <sub>5</sub>	2.25	2.28	2.51	2.35	4
		COD	15.6	14.1	15.6	15.1	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.3×10 <sup>3</sup>	1.5×10 <sup>3</sup>	1.4×10 <sup>3</sup>	1.4×10 <sup>3</sup>	10000
	Fujin Landfill	pH	7.25	7.29	7.32	7.29	6~9
		Conductivity	1028	1034	1051	1037	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.43	0.44	0.35	0.41	1
		TN	0.72	0.84	0.72	0.76	1
		TP	0.15	0.15	0.15	0.15	0.2
		BOD <sub>5</sub>	3.27	3.35	3.32	3.31	4
		COD	17.3	18.1	17.9	17.8	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.5×10 <sup>3</sup>	1.5×10 <sup>3</sup>	1.5×10 <sup>3</sup>	1.5×10 <sup>3</sup>	10000
2015.2	Hongqi Pump Station	pH	7.33	7.7	7.81	7.61	6~9
		Conductivity	1575	1567	1582	1574	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.44	0.37	0.36	0.39	1
		TN	0.54	0.67	0.64	0.62	1
		TP	0.16	0.19	0.12	0.16	0.2



	Fujin Landfill	BOD <sub>5</sub>	2.96	2.82	3.3	3.03	4
		COD	18.9	16.7	19.7	18.4	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.5×10 <sup>3</sup>	1.5×10 <sup>3</sup>	1.5×10 <sup>3</sup>	1.5×10 <sup>3</sup>	10000
		pH	6.93	6.75	7.34	7.01	6~9
		Conductivity	1464	1575	1640	1560	100~10000
		NH <sub>4</sub> <sup>+</sup> -N	0.67	0.61	0.47	0.58	1
		TN	0.71	0.76	0.85	0.77	1
		TP	0.12	0.17	0.14	0.14	0.2
		BOD <sub>5</sub>	3.53	3.74	3.68	3.65	4
		COD	16.8	13.1	18.7	16.2	20
		Petroleum	0.05L	0.05L	0.05L	0.05L	0.05
		Coliform count	1.3×10 <sup>3</sup>	1.5×10 <sup>3</sup>	1.4×10 <sup>3</sup>	1.4×10 <sup>3</sup>	10000

#### Fujin WWTP: Ambient Air Quality Monitoring Results

Monitoring Date	Parameter	Monitoring Results				Standard
		1st	2nd	3rd	Daily Average	
2011.3	TSP	0.26	0.23	0.26	0.22	0.3
	SO <sub>2</sub>	0.006	0.005	0.002	0.004	0.06
	NH <sub>3</sub>	0.184	0.143	0.185	0.171	1.5
	H <sub>2</sub> S	0.006	0.008	0.003	0.006	0.06
	Odor	14	11	12	12	20
2011.7	TSP	0.25	0.27	0.21	0.24	0.3
	SO <sub>2</sub>	0.007	0.005	0.007	0.006	0.06
	NH <sub>3</sub>	0.186	0.175	0.184	0.182	1.5
	H <sub>2</sub> S	0.007	0.005	0.004	0.005	0.06
	Odor	12	14	12	13	20
2011.11	TSP	0.25	0.26	0.25	0.25	0.3
	SO <sub>2</sub>	0.007	0.005	0.004	0.005	0.06

	NH <sub>3</sub>	0.187	0.183	0.187	0.186	1.5
	H <sub>2</sub> S	0.006	0.004	0.006	0.005	0.06
	Odor	14	12	11	12	20
2012.2	TSP	0.26	0.23	0.27	0.25	0.3
	SO <sub>2</sub>	0.004	0.005	0.004	0.004	0.06
	NH <sub>3</sub>	0.187	0.173	0.176	0.179	1.5
	H <sub>2</sub> S	0.005	0.007	0.004	0.005	0.06
	Odor	12	13	14	13	20
2012.6	TSP	0.25	0.26	0.22	0.24	0.3
	SO <sub>2</sub>	0.006	0.004	0.005	0.005	0.06
	NH <sub>3</sub>	0.175	0.187	0.181	0.181	1.5
	H <sub>2</sub> S	0.003	0.002	0.004	0.003	0.06
	Odor	13	12	12	12	20
2012.1	TSP	0.24	0.26	0.22	0.24	0.3
	SO <sub>2</sub>	0.007	0.006	0.004	0.006	0.06
	NH <sub>3</sub>	0.177	0.188	0.183	0.183	1.5
	H <sub>2</sub> S	0.005	0.007	0.004	0.005	0.06
2013.2	TSP	0.27	0.22	0.26	0.25	0.3
	SO <sub>2</sub>	0.005	0.007	0.004	0.005	0.06
	NH <sub>3</sub>	0.178	0.182	0.181	0.18	1.5
	H <sub>2</sub> S	0.007	0.006	0.004	0.006	0.06
	Odor	14	12	13	13	20
2013.5	TSP	0.25	0.27	0.26	0.26	0.3
	SO <sub>2</sub>	0.003	0.004	0.005	0.004	0.06
	NH <sub>3</sub>	0.185	0.188	0.187	0.187	1.5
	H <sub>2</sub> S	0.003	0.005	0.007	0.005	0.06
	Odor	14	12	12	13	20

2013.8	TSP	0.27	0.28	0.26	0.27	0.3
	SO <sub>2</sub>	0.008	0.008	0.005	0.007	0.06
	NH <sub>3</sub>	0.182	0.172	0.174	0.176	1.5
	H <sub>2</sub> S	0.006	0.008	0.004	0.006	0.06
	Odor	12	14	13	13	20
2013.11	TSP	0.28	0.26	0.23	0.26	0.3
	SO <sub>2</sub>	0.003	0.004	0.004	0.004	0.06
	NH <sub>3</sub>	0.185	0.185	0.183	0.184	1.5
	H <sub>2</sub> S	0.006	0.004	0.002	0.004	0.06
	Odor	14	12	11	12	20
2014.2	TSP	0.24	0.26	0.27	0.26	0.3
	SO <sub>2</sub>	0.005	0.005	0.004	0.005	0.06
	NH <sub>3</sub>	0.184	0.176	0.178	0.179	1.5
	H <sub>2</sub> S	0.002	0.005	0.004	0.004	0.06
	Odor	12	13	12	12	20
2014.8	TSP	0.26	0.21	0.26	0.24	0.3
	SO <sub>2</sub>	0.005	0.005	0.004	0.005	0.06
	NH <sub>3</sub>	0.177	0.187	0.188	0.184	1.5
	H <sub>2</sub> S	0.004	0.004	0.004	0.004	0.06
	Odor	13	11	12	12	20
2014.12	TSP	0.22	0.26	0.24	0.24	0.3
	SO <sub>2</sub>	0.005	0.004	0.004	0.004	0.06
	NH <sub>3</sub>	0.176	0.182	0.181	0.18	1.5
	H <sub>2</sub> S	0.002	0.002	0.006	0.003	0.06
2015.3	TSP	0.24	0.23	0.22	0.23	0.3
	SO <sub>2</sub>	0.005	0.003	0.006	0.005	0.06
	NH <sub>3</sub>	0.177	0.182	0.181	0.18	1.5

	H <sub>2</sub> S	0.003	0.002	0.004	0.003	0.06
	Odor	13	12	12	12	20

**Fujin WWTP: Noise Monitoring Results (Quarterly Average)**

Monitoring Date	Monitoring Location	Day / Night	Leq (dB(A))				Standard
			1st	2nd	3rd	Average	
2011.3	East Border	Day	52.4	51.2	52.7	52.1	60
		Night	46.5	41.2	45.4	44.4	50
	South Border	Day	51.4	50.8	51.6	51.3	60
		Night	43.8	41.6	45.7	43.7	50
	West Border	Day	50.2	52.2	50.6	51	60
		Night	43.8	44.7	47.6	45.4	50
	North Border	Day	51.9	51.6	50.7	51.4	60
		Night	40.5	43.4	44.7	42.9	50
2011.7	East Border	Day	51.6	57.4	51.6	53.5	60
		Night	47.2	44.7	43.6	45.2	50
	South Border	Day	52.3	53.2	50.4	52	60
		Night	44.4	43.5	47.2	45	50
	West Border	Day	50.8	51.2	54.6	52.2	60
		Night	43.8	44.2	44.9	44.3	50
	North Border	Day	52.8	50.1	50.9	51.3	60
		Night	43.7	41.6	40.8	42	50
2011.11	East Border	Day	50.7	52.5	50.4	51.2	60
		Night	43.7	46.7	42.8	44.4	50
	South Border	Day	50.7	50.1	50.8	50.5	60
		Night	45.7	44.3	43.6	44.5	50
	West Border	Day	50.9	51.7	52.7	51.8	60
		Night	41.4	42.5	41.1	41.7	50
	North Border	Day	51.4	50.5	51.1	51	60
		Night	42.3	41.7	41.8	41.9	50
2012.1	East Border	Day	52.1	51.3	50.4	51.3	60

		Night	42.7	43.8	40.9	42.5	50
		Day	51.8	50.9	51.1	51.3	60
	South Border	Night	44.7	44.5	42.6	43.9	50
		Day	51.6	50.9	51.4	51.3	60
	West Border	Night	41.6	42.2	41.7	41.8	50
		Day	51.3	52.5	52.1	52	60
2012.3	North Border	Night	43.1	40.4	43.5	42.3	50
		Day	51.6	51.6	52.7	52	60
	East Border	Night	46.5	41.2	45.4	44.4	50
		Day	51.8	50.8	51.6	51.4	60
	South Border	Night	43.8	41.6	45.7	43.7	50
		Day	50.2	52.2	52.6	51.7	60
	West Border	Night	43.8	44.7	47.6	45.4	50
		Day	50.9	51.6	50.7	51.1	60
	North Border	Night	40.5	43.4	44.7	42.9	50
		Day	51.6	57.4	51.6	53.5	60
2012.7	East Border	Night	47.2	44.7	43.6	45.2	50
		Day	51.6	52.2	50.4	51.4	60
	South Border	Night	44.4	43.5	47.2	45	50
		Day	50.8	51.2	54.6	52.2	60
	West Border	Night	43.8	44.2	44.9	44.3	50
		Day	50.8	50.2	51.7	50.9	60
	North Border	Night	43.7	41.6	40.8	42	50
		Day	50.7	50.7	50.4	50.6	60
	East Border	Night	43.7	46.7	42.8	44.4	50
		Day	51.7	50.1	50.8	50.9	60
2012.11	South Border	Night	45.7	44.3	43.6	44.5	50
		Day	50.9	51.7	51.7	51.4	60
	West Border	Night	41.4	42.5	41.1	41.7	50
		Day	50.4	51.5	51.1	51	60
	North Border	Night	42.3	41.7	41.8	41.9	50
		Day	52.1	50.3	51.4	51.3	60
	East Border	Night	43.7	46.7	42.8	44.4	50
		Day	51.7	50.1	50.8	50.9	60
2013.1	East Border	Day	52.1	50.3	51.4	51.3	60

	South Border	Night	42.7	43.8	40.9	42.5	50
		Day	50.8	50.9	51.1	50.9	60
	West Border	Night	44.7	44.5	42.6	43.9	50
		Day	51.6	51.9	50.4	51.3	60
	North Border	Night	41.6	42.2	41.7	41.8	50
		Day	51.3	51.5	50.1	51	60
2013.3	East Border	Night	43.1	40.4	43.5	42.3	50
		Day	51.6	51.6	52.7	52	60
	South Border	Night	46.5	41.2	45.4	44.4	50
		Day	49.8	50.8	51.6	50.7	60
	West Border	Night	43.8	41.6	45.7	43.7	50
		Day	50.2	47.2	46.6	48	60
	North Border	Night	43.8	44.7	47.6	45.4	50
		Day	47.9	48.6	49.7	48.7	60
2013.7	East Border	Night	40.5	43.4	44.7	42.9	50
		Day	51.6	57.4	51.6	53.5	60
	South Border	Night	47.2	44.7	43.6	45.2	50
		Day	47.6	48.2	49.4	48.4	60
	West Border	Night	44.4	43.5	47.2	45	50
		Day	50.8	51.2	54.6	52.2	60
	North Border	Night	43.8	44.2	44.9	44.3	50
		Day	47.8	48.2	48.7	48.2	60
2013.11	East Border	Night	43.7	41.6	40.8	42	50
		Day	50.7	49.7	50.4	50.3	60
	South Border	Night	43.7	46.7	42.8	44.4	50
		Day	49.7	50.1	50.8	50.2	60
	West Border	Night	45.7	44.3	43.6	44.5	50
		Day	49.9	47.7	48.7	48.8	60
	North Border	Night	41.4	42.5	41.1	41.7	50
		Day	48.4	49.5	48.1	48.7	60
2014.1	East Border	Night	42.3	41.7	41.8	41.9	50
		Day	49.1	49.3	49.4	49.3	60

		Night	42.7	43.8	40.9	42.5	50
		Day	49.8	49.9	49.1	49.6	60
	South Border	Night	44.7	44.5	42.6	43.9	50
		Day	47.6	49.9	48.4	48.6	60
	West Border	Night	41.6	42.2	41.7	41.8	50
		Day	49.3	49.5	48.1	49	60
2014.3	North Border	Night	43.1	40.4	43.5	42.3	50
		Day	51.6	50.7	52.7	51.7	60
	East Border	Night	46.5	46.7	45.4	46.2	50
		Day	51.8	50.1	51.6	51.2	60
	South Border	Night	43.8	44.3	45.7	44.6	50
		Day	50.2	51.7	52.6	51.5	60
	West Border	Night	43.8	42.5	47.6	44.6	50
		Day	50.9	51.5	50.7	51	60
	North Border	Night	40.5	41.7	44.7	42.3	50
		Day	51.6	50.3	51.6	51.2	60
2014.7	East Border	Night	47.2	43.8	43.6	44.9	50
		Day	51.6	50.9	50.4	51	60
	South Border	Night	44.4	44.5	47.2	45.4	50
		Day	50.8	51.9	54.6	52.4	60
	West Border	Night	43.8	42.2	44.9	43.6	50
		Day	51.8	51.5	50.7	51.3	60
	North Border	Night	43.7	40.4	40.8	41.6	50
		Day	50.7	51.6	50.7	51	60
	East Border	Night	43.7	41.2	43.7	42.9	50
		Day	51.7	50.8	51.7	51.4	60
2014.11	South Border	Night	45.7	41.6	45.7	44.3	50
		Day	50.9	52.2	50.9	51.3	60
	West Border	Night	41.4	44.7	41.4	42.5	50
		Day	52.4	51.6	50.4	51.5	60
	North Border	Night	42.3	43.4	42.3	42.7	50
		Day	51.1	57.4	52.1	53.5	60
	East Border	Day	51.1	57.4	52.1	53.5	60
		Night	42.3	43.4	42.3	42.7	50
2015.1	East Border	Day	51.1	57.4	52.1	53.5	60

	South Border	Night	42.7	44.7	42.7	43.4	50
		Day	52.8	52.2	50.8	51.9	60
	West Border	Night	44.7	43.5	44.7	44.3	50
		Day	51.6	51.2	51.6	51.5	60
	North Border	Night	41.6	44.2	41.6	42.5	50
		Day	52.3	50.2	51.3	51.3	60
		Night	43.1	41.6	43.1	42.6	50

### Fujin WWTP: Sludge Testing Results (mg/kg)

Monitoring Date	Monitoring Parameter	Pollutant Concentration				Standard
		1st	2nd	3rd	Average	
2011.3	Water content (%)	78.64	78.78	78.82	78.75	80
	Zn	682	681	694	686	3000
	Cr	142	149	154	148	1000
	Cd	0.182	0.186	0.192	0.187	20
	Pb	69.1	70.3	69.5	69.6	1000
	Cu	61.4	62.8	64.5	62.9	1500
	Hg	7.33	6.82	7.13	7.09	15
2011.8	Water content (%)	78.52	77.37	77.33	77.74	80
	Zn	640	642	658	647	3000
	Cr	137	140	125	134	1000
	Cd	0.187	0.178	0.195	0.19	20
	Pb	68.4	71.5	68.04	69.3	1000
	Cu	61.25	62.6	61.12	61.7	1500
	Hg	7.35	6.94	7.31	7.2	15
2011.1	Water content (%)	79.34	78.64	78.35	78.78	80
	Zn	623	655	697	658	3000
	Cr	145	156	148	150	1000
	Cd	0.197	0.182	0.175	0.18	20
	Pb	68.3	69.8	69.4	69.2	1000
	Cu	62.8	66.2	64.4	64.5	1500
	Hg	7.16	6.85	7.14	7.05	15
2012.1	Water content (%)	77.64	73.78	75.82	75.75	80



	Zn	672	656	684	671	3000
	Cr	122	139	174	145	1000
	Cd	0.182	0.186	0.192	0.187	20
	Pb	68.1	72.3	69.5	70	1000
	Cu	68.4	65.8	65.5	66.6	1500
	Hg	7.34	6.82	7.43	7.2	15
2012.3	Water content (%)	78.24	77.78	72.82	76.28	80
	Zn	652	621	674	649	3000
	Cr	142	149	154	148	1000
	Cd	0.172	0.181	0.172	0.175	20
	Pb	68.1	71.3	69.5	69.6	1000
	Cu	61.4	62.8	65.5	63.2	1500
	Hg	7.31	6.92	7.23	7.15	15
2012.8	Water content (%)	77.52	76.37	78.33	77.41	80
	Zn	650	648	628	642	3000
	Cr	131	146	135	137	1000
	Cd	0.167	0.172	0.185	0.175	20
	Pb	64.4	77.5	61.04	67.6	1000
	Cu	61.2	65.6	67.12	64.6	1500
	Hg	7.45	6.24	7.11	6.93	15
2012.1	Water content (%)	76.34	72.64	76.35	75.11	80
	Zn	656	625	665	649	3000
	Cr	165	151	143	153	1000
	Cd	0.187	0.189	0.135	0.17	20
	Pb	64.3	64.8	66.4	65.2	1000
	Cu	62.8	66.2	64.4	64.5	1500
	Hg	7.16	6.85	7.14	7.05	15
2013.1	Water content (%)	78.64	75.78	72.82	75.75	80
	Zn	678	645	684	669	3000
	Cr	140	139	154	144	1000
	Cd	0.182	0.186	0.192	0.19	20
	Pb	68.5	72.8	68.5	69.9	1000
	Cu	63.4	61.8	62.5	62.6	1500
	Hg	7.24	6.82	7.43	7.16	15
2013.3	Water content (%)	76.24	72.78	76.82	75.28	80
	Zn	643	656	683	661	3000

	Cr	142	139	134	138	1000
	Cd	0.172	0.181	0.172	0.175	20
	Pb	68.1	71.3	69.5	69.6	1000
	Cu	61.4	62.8	65.5	63.2	1500
	Hg	7.31	6.92	7.23	7.15	15
2013.8	Water content (%)	79.34	78.64	78.35	78.78	80
	Zn	623	655	697	658	3000
	Cr	145	156	148	150	1000
	Cd	0.197	0.182	0.175	0.185	20
	Pb	68.3	69.8	69.4	69.2	1000
	Cu	62.8	66.2	64.4	64.5	1500
	Hg	7.16	6.85	7.14	7.05	15
2013.1	Water content (%)	77.64	73.78	75.82	75.75	80
	Zn	672	656	684	671	3000
	Cr	122	139	174	145	1000
	Cd	0.182	0.186	0.192	0.19	20
	Pb	68.1	72.3	69.5	69.9	1000
	Cu	68.4	65.8	65.5	66.6	1500
	Hg	7.34	6.82	7.43	7.2	15
2014.1	Water content (%)	78.94	74.78	73.82	75.85	80
	Zn	618	635	624	626	3000
	Cr	145	139	164	149	1000
	Cd	0.198	0.196	0.186	0.19	20
	Pb	68.8	71.8	61.5	67.4	1000
	Cu	63.8	66.8	63.5	64.7	1500
	Hg	7.27	6.88	7.46	7.2	15
2014.5	Water content (%)	73.64	74.78	78.22	75.55	80
	Zn	622	641	624	629	3000
	Cr	123	143	155	140	1000
	Cd	0.187	0.176	0.122	0.162	20
	Pb	69.8	71.3	64.5	68.5	1000
	Cu	63.4	65.8	66.5	65.2	1500
	Hg	7.35	6.72	7.43	7.17	15
2014.8	Water content (%)	78.62	78.37	76.33	77.77	80
	Zn	623	645	653	640	3000
	Cr	132	135	145	137	1000

	Cd	0.187	0.178	0.195	0.187	20
	Pb	66.4	72.5	69.04	69.3	1000
	Cu	62.3	62.6	61.1	62	1500
	Hg	7.25	6.14	7.81	7.07	15
2014.11	Water content (%)	79.84	78.14	78.95	78.98	80
	Zn	613	645	627	628	3000
	Cr	143	126	158	142	1000
	Cd	0.187	0.162	0.175	0.175	20
	Pb	67.3	65.8	64.4	65.8	1000
	Cu	63.8	62.2	63.4	63.1	1500
	Hg	7.16	6.85	7.14	7.05	15
2015.2	Water content (%)	75.64	77.78	74.82	76.08	80
	Zn	652	616	684	651	3000
	Cr	127	133	174	145	1000
	Cd	0.182	0.186	0.192	0.19	20
	Pb	65.1	67.3	69.5	67.3	1000
	Cu	62.4	65.8	65.5	64.6	1500
	Hg	7.54	6.82	7.43	7.26	15

## 5. Harbin Xinyigou WWTP

### Harbin Xinyigou WWTP (Daily Water Quality Monitoring, Jan-Sep 2014)

Date	Influent (mg/l)							Effluent (mg/l)							Coliform count per liter
	BOD <sub>5</sub>	SS	COD	NH <sub>4</sub> -N	TN	TP	pH	BOD <sub>5</sub>	SS	COD	NH <sub>4</sub> -N	TN	TP	pH	
1.1	208	280	678	53.35	66.55	6.05	7.38	4.08	17	36.2	2.15	11.55	0.78	7.14	<10000
1.2	195	350	690	55.45	68.35	6.25	7.68	4.13	15	34.5	2.08	12.15	0.82	7.25	<10000
1.3	219	165	899	52.70	62.35	4.50	7.79	3.96	15	37.1	3.34	12.25	0.40	7.48	<10000
1.4	207	295	756	54.20	64.35	4.85	7.65	4.02	17	35.3	3.29	13.00	0.56	7.30	<10000
1.5	281	305	863	56.40	68.45	4.85	7.34	4.12	13	33.2	3.26	13.45	0.62	7.05	<10000
1.6	219	365	549	47.55	60.45	5.05	7.64	4.24	16	39.4	2.47	14.25	0.74	7.24	<10000
1.7	369	210	452	54.55	59.55	5.45	7.45	4.28	15	36.2	2.71	9.75	0.42	7.14	<10000
1.8	291	295	494	51.25	59.55	5.15	7.62	4.34	15	37.2	2.48	10.95	0.59	7.27	<10000
1.9	340	325	536	55.45	67.40	4.95	7.68	4.28	15	37.6	1.91	9.00	0.40	7.25	<10000
1.10	241	265	424	47.55	54.75	4.65	7.74	3.94	16	39.2	1.47	10.75	0.75	7.19	<10000

1.11	247	295	487	49.35	61.95	4.85	7.68	4.21	14	36.5	1.43	11.25	0.82	7.32	<10000
1.12	194	300	509	45.55	56.20	5.25	7.54	4.05	16	33.2	1.52	11.00	0.76	7.09	<10000
1.13	207	405	546	47.35	60.55	4.95	7.55	3.96	14	36.8	1.58	12.05	0.73	7.34	<10000
1.14	241	285	623	51.20	61.75	5.40	7.60	3.86	16	32.4	1.62	11.65	0.78	7.25	<10000
1.15	191	435	574	53.45	66.05	5.75	7.75	4.12	13	38.9	1.65	13.15	0.81	7.34	<10000
1.16	215	365	725	56.15	67.15	6.95	7.59	3.96	17	51.9	1.25	10.05	0.82	7.20	<10000
1.17	194	305	597	50.15	59.45	5.95	7.74	4.15	17	52.4	1.42	9.75	0.75	7.19	<10000
1.18	164	315	504	47.55	56.75	5.15	7.68	4.14	16	50.4	1.09	9.45	0.80	7.25	<10000
1.19	159	305	474	50.10	58.15	5.65	7.56	4.26	14	47.4	1.24	10.15	0.73	7.16	<10000
1.20	234	1025	1016	49.05	62.45	9.85	7.57	2.34	17	53.7	1.39	16.45	0.80	7.29	<10000
1.21	274	565	674	54.95	63.95	7.85	7.79	3.14	16	51.4	1.40	14.30	0.85	7.24	<10000
1.22	176	645	728	50.95	64.15	7.65	7.50	3.34	15	49.3	1.74	15.05	0.80	7.26	<10000
1.23	134	810	1166	41.55	54.95	14.25	7.78	3.29	13	51.9	2.09	11.05	0.65	7.20	<10000
1.24	117	600	819	43.75	57.25	9.65	7.64	3.74	17	47.8	1.74	14.15	0.80	7.20	<10000
1.25	204	475	507	53.35	59.45	6.75	7.68	3.84	15	44.7	2.15	11.75	0.83	7.20	<10000
1.26	198	560	597	53.35	59.45	12.75	7.92	3.91	11	50.3	2.15	11.25	0.85	7.34	<10000
1.27	249	630	694	49.45	57.65	9.75	7.64	3.07	13	48.9	1.79	13.75	0.64	7.17	<10000
1.28	247	545	724	54.15	62.75	9.05	7.52	4.14	14	50.9	1.64	14.65	0.70	7.13	<10000
1.29	304	550	819	50.15	57.85	8.75	7.69	3.97	14	46.2	1.91	13.05	0.65	7.23	<10000
1.30	147	350	672	52.35	60.25	8.05	7.68	4.24	14	48.7	1.53	12.85	0.70	7.24	<10000
1.31	194	305	534	57.35	67.35	8.35	7.53	4.36	13	47.1	1.65	11.75	0.77	7.21	<10000
2.1	209	505	624	48.35	57.95	5.45	7.46	4.14	16	49.6	1.94	12.65	0.84	7.14	<10000
2.2	237	375	735	48.50	59.45	5.05	7.73	4.04	12	50.2	1.56	12.75	0.72	7.16	<10000
2.3	215	540	659	45.25	58.60	7.35	7.65	4.38	14	51.3	1.73	13.20	0.75	7.24	<10000
2.4	201	450	595	47.35	63.85	7.25	7.48	3.84	12	51.6	1.65	14.10	0.71	7.26	<10000
2.5	127	480	627	49.20	56.95	5.25	7.65	3.87	15	50.3	1.74	14.00	0.69	7.18	<10000
2.6	217	375	574	50.15	54.75	6.95	7.73	4.13	17	45.7	1.86	12.95	0.70	7.28	<10000
2.7	204	345	501	47.35	52.75	5.05	7.59	4.17	16	52.7	1.60	14.75	0.74	7.20	<10000
2.8	164	395	474	46.15	56.75	4.95	7.48	4.08	14	50.9	1.94	14.95	0.70	7.06	<10000
2.9	139	425	564	46.95	56.00	5.75	7.34	4.27	16	49.3	1.57	13.25	0.62	7.20	<10000
2.10	282	325	574	47.55	54.75	5.65	7.69	4.16	15	52.5	1.74	14.95	0.63	7.35	<10000
2.11	171	375	479	41.95	51.75	6.05	7.58	4.27	17	50.4	2.14	13.65	0.64	7.21	<10000
2.12	169	415	627	40.95	53.45	6.95	7.67	4.04	15	51.9	1.94	14.00	0.70	7.30	<10000
2.13	284	475	596	42.35	50.75	6.25	7.52	4.15	16	53.4	1.98	11.45	0.63	7.15	<10000
2.14	139	375	539	43.95	59.45	9.45	7.64	4.01	14	52.7	1.27	12.50	0.60	7.25	<10000
2.15	192	315	647	50.75	54.75	7.45	7.76	3.97	17	50.1	1.43	12.95	0.54	7.18	<10000
2.16	186	535	547	46.15	57.85	6.15	7.74	3.84	15	47.6	1.82	11.05	0.57	7.10	<10000
2.17	204	515	769	49.55	56.95	5.55	7.44	3.92	17	51.9	2.14	10.95	0.61	7.30	<10000
2.18	219	300	727	49.55	56.95	6.75	7.64	4.12	15	52.4	2.15	10.95	0.52	7.52	<10000
2.19	202	515	560	47.50	53.50	5.35	7.72	4.26	17	49.4	1.65	8.45	0.54	7.24	<10000
2.20	219	315	574	46.55	52.95	5.95	7.52	3.94	16	49.2	1.97	9.25	0.61	7.21	<10000

2.21	161	345	526	49.55	56.15	6.15	7.34	3.81	17	52.0	2.47	10.15	0.70	7.14	<10000
2.22	203	395	594	47.15	54.95	5.45	7.49	3.74	14	50.2	2.50	10.45	0.70	7.18	<10000
2.23	167	295	614	47.10	56.15	5.05	7.69	3.77	15	48.7	2.24	10.45	0.59	7.30	<10000
2.24	235	355	592	37.70	48.15	5.25	7.46	3.96	17	49.5	2.43	11.65	0.62	7.15	<10000
2.25	191	395	589	43.75	57.15	5.65	7.76	3.68	16	48.6	2.57	11.15	0.60	7.30	<10000
2.26	196	395	474	41.95	49.85	5.75	7.87	3.94	17	50.2	3.15	10.05	0.74	7.24	<10000
2.27	137	370	517	42.95	51.40	5.25	7.54	4.05	16	51.4	3.13	10.05	0.59	7.26	<10000
2.28	264	360	589	38.90	49.75	7.45	7.58	4.12	15	53.5	2.10	10.55	0.62	7.15	<10000
3.1	242	385	608	42.35	48.35	7.15	7.62	3.98	16	50.4	1.85	11.25	0.71	7.21	<10000
3.2	247	355	649	43.25	49.95	6.95	7.35	4.08	14	52.8	1.64	11.50	0.65	7.10	<10000
3.3	178	365	641	41.25	47.85	7.85	7.71	3.93	14	54.7	2.14	12.20	0.63	7.27	<10000
3.4	129	320	591	47.95	54.90	5.15	7.64	3.87	15	53.7	2.45	12.95	0.72	7.37	<10000
3.5	136	385	624	43.95	51.05	7.05	7.45	4.01	14	51.9	2.67	11.65	0.64	7.20	<10000
3.6	127	315	590	41.05	50.65	6.90	7.54	4.14	14	51.9	2.37	11.95	0.57	7.21	<10000
3.7	257	365	625	41.65	50.95	6.75	7.64	4.10	15	52.3	2.32	11.75	0.65	7.25	<10000
3.8	255	350	638	40.35	50.25	6.55	7.54	4.08	14	51.4	2.36	12.05	0.70	7.18	<10000
3.9	292	395	675	41.95	51.65	6.80	7.75	3.96	16	50.8	2.41	12.35	0.57	7.38	<10000
3.10	194	735	1204	51.95	60.75	9.45	7.68	3.72	17	50.4	1.95	15.95	0.74	7.27	<10000
3.11	204	505	989	54.95	62.75	6.15	7.75	3.91	17	51.7	2.47	16.95	0.70	7.30	<10000
3.12	191	410	614	47.65	54.65	6.95	7.82	4.11	16	50.1	2.54	13.30	0.64	7.19	<10000
3.13	209	395	574	50.95	56.00	6.05	7.62	3.91	17	53.4	2.69	13.05	0.59	7.24	<10000
3.14	217	390	542	50.95	56.75	6.45	7.47	4.14	16	51.7	2.91	13.00	0.64	7.12	<10000
3.15	494	365	524	47.95	56.90	5.65	7.59	4.47	14	49.6	2.61	14.75	0.67	7.20	<10000
3.16	309	295	509	47.85	54.75	6.20	7.82	4.27	14	49.6	2.96	12.95	0.58	7.34	<10000
3.17	147	310	534	49.65	56.15	5.95	7.80	4.39	16	52.0	2.91	15.75	0.66	7.24	<10000
3.18	194	305	519	47.65	56.05	5.45	7.74	3.98	14	49.3	3.15	14.95	0.71	7.29	<10000
3.19	167	295	549	47.95	54.95	5.45	7.45	4.08	14	45.4	2.47	14.75	0.59	7.20	<10000
3.20	139	265	569	51.65	59.45	4.95	7.69	4.37	13	48.7	2.17	13.05	0.63	7.20	<10000
3.21	141	260	474	49.95	55.25	5.15	7.65	4.54	15	53.9	2.67	15.25	0.71	7.25	<10000
3.22	132	290	465	43.05	50.75	5.90	7.57	4.09	14	51.6	2.59	14.05	0.63	7.33	<10000
3.23	119	295	515	46.95	54.75	4.95	7.81	4.23	14	48.9	2.91	15.95	0.59	7.25	<10000
3.24	149	260	607	52.50	59.75	5.15	7.54	4.39	12	50.7	1.61	13.05	0.63	7.20	<10000
3.25	174	295	547	51.75	59.85	5.75	7.57	4.19	16	47.6	2.04	14.75	0.71	7.19	<10000
3.26	199	250	565	52.35	58.65	5.65	7.58	4.20	15	49.5	1.85	13.25	0.57	7.20	<10000
3.27	109	315	806	60.05	69.85	9.95	7.54	4.17	11	49.4	1.72	10.15	0.62	7.20	<10000
3.28	171	365	594	50.45	59.45	7.95	7.59	4.06	12	51.2	1.94	11.05	0.69	7.30	<10000
3.29	194	305	509	48.35	56.45	6.15	7.62	3.94	11	48.2	1.87	10.95	0.64	7.23	<10000
3.30	163	295	496	48.95	56.95	6.05	7.68	4.11	12	47.2	2.17	11.65	0.68	7.34	<10000
3.31	174	365	674	51.95	58.25	6.65	7.74	4.10	12	54.1	2.94	12.35	0.71	7.29	<10000
4.1	330	380	695	51.35	57.85	7.65	7.68	3.98	13	53.6	2.83	12.50	0.85	7.25	<10000
4.2	202	345	594	50.20	59.50	6.45	7.62	4.16	13	51.6	2.76	13.75	0.80	7.37	<10000

4.3	204	315	599	51.30	54.05	5.95	7.72	3.89	14	47.4	2.09	12.05	0.75	7.34	<10000
4.4	109	395	637	51.60	67.05	7.05	7.54	4.12	14	54.7	2.09	9.65	0.81	7.20	<10000
4.5	147	345	546	58.50	56.95	5.05	7.74	4.14	12	50.9	1.97	10.15	0.85	7.40	<10000
4.6	119	295	647	52.40	56.05	5.45	7.50	4.04	15	50.4	2.47	11.45	0.75	7.20	<10000
4.7	154	290	624	50.05	56.95	5.85	7.56	4.00	14	49.4	1.94	10.45	0.70	7.20	<10000
4.8	149	515	815	53.65	78.05	5.75	7.69	4.24	14	49.4	1.94	9.05	0.75	7.30	<10000
4.9	261	605	876	52.50	78.65	5.35	7.58	4.31	13	50.3	1.85	9.75	0.70	7.25	<10000
4.10	192	405	591	51.05	59.85	5.95	7.72	3.91	14	50.1	1.93	10.05	0.75	7.34	<10000
4.11	157	345	624	49.75	57.85	6.25	7.51	4.51	12	47.6	2.36	10.05	0.77	7.20	<10000
4.12	191	295	617	49.40	61.05	5.85	7.69	4.14	14	48.9	2.43	10.15	0.65	7.27	<10000
4.13	184	315	514	44.30	59.05	5.15	7.61	3.95	14	51.2	2.17	11.45	0.70	7.26	<10000
4.14	231	315	708	44.10	72.50	6.55	7.57	4.19	14	51.7	1.67	13.85	0.75	7.24	<10000
4.15	201	315	599	32.80	59.75	5.95	7.74	3.91	12	41.7	1.94	10.75	0.80	7.25	<10000
4.16	192	365	702	58.20	59.75	6.15	7.82	4.14	11	52.4	1.90	10.95	0.75	7.34	<10000
4.17	209	325	714	58.55	59.45	7.25	7.49	4.14	13	53.7	1.39	10.95	0.65	7.20	<10000
4.18	214	395	605	54.10	56.75	7.85	7.57	4.09	16	57.1	1.27	10.15	0.65	7.21	<10000
4.19	204	360	574	48.95	56.75	6.05	7.62	4.19	15	56.7	1.49	11.25	0.70	7.20	<10000
4.20	197	305	509	51.65	59.05	6.15	7.51	4.01	12	55.2	1.47	12.05	0.85	7.14	<10000
4.21	237	540	806	65.75	69.45	7.25	7.79	4.09	11	56.7	1.16	7.35	0.65	7.27	<10000
4.22	194	395	747	51.65	59.65	7.85	7.62	4.11	14	54.2	1.76	8.95	0.70	7.19	<10000
4.23	243	345	645	51.25	59.95	6.05	7.39	4.19	15	53.7	1.91	9.05	0.75	7.14	<10000
4.24	204	315	647	48.95	54.90	6.15	7.50	4.15	15	57.4	0.77	12.75	0.75	7.24	<10000
4.25	174	305	619	50.05	57.15	6.95	7.54	4.24	14	54.7	1.09	11.05	0.75	7.20	<10000
4.26	206	295	591	47.55	56.95	7.15	7.81	4.01	12	54.2	1.42	10.95	0.80	7.36	<10000
4.27	214	315	584	47.85	52.75	6.75	7.59	3.95	11	53.7	1.47	11.05	0.80	7.24	<10000
4.28	175	315	453	64.45	69.55	7.15	7.75	4.05	13	53.1	1.28	10.95	0.85	7.27	<10000
4.29	199	365	597	49.75	57.35	6.05	7.63	4.34	14	54.7	1.94	10.35	0.75	7.27	<10000
4.30	204	305	547	54.45	61.45	7.15	7.64	4.17	11	56.2	2.19	11.25	0.96	7.27	<10000
5.1	197	295	612	48.95	54.05	5.95	7.54	4.06	13	51.9	1.37	10.05	0.94	7.20	<10000
5.2	187	315	562	46.05	52.75	5.95	7.69	3.92	11	52.4	1.27	11.05	0.89	7.34	<10000
5.3	167	305	621	49.05	54.65	6.05	7.51	3.91	10	54.1	1.94	12.05	0.91	7.26	<10000
5.4	176	405	769	49.55	56.75	7.15	7.79	4.02	14	45.1	2.74	10.95	0.65	7.21	<10000
5.5	195	350	439	31.40	37.15	3.45	7.81	4.37	15	33.7	0.87	9.15	0.75	7.34	<10000
5.6	139	415	475	34.95	42.85	4.15	7.74	4.27	16	36.2	0.96	10.15	0.85	7.29	<10000
5.7	157	375	519	42.95	50.75	6.95	7.64	4.45	14	44.9	1.72	12.75	0.90	7.20	<10000
5.8	121	395	647	43.95	49.65	5.05	7.75	4.14	15	49.4	0.99	10.05	0.95	7.31	<10000
5.9	147	365	549	47.95	56.00	6.95	7.61	4.25	16	51.0	1.47	9.65	0.90	7.29	<10000
5.10	159	320	519	51.95	56.75	6.05	7.57	4.09	14	49.7	1.92	11.45	0.65	7.21	<10000
5.11	157	330	494	47.65	54.65	5.75	7.39	4.23	14	48.6	1.87	12.05	0.85	7.24	<10000
5.12	162	395	647	47.95	52.95	7.15	7.57	4.31	16	45.9	1.04	12.95	0.95	7.14	<10000
5.13	138	280	476	16.95	27.15	2.95	7.62	4.12	12	38.3	0.74	13.65	0.65	7.29	<10000

5.14	157	315	527	39.45	46.95	5.45	7.57	4.24	13	39.7	0.94	13.75	0.65	7.29	<10000
5.15	129	340	647	49.55	59.25	7.65	7.72	4.16	14	37.2	1.24	14.65	0.80	7.34	<10000
5.16	141	315	604	48.75	53.75	7.25	7.64	3.97	14	39.1	1.04	14.95	0.90	7.25	<10000
5.17	174	320	594	51.25	59.65	6.75	7.74	4.02	12	41.6	1.37	13.75	0.75	7.27	<10000
5.18	171	280	610	49.65	56.25	5.95	7.82	4.14	12	43.1	1.27	12.75	0.90	7.34	<10000
5.19	159	850	820	41.55	53.50	6.30	7.57	4.11	11	35.7	1.11	12.10	0.65	7.29	<10000
5.20	157	460	647	49.55	56.95	7.35	7.48	4.19	14	39.4	1.47	12.95	0.70	7.32	<10000
5.21	174	415	545	48.75	59.25	6.75	7.64	4.45	14	38.4	1.75	13.95	0.80	7.29	<10000
5.22	169	395	562	49.25	59.45	5.75	7.64	4.07	14	41.5	1.55	14.05	0.85	7.24	<10000
6.14	/	310	706	49.25	59.95	6.45	7.85	/	11	41.6	0.91	13.15	0.55	7.25	<10000
6.15	/	290	624	41.35	51.05	5.85	7.76	/	11	39.6	0.78	12.05	0.62	7.34	<10000
6.16	/	300	689	65.45	78.75	6.80	7.80	/	13	32.5	1.42	13.45	0.73	7.28	<10000
6.17	/	225	581	55.60	69.45	6.15	7.72	/	12	31.5	0.71	13.05	0.59	7.35	<10000
6.18	/	350	787	64.20	73.10	7.70	7.65	/	14	32.3	0.85	11.75	0.57	7.36	<10000
6.19	194	305	647	54.75	66.95	6.90	7.55	4.91	14	34.9	1.09	10.45	0.61	7.22	<10000
6.20	163	365	859	80.65	89.95	8.55	7.58	4.36	13	38.4	1.08	9.95	0.65	7.38	<10000
6.21	151	315	746	75.20	81.25	7.65	7.64	4.69	14	39.2	1.20	13.25	0.61	7.28	<10000
6.22	169	320	649	70.25	78.35	7.60	7.62	4.14	12	41.0	1.03	11.35	0.66	7.30	<10000
6.23	249	400	959	79.30	83.15	9.80	7.58	5.47	16	33.6	0.96	11.90	0.88	7.26	<10000
6.24	187	395	847	67.15	76.15	9.15	7.76	4.46	17	37.2	0.87	12.95	0.68	7.30	<10000
6.25	241	365	724	64.15	76.95	8.45	7.68	3.17	16	41.4	0.74	9.25	0.72	7.26	<10000
6.26	209	345	694	57.15	69.45	7.65	7.80	3.04	16	42.9	1.42	8.75	0.72	7.31	<10000
6.27	211	350	752	55.35	64.75	8.05	7.82	3.12	13	51.0	1.06	8.90	0.74	7.34	<10000
6.28	261	390	825	65.20	72.35	7.85	7.73	4.18	16	49.4	1.12	13.45	0.69	7.26	<10000
6.29	230	415	782	60.55	69.45	7.25	7.76	4.24	16	51.4	0.91	8.05	0.74	7.34	<10000
6.30	281	415	724	60.05	69.15	7.45	7.84	4.09	17	47.6	0.84	8.65	0.72	7.44	<10000
7.1	147	305	620	50.40	56.25	6.05	7.65	4.09	13	53.2	1.03	12.20	0.74	7.38	<10000
7.2	191	320	694	54.65	62.45	6.45	7.42	4.24	14	50.3	1.27	10.45	0.59	7.28	<10000
7.3	184	305	639	48.75	57.85	6.85	7.58	4.04	12	47.2	1.62	10.05	0.65	7.34	<10000
7.4	163	315	786	51.95	56.95	6.25	7.52	3.97	14	54.3	1.04	9.85	0.74	7.28	<10000
7.5	164	295	547	49.15	59.05	6.15	7.43	3.91	13	50.2	0.94	9.15	0.67	7.15	<10000
7.6	204	265	617	48.75	54.75	6.45	7.32	4.10	14	48.2	1.12	10.95	0.59	7.23	<10000
7.7	187	380	561	48.95	54.65	7.15	7.28	4.09	15	39.4	1.07	13.30	0.73	7.10	<10000
7.8	194	405	515	49.25	58.75	5.75	7.43	4.51	14	36.9	1.12	12.15	0.60	7.38	<10000
7.9	241	315	605	54.75	61.75	6.05	7.67	4.15	12	33.4	1.09	12.15	0.71	7.26	<10000
7.10	189	395	627	50.15	61.45	5.95	7.51	4.15	14	39.4	1.09	13.95	0.59	7.15	<10000
7.11	134	305	604	41.55	49.55	6.95	7.58	4.00	13	41.2	0.81	13.05	0.57	7.20	<10000
7.12	114	295	542	45.75	54.05	6.05	7.54	3.87	14	36.2	1.27	12.05	0.64	7.37	<10000
7.13	206	405	519	48.95	52.65	5.45	7.65	3.91	16	36.9	1.41	10.95	0.72	7.31	<10000
7.14	217	620	457	31.45	39.95	3.65	7.42	3.96	14	45.8	1.19	13.75	0.57	7.20	<10000
7.15	164	425	504	39.06	46.75	5.05	7.69	4.15	15	42.9	1.21	12.95	0.59	7.41	<10000

7.16	149	395	627	42.95	50.65	5.95	7.62	4.20	14	39.1	1.01	13.95	0.71	7.48	<10000
7.17	167	305	634	54.15	61.95	6.25	7.53	4.09	15	42.4	1.39	13.05	0.57	7.24	<10000
7.18	213	365	491	56.35	61.45	5.85	7.40	3.98	15	41.9	0.59	12.95	0.64	7.25	<10000
7.19	206	410	519	49.75	56.75	7.15	7.38	4.12	14	39.1	0.91	10.95	0.75	7.11	<10000
7.20	217	425	604	50.65	59.45	6.45	7.48	4.39	13	34.9	1.04	10.65	0.63	7.18	<10000
7.21	191	465	441	36.95	42.75	4.75	7.46	4.04	16	46.1	0.74	12.75	0.54	7.25	<10000
7.22	164	575	679	45.35	51.25	4.50	7.40	4.19	14	37.8	0.29	16.20	0.62	7.19	<10000
7.23	191	415	604	42.95	48.95	6.95	7.53	4.08	17	35.1	0.58	17.95	0.71	7.14	<10000
7.24	171	425	580	49.55	56.95	7.05	7.50	3.98	16	44.9	0.74	16.75	0.59	7.21	<10000
7.25	169	390	634	49.35	55.25	6.85	7.62	4.15	17	50.3	0.80	16.35	0.59	7.37	<10000
7.26	157	345	591	51.45	59.05	5.95	7.39	4.14	15	42.7	0.62	15.95	0.64	7.25	<10000
7.27	191	345	517	49.55	54.95	5.65	7.40	4.12	15	45.9	0.69	16.45	0.67	7.36	<10000
7.28	219	355	763	45.95	51.95	5.15	7.60	5.78	16	39.6	0.88	15.05	0.72	7.17	<10000
7.29	198	375	604	49.15	50.05	6.05	7.71	5.09	17	49.6	0.86	13.95	0.74	7.51	<10000
7.30	169	365	594	45.95	54.05	6.95	7.64	5.27	14	45.7	0.92	14.15	0.73	7.34	<10000
7.31	242	385	429	49.55	54.80	6.70	7.53	5.20	16	47.8	0.66	10.05	0.72	7.37	<10000
8.1	198	295	596	48.95	52.65	6.05	7.65	4.97	18	41.2	0.91	11.00	0.72	7.32	<10000
8.2	167	305	604	51.25	59.85	5.85	7.54	4.59	17	39.1	0.87	11.65	0.81	7.45	<10000
8.3	168	315	519	48.95	54.95	6.15	7.85	4.92	16	41.9	0.89	12.95	0.59	7.18	<10000
8.4	169	295	569	42.15	46.95	6.95	7.35	5.09	16	41.3	0.61	10.15	0.63	7.21	<10000
8.5	191	335	637	51.25	56.05	6.40	7.65	4.89	14	43.2	0.78	12.05	0.57	7.35	<10000
8.6	174	345	649	50.15	57.15	7.15	7.45	5.17	17	45.7	0.91	11.75	0.71	7.16	<10000
8.7	192	315	592	49.45	57.85	7.15	7.50	5.27	18	41.7	0.92	13.05	0.64	7.40	<10000
8.8	187	340	629	47.95	54.15	7.10	7.81	5.04	18	50.7	0.97	13.05	0.74	7.21	<10000
8.9	196	305	649	49.55	57.95	7.05	7.63	5.11	16	47.2	1.04	11.95	0.68	7.32	<10000
8.10	164	295	541	46.05	51.65	6.05	7.45	4.91	15	46.1	1.14	13.15	0.75	7.26	<10000
8.11	194	480	689	40.65	45.65	5.05	7.73	5.09	12	33.2	1.00	16.25	0.67	7.38	<10000
8.12	172	365	729	46.95	51.95	7.85	7.45	4.84	16	37.1	1.27	14.95	0.78	7.15	<10000
8.13	176	205	394	39.15	46.95	3.90	7.68	5.29	17	51.9	2.14	16.05	0.69	7.28	<10000
8.14	154	295	419	41.00	51.05	4.15	7.55	5.04	14	52.9	1.94	15.45	0.81	7.30	<10000
8.15	182	285	304	56.05	61.05	5.65	7.64	5.19	17	31.4	2.94	16.00	0.65	7.42	<10000
8.16	194	275	429	24.50	49.35	4.95	7.32	5.04	15	48.4	0.34	16.45	0.55	7.20	<10000
8.17	209	304	642	34.25	45.75	5.05	7.20	4.97	14	50.2	0.93	15.95	0.70	7.15	<10000
8.18	169	335	331	23.45	32.45	4.40	7.20	4.69	17	46.5	0.65	15.95	0.85	7.11	<10000
8.19	129	295	419	46.75	54.05	5.95	7.74	5.02	17	49.4	0.92	15.95	0.72	7.28	<10000
8.20	146	325	459	48.65	56.25	4.45	7.34	4.95	17	51.2	0.74	18.05	0.82	7.08	<10000
8.21	157	425	619	54.15	64.25	6.15	7.62	4.87	16	54.2	3.94	16.25	0.71	7.19	<10000
8.22	162	390	494	51.25	59.45	5.95	7.64	5.17	18	47.9	3.74	17.05	0.62	7.20	<10000
8.23	120	360	509	48.95	56.75	5.75	7.50	4.95	16	42.9	3.51	16.05	0.65	7.31	<10000
8.24	157	345	509	48.75	56.25	5.15	7.74	5.34	16	48.4	3.05	15.95	0.59	7.18	<10000
8.25	115	220	327	40.20	54.15	3.65	7.60	5.07	17	40.4	1.01	17.15	0.54	7.26	<10000



8.26	109	295	374	42.75	51.05	4.95	7.30	5.41	11	23.3	0.85	17.05	0.71	7.23	<10000
8.27	119	215	349	42.95	51.95	4.95	7.54	5.34	17	29.5	0.47	14.05	0.72	7.30	<10000
8.28	115	110	304	38.60	44.05	4.10	7.62	5.47	12	26.3	0.47	16.05	0.59	7.25	<10000
8.29	119	210	391	41.95	49.75	5.15	7.38	5.34	13	36.0	0.69	17.95	0.31	7.14	<10000
8.30	149	265	359	45.15	51.75	4.95	7.54	5.27	13	31.4	0.94	15.75	0.57	7.15	<10000
8.31	154	295	372	50.45	57.85	5.05	7.30	5.09	12	27.9	1.04	17.15	0.71	7.00	<10000
9.1	158	310	358	41.65	48.95	4.50	7.32	5.17	13	35.7	0.89	15.55	0.59	7.20	<10000
9.2	127	290	459	29.45	41.20	4.40	7.44	5.41	18	35.2	0.45	18.45	0.75	7.22	<10000
9.3	147	315	524	41.95	50.65	5.15	7.54	5.04	17	42.9	0.78	18.15	0.73	7.35	<10000
9.4	142	315	521	47.25	59.45	6.05	7.49	5.19	16	47.6	1.09	17.95	0.70	7.24	<10000
9.5	119	265	318	29.75	42.50	4.20	7.38	5.27	19	49.6	0.47	18.05	0.91	7.28	<10000
9.6	142	300	354	31.95	41.75	5.05	7.56	5.14	17	47.2	0.54	17.25	0.92	7.30	<10000
9.7	151	245	405	41.95	52.05	5.25	7.48	5.29	14	44.9	0.76	16.90	0.67	7.28	<10000
9.8	124	295	347	39.45	46.75	4.95	7.40	5.24	14	43.9	0.91	15.25	0.92	7.25	<10000
9.9	214	235	222	40.60	46.85	4.40	7.53	5.15	16	45.2	0.86	16.15	0.57	7.20	<10000
9.10	157	280	280	36.15	52.90	4.20	7.68	5.82	18	50.7	0.63	17.95	0.64	7.26	<10000
9.11	161	185	341	39.45	49.85	4.30	7.58	5.04	15	39.1	0.59	17.95	0.76	7.23	<10000
9.12	146	245	347	54.95	41.05	4.35	7.39	5.27	17	40.4	0.74	18.45	0.55	7.12	<10000
9.13	152	315	392	41.05	50.75	4.05	7.43	5.02	17	42.9	0.92	17.15	0.72	7.11	<10000
9.14	104	305	387	39.45	44.95	4.75	7.46	5.00	14	42.9	0.78	15.95	0.74	7.08	<10000
9.15	147	260	501	34.75	43.15	4.50	7.80	5.02	11	50.0	0.74	15.05	0.91	7.27	<10000
9.16	124	295	501	41.95	52.05	5.15	7.27	5.00	16	54.2	0.94	16.95	0.98	7.09	<10000
9.17	127	265	394	39.45	48.95	4.05	7.38	4.93	18	43.5	0.92	18.25	0.84	7.18	<10000
9.18	142	305	711	42.95	54.10	6.10	7.46	4.74	15	54.2	0.70	18.05	0.84	7.16	<10000
9.19	136	295	514	45.05	54.75	5.05	7.44	4.82	18	39.1	0.78	18.25	0.93	7.20	<10000
9.20	152	280	562	50.25	56.95	5.15	7.42	5.02	15	41.7	0.91	17.25	0.89	7.05	<10000
9.21	136	295	416	39.45	48.95	5.15	7.55	5.01	16	42.9	1.24	17.00	0.92	7.16	<10000
9.22	135	365	554	49.55	56.25	4.85	7.38	4.92	17	46.9	0.81	16.40	0.76	7.24	<10000
9.24	147	365	393	51.95	53.75	6.05	7.50	5.15	17	53.6	5.12	16.85	0.81	7.30	<10000
9.25	159	215	321	37.45	54.15	4.00	7.48	4.76	18	43.1	0.96	16.25	0.82	7.15	<10000
9.26	149	305	627	50.45	48.75	5.95	7.46	4.74	17	50.4	0.91	17.15	0.59	7.11	<10000
9.27	157	300	590	50.05	56.20	6.00	7.34	5.07	17	51.9	1.04	15.30	0.72	7.05	<10000
9.28	162	295	519	49.45	54.15	5.15	7.45	5.19	16	47.6	1.27	16.55	0.74	7.08	<10000
9.29	161	287	505	37.60	51.50	4.75	7.41	4.75	15	45.8	0.89	16.60	0.50	7.12	<10000
9.30	143	295	547	50.15	49.85	5.25	7.39	5.01	14	51.2	1.37	17.45	0.74	7.14	<10000

## 6. Jiamusi Effluent Reuse Plant

### Jiamusi Effluent Reuse: Surface Water Monitoring Results (Upstream)

	2014.06.11			2014.08.15		
	Upstream 1	Upstream 1	Upstream 2	Upstream 3	Upstream 2	Upstream 3
pH	7.28	7.32	7.29	7.43	7.23	7.36
Conductivity (mS/m)	20.1	17.5	18.1	17.3	21.8	18.0
COD	25	27	29	23	24	26
NH3-N	0.750	0.241	0.253	0.387	0.640	0.109
BOD	2.9	4.3	4.4	1.2	2.8	3.1
TP	0.173	0.114	0.135	0.164	0.220	0.135
TN	2.02	1.38	1.76	1.31	2.36	2.16
SS	16	15	17	16	18	18
Petroleum	0.05L	0.05L	0.05L	0.05L	0.05L	0.05L

Note: pH value dimensionless; "L" means being less than the detection limit.

### Jiamusi Effluent Reuse: Surface Water Monitoring Results (Downstream)

	2014.06.11			2014.08.15		
	Downstream 1	Downstream 1	Downstream 2	Downstream 3	Downstream 2	Downstream 3
pH	7.14	7.42	7.47	7.47	7.25	7.29
Conductivity (mS/m)	16.4	16.5	17.4	19.3	17.5	20.3
COD	25	22	23	27	28	27
NH3-N	0.267	0.226	0.324	0.276	0.148	0.135
BOD	2.8	1.6	1.2	1.1	2.5	2.3
TP	0.152	0.085	0.127	0.146	0.124	0.156
TN	1.58	1.42	0.714	1.03	1.39	1.96
SS	18	18	17	15	17	16
Petroleum	0.05L	0.05L	0.05L	0.05L	0.05L	0.05L

Note: pH value dimensionless; "L" means being less than the detection limit.

**Jiamusi Effluent Reuse: Air Quality Monitoring Results (Hourly Average)**

	Unit (mg/m <sup>3</sup> )		
	SO <sub>2</sub>	NO <sub>2</sub>	TSP
2014.06.14 Upwind 1	0.008	0.013	0.041
2014.06.14 Upwind 2	0.009	0.014	0.022
2014.06.14 Upwind 3	0.008	0.013	0.051
2014.06.14 Upwind 4	0.008	0.011	0.051
2014.06.14 Downwind 1 Gas1	0.003	0.032	0.047
2014.06.14 Downwind 1 Gas 2	0.003	0.019	0.033
2014.06.14 Downwind 1 Gas 3	0.003	0.034	0.073
2014.06.14 Downwind 1 Gas 4	0.006	0.022	0.062
2014.06.14 Downwind 2 Gas 1	0.006	0.004	0.023
2014.06.14 Downwind 2 Gas 2	0.007	0.005	0.035
2014.06.14 Downwind 2 Gas 3	0.007	0.007	0.033
2014.06.14 Downwind 2 Gas 4	0.007	0.016	0.060
2014.06.15 Upwind 1	0.009	0.010	0.045
2014.06.15 Upwind 2	0.010	0.012	0.067
2014.06.15 Upwind 3	0.010	0.009	0.049
2014.06.15 Upwind 4	0.009	0.010	0.080
2014.06.15 Downwind 1 Gas 1	0.003	0.021	0.053
2014.06.15 Downwind 1 Gas 2	0.003	0.029	0.056
2014.06.15 Downwind 1 Gas 3	0.007	0.017	0.081
2014.06.15 Downwind 1 Gas 4	0.004	0.019	0.055
2014.06.15 Downwind 2 Gas 1	0.007	0.011	0.042
2014.06.15 Downwind 2 Gas 2	0.003	0.010	0.050
2014.06.15 Downwind 2 Gas 3	0.006	0.013	0.050
2014.06.15 Downwind 2 Gas 4	0.008	0.008	0.044
2014.06.16 Upwind 1	0.009	0.018	0.132

**Jiamusi Effluent Reuse: Air Quality Monitoring Results (Hourly Average)**

	Unit (mg/m <sup>3</sup> )		
	SO <sub>2</sub>	NO <sub>2</sub>	TSP
2014.06.16 Upwind 2	0.010	0.019	0.098
2014.06.16 Upwind 3	0.015	0.012	0.135
2014.06.16 Upwind 4	0.018	0.009	0.067

2014.06.16 Downwind 1 Gas 1	0.019	0.049	0.060
2014.06.16 Downwind 1 Gas 2	0.011	0.047	0.094
2014.06.16 Downwind 1 Gas 3	0.018	0.041	0.085
2014.06.16 Downwind 1 Gas 4	0.003	0.025	0.061
2014.06.16 Downwind 2 Gas 1	0.013	0.008	0.048
2014.06.16 Downwind 2 Gas 2	0.007	0.008	0.061
2014.06.16 Downwind 2 Gas 3	0.008	0.012	0.054
2014.06.16 Downwind 2 Gas 4	0.007	0.007	0.049
140817 Upwind 1	0.011	0.012	0.062
140817 Upwind 2	0.012	0.013	0.069
140817 Upwind 3	0.012	0.012	0.064
140817 Upwind 4	0.012	0.013	0.055
140817 Downwind 1 Gas 1	0.007	0.024	0.061
140817 Downwind 1 Gas 2	0.007	0.019	0.044
140817 Downwind 1 Gas 3	0.007	0.021	0.059
140817 Downwind 1 Gas 4	0.008	0.023	0.062
140817 Downwind 2 Gas 1	0.003	0.011	0.035
140817 Downwind 2 Gas 2	0.006	0.008	0.055
140817 Downwind 2 Gas 3	0.003	0.006	0.039
140817 Downwind 2 Gas 4	0.006	0.009	0.035
140818 Upwind 1	0.012	0.013	0.055
140818 Upwind 2	0.014	0.013	0.063
140818 Upwind 3	0.015	0.020	0.111

#### Jiamusi Effluent Reuse: Air Quality Monitoring Results (Hourly Average)

	Unit (mg/m <sup>3</sup> )		
	SO <sub>2</sub>	NO <sub>2</sub>	TSP
140818 Upwind 4	0.015	0.021	0.042
140818 Downwind 1 Gas 1	0.008	0.022	0.060
140818 Downwind 1 Gas 2	0.008	0.010	0.047
140818 Downwind 1 Gas 3	0.007	0.022	0.044
140818 Downwind 1 Gas 4	0.009	0.028	0.061
140818 Downwind 2 Gas 1	0.006	0.007	0.043
140818 Downwind 2 Gas 2	0.010	0.006	0.039
140818 Downwind 2 Gas 3	0.007	0.007	0.041

140818 Downwind 2 Gas 4	0.004	0.005	0.090
140819 Downwind 1 Gas 1	0.010	0.039	0.084
140819 Downwind 1 Gas 2	0.008	0.039	0.129
140819 Downwind 1 Gas 3	0.008	0.036	0.107
140819 Downwind 1 Gas 4	0.007	0.037	0.101
140819 Downwind 2 Gas 1	0.010	0.004	0.023
140819 Downwind 2 Gas 2	0.013	0.011	0.058
140819 Downwind 2 Gas 3	0.014	0.012	0.031
140819 Downwind 2 Gas 4	0.020	0.004	0.032

#### Jiamusi Effluent Reuse: Noise Monitoring Results

	2014.6.11		2014.8.15	
	Daytime dB(A)	Nighttime dB(A)	Daytime dB(A)	Nighttime dB(A)
East Border	55.1	52.2	53.8	53.4
South Border	62.9	57.8	64.3	53.1
West Border	58.3	52.6	58.2	53.9
North Border	51.7	46.7	52.8	47.2

#### Jiamusi Effluent Reuse (Sewers): Air Quality Monitoring Results (mg/m<sup>3</sup>)

Location	Date	SO <sub>2</sub>	NO <sub>2</sub>	PM <sub>10</sub>
Xi an Area (Hailang Road, Xishiyitiao Road)	2014.01.01	0.019	0.015	0.057
	2014.01.02	0.021	0.031	0.103
	2014.01.03	0.028	0.033	0.099
	2014.01.04	0.029	0.035	0.114
	2014.01.05	0.046	0.048	0.177
	2014.04.01	0.006	0.020	0.084
	2014.04.02	0.003	0.025	0.069
	2014.04.03	0.005	0.022	0.046
	2014.04.04	0.005	0.022	0.050
	2014.04.05	0.006	0.017	0.050
	2014.07.01	0.006	0.019	0.069
	2014.07.02	0.007	0.018	0.060
	2014.07.03	0.006	0.012	0.042

	2014.07.04	0.007	0.017	0.057
	2014.07.05	0.008	0.019	0.075
Aimin Area (Huanghua Road, Tongxiang Street, Xingping Road, Xilin Road, Jinlongxi, Along Yinlongxi, Dongdiming Street, Daqing Road, Along Beianhe )	2014.01.01	0.062	0.019	0.057
	2014.01.02	0.059	0.045	0.109
	2014.01.03	0.029	0.031	0.091
	2014.01.04	0.022	0.055	0.150
	2014.01.05	0.030	0.070	0.218
	2014.04.01	0.023	0.027	0.087
	2014.04.02	0.011	0.020	0.055
	2014.04.03	0.012	0.021	0.044
	2014.04.04	0.026	0.025	0.068
	2014.04.05	0.021	0.028	0.068
	2014.07.01	0.004	0.034	0.082
	2014.07.02	0.008	0.036	0.094
	2014.07.03	0.004	0.029	0.061
	2014.07.04	0.004	0.040	0.087
	2014.07.05	0.005	0.042	0.110
Yangmin Area (Wastewater Treatment Plant, Drainage Water Site)	2014.01.01	0.032	0.023	0.080
	2014.01.02	0.031	0.040	0.133
	2014.01.03	0.023	0.030	0.118
	2014.01.04	0.023	0.043	0.140
	2014.01.05	0.031	0.056	0.219
	2014.04.01	0.028	0.028	0.103
	2014.04.02	0.017	0.028	0.065
	2014.04.03	0.013	0.02	0.054
	2014.04.04	0.020	0.023	0.064
	2014.04.05	0.012	0.020	0.070
	2014.07.01	0.009	0.020	0.094
	2014.07.02	0.013	0.024	0.101
	2014.07.03	0.006	0.015	0.054
	2014.07.04	0.007	0.018	0.078
	2014.07.05	0.009	0.024	0.100

**Jiamusi Effluent Reuse (Sewers): Noise Monitoring Results Unit: dB(A)**

Classification	Date	Monitoring Period	Monitoring Sites
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			1	2	3
			Xi an Area (Hailang Road, Xishiyitiao Road)	Aimin Area (Huanghua Road, Tongxiang Street, Xingping Road, Xilin Road, Jinlongxi, Along Yinlongxi, Dongdiming Street, Daqing Road, Along Beianhe )	Yangmin Area (Wastewater Treatment Plant, Drainage Water Site)
Equivalent Sound Level A	2014.02.10	24h	64.7	52.8	
	2014.02.15	24h			45.6
	2014.05.12	24h		48.4	
	2014.05.13	24h	64.6		53.6
	2014.08.16	24h	58.1		
	2014.08.19	24h		49.7	48.0

#### Jiamusi River Water Quality Monitoring Data (2011)

Parameter	Jiamusi Section								
	Dry Season		Normal Season		Wet Season		Annual		
	Average	% Violation	Average	% Violation	Average	% Violation	Average	% Violation	Maximum
pH	7.17	0	8.44	0	7.61	0	7.81	0	8.94
Conductivity	27.8	-	20.5	-	16.8	-	20.9	-	30.3
DO	7.2	0	11.1	0	7.1	0	8.6	0	6.6
CODMn	5.9	0	6.1	0	6.1	0	6.0	0	6.8
BOD	3.7	0	4.8	0	2.2	0	3.5	0	5.9
NH3-N	1.354	0	0.497	0	0.422	0	0.683	0	1.375
Petroleum	0.05L	0	0.05L	0	0.05L	0	0.05L	0	0.05L
Volatile Phenol	0.0006	0	0.0004	0	0.0003L	0	0.0003	0	0.0009
Total Hg	0.000025	0	0.000025	0	0.000027	0	0.000025	0	0.000040
Lead	0.0009	0	0.0008	0	0.0015	0	0.0011	0	0.0034
COD	25	0	27	22.2	26	0	26	8.3	34
TN	3.48	100	1.71	77.8	1.65	55.6	2.13	75.0	4.47
TP	0.186	0	0.114	0	0.206	0	0.166	0	0.296
Cu	0.0079	0	0.0064	0	0.0052	0	0.0063	0	0.0179
Zn	0.066	0	0.018	0	0.033	0	0.033	0	0.113
Cyanide	0.27	0	0.22	0	0.44	0	0.32	0	0.96
Se	0.00012	0	0.00004L	0	0.00004L	0	0.00005	0	0.00014
As	0.00084	0	0.00102	0	0.00081	0	0.00090	0	0.00126

Sn	0.00004L	0	0.00004L	0	0.00004L	0	0.00004L	0	0.00004L
Cr~(+6)	0.004L	0	0.004L	0	0.004L	0	0.004L	0	0.004L
Cyanide	0.004L	0	0.004L	0	0.004L	0	0.004L	0	0.004L
Anionic Detergent	0.05L	0	0.05L	0	0.06L	0	0.05L	0	0.05L
Sulphide	0.013	0	0.026	0	0.085	0	0.045	0	0.125
Fecal Coliform	9000	0	7887	0	24333	66.7	14325	25	35000

### Jiamusi River Water Quality Monitoring Data (2011)

Parameter	Jiamusi Downstream Section								
	Dry Season		Normal Season		Wet Season		Annual		
	Average	% Violation	Average	% Violation	Average	% Violation	Average	% Violation	Maximum
pH	7.21	0	8.59	0	7.69	0	7.91	0	8.89
Conductivity	28.9	-	21.2	-	15.9	-	21.2	-	32.6
DO	6.4	0	31.9	0	7.6	0	8.9	0	5.2
CODMn	5.6	0	5.9	0	5.9	0	5.8	0	6.5
BOD	1.8	0	5.0	0	1.4	0	2.8	0	5.8
NH3-N	1.358	0	0.430	0	0.422	0	0.659	0	1.399
Petroleum	0.05L	0	0.05L	0	0.05L	0	0.05L	0	0.05L
Volatile Phenol	0.0005	0	0.0003L	0	0.0003L	0	0.0003L	0	0.0008
Total Hg	0.000027	0	0.000030	0	0.000028	0	0.000029	0	0.000060
Lead	0.0006	0	0.0007	0	0.0009	0	0.0007	0	0.0018
COD	26	0	28	22.2	25	0	26	8.3	38
TN	3.36	100	1.34	55.6	1.47	44.4	1.90	62.5	4.28
TP	0.218	0	0.112	0	0.161	0	0.157	0	0.290
Cu	0.0045	0	0.0050	0	0.0030	0	0.0041	0	0.0168
Zn	0.019	0	0.022	0	0.010	0	0.017	0	0.057
Cyanide	0.25	0	0.21	0	0.35	0	0.27	0	0.67
Se	0.00014	0	0.00005	0	0.00004L	0	0.00006	0	0.00015
As	0.00095	0	0.00114	0	0.00085	0	0.00099	0	0.00151
Sn	0.00004L	0	0.00004L	0	0.00004L	0	0.00004L	0	0.00004L
Cr~(+6)	0.004L	0	0.004L	0	0.004L	0	0.004L	0	0.004L
Cyanide	0.004L	0	0.004L	0	0.004L	0	0.004L	0	0.004L
Anionic Detergent	0.05L	0	0.05L	0	0.05L	0	0.05L	0	0.05L
Sulphide	0.017	0	0.042	0	0.078	0	0.049	0	0.097
Fecal Coliform	49950	50	35333	66.7	19133	33.3	32912	50	92000



### Jiamusi River Water Quality Monitoring Data (2011)

Parameter	Jiangnan Tuen Section								
	Dry Season		Normal Season		Wet Season		Annual		
	Average	% Violation	Average	% Violation	Average	% Violation	Average	% Violation	Maximum
pH	7.23	0	8.48	0	7.64	0	7.85	0	8.91
Conductivity	29.0	-	19.6	-	15.2	-	20.3	-	32.4
DO	6.6	0	10.8	0	7.3	0	8.4	0	5.8
CODMn	5.4	0	5.8	0	5.7	0	5.7	0	6.3
BOD	2.3	0	4.3	0	1.2	0	2.6	0	5.1
NH3-N	1.362	0	0.460	0	0.442	0	0.678	0	1.378
Petroleum	0.05L	0	0.05L	0	0.05L	0	0.05L	0	0.05L
Volatile Phenol	0.0006	0	0.0004	0	0.0003L	0	0.0004	0	0.0009
Total Hg	0.000029	0	0.000026	0	0.000020	0	0.000025	0	0.000051
Lead	0.0004L	0	0.0007	0	0.0011	0	0.0007	0	0.0023
COD	26	0	29	33.3	25	0	27	12.5	38
TN	3.70	100	1.16	11.1	1.47	33.3	1.91	41.7	4.63
TP	0.152	0	0.099	0	0.166	0	0.137	0	0.205
Cu	0.0038	0	0.0048	0	0.0031	0	0.0039	0	0.0124
Zn	0.026	0	0.009	0	0.015	0	0.016	0	0.055
Cyanide	0.23	0	0.18	0	0.40	0	0.28	0	0.60
Se	0.00014	0	0.00006	0	0.00004L	0	0.00007	0	0.00016
As	0.00092	0	0.00092	0	0.00089	0	0.00091	0	0.00173
Sn	0.00004L	0	0.00004L	0	0.00004L	0	0.00004L	0	0.00004L
Cr~(+6)	0.004L	0	0.004L	0	0.004L	0	0.004L	0	0.004L
Cyanide	0.004L	0	0.004L	0	0.004L	0	0.004L	0	0.004L
Anionic Detergent	0.05L	0	0.05L	0	0.05L	0	0.05L	0	0.05L
Sulphide	0.024	0	0.025	0	0.069	0	0.041	0	0.096
Fecal Coliform	44500	100	17533	33.3	92000	100	52200	75	160000

### Jiamusi River Water Quality Monitoring Data (2012)

Parameter	Jiamusi Section			
	Dry Season	Normal Season	Wet Season	Annual

	Average	% Violation	Average	% Violation	Average	% Violation	Average	% Violation	Maximum
pH	7.90	0	7.61	0	7.30	0	7.57	0	8.95
Conductivity	28.6	-	18.2	-	17.2	-	20.4	-	31.2
DO	10.2	0	10.6	0	7.5	0	9.3	0	7.3
CODMn	5.3	0	6.3	0	5.3	0	5.7	0	7.4
BOD	5.1	0	3.9	0	3.1	0	3.9	0	5.4
NH3-N	0.999	0	0.289	0	0.382	0	0.501	0	1.009
Petroleum	0.01	0	0.04	0	0.05	0	0.04	0	0.05
Volatile Phenol	0.0006	0	0.0004	0	0.0010	0	0.0006	0	0.0016
Total Hg	0.000023	0	0.000013	0	0.000023	0	0.000020	0	0.000030
Lead	0.0008	0	0.0012	0	0.0012	0	0.0011	0	0.0032
COD	26	0	25	0	22	0	24	0	29
TN	1.84	50.0	1.58	33.3	2.00	100	1.80	62.5	2.58
TP	0.155	0	0.103	0	0.173	0	0.142	0	0.203
Cu	0.0016	0	0.0059	0	0.0058	0	0.0048	0	0.0124
Zn	0.014	0	0.118	0	0.046	0	0.065	0	0.289
Cyanide	0.21	0	0.30	0	0.47	0	0.34	0	0.52
Se	0.00004	0	0.00004L	0	0.00004L	0	0.00004L	0	0.00006
As	0.00069	0	0.00096	0	0.00072	0	0.00080	0	0.00151
Sn	0.00004	0	0.00004L	0	0.00005	0	0.00004	0	0.00012
Cr~(+6)	0.004L	0	0.004L	0	0.004L	0	0.004L	0	0.004L
Cyanide	0.004L	0	0.004L	0	0.004L	0	0.004L	0	0.004L
Anionic Detergent	0.05L	0	0.05L	0	0.05L	0	0.05L	0	0.05L
Sulphide	0.024	0	0.047	0	0.059	0	0.046	0	0.075
Fecal Coliform	3600	0	5433	0	23333	66.7	11688	25	36000

#### Jiamusi River Water Quality Monitoring Data (2012)

Parameter	Jiamusi Downstream Section								
	Dry Season		Normal Season		Wet Season		Annual		
	Average	% Violation	Average	% Violation	Average	% Violation	Average	% Violation	Maximum
pH	7.71	0	7.78	0	7.34	0	7.60	0	8.91
Conductivity	36.5	-	16.2	-	14.7	-	18.2	-	29.3
DO	9.8	0	11.2	0	7.9	0	9.6	0	7.7
CODMn	5.0	0	7.1	0	6.3	0	5.9	0	9.1
BOD	5.0	0	4.3	0	2.0	0	3.6	0	5.8

NH3-N	0.982	0	0.374	0	0.398	0	0.535	0	1.104
Petroleum	0.02	0	0.04	0	0.04	0	0.03	0	0.04
Volatile Phenol	0.0005	0	0.0012	0	0.0013	0	0.0008	0	0.0020
Total Hg	0.000021	0	0.000019	0	0.000029	0	0.000023	0	0.000037
Lead	0.0012	0	0.0011	0	0.0032	0	0.0019	0	0.0059
COD	28	0	25	0	23	0	25	0	29
TN	1.76	50.0	1.52	33.3	1.56	66.7	1.63	50.0	2.50
TP	0.134	0	0.108	0	0.177	0	0.140	0	0.201
Cu	0.0029	0	0.0049	0	0.0046	0	0.0043	0	0.0094
Zn	0.017	0	0.033	0	0.018	0	0.023	0	0.071
Cyanide	0.32	0	0.29	0	0.42	0	0.35	0	0.50
Se	0.00004	0	0.00006L	0	0.00004L	0	0.00004	0	0.00011
As	0.00089	0	0.00086	0	0.00067	0	0.00079	0	0.00130
Sn	0.00006	0	0.00004L	0	0.00004L	0	0.00004	0	0.00011
Cr~(+6)	0.004L	0	0.004L	0	0.004L	0	0.004L	0	0.004L
Cyanide	0.004L	0	0.004L	0	0.004L	0	0.004L	0	0.004L
Anionic Detergent	0.05L	0	0.05L	0	0.05L	0	0.05L	0	0.05L
Sulphide	0.024	0	0.038	0	0.044	0	0.037	0	0.055
Fecal Coliform	16500	50.0	13667	0	48000	66.7	27250	37.5	92000

#### Jiamusi River Water Quality Monitoring Data (2012)

Parameter	Jiangnan Tuen Section								
	Dry Season		Normal Season		Wet Season		Annual		
	Average	% Violation	Average	% Violation	Average	% Violation	Average	% Violation	Maximum
pH	7.72	0	7.86	0	7.31	0	7.62	0	8.88
Conductivity	24.7	-	17.2	-	16.0	-	18.6	-	29.1
DO	9.8	0	11.0	0	7.5	0	9.4	0	7.3
CODMn	4.9	0	6.9	0	5.1	0	5.7	0	8.7
BOD	5.1	0	4.0	0	1.5	0	3.3	0	5.4
NH3-N	0.990	0	0.388	0	0.406	0	0.545	0	1.061
Petroleum	0.01L	0	0.03	0	0.03	0	0.02	0	0.05
Volatile Phenol	0.0006	0	0.0008	0	0.0017	0	0.0011	0	0.0029
Total Hg	0.000028	0	0.000026	0	0.000028	0	0.000027	0	0.000043
Lead	0.0011	0	0.0007	0	0.0028	0	0.0016	0	0.0043
COD	28	0	25	0	22	0	25	0	28

TN	2.05	100	1.63	66.7	1.71	100	1.76	87.5	2.51
TP	0.127	0	0.122	0	0.170	0	0.142	0	0.211
Cu	0.0023	0	0.0026	0	0.0068	0	0.0041	0	0.0146
Zn	0.023	0	0.042	0	0.005	0	0.024	0	0.099
Cyanide	0.41	0	0.30	0	0.49	0	0.40	0	0.61
Se	0.00004	0	0.00006	0	0.00004L	0	0.00004	0	0.00011
As	0.00095	0	0.00086	0	0.00070	0	0.00082	0	0.00117
Sn	0.00004L	0	0.00004L	0	0.00004L	0	0.00004L	0	0.00004L
Cr~(+6)	0.004L	0	0.004L	0	0.004L	0	0.004L	0	0.004L
Cyanide	0.004L	0	0.004L	0	0.004L	0	0.004L	0	0.004L
Anionic Detergent	0.05L	0	0.05L	0	0.05L	0	0.05L	0	0.05L
Sulphide	0.023	0	0.054	0	0.044	0	0.042	0	0.087
Fecal Coliform	126000	100	27633	66.7	95667	100	77738	87.5	160000

#### Jiamusi River Water Quality Monitoring Data (2013)

Parameter	Jiamusi Section								
	Dry Season		Normal Season		Wet Season		Annual		
	Average	% Violation	Average	% Violation	Average	% Violation	Average	% Violation	Maximum
pH	6.8	0	7.24	0	7.19	0	7.11	0	7.65
Conductivity	24.0	-	20.3	-	16.1	-	19.7	-	26.5
DO	9.4	0	10.0	0	7.8	0	9.0	0	6.7
CODMn	4.1	0	5.13	0	5.5	0	5.0	0	6.0
BOD	2.7	0	2.8	0	2.6	0	2.7	0	3.4
NH3-N	0.841	0	0.455	0	0.592	0	0.603	0	1.200
Petroleum	0.05	0	0.04	0	0.04	0	0.04	0	0.05
Volatile Phenol	0.0012	0	0.0022	0	0.0026	0	0.0021	0	0.0036
Total Hg	0.000023	0	0.000039	0	0.000024	0	0.000029	0	0.000047
Lead	0.0004L	0	0.0018	0	0.0011	0	0.0011	0	0.0030
COD	18	0	19	0	18	0	18	0	20
TN	1.28	50.0	1.29	33.3	1.42	33.3	1.34	37.5	1.69
TP	0.111	0	0.135	0	0.147	0	0.134	0	0.192
Cu	0.0041	0	0.0046	0	0.0080	0	0.0057	0	0.0117
Zn	0.059	0	0.034	0	0.046	0	0.045	0	0.059
Cyanide	0.36	0	0.40	0	0.46	0	0.41	0	0.57
Se	0.00004L	0	0.00004L	0	0.00035	0	0.00014	0	0.00043

As	0.00092	0	0.00107	0	0.00212	0	0.000143	0	0.00237
Sn	0.00004L	0	0.00004L	0	0.00004L	0	0.00004L	0	0.00004L
Cr~(+6)	0.004L	0	0.004L	0	0.004L	0	0.004L	0	0.004L
Cyanide	0.004L	0	0.004L	0	0.004L	0	0.004L	0	0.004L
Anionic Detergent	0.05L	0	0.05L	0	0.05L	0	0.05L	0	0.05L
Sulphide	0.017	0	0.081	0	0.047	0	0.062	0	0.133
Fecal Coliform	6400	0	6633	0	29000	66.7	14962	25.0	35000

### Jiamusi River Water Quality Monitoring Data Sheet (2013)

Parameter	Downstream Jiamusi								
	Dry Season		Normal Season		Wet Season		Annual		
	Average	% Violation	Average	% Violation	Average	% Violation	Average	% Violation	Maximum
pH	6.84	0	7.34	0	7.23	0	7.17	0	7.75
Conductivity	24.1	-	18.7	-	15.0	-	18.6	-	26.1
DO	8.4	0	10.0	0	7.8	0	8.8	0	6.7
CODMn	3.7	0	5.7	0	5.5	0	5.1	0	5.9
BOD	2.7	0	2.2	0	1.7	0	2.1	0	3.3
NH3-N	0.854	0	0.462	0	0.642	0	0.628	0	1.120
Petroleum	0.03	0	0.02	0	0.03	0	0.03	0	0.04
Volatile Phenol	0.0009	0	0.0019	0	0.0023	0	0.0018	0	0.0041
Total Hg	0.000022	0	0.000041	0	0.000033	0	0.000033	0	0.000052
Lead	0.0012	0	0.0004	0	0.0034	0	0.0017	0	0.0064
COD	18	0	19	0	19	0	19	0	20
TN	1.22	50.0	1.09	0	1.24	0	1.18	12.5	1.55
TP	0.111	0	0.159	0	0.149	0	0.143	0	0.182
Cu	0.0054	0	0.0032	0	0.0096	0	0.0061	0	0.0159
Zn	0.021	0	0.016	0	0.020	0	0.019	0	0.036
Cyanide	0.24	0	0.40	0	0.45	0	0.38	0	0.55
Se	0.00004L	0	0.00004L	0	0.00033	0	0.00014	0	0.00045
As	0.00104	0	0.00112	0	0.00251	0	0.000162	0	0.00261
Sn	0.00004L	0	0.00004L	0	0.00004L	0	0.00004L	0	0.00004L
Cr~(+6)	0.004L	0	0.004L	0	0.004L	0	0.004L	0	0.004L
Cyanide	0.004L	0	0.004L	0	0.004L	0	0.004L	0	0.004L
Anionic Detergent	0.05L	0	0.05L	0	0.05L	0	0.05L	0	0.05L
Sulphide	0.013	0	0.076	0	0.046	0	0.049	0	0.103

Fecal Coliform	6350	0	56767	33.3	17967	33.3	29612	25.0	160000
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### Jiamusi River Water Quality Monitoring Data (2013)

Parameter	Jiangnan Tuen Section								
	Dry Season		Normal Season		Wet Season		Annual		
	Average	% Violation	Average	% Violation	Average	% Violation	Average	% Violation	Maximum
pH	6.84	0	7.23	0	7.32	0	7.17	0	7.66
Conductivity	27.0	-	19.1	-	15.0	-	19.5	-	27.4
DO	8.4	0	9.9	0	7.7	0	8.7	0	6.6
CODMn	3.7	0	5.2	0	5.5	0	4.9	0	5.8
BOD	3.0	0	2.1	0	1.6	0	2.1	0	3.4
NH3-N	0.963	0	0.522	0	0.676	0	0.690	0	1.280
Petroleum	0.03	0	0.01	0	0.03	0	0.02	0	0.06
Volatile Phenol	0.0015	0	0.0022	0	0.0028	0	0.0023	0	0.0035
Total Hg	0.000026	0	0.000042	0	0.000041	0	0.000038	0	0.000058
Lead	0.0004	0	0.0008	0	0.0029	0	0.0015	0	0.0035
COD	18	0	18	0	18	0	18	0	19
TN	1.24	50.0	1.25	0	1.40	0	1.30	12.5	1.55
TP	0.129	0	0.141	0	0.146	0	0.140	0	0.175
Cu	0.0055	0	0.0034	0	0.0157	0	0.0086	0	0.0192
Zn	0.013	0	0.015	0	0.014	0	0.014	0	0.030
Cyanide	0.27	0	0.43	0	0.46	0	0.40	0	0.55
Se	0.00004L	0	0.00004L	0	0.00032	0	0.00014	0	0.00047
As	0.00099	0	0.00128	0	0.00253	0	0.000168	0	0.00272
Sn	0.00004L	0	0.00004L	0	0.00004L	0	0.00004L	0	0.00004L
Cr~(+6)	0.00004L	0	0.004L	0	0.004L	0	0.004L	0	0.004L
Cyanide	0.004L	0	0.004L	0	0.004L	0	0.004L	0	0.004L
Anionic Detergent	0.05L	0	0.05L	0	0.05L	0	0.05L	0	0.05L
Sulphide	0.020	0	0.075	0	0.045	0	0.050	0	0.127
Fecal Coliform	126000	100	100633	66.7	47000	66.7	86862	75.0	≥240000

## 7. Nenjiang WWTP

### Nenjiang WWTP: Monthly Influent and Effluent Monitoring Data (Jan 2014)

No.	Parameter	Influent	Effluent
1	Volume, m3	443462	435972
2	Sludge, m3		261
3	COD mg/l	538.8	38.6
4	NH3-N (mg/l)	43.54	7.57
5	BOD (mg/l)	179.4	11.9
6	TP (mg/l)	0.92	0.41
Monthly Monitoring Data (2014.2)			
No.	Parameter	Influent	Effluent
1	Volume, m3	330823	324353
2	Sludge, m3		224
3	COD (mg/l)	534.29	46.76
4	NH3-N (mg/l)	47.93	7.21
5	BOD (mg/l)	175.48	10.6
6	TP (mg/l)	0.85	0.62
2014.3			
No.	Parameter	Influent	Effluent
1	Volume, m3	467351	458837
2	Sludge, m3		245
3	COD (mg/l)	514.82	44.18
4	NH3-N (mg/l)	46.89	7.33
5	BOD (mg/l)	196.41	12.37
6	TP (mg/l)	0.78	0.56
(2014.4)			
No.	Parameter	Influent	Effluent
1	Volume, m3	413921	404910
2	Sludge, m3		209
3	COD (mg/l)	575.2	39.7
4	NH3-N (mg/l)	44.93	7.85
5	BOD (mg/l)	367.84	13.68

6	TP (mg/l)	1.37	0.69
(2014.5)			
No.	Parameter	Influent	Effluent
1	Volume, m3	453532	448704
2	Sludge, m3		210
3	COD (mg/l)	617.8	41.4
4	NH3-N (mg/l)	48.21	7.53
5	BOD (mg/l)	376.18	14.12
6	TP (mg/l)	1.45	0.65
(2014.6)			
No.	Parameter	Influent	Effluent
1	Volume, m3	405985	399065
2	Sludge, m3		199
3	COD (mg/l)	563.5	40.31
4	NH3-N (mg/l)	45.57	7.08
5	BOD (mg/l)	358.29	15.64
6	TP (mg/l)	1.57	0.88
(2014.7)			
No.	Parameter	Influent	Effluent
1	Volume, m3	391626	391542
2	Sludge, m3		233
3	COD (mg/l)	477.8	40.2
4	NH3-N (mg/l)	45	7.88
5	BOD (mg/l)	174.35	16.27
6	TP (mg/l)	2.37	0.96
(2014.8)			
No.	Parameter	Influent	Effluent
1	Volume, m3	375049	368033
2	Sludge, m3		343
3	COD (mg/l)	521.3	39.4
4	NH3-N (mg/l)	44.92	5.69
5	BOD (mg/l)	172.15	13.13
6	TP (mg/l)	1.18	0.43



(2014.9)			
No.	Parameter	Influent	Effluent
1	Volume, m3	202181	198681
2	Sludge, m3		153
3	COD (mg/l)	526.5	40.1
4	NH3-N (mg/l)	44.92	5.46
5	BOD (mg/l)	194.32	14.2
6	TP (mg/l)	1.26	0.39
(2014.10)			
No.	Parameter	Influent	Effluent
1	Volume, m3	301638	295359
2	Sludge, m3		242
3	COD (mg/l)	539.1	39.1
4	NH3-N (mg/l)	47.89	5.79
5	BOD (mg/l)	185.63	16.1
6	TP (mg/l)	1.34	0.31
(2014.11)			
No.	Parameter	Influent	Effluent
1	Volume, m3	290022	283393
2	Sludge, m3		236
3	COD (mg/l)	576.25	40.76
4	NH3-N (mg/l)	45.27	6.18
5	BOD (mg/l)	185.66	15.4
6	TP (mg/l)	1.09	0.38
(2014.12)			
No.	Parameter	Influent	Effluent
1	Volume, m3	318642	312223
2	Sludge, m3		228
3	COD (mg/l)	593.5	45.18
4	NH3-N (mg/l)	48.49	7.05
5	BOD (mg/l)	196.63	14.3
6	TP (mg/l)	0.94	0.39

## 8. Qiqihar WWTP

### Qiqihar WWTP (Monthly, Jan 2012-Mar 2015)

COD		BOD		SS		NH3-N		TN		TP	
Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent
(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
414	56	225	18	298	17	51.47	6.9	55.97	18.36	6.13	0.75
468	57	260	17	332	18	48.97	6.99	53.63	18.5	4.41	0.67
502	56	262	17	339	18	53.37	6.94	62.09	18.1	8.13	0.68
417	51	277	17	307	17	40.42	6.42	42.22	14.71	9.79	0.82
388.91	47.14	270	17	291.32	18.86	45.85	5.46	64.7	12.71	6.18	0.53
416	51	270	16	313	17	39.44	7.21	65.98	13.97	6.3	0.32
356	43	279	17	280	17	34.62	2.7	39.96	12.63	16.38	0.51
303	47	272	18	258	17	36.75	3.97	52.02	13.58	15.83	0.68
296	50	286	17	246	17	38.74	3.32	70.06	13.55	17.15	0.63
307	49	274	18	266	18	39.35	5.13	59.9	17.59	8.33	0.73
281	50	266	18	246	16	33.52	4.18	38.56	13.26	7.83	0.8
312	53	251	18	258	17	38.73	6.35	46.48	15.39	18.51	0.72
448.52	45.19	285.4	17.4	278.77	17.74	49.51	7.48	58.21	16.85	8.99	0.67
443.36	41.75	285.4	17.4	279.82	17	52.66	7.05	58.39	10.98	7.68	0.76
336	45.65	132	16.25	225.55	16.9	38.98	7.5	44.59	11.45	4.94	0.61
306.6	48.63	131	15	221.87	16.93	31.46	6.57	38.37	10.48	4.83	0.53
328.75	45.07	136.6	13	198	16.4	28.57	5.71	34.6	11.55	5.63	0.52
343	35.97	140	13	228	17	26.44	4	35.29	13.26	4.51	0.35
552	35.58	147	14.27	272	16.7	35.48	6.85	51.27	19.44	9.15	0.34
237	27	136	12	185	15	28.34	2.97	34.68	16.37	4.44	0.33
223.2	27	134.75	11.8	202	15	25.02	4.72	31.16	14.39	3.59	0.23
272.81	38.97	134.56	11.67	257	16	29.32	6.59	35.8	13.73	3.89	0.29
301.3	43.73	135	13.6	186	16	36.6	7.14	45.81	16.63	4.85	0.41
331.19	36.39	179.85	15.46	209.52	14.77	39.2	6.92	48.85	14.58	5.24	0.39
382.16	35.65	135.27	14.09	229.9	15	43.97	5.32	57.14	11.57	6.52	0.44
376.07	37.04	137	12	255.14	15.64	48.09	6.52	63.24	12.32	6.04	0.44
291.65	32.58	137.8	12.7	234.74	16	45.99	5.75	57.24	10.89	5.16	0.45
337.97	35.25	134.33	12.17	228.57	15.5	31.57	5.56	44.85	14.68	6.13	0.36
311.67	33	133	14.85	135.03	15.63	36.56	9.44	45.7	18.68	5.16	0.32

263.9	21.17	136.7	14.3	225.07	14.83	34.97	5.82	41.28	15.43	3.89	0.32
212.71	32.48	169.55	16.45	224.9	14.23	23.29	4.83	33.87	13.8	2.38	0.35
227.52	26.61	161.2	7.5	219.03	15.55	34.12	4.93	43.25	13.52	3.87	0.34
254.67	32.57	118.36	15.18	203.6	15.23	28.45	2.91	41.13	12.25	3.62	0.3
239.94	29.19	131.17	12.5	208.97	16.03	40.24	5.97	47.5	9.69	4.11	0.31
320.97	31.6	194.8	15.8	223.33	15.6	48.97	7.99	56.7	14.54	4.88	0.34
324.1	35.58	179.5	7.25	218.87	15.94	50.27	8.26	57.18	12.55	5.61	0.33
315.29	31.19	118.25	12.17	209.94	16.32	55.54	5.98	61.51	11.48	5.24	0.34
321.14	31.25	134.63	6.75	186	17	56.15	4.02	62.01	12.89	5.62	0.35

#### Qiqihar WWTP: Sludge

Location	Item	Results
Sludge Plant of Qiqihar Southern Suburbs' WTP	Volatile Phenol	0.014
	Petroleum	6.05
	Cr	29
	Ni	15
	TC	Negative
	Cr~(+6)	0.344
	Benzopyrene	0. 0125

#### Qitaihe WWTP: Influent and Effluent Quality

Date	Capacity (10000/m <sup>3</sup> )	Normal Days	COD Influent (mg/l)	COD Effluent (mg/l)	BOD Influent (mg/l)	BOD Effluent (mg/l)	SS Influent (mg/l)	SS Effluent (mg/l)	NH3-N Influent (mg/l)	NH3-N Effluent (mg/l)	TN Influent (mg/l)	TN Effluent (mg/l)	TP Influent (mg/l)	TP Effluent (mg/l)
2012.1	215	31	414	56	225	18	298	17	51.47	6.9	55.97	18.36	6.13	0.75
2012.2	198	29	468	57	260	17	332	18	48.97	6.99	53.63	18.5	4.41	0.67
2012.3	193	30	502	56	262	17	339	18	53.37	6.94	62.09	18.1	8.13	0.68
2012.4	169.98	30	417	51	277	17	307	17	40.42	6.42	42.22	14.71	9.79	0.82
2012.5	195.7	31	388.91	47.14	270	17	291.32	18.86	45.85	5.46	64.7	12.71	6.18	0.53
2012.6	164	24	416	51	270	16	313	17	39.44	7.21	65.98	13.97	6.3	0.32
2012.7	211	31	356	43	279	17	280	17	34.62	2.7	39.96	12.63	16.38	0.51
2012.8	206	30	303	47	272	18	258	17	36.75	3.97	52.02	13.58	15.83	0.68
2012.9	176	30	296	50	286	17	246	17	38.74	3.32	70.06	13.55	17.15	0.63
2012.10	155	31	307	49	274	18	266	18	39.35	5.13	59.9	17.59	8.33	0.73
2012.11	198	30	281	50	266	18	246	16	33.52	4.18	38.56	13.26	7.83	0.8
2012.12	213	30	312	53	251	18	258	17	38.73	6.35	46.48	15.39	18.51	0.72

2013.1	142.7	31	448.52	45.19	285.4	17.4	278.77	17.74	49.51	7.48	58.21	16.85	8.99	0.67
2013.2	136.18	28	443.36	41.75	285.4	17.4	279.82	17	52.66	7.05	58.39	10.98	7.68	0.76
2013.3	160.21	31	336	45.65	132	16.25	225.55	16.9	38.98	7.5	44.59	11.45	4.94	0.61
2013.4	156.56	30	306.6	48.63	131	15	221.87	16.93	31.46	6.57	38.37	10.48	4.83	0.53
2013.5	184.66	31	328.75	45.07	136.6	13	198	16.4	28.57	5.71	34.6	11.55	5.63	0.52
2013.6	229.58	30	343	35.97	140	13	228	17	26.44	4	35.29	13.26	4.51	0.35
2013.7	202.81	31	552	35.58	147	14.27	272	16.7	35.48	6.85	51.27	19.44	9.15	0.34
2013.8	271.55	31	237	27	136	12	185	15	28.34	2.97	34.68	16.37	4.44	0.33
2013.9	320.13	30	223.2	27	134.75	11.8	202	15	25.02	4.72	31.16	14.39	3.59	0.23
2013.10	308.71	31	272.81	38.97	134.56	11.67	257	16	29.32	6.59	35.8	13.73	3.89	0.29
2013.11	278.33	30	301.3	43.73	135	13.6	186	16	36.6	7.14	45.81	16.63	4.85	0.41
2013.12	200.56	31	331.19	36.39	179.85	15.46	209.52	14.77	39.2	6.92	48.85	14.58	5.24	0.39
2014.1	190	31	382.16	35.65	135.27	14.09	229.9	15	43.97	5.32	57.14	11.57	6.52	0.44
2014.2	131.57	28	376.07	37.04	137	12	255.14	15.64	48.09	6.52	63.24	12.32	6.04	0.44
2014.3	117.51	31	291.65	32.58	137.8	12.7	234.74	16	45.99	5.75	57.24	10.89	5.16	0.45
2014.4	126.9	17	337.97	35.25	134.33	12.17	228.57	15.5	31.57	5.56	44.85	14.68	6.13	0.36
2014.5	318.35	31	311.67	33	133	14.85	135.03	15.63	36.56	9.44	45.7	18.68	5.16	0.32
2014.6	228.43	30	263.9	21.17	136.7	14.3	225.07	14.83	34.97	5.82	41.28	15.43	3.89	0.32
2014.7	154.01	31	212.71	32.48	169.55	16.45	224.9	14.23	23.29	4.83	33.87	13.8	2.38	0.35
2014.8	118.49	31	227.52	26.61	161.2	7.5	219.03	15.55	34.12	4.93	43.25	13.52	3.87	0.34
2014.9	84.66	30	254.67	32.57	118.36	15.18	203.6	15.23	28.45	2.91	41.13	12.25	3.62	0.3
2014.10	98.48	31	239.94	29.19	131.17	12.5	208.97	16.03	40.24	5.97	47.5	9.69	4.11	0.31
2014.11	81.48	30	320.97	31.6	194.8	15.8	223.33	15.6	48.97	7.99	56.7	14.54	4.88	0.34
2014.12	73.56	31	324.1	35.58	179.5	7.25	218.87	15.94	50.27	8.26	57.18	12.55	5.61	0.33
2015.1	84.7	31	315.29	31.19	118.25	12.17	209.94	16.32	55.54	5.98	61.51	11.48	5.24	0.34
2015.2	88.02	28	321.14	31.25	134.63	6.75	186	17	56.15	4.02	62.01	12.89	5.62	0.35

## 9. Shuangyashan WWTP

### Shuangyashan WWTP (2014)

No.	Parameter	Unit	Class-1B Standard	Frequency	Monitoring Location	
					Influent	Effluent
1	SS	mg/l	20	Once per Day	176	7.1
2	COD	mg/l	60	Once per Day	187	32
3	NH3-N	mg/l	8 (15)	Once per Day	27.7	3.3
4	BOD5	mg/l	20	Once per Day	68.6	8.1
5	TN	mg/l	20	Once per Day	34.6	10.2
6	TP	mg/l	1	Once per Day	2.95	0.68
No.	Parameter	Unit	Class-1B Standard	Frequency	Monitoring Location	

					Influent	Effluent
1	SS	mg/l	20	Once per Day	171	10
2	COD	mg/l	60	Once per Day	178	33
3	NH3-N	mg/l	8 (15)	Once per Day	26	2.9
4	BOD5	mg/l	20	Once per Day	88	9
5	TN	mg/l	20	Once per Day	31	8.3
6	TP	mg/l	1	Once per Day	2.7	0.74
No.	Parameter	Unit	Class-1B Standard	Frequency	Monitoring Location	
					Influent	Effluent
1	SS	mg/l	20	Once per Day	150	16
2	COD	mg/l	60	Once per Day	215	36
3	NH3-N	mg/l	8 (15)	Once per Day	26.3	2.3
4	BOD5	mg/l	20	Once per Day	102	8.4
5	TN	mg/l	20	Once per Day	29	14
6	TP	mg/l	1	Once per Day	2.97	0.84
No.	Parameter	Unit	Class-1B Standard	Frequency	Monitoring Location	
					Influent	Effluent
1	SS	mg/l	20	Once per Day	173	13
2	COD	mg/l	60	Once per Day	294	28
3	NH3-N	mg/l	8 (15)	Once per Day	32	1.9
4	BOD5	mg/l	20	Once per Day	117	8.6
5	TN	mg/l	20	Once per Day	37.3	19
6	TP	mg/l	1	Once per Day	3.23	0.96
No.	Parameter	Unit	Class-1B Standard	Frequency	Monitoring Location	
					Influent	Effluent
1	SS	mg/l	20	Once per Day	154	10
2	COD	mg/l	60	Once per Day	199	32
3	NH3-N	mg/l	8 (15)	Once per Day	22	7.7
4	BOD5	mg/l	20	Once per Day	87	7.4
5	TN	mg/l	20	Once per Day	35	13
6	TP	mg/l	1	Once per Day	2.4	0.75

No.	Parameter	Unit	Class-1B Standard	Frequency	Monitoring Location	
					Influent	Effluent
1	SS	mg/l	20	Once per Day	263	16
2	COD	mg/l	60	Once per Day	132	55
3	NH3-N	mg/l	8 (15)	Once per Day	9.9	3.6
4	BOD5	mg/l	20	Once per Day	48	4.6
5	TN	mg/l	20	Once per Day	16	9.2
6	TP	mg/l	1	Once per Day	1.4	0.7
No.	Parameter	Unit	Class-1B Standard	Frequency	Monitoring Location	
					Influent	Effluent
1	SS	mg/l	20	Once per Day	245	17
2	COD	mg/l	60	Once per Day	152	49
3	NH3-N	mg/l	8 (15)	Once per Day	13	6.6
4	BOD5	mg/l	20	Once per Day	55	6.4
5	TN	mg/l	20	Once per Day	20	18
6	TP	mg/l	1	Once per Day	1.53	0.57
No.	Parameter	Unit	Class-1B Standard	Frequency	Monitoring Location	
					Influent	Effluent
1	SS	mg/l	20	Once per Day	185	17
2	COD	mg/l	60	Once per Day	114	47
3	NH3-N	mg/l	8 (15)	Once per Day	7.1	0.7
4	BOD5	mg/l	20	Once per Day	41	2.9
5	TN	mg/l	20	Once per Day	13	12
6	TP	mg/l	1	Once per Day	1.34	0.9
No.	Parameter	Unit	Class-1B Standard	Frequency	Monitoring Location	
					Influent	Effluent
1	SS	mg/l	20	Once per Day	156	14
2	COD	mg/l	60	Once per Day	96	39
3	NH3-N	mg/l	8 (15)	Once per Day	7.3	0.5

4	BOD5	mg/l	20	Once per Day	40	4.3
5	TN	mg/l	20	Once per Day	14	12
6	TP	mg/l	1	Once per Day	1.14	0.53
No.	Parameter	Unit	Class-1B Standard	Frequency	Monitoring Location	
					Influent	Effluent
1	SS	mg/l	20	Once per Day	154	14
2	COD	mg/l	60	Once per Day	127	48
3	NH3-N	mg/l	8 (15)	Once per Day	10	1.21
4	BOD5	mg/l	20	Once per Day	45	7.1
5	TN	mg/l	20	Once per Day	19	17
6	TP	mg/l	1	Once per Day	1.37	0.69
No.	Parameter	Unit	Class-1B Standard	Frequency	Monitoring Location	
					Influent	Effluent
1	SS	mg/l	20	Once per Day	241	17
2	COD	mg/l	60	Once per Day	233	47
3	NH3-N	mg/l	8 (15)	Once per Day	18	1.47
4	BOD5	mg/l	20	Once per Day	86	9.4
5	TN	mg/l	20	Once per Day	26	17
6	TP	mg/l	1	Once per Day	2.33	0.7

#### Shuangyashan WWTP Completion Environmental Audit: Influent Monitoring Results (Apr 28, 2014)

Parameter	Sampling				
	1 <sup>st</sup> Sample	2 <sup>nd</sup> Sample	3 <sup>rd</sup> Sample	4 <sup>th</sup> Sample	Daily Average
Water Temperature	11.2	10.8	10.6	11.5	11.0
pH Value	7.8	7.9	7.8	7.7	7.7~7.9
Chroma	312	286	293	297	297
SS	62.7	64.5	60.6	63.3	62.8
COD	231	227	229	216	226
BOD <sub>5</sub>	0.39	0.44	0.34	0.41	0.40

Ammonia	5.02	4.89	5.05	5.21	5.04
Total Ammonia	33.9	34.3	35.1	34.9	34.6
Oil	23.8	23.4	23.8	23.1	23.5
Animal & Vegetable Oils	1.80	1.82	1.76	1.83	1.80
TP	0.768	0.802	0.758	0.775	0.776
LAS	58	57	57	56	57
Fecal Coliform	24000	24000	24000	24000	24000
Total Hg	0.000108	0.000124	0.000116	0.000105	0.000113
Total Nickel	0.001L	0.001L	0.001L	0.001L	0.001L
Total Chromium	0.03L	0.03L	0.03L	0.03L	0.03L
Hexavalent Chromium	0.004L	0.004L	0.004L	0.004L	0.004L
Total Arsenic	0.00128	0.00102	0.00131	0.00122	0.00121
Total Lead	0.01L	0.01L	0.01L	0.01L	0.01L

#### Shuangyashan WWTP Completion Environmental Audit: Effluent Monitoring Results (Apr 28, 2014)

Parameter	Sampling					% Removal	Standard
	1 <sup>st</sup> Sample	2 <sup>nd</sup> Sample	3 <sup>rd</sup> Sample	4 <sup>th</sup> Sample	Daily Average		
Water Temperature	9.8	10.1	9.7	10.0	9.9		/
pH Value	7.3	7.3	7.3	7.3	7.3~7.3		6-9
Chroma	46	47	43	44	45	84.8%	50
SS	9.2	8.8	9.5	9.3	9.2	85.3%	10
COD	5	8	9	7	7	96.9%	10
BOD <sub>5</sub>	0.04L	0.04L	0.04L	0.04L	0.04L		1
Ammonia	0.31	0.27	0.33	0.28	0.30		1
Total Ammonia	6.35	6.40	6.42	6.47	6.41		15
Oil	3.30	3.14	3.38	3.24	3.26	86.1%	8
Animal & Vegetable Oils	0.384	0.390	0.402	0.386	0.390		0.5



TP	0.105	0.113	0.100	0.098	0.104		0.5
LAS	29	27	26	28	28		30
Fecal Coliform	940	940	940	940	940		1000
Total Hg	0.000062	0.000054	0.000060	0.000055	0.000058		0.001
Total Nickel	0.001L	0.001L	0.001L	0.001L	0.001L		0.01
Total Chromium	0.03L	0.03L	0.03L	0.03L	0.03L		0.1
Hexavalent Chromium	0.004L	0.004L	0.004L	0.004L	0.004L		0.05
Total arsenic	0.00054	0.00062	0.00052	0.00060	0.00057		0.1
Total Lead	0.01L	0.01L	0.01L	0.01L	0.01L		0.1

**Shuangyashan WWTP Completion Environmental Audit: influent Monitoring Results (Apr 29, 2014)**

Parameter	Sampling				
	1 <sup>st</sup> Sample	2 <sup>nd</sup> Sample	3 <sup>rd</sup> Sample	4 <sup>th</sup> Sample	Daily Average
Water Temperature	11.6	11.2	11.5	10.9	11.3
pH Value	7.9	7.9	7.8	7.8	7.8~7.9
Chroma	269	277	276	282	276
SS	58.8	60.6	57.3	61.8	59.6
COD	224	219	212	216	218
BOD <sub>5</sub>	0.46	0.49	0.51	0.44	0.48
Ammonia	4.98	4.96	5.00	4.92	4.96
Total Ammonia	35.0	35.6	36.1	36.5	35.8
Oil	24.9	24.2	25.3	24.7	24.8
Animal & Vegetable Oils	1.83	1.91	1.85	1.88	1.87
TP	0.796	0.785	0.812	0.756	0.787
LAS	56	56	55	58	56
Fecal Coliform	24000	24000	24000	24000	24000
Total Hg	0.000119	0.000121	0.000113	0.000109	0.000111
Total Nickel	0.001L	0.001L	0.001L	0.001L	0.001L
Total Chromium	0.03L	0.03L	0.03L	0.03L	0.03L
Hexavalent Chromium	0.004L	0.004L	0.004L	0.004L	0.004L
Total Arsenic	0.00106	0.00115	0.00108	0.00110	0.00110
Total Lead	0.01L	0.01L	0.01L	0.01L	0.01L

**Shuangyashan WWTP Completion Environmental Audit: Effluent Monitoring Results (Apr 29, 2014)**

Parameter	Sampling					% Removal	Standard
	1 <sup>st</sup> Sample	2 <sup>nd</sup> Sample	3 <sup>rd</sup> Sample	4 <sup>th</sup> Sample	Daily Average		
Water Temperature	10.3	10.6	10.2	10.8	10.5		/
pH Value	7.2	7.2	7.3	7.2	7.2~7.3		6-9
Chroma	44	45	47	40	44	84.1%	50
SS	8.4	9.5	9.3	8.4	8.9	85.1%	10
COD	9	8	6	8	8	96.3%	10
BOD <sub>5</sub>	0.04L	0.04L	0.04L	0.04L	0.04L		1
Ammonia	0.33	0.35	0.36	0.35	0.35		1
Total Ammonia	6.51	6.60	6.72	6.67	6.62		15
Oil	3.49	3.23	3.59	3.40	3.43	86.2%	8
Animal & Vegetable Oils	0.388	0.392	0.375	0.380	0.384		0.5
TP	0.098	0.106	0.091	0.112	0.102		0.5
LAS	27	25	26	24	26		30
Fecal Coliform	540	540	920	540	540-920		1000
Total Hg	0.000055	0.000061	0.000058	0.000050	0.000056		0.001
Total Nickel	0.001L	0.001L	0.001L	0.001L	0.001L		0.01
Total Chromium	0.03L	0.03L	0.03L	0.03L	0.03L		0.1
Hexavalent Chromium	0.004L	0.004L	0.004L	0.004L	0.004L		0.05
Total arsenic	0.00088L	0.00075	0.00082	0.00080	0.00081		0.1
Total Lead	0.01L	0.01L	0.01L	0.01L	0.01L		0.1

**Shuangyashan WWTP Completion Environmental Audit: influent Monitoring Results (Apr 30, 2014)**

Parameter	Sampling				
	1 <sup>st</sup> Sample	2 <sup>nd</sup> Sample	3 <sup>rd</sup> Sample	4 <sup>th</sup> Sample	Daily Average
Water Temperature	11.6	12.4	11.9	10.8	11.7
pH Value	7.9	7.9	7.8	7.9	7.8~7.9
Chroma	279	283	294	284	285
SS	61.5	62.7	60.6	62.7	61.9
COD	209	214	218	207	212
BOD <sub>5</sub>	0.42	0.43	0.45	0.42	0.43
Ammonia	4.88	4.92	4.99	4.93	4.93
Total Ammonia	36.0	36.7	35.7	36.2	36.2
Oil	22.5	23.3	24.4	23.6	23.4
Animal & Vegetable Oils	1.73	1.78	1.81	1.85	1.79
TP	0.745	0.778	0.799	0.786	0.777
LAS	58	56	55	57	56
Fecal Coliform	24000	24000	24000	24000	24000
Total Hg	0.000123	0.000116	0.000120	0.000119	0.000120
Total Nickel	0.001L	0.001L	0.001L	0.001L	0.001L
Total Chromium	0.03L	0.03L	0.03L	0.03L	0.03L
Hexavalent Chromium	0.004L	0.004L	0.004L	0.004L	0.004L
Total Arsenic	0.00127	0.00113	0.00130	0.00117	0.00122
Total Lead	0.01L	0.01L	0.01L	0.01L	0.01L

**Shuangyashan WWTP Completion Environmental Audit: Effluent Monitoring Results (Apr 30, 2014)**

Parameter	Sampling					% Removal	Standard
	1 <sup>st</sup> Sample	2 <sup>nd</sup> Sample	3 <sup>rd</sup> Sample	4 <sup>th</sup> Sample	Daily Average		
Water Temperature	10.6	10.9	10.2	10.7	10.6		/
pH Value	7.2	7.3	7.3	7.3	7.2~7.3		6-9
Chroma	48	45	48	47	47	83.5%	50
SS	8.6	7.8	8.7	8.9	8.5	86.3%	10
COD	7	5	9	6	7	96.7%	10
BOD <sub>5</sub>	0.04L	0.04L	0.04L	0.04L	0.04L		1
Ammonia	0.31	0.29	0.34	0.30	0.31		1
Total Ammonia	6.70	6.72	6.81	6.80	6.76		15
Oil	3.22	3.34	3.59	3.44	3.39	85.5%	8
Animal & Vegetable Oils	0.402	0.407	0.398	0.387	0.398		0.5
TP	0.124	0.115	0.104	0.118	0.115		0.5
LAS	28	25	26	28	27		30
Fecal Coliform	920	920	920	540	540-920		1000
Total Hg	0.000058	0.000062	0.000054	0.000060	0.000058		0.001
Total Nickel	0.001L	0.001L	0.001L	0.001L	0.001L		0.01
Total Chromium	0.03L	0.03L	0.03L	0.03L	0.03L		0.1
Hexavalent Chromium	0.004L	0.004L	0.004L	0.004L	0.004L		0.05
Total arsenic	0.00082	0.00078	0.00080	0.00077	0.00079		0.1
Total Lead	0.01L	0.01L	0.01L	0.01L	0.01L		0.1

### Shuangyashan WWTP: Air Quality Monitoring Results

Monitoring Sites	Parameter	Date	Monitoring Results (mg/m <sup>3</sup> )				Standard
			1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	
Downwind Monitoring Site (01)	Odor	2011.12.01	10	10	10	10	20
		2011.12.02	10	10	10	10	20
Downwind Monitoring Site (02)	Odor	2011.12.01	10	10	10	10	20
		2011.12.02	10	10	10	10	20
Downwind Monitoring Site (03)	Odor	2011.12.01	10	10	10	10	20
		2011.12.02	10	10	10	10	20
Downwind Monitoring Site (04)	Odor	2011.12.01	10	10	10	10	20
		2011.12.02	10	10	10	10	20
Downwind Monitoring Site (01)	Hydrogen Sulfide	2011.12.01	0.002	0.003	0.003	0.004	0.06
		2011.12.02	0.003	0.003	0.003	0.004	0.06
Downwind Monitoring Site (02)	Hydrogen Sulfide	2011.12.01	0.003	0.003	0.004	0.004	0.06
		2011.12.02	0.003	0.003	0.004	0.004	0.06
Downwind Monitoring Site (03)	Hydrogen Sulfide	2011.12.01	0.003	0.003	0.004	0.004	0.06
		2011.12.02	0.003	0.003	0.004	0.004	0.06
Downwind Monitoring Site (04)	Hydrogen Sulfide	2011.12.01	0.005	0.005	0.005	0.006	0.06
		2011.12.02	0.005	0.006	0.006	0.005	0.06

### Shuangyashan WWTP: Air Quality Monitoring Results

Monitoring Sites	Parameter	Date	Monitoring Results (mg/m <sup>3</sup> )				Standard
			1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	
Downwind Monitoring Site (01)	Ammonia	2011.12.01	0.044	0.042	0.041	0.045	1.5
		2011.12.02	0.047	0.046	0.044	0.044	1.5
Downwind Monitoring Site (02)	Ammonia	2011.12.01	0.044	0.046	0.047	0.047	1.5
		2011.12.02	0.043	0.042	0.038	0.037	1.5
Downwind Monitoring Site (03)	Ammonia	2011.12.01	0.032	0.033	0.035	0.036	1.5
		2011.12.02	0.037	0.037	0.035	0.036	1.5
Downwind Monitoring Site (04)	Ammonia	2011.12.01	0.043	0.04	0.041	0.042	1.5
		2011.12.02	0.045	0.044	0.042	0.042	1.5

WWTP Monitoring Site (05)	Methane	2011.12.01	0.0019	0.0020	0.0021	0.0019	1
		2011.12.02	0.0019	0.0018	0.0018	0.0018	1
WWTP Monitoring Site (06)	Methane	2011.12.01	0.0021	0.0023	0.0023	0.0022	1
		2011.12.02	0.0020	0.0021	0.0021	0.0020	1

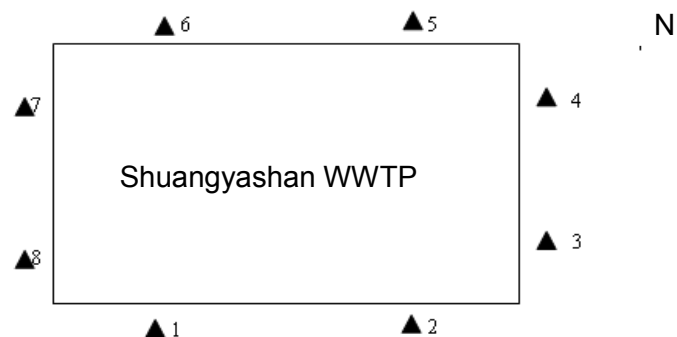
### Shuangyashan WWTP: Boiler Emission Monitoring Results

Monitoring Sites	Parameter	Monitoring Results (mg/m <sup>3</sup> ) Dec 1, 2011			Monitoring Results (mg/m <sup>3</sup> ) Dec 2, 2011			Evaluation Criteria
		1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	
4t/h Heating Boiler Outlet (O1)	Emissions (Nm <sup>3</sup> /h)	3516	3382	3378	3376	3514	3515	
	Measured concentration of dust emissions (mg/m <sup>3</sup> )	52	48	54	55	52	62	
	Concentration of dust emissions after conversion (mg/m <sup>3</sup> )	145	134	151	160	152	181	200
	Soot Emissions (kg/h)	0.18	0.16	0.18	0.19	0.18	0.22	
	Measured concentrations of SO <sub>2</sub> emissions (mg/m <sup>3</sup> )	71	76	81	74	69	78	
	Concentrations of SO <sub>2</sub> emission after conversion (mg/m <sup>3</sup> )	198	212	226	216	201	227	900
	SO <sub>2</sub> Emissions (kg/h)	0.25	0.26	0.27	0.25	0.24	0.27	
	Measured concentrations of NO <sub>2</sub> emissions (mg/m <sup>3</sup> )	107	110	102	104	106	109	
	Concentration of NO <sub>2</sub> after conversion (mg/m <sup>3</sup> )	299	307	285	303	309	318	/
	NO <sub>2</sub> Emissions (kg/h)	0.38	0.38	0.35	0.35	0.37	0.38	

### Shuangyashan WWTP: Noise Monitoring Results in dB (A)

Monitoring Sites	Apr 28, 2014			Monitoring Sites	Apr 29, 2014		
	Daytime		Night		Daytime		Night
▲1	53.4	52.9	42.1	▲1	53.6	53.7	42.8
▲2	52.2	53.7	44.0	▲2	52.8	52.9	43.4

▲3	54.5	53.6	43.2	▲3	53.4	54.4	43.7
▲4	51.1	54.4	44.7	▲4	53.2	52.6	43.5
▲5	53.2	52.1	43.2	▲5	54.3	53.5	44.0
▲6	52.4	53.3	43.8	▲6	53.5	54.3	43.8
▲7	52.1	52.4	42.7	▲7	53.2	52.6	44.2
▲8	54.2	52.9	41.9	▲8	52.6	53.5	43.5
Standard Values	60		50	Standard Values	60		50



Time	Equipment	Designed Production Capacity	Actual production Capacity	Production Load
2011.12.01-2011.12.02	Sewage treatment facilities	50,000 m <sup>3</sup> /d	30,000 m <sup>3</sup> /d	60%
2014.04.28-2014.04.30	Sewage treatment facilities	50,000 m <sup>3</sup> /d	4.21~4.25 m <sup>3</sup> /d	84.2~85.0%

### Shuangyashan WWTP: Boiler Emission Monitoring Results

Sites	Parameter	Monitoring Results (mg/m <sup>3</sup> ) Dec 1, 2011			Monitoring Results (mg/m <sup>3</sup> ) Dec 2, 2011			Criteria
		1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	
CLSG2.8- AIII Heating	Emissions (Nm <sup>3</sup> /h)	3516	3382	3378	3425	3376	3514	
	Measured concentration of dust emissions (mg/m <sup>3</sup> )	52	48	54	51	55	52	
	Concentration of dust emissions after conversion (mg/m <sup>3</sup> )	145	134	151	143	160	152	200

Boiler Outlet	Soot Emissions (kg/h)	0.18	0.16	0.18	0.17	0.19	0.18	
	Measured concentrations of SO <sub>2</sub> emissions (mg/m <sup>3</sup> )	71	76	81	76	74	69	
	Concentrations of SO <sub>2</sub> emission after conversion (mg/m <sup>3</sup> )	198	212	226	212	216	201	900
	SO <sub>2</sub> Emissions (kg/h)	0.25	0.26	0.27	0.26	0.25	0.24	
	Measured concentrations of NO <sub>2</sub> emissions (mg/m <sup>3</sup> )	107	110	102	106	104	106	
	Concentration of NO <sub>2</sub> after conversion (mg/m <sup>3</sup> )	299	307	285	297	303	309	/
	NO <sub>2</sub> Emissions (kg/h)	0.38	0.38	0.35	0.37	0.35	0.37	

### Shuangyashan WWTP: Fugitive Emissions Monitoring Results

Location	Date	Frequency	Parameter		
			NH <sub>3</sub> (mg/m <sup>3</sup> )	H <sub>2</sub> S (mg/m <sup>3</sup> )	Odor
Upwind (O1)	2011.12.1	First Time	0.03L	0.001L	10
		Second Time	0.03L	0.001L	10
		Third Time	0.03L	0.001L	10
		Fourth Time	0.03L	0.001L	10
	2011.12.2	First Time	0.03L	0.001L	10
		Second Time	0.03L	0.001L	10
		Third Time	0.03L	0.001L	10
		Fourth Time	0.03L	0.001L	10
Downwind (O2)	2011.12.1	First Time	0.044	0.002	10
		Second Time	0.042	0.003	10
		Third Time	0.041	0.003	10
		Fourth Time	0.045	0.004	10
	2011.12.2	First Time	0.047	0.003	10
		Second Time	0.046	0.003	10
		Third Time	0.044	0.003	10
		Fourth Time	0.044	0.004	10
Downwind (O3)	2011.12.1	First Time	0.044	0.003	10
		Second Time	0.046	0.003	10
		Third Time	0.047	0.004	10
		Fourth Time	0.047	0.004	10
	2011.12.2	First Time	0.043	0.003	10
		Second Time	0.042	0.003	10
		Third Time	0.038	0.004	10
		Fourth Time	0.037	0.004	10



### Shuangyashan WWTP: Fugitive Emissions Monitoring Results

Location	Date	Frequency	Monitoring Programs		
			NH <sub>3</sub> (mg/m <sup>3</sup> )	H <sub>2</sub> S (mg/m <sup>3</sup> )	Odor
Downwind (O4)	2011.12.1	First Time	0.032	0.003	10
		Second Time	0.033	0.003	10
		Third Time	0.035	0.004	10
		Fourth Time	0.036	0.004	10
	2011.12.2	First Time	0.037	0.003	10
		Second Time	0.037	0.003	10
		Third Time	0.035	0.004	10
		Fourth Time	0.036	0.004	10
Downwind (O5)	2011.12.1	First Time	0.043	0.005	10
		Second Time	0.040	0.005	10
		Third Time	0.041	0.005	10
		Fourth Time	0.042	0.006	10
	2011.12.2	First Time	0.045	0.005	10
		Second Time	0.044	0.006	10
		Third Time	0.042	0.006	10
		Fourth Time	0.042	0.005	10

### Shuangyashan WWTP: Methane Monitoring Results

Location	2011.12.1				2011.12.2			
Plant Area (O6)	0.0019	0.0020	0.0021	0.0019	0.0019	0.0018	0.0018	0.0018
Plant Area (O7)	0.0021	0.0023	0.0023	0.0022	0.0020	0.0021	0.0021	0.0020
Standard	1							

### Shuangyashan WWTP: Influent Monitoring Results

Parameter	Date	Monitoring Results				
		1 <sup>st</sup> Sample	2 <sup>nd</sup> Sample	3 <sup>rd</sup> Sample	4 <sup>th</sup> Sample	Daily Average
Water Temperature	2014.04.28	11.2	10.8	10.6	11.5	11.0
pH Value		7.8	7.9	7.8	7.7	7.8
COD		312	286	293	297	297
BOD <sub>5</sub>		62.7	64.5	60.6	63.3	62.8
SS		231	227	229	216	226
Petroleum		0.39	0.44	0.34	0.41	0.40
Animal & Vegetable Oils		5.02	4.89	5.05	5.21	5.04
TN		33.9	34.3	35.1	34.9	34.6
Ammonia Nitrogen		23.8	23.4	23.8	23.1	23.5
TP		1.80	1.82	1.76	1.83	1.80
Anionic Detergent		0.768	0.802	0.758	0.775	0.776
Chroma		58	57	57	56	57
Fecal Coliform		24000	24000	24000	24000	24000
Total Hg		0.000108	0.000124	0.000116	0.000105	0.000113
Total Cd		0.001L	0.001L	0.001L	0.001L	0.001L
Total Chromium		0.03L	0.03L	0.03L	0.03L	0.03L
Hexavalent Chromium		0.004L	0.004L	0.004L	0.004L	0.004L
Total Arsenic		0.00128	0.00102	0.00131	0.00122	0.00121
Total Lead		0.01L	0.01L	0.01L	0.01L	0.01L
Water Temperature	2014.04.29	11.6	11.2	11.5	10.9	11.3
pH Value		7.9	7.9	7.8	7.8	7.8
COD		269	277	276	282	276
BOD <sub>5</sub>		58.8	60.6	57.3	61.8	59.6
SS		224	219	212	216	218
Petroleum		0.46	0.49	0.51	0.44	0.48
Animal & Vegetable Oils		4.98	4.96	5.00	4.92	4.96
TN		35.0	35.6	36.1	36.5	35.8
Ammonia Nitrogen		24.9	24.2	25.3	24.7	24.8
TP		1.83	1.91	1.85	1.88	1.87
Anionic Detergent		0.796	0.785	0.812	0.756	0.787
Chroma		56	56	55	58	56
Fecal Coliform		24000	24000	24000	24000	24000
Total Hg		0.000119	0.000121	0.000113	0.000109	0.000111

Total Cd		0.001L	0.001L	0.001L	0.001L	0.001L
Total Chromium		0.03L	0.03L	0.03L	0.03L	0.03L
Hexavalent Chromium		0.004L	0.004L	0.004L	0.004L	0.004L
Total Arsenic		0.00106	0.00115	0.00108	0.00110	0.00110
Total Lead		0.01L	0.01L	0.01L	0.01L	0.01L
Water Temperature	2014.04.30	11.6	12.4	11.9	10.8	11.7
pH Value		7.9	7.9	7.8	7.9	7.9
COD		279	283	294	284	285
BOD <sub>5</sub>		61.5	62.7	60.6	62.7	61.9
SS		209	214	218	207	212
Petroleum		0.42	0.43	0.45	0.42	0.43
Animal & Vegetable Oils		4.88	4.92	4.99	4.93	4.93
TN		36.0	36.7	35.7	36.2	36.2
Ammonia Nitrogen		22.5	23.3	24.4	23.6	23.4
TP		1.73	1.78	1.81	1.85	1.79
Anionic Detergent		0.745	0.778	0.799	0.786	0.777
Chroma		58	56	55	57	56
Fecal Coliform		24000	24000	24000	24000	24000
Total Hg		0.000123	0.000116	0.000120	0.000119	0.000120
Total Cd		0.001L	0.001L	0.001L	0.001L	0.001L
Total Chromium		0.03L	0.03L	0.03L	0.03L	0.03L
Hexavalent Chromium		0.004L	0.004L	0.004L	0.004L	0.004L
Total Arsenic		0.00127	0.00113	0.00130	0.00117	0.00122
Total Lead		0.01L	0.01L	0.01L	0.01L	0.01L

### Shuangyashan WWTP: Effluent Monitoring Results

Parameter	Date	Monitoring Results					% Removal	Standard
		1 <sup>st</sup> Sample	2 <sup>nd</sup> Sample	3 <sup>rd</sup> Sample	4 <sup>th</sup> Sample	Average		
Water Temperature	2014.04.28	9.8	10.1	9.7	10.0	9.9		/
pH Value		7.3	7.3	7.3	7.3	7.3		6-9
COD		46	47	43	44	45	84.8%	50
BOD <sub>5</sub>		9.2	8.8	9.5	9.3	9.2	85.3%	10
SS		5	8	9	7	7	96.9%	10
Petroleum		0.04L	0.04L	0.04L	0.04L	0.04L		1

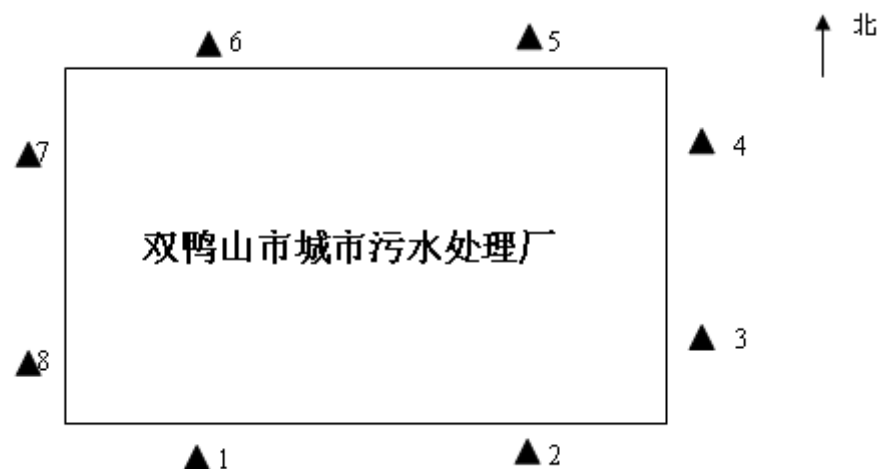
Animal & Vegetable Oils		0.31	0.27	0.33	0.28	0.30		1
TN		6.35	6.40	6.42	6.47	6.41		15
Ammonia Nitrogen		3.30	3.14	3.38	3.24	3.26		8
TP		0.384	0.390	0.402	0.386	0.390		0.5
Anionic Detergent		0.105	0.113	0.100	0.098	0.104		0.5
Chroma		29	27	26	28	28		30
Fecal Coliform		940	940	940	940	940		1000
Total Hg		0.000062	0.000054	0.000060	0.000055	0.000058		0.001
Total Cd		0.001L	0.001L	0.001L	0.001L	0.001L		0.01
Total Chromium		0.03L	0.03L	0.03L	0.03L	0.03L		0.1
Hexavalent Chromium		0.004L	0.004L	0.004L	0.004L	0.004L		0.05
Total Arsenic		0.00054	0.00062	0.00052	0.00060	0.00057		0.1
Total Lead		0.01L	0.01L	0.01L	0.01L	0.01L		0.1
Water Temperature	2014.04.29	10.3	10.6	10.2	10.8	10.5		/
pH Value		7.2	7.2	7.3	7.2	7.2		6-9
COD		44	45	47	40	44	84.1%	50
BOD <sub>5</sub>		8.4	9.5	9.3	8.4	8.9	85.1%	10
SS		9	8	6	8	8	96.3%	10
Petroleum		0.04L	0.04L	0.04L	0.04L	0.04L		1
Animal & Vegetable Oils		0.33	0.35	0.36	0.35	0.35		1
TN		6.51	6.60	6.72	6.67	6.62		15
Ammonia Nitrogen		3.49	3.23	3.59	3.40	3.43		8
TP		0.388	0.392	0.375	0.380	0.384		0.5
Anionic Detergent		0.098	0.106	0.091	0.112	0.102		0.5
Chroma		27	25	26	24	26		30
Fecal Coliform		540	540	920	540	540-920		1000
Total Hg		0.000055	0.000061	0.000058	0.000050	0.000056		0.001
Total Cd		0.001L	0.001L	0.001L	0.001L	0.001L		0.01
Total Chromium		0.03L	0.03L	0.03L	0.03L	0.03L		0.1
Hexavalent Chromium		0.004L	0.004L	0.004L	0.004L	0.004L		0.05
Total Arsenic		0.00088L	0.00075	0.00082	0.00080	0.00081		0.1
Total Lead		0.01L	0.01L	0.01L	0.01L	0.01L		0.1
Water Temperature	2014.04.30	10.6	10.9	10.2	10.7	10.6		/
pH Value		7.2	7.3	7.3	7.3	7.3		6-9
COD		48	45	48	47	47	83.5%	50

BOD <sub>5</sub>		8.6	7.8	8.7	8.9	8.5	86.3%	10
SS		7	5	9	6	7	96.7%	10
Petroleum		0.04L	0.04L	0.04L	0.04L	0.04L		1
Animal & Vegetable Oils		0.31	0.29	0.34	0.30	0.31		1
TN		6.70	6.72	6.81	6.80	6.76		15
Ammonia Nitrogen		3.22	3.34	3.59	3.44	3.39		8
TP		0.402	0.407	0.398	0.387	0.398		0.5
Anionic Detergent		0.124	0.115	0.104	0.118	0.115		0.5
Chroma		28	25	26	28	27		30
Fecal Coliform		920	920	920	540	540-920		1000
Total Hg		0.000058	0.000062	0.000054	0.000060	0.000058		0.001
Total Cd		0.001L	0.001L	0.001L	0.001L	0.001L		0.01
Total Chromium		0.03L	0.03L	0.03L	0.03L	0.03L		0.1
Hexavalent Chromium		0.004L	0.004L	0.004L	0.004L	0.004L		0.05
Total Arsenic		0.00082	0.00078	0.00080	0.00077	0.00079		0.1
Total Lead		0.01L	0.01L	0.01L	0.01L	0.01L		0.1

### Shuangyashan WWTP: Noise Monitoring Results

Monitoring Sites	Date	Monitoring Results db(A)		
		Morning	Afternoon	Night
▲1	2014.4.28	53.4	52.9	42.1
▲2		52.2	53.7	44.0
▲3		54.5	53.6	43.2
▲4		51.1	54.4	44.7
▲5		53.2	52.1	43.2
▲6		52.4	53.3	43.8
▲7		52.1	52.4	42.7
▲8		54.2	52.9	41.9
▲1	2014.4.29	53.6	53.7	42.8
▲2		52.8	52.9	43.4
▲3		53.4	54.4	43.7
▲4		53.2	52.6	43.5
▲5		54.3	53.5	44.0
▲6		53.5	54.3	43.8
▲7		53.2	52.6	44.2

▲ 8		52.6	53.5	43.5
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## 10. Tangyuan WWTP

### Tangyuan WWTP: Influent Monitoring Results (Nov 23, 2011)

Parameter	Sampling				
	1 <sup>st</sup> Sample	2 <sup>nd</sup> Sample	3 <sup>rd</sup> Sample	4 <sup>th</sup> Sample	Daily Average
Water Temperature	21	20	20	21	20
pH	6.11	6.15	6.12	6.13	6.11~6.15
Chroma	40	80	80	80	70
SS	300	450	160	370	320
COD	265	259	252	248	256
BOD <sub>5</sub>	126	118	112	119	119
Ammonia	26.2	25.2	28.9	31.0	27.8
Total Ammonia	39.7	37.2	38.0	38.1	38.2

Oil	1.0	1.4	2.0	1.0	1.4
Animal & Vegetable Oils	16.8	17.8	20.0	18.2	18.2
TP	2.96	2.71	2.86	2.80	2.83
LAS	1.71	1.88	1.85	1.80	1.81
Fecal Coliform	$4.90 \times 10^6$	$1.70 \times 10^4$	$3.30 \times 10^6$	$2.10 \times 10^4$	$3.00 \times 10^4$
Total Hg	0.00005	0.00004	0.00017	0.00012	0.00010
Total Nickel	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
Total Chromium	0.02L	0.02L	0.02L	0.02L	0.02L
Hexavalent Chromium	0.080	0.096	0.119	0.135	0.108
Total Arsenic	0.0003	0.0004	0.0004	0.0003	0.0004
Total Lead	0.01L	0.001L	0.01L	0.01L	0.01L

#### Tangyuan WWTP: Effluent Monitoring Results (Nov 23, 2011)

Parameter	Sampling					% of Removal	Standard
	1 <sup>st</sup> Sample	2 <sup>nd</sup> Sample	3 <sup>rd</sup> Sample	4 <sup>th</sup> Sample	Daily Average		
Water Temperature	17	18	17	18	18	/	/
pH Value	6.47	6.50	6.45	6.45	6.45~6.50	/	6~9
Chroma	4	4	4	4	4	94.3	30
SS	4L	4L	4L	6	6	98.1	10
COD	28.3	26.5	24.2	21.5	25.1	90.2	50
BOD <sub>5</sub>	3.18	4.59	4.81	4.22	4.20	96.5	10
Ammonia	3.05	2.62	2.95	3.13	2.94	89.4	5
Total Ammonia	11.0	115	12.0	9.78	11.1	70.9	15
Oil	0.4	0.2	0.1L	0.1L	0.3	78.6	1
Animal & Vegetable Oils	0.1	0.2	0.1L	0.1L	0.2	98.9	1
TP	0.180	0.188	0.184	0.175	0.182	93.6	0.5
LAS	0.104	0.099	0.094	0.100	0.099	94.5	0.5
Fecal Coliform	900	700	900	800	700-900	/	$10^3$
Total Hg	0.0000015L	0.0000015L	0.0000015L	0.0000015L	0.0000015L	/	0.001
Total Nickel	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	/	0.01
Total Chromium	0.02L	0.02L	0.02L	0.02L	0.02L	/	0.1
Hexavalent Chromium	0.013	0.013	0.013	0.013	0.012	88.9	0.05
Total arsenic	0.0002	0.0002L	0.00021	0.00021	0.00002	95.0	0.1
Total Lead	0.01L	0.001L	0.01L	0.01L	0.01L	/	0.1

**Tangyuan WWTP: Influent Monitoring Results (Nov 24, 2011)**

Parameter	Sampling				
	1 <sup>st</sup> Sample	2 <sup>nd</sup> Sample	3 <sup>rd</sup> Sample	4 <sup>th</sup> Sample	Daily Average
Water Temperature	21	20	20	21	20
pH Value	6.12	6.13	6.12	6.11	6.11~6.13
Chroma	40	40	40	40	40
SS	270	300	420	360	338
COD	275	264	275	266	270
BOD <sub>5</sub>	133	124	134	122	128
Ammonia	29.8	26.7	29.7	24.9	27.8
Total Ammonia	41.0	39.7	40.8	38.4	40.0
Oil	2.3	0.9	1.5	2.0	1.7
Animal & Vegetable Oils	20.0	16.3	16.4	18.7	17.8
TP	2.67	2.69	2.22	2.49	2.52
LAS	1.64	1.59	1.54	1.01	1.44
Fecal Coliform	1.70×10 <sup>6</sup>	2.20×10 <sup>6</sup>	1.70×10 <sup>6</sup>	3.30×10 <sup>6</sup>	2.22×10 <sup>6</sup>
Total Hg	0.00001	0.00012	0.00011	0.00004	0.00007
Total Nickel	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
Total Chromium	0.02L	0.02L	0.02L	0.02L	0.02L
Hexavalent Chromium	0.119	0.127	0.096	0.088	0.108
Total Arsenic	0.0003	0.0006	0.0004	0.0003	0.0004
Total Lead	0.01L	0.01L	0.01L	0.01L	0.01L

**Tangyuan WWTP: Effluent Monitoring Results (Nov 24, 2011)**

Parameter	Sampling					% Removal	Standard
	1 <sup>st</sup> Sample	2 <sup>nd</sup> Sample	3 <sup>rd</sup> Sample	4 <sup>th</sup> Sample	Daily Average		
Water Temperature	18	17	16	16	17	/	/
pH Value	6.46	6.47	6.50	6.45	6.45~6.50	/	6~9
Chroma	4	4	4	4	4	90.0	30
SS	5	4	4L	5	5	98.5	10
COD	22.9	27.5	29.3	28.5	27.0	90.0	50
BOD <sub>5</sub>	4.97	3.78	5.65	4.96	4.84	96.2	10
Ammonia	2.89	2.73	2.82	2.88	2.83	89.8	5



Total Ammonia	8.36	9.84	9.94	10.9	9.76	75.6	15
Oil	0.1L	0.1L	0.1L	0.1L	0.1L	/	1
Animal & Vegetable Oils	0.1L	0.1L	0.1L	0.1L	0.1L	/	1
TP	0.213	0.196	0.213	0.188	0.202	92.0	0.5
LAS	0.104	0.109	0.117	0.119	0.112	92.2	0.5
Fecal Coliform	400	900	800	900	400-900	/	10 <sup>3</sup>
Total Hg	0.0000015L	0.0000015L	0.0000015L	0.0000015L	0.0000015L	/	0.001
Total Nickel	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	/	0.01
Total Chromium	0.02L	0.02L	0.02L	0.02L	0.02L	/	0.1
Hexavalent Chromium	0.013	0.013	0.01L	0.013	0.012	88.9	0.05
Total arsenic	0.0002L	0.0002L	0.0002L	0.0002L	0.0002L	/	0.1
Total Lead	0.01L	0.01L	0.01L	0.01L	0.01L	/	0.1

#### Tangyuan WWTP: Influent Monitoring Results (Nov 25, 2011)

Parameter	Sampling				
	1 <sup>st</sup> Sample	2 <sup>nd</sup> Sample	3 <sup>rd</sup> Sample	4 <sup>th</sup> Sample	Daily Average
Water Temperature	20	21	20	20	20
pH Value	6.13	6.11	6.20	6.17	6.11~6.20
Chroma	40	40	80	80	60
SS	240	430	390	340	350
COD	281	274	268	279	276
BOD <sub>5</sub>	106	124	132	122	121
Ammonia	25.9	28.5	25.2	24.1	25.9
Total Ammonia	34.6	35.7	34.0	33.0	34.3
Oil	1.4	2.4	1.4	1.2	1.6
Animal & Vegetable Oils	17.8	19.9	17.9	20.9	19.1
TP	2.88	2.71	2.63	2.57	2.70
LAS	0.845	0.822	1.52	1.01	1.05
Fecal Coliform	2.20×10 <sup>6</sup>	1.70×10 <sup>6</sup>	2.20×10 <sup>6</sup>	1.40×10 <sup>6</sup>	1.88×10 <sup>6</sup>
Total Hg	0.00008	0.00002	0.00004	0.00002	0.00004
Total Nickel	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
Total Chromium	0.02L	0.02L	0.02L	0.02L	0.02L
Hexavalent Chromium	0.072	0.096	0.104	0.088	0.090
Total Arsenic	0.0004	0.0003	0.0002L	0.0002L	0.0004
Total Lead	0.01L	0.01L	0.01L	0.01L	0.01L

**Tangyuan WWTP: Effluent Monitoring Results (Nov 25, 2011)**

Parameter	Sampling					% Removal	Standard
	1 <sup>st</sup> Sample	2 <sup>nd</sup> Sample	3 <sup>rd</sup> Sample	4 <sup>th</sup> Sample	Daily Average		
Water Temperature	17	10	17	15	15	/	/
pH Value	6.50	6.45	6.45	6.47	6.45~6.50	/	6~9
Chroma	4	4	4	4	4	93.3	30
SS	6	5	4	4L	5	98.6	10
COD	25.3	28.1	22.3	24.6	25.1	90.9	50
BOD <sub>5</sub>	5.18	5.34	5.18	5.42	5.28	95.6	10
Ammonia	2.79	2.65	2.92	2.67	2.76	89.3	5
Total Ammonia	10.5	8.31	9.63	10.4	9.71	71.7	15
Oil	0.1L	0.1L	0.1L	0.1L	0.1L	/	1
Animal & Vegetable Oils	0.1L	0.1L	0.1L	0.1L	0.1L	/	1
TP	0.204	0.180	0.196	0.200	0.195	92.8	0.5
LAS	0.142	0.096	0.103	0.104	0.111	89.4	0.5
Fecal Coliform	800	700	700	900	700-900	/	10 <sup>3</sup>
Total Hg	0.0000015L	0.0000015L	0.0000015L	0.0000015L	0.0000015L	/	0.001
Total Nickel	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	/	0.01
Total Chromium	0.02L	0.02L	0.02L	0.02L	0.02L	/	0.1
Hexavalent Chromium	0.013	0.013	0.014	0.014	0.014	84.4	0.05
Total arsenic	0.0002L	0.0002L	0.0002L	0.0002L	0.0002L	/	0.1
Total Lead	0.01L	0.01L	0.01L	0.01L	0.01L	/	0.1

**Tangyuan WWTP: Monthly Average Influent and Effluent Monitoring Results (Jan 2012-Mar 2015) (mg/l, except for dimensionless pH)**

	Influent							Effluent						
	BOD	COD	NH3-N	SS	TN	TP	pH	BOD	COD	NH3-N	SS	TN	TP	pH
2012.01	8.0	48.0	4.8	7	13.5	0.43	6.78	184	353	33.5	130	39.6	4.98	6.69
2012.02	8.6	49.0	4.7	8	14.3	0.35	6.69	217	356	31.2	136	43.0	3.83	6.50
2012.03	8.7	48.0	4.8	7	11.5	0.35	6.60	191	276	27.0	137	27.0	4.16	6.60
2012.04	7.2	47.0	4.8	8	14.0	0.35	6.60	196	346	32.0	142	45.3	3.47	6.60
2012.05	6.2	45.0	4.7	7	11.8	0.33	6.70	176	295	27.0	147	39.2	3.18	6.70
2012.06	7.5	45.0	4.2	6	11.9	0.27	6.70	155	260	26.9	149	43.1	3.12	6.75
2012.07	6.5	41.0	3.7	6	11.0	0.25	6.77	139	223	23.2	152	40.5	3.30	6.70
2012.08	6.8	38.0	3.4	6	10.9	0.40	6.08	121	194	21.9	148	39.7	3.28	6.81
2012.09	9.1	36.0	3.4	6	10.7	0.24	6.80	100	204	20.4	161	37.3	3.41	6.80

2012.10	7.5	40.0	4.1	6	11.7	0.29	6.80	133	243	22.6	168	41.9	4.25	6.80
2012.11	8.6	44.0	4.7	6	11.3	0.30	6.70	148	300	25.5	167	41.8	3.67	6.70
2012.12	8.8	45.0	4.8	7	11.9	0.38	6.82	173	298	31.3	178	41.2	4.11	6.75
2013.01	8.8	45.0	4.5	6	12.0	0.37	6.80	164	270	29.2	189	41.0	4.17	6.77
2013.02	8.8	46.0	4.6	7	12.6	0.40	6.93	166	293	29.7	206	42.4	4.05	6.82
2013.03	8.7	44.8	4.7	6	12.1	0.35	6.88	169	287	27.6	159	41.5	4.08	6.76
2013.04	8.3	42.9	4.5	6	12.5	0.38	6.82	156	287	25.8	168	39.6	3.74	6.68
2013.05	8.4	42.9	4.5	8	12.2	0.33	7.40	161	290	27.0	183	38.2	3.85	7.40
2013.06	7.4	40.6	4.1	8	11.9	0.31	7.17	168	312	28.8	209	41.6	3.55	7.35
2013.07	4.7	35.4	3.0	6	10.2	0.22	7.14	146	242	23.0	202	41.1	3.60	7.14
2013.08	4.7	33.3	2.1	6	8.9	0.28	6.99	76	127	19.6	184	32.0	3.27	6.95
2013.09	5.9	34.6	2.2	5	10.3	0.23	6.54	69	145	21.4	176	34.8	3.77	6.53
2013.10	5.9	40.6	3.0	6	9.8	0.32	6.73	157	285	29.6	247	43.2	3.71	6.69
2013.11	8.0	43.2	4.2	6	12.1	0.38	6.89	186	351	28.6	250	42.8	4.21	6.89
2013.12	9.0	44.9	4.8	7	12.4	0.34	6.95	187	308	26.6	255	42.4	4.16	6.86
2014.01	7.4	44.9	4.7	6	13.1	0.41	6.77	118	296	29.0	234	40.7	3.71	6.88
2014.02	8.4	45.5	4.9	7	11.9	0.31	6.80	163	332	27.7	235	38.3	4.00	6.78
2014.03	8.2	45.4	4.8	5	12.3	0.23	6.83	143	301	27.1	236	40.1	3.32	6.83
2014.04	6.5	41.4	3.7	5	10.8	0.21	6.94	122	299	26.2	249	39.5	4.17	6.91
2014.05	6.2	40.5	3.6	5	9.5	0.21	6.80	107	274	24.7	240	35.6	3.33	6.84
2014.06	6.7	36.1	2.6	5	9.1	0.21	6.86	110	257	22.8	225	37.8	3.71	6.88
2014.07	5.8	35.4	2.0	5	9.4	0.19	6.83	112	248	22.0	210	34.6	3.73	6.83
2014.08	6.6	36.0	2.7	5	11.1	0.28	6.82	98	213	21.2	203	32.1	3.48	6.83
2014.09	7.5	35.7	2.2	4	9.4	0.23	6.83	109	250	22.8	204	37.3	4.13	6.84
2014.10	6.9	41.5	2.4	6	9.8	0.18	6.77	112	290	24.2	182	37.0	4.22	6.77
2014.11	7.2	41.5	3.6	6	8.1	0.27	6.76	209	292	27.9	198	32.7	4.18	6.76
2014.12	7.0	40.5	4.3	6	12.4	0.40	7.05	215	384	33.7	242	32.3	4.40	7.35
2015.01	7.4	41.5	4.4	6	11.4	0.38	6.70	175	343	34.2	269	32.3	4.04	6.90
2015.02	8.8	42.9	5.1	6	11.9	0.32	6.81	171	338	29.4	235	35.4	3.79	6.83
2015.03	8.5	40.6	4.3	7	12.3	0.35	6.45	169	316	27.9	220	33.6	3.59	6.78

### Tangyuan WWTP: Noise Monitoring Results

		Location	Result (dB(A))
2012.Q1	Daytime	East Border	54.1
		South Border	51.3
		West Border	54.7
		North Border	57.1
	Nighttime	East Border	45.6
		South Border	41.3
		West Border	42.2
		North Border	44.4
2012.Q2	Daytime	East Border	57.3

		South Border	58.0
		West Border	56.3
		North Border	57.7
	Nighttime	East Border	47.6
		South Border	45.9
		West Border	47.8
		North Border	46.4
2012.Q3	Daytime	East Border	58.7
		South Border	57.6
		West Border	57.2
		North Border	57.4
	Nighttime	East Border	48.9
		South Border	48.1
		West Border	47.5
2012.Q4		North Border	47.8
	Daytime	East Border	58.3
		South Border	57.8
		West Border	57.1
		North Border	57.4
	Nighttime	East Border	48.6
		South Border	47.9
		West Border	47.2
		North Border	47.5

**Tangyuan WWTP (Completion Environmental Audit): Air Emissions Monitoring Results (Nov 23, 2011)**

Monitoring Sites	Parameter	Monitoring Results (mg/m <sup>3</sup> )			% Removal	Standard
		1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>		
Boiler Outlet Airflow Plateau (O1)	Emissions (Nm <sup>3</sup> /h)	2904	2832	2823	/	/
	Measured concentration of dust emissions (mg/m <sup>3</sup> )	93.3	91.4	91.0		/
	Concentration of dust emissions after conversion (mg/m <sup>3</sup> )	108.9	106.6	106.1		200
	Soot Emissions (kg/h)	0.27	0.26	0.26		/

	Measured concentrations of SO <sub>2</sub> emissions (mg/m <sup>3</sup> )	389	388	388		/
	Concentrations of SO <sub>2</sub> emission after conversion (mg/m <sup>3</sup> )	453	453	453		900
	SO <sub>2</sub> Emissions (kg/h)	1.13	1.10	1.10		/
	Measured concentrations of NO <sub>2</sub> emissions (mg/m <sup>3</sup> )	180	181	182		/
	Concentration of NO <sub>2</sub> after conversion (mg/m <sup>3</sup> )	210	212	213		/
	NO <sub>2</sub> Emissions (kg/h)	0.52	0.51	0.51		/

**Tangyuan WWTP (Completion Environmental Audit): Air Emissions Monitoring Results (Nov 24, 2011)**

Monitoring Sites	Parameter	Monitoring Results (mg/m <sup>3</sup> )			% removal	Standard
		1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>		
Boiler Outlet Airflow Plateau (O1)	Emissions (Nm <sup>3</sup> /h)	2865	2824	2811	/	/
	Measured concentration of dust emissions (mg/m <sup>3</sup> )	90.7	92.8	90.9		/
	Concentration of dust emissions after conversion (mg/m <sup>3</sup> )	105.8	108.3	106.1		200
	Soot Emissions (kg/h)	0.26	0.26	0.26		/
	Measured concentrations of SO <sub>2</sub> emissions (mg/m <sup>3</sup> )					
	Concentrations of SO <sub>2</sub> emission after conversion (mg/m <sup>3</sup> )	388	388	389		/
	SO <sub>2</sub> Emissions (kg/h)	453	453	453		900
	Measured concentrations of NO <sub>2</sub> emissions (mg/m <sup>3</sup> )	1.11	1.10	1.09		/
	Concentration of NO <sub>2</sub> after conversion (mg/m <sup>3</sup> )	182	181	180		/
	NO <sub>2</sub> Emissions (kg/h)	213	212	210		/

**Tangyuan WWTP (Completion Environmental Audit): Air Quality Monitoring Results**

Monitoring Sites	Parameter	Date	Monitoring Results (mg/m <sup>3</sup> )				Standard
			1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	
Upwind Reference Point (01)	Ammonia	2011.11.23	0.020	0.021	0.021	0.020	1.5
		2011.11.24	0.020	0.021	0.021	0.020	
Downwind Monitoring Sites (02)	Ammonia	2011.11.23	0.082	0.086	0.083	0.086	
		2011.11.24	0.089	0.093	0.107	0.085	
Downwind Monitoring Sites (03)	Ammonia	2011.11.23	0.085	0.090	0.086	0.086	
		2011.11.24	0.080	0.079	0.082	0.083	
Downwind Monitoring Sites (04)	Ammonia	2011.11.23	0.078	0.077	0.084	0.080	
		2011.11.24	0.079	0.083	0.087	0.083	
Downwind Monitoring Sites (05)	Ammonia	2011.11.23	0.080	0.078	0.085	0.080	
		2011.11.24	0.085	0.086	0.083	0.081	

**Tangyuan WWTP (Completion Environmental Audit): Air Emission Monitoring Results**

Monitoring Sites	Parameter	Date	Monitoring Results (mg/m <sup>3</sup> )				Standard
			1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	
Upwind Reference Point (01)	Hydrogen Sulfide	2011.11.23	0.001L	0.001L	0.001L	0.001L	0.06
		2011.11.24	0.001L	0.001L	0.001L	0.001L	
Downwind Monitoring Sites (02)	Hydrogen Sulfide	2011.11.23	0.001L	0.001L	0.001L	0.001L	
		2011.11.24	0.001L	0.001L	0.001L	0.001L	
Downwind Monitoring Sites (03)	Hydrogen Sulfide	2011.11.23	0.001L	0.001L	0.001L	0.001L	
		2011.11.24	0.001L	0.001L	0.001L	0.001L	
Downwind Monitoring Sites (04)	Hydrogen Sulfide	2011.11.23	0.001L	0.001L	0.001L	0.001L	
		2011.11.24	0.001L	0.001L	0.001L	0.001L	
Downwind Monitoring Sites (05)	Hydrogen Sulfide	2011.11.23	0.001L	0.001L	0.001L	0.001L	
		2011.11.24	0.001L	0.001L	0.001L	0.001L	

**Tangyuan WWTP (Completion Environmental Audit): Noise Monitoring Results Unit: dB (A)**

Monitoring Sites	Nov 23, 2011			Monitoring Sites	Nov 24, 2011		
	Daytime		Night		Daytime		Night
▲ 1	46.8	49.8	40.9	▲ 1	46.3	49.7	40.6

▲2	47.8	49.2	40.9	▲2	44.5	47.5	41.8
▲3	45.5	52.7	40.6	▲3	48.0	52.3	42.1
▲4	50.3	49.6	38.2	▲4	51.3	50.2	40.9
▲5	44.5	42.5	41.1	▲5	52.4	44.9	43.0
▲6	48.1	41.8	41.1	▲6	42.6	50.0	41.7
▲7	47.3	42.2	35.6	▲7	46.1	51.4	41.3
▲8	44.8	48.5	38.0	▲8	42.1	49.3	41.1
Standard	60		50	Standard	60		50
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