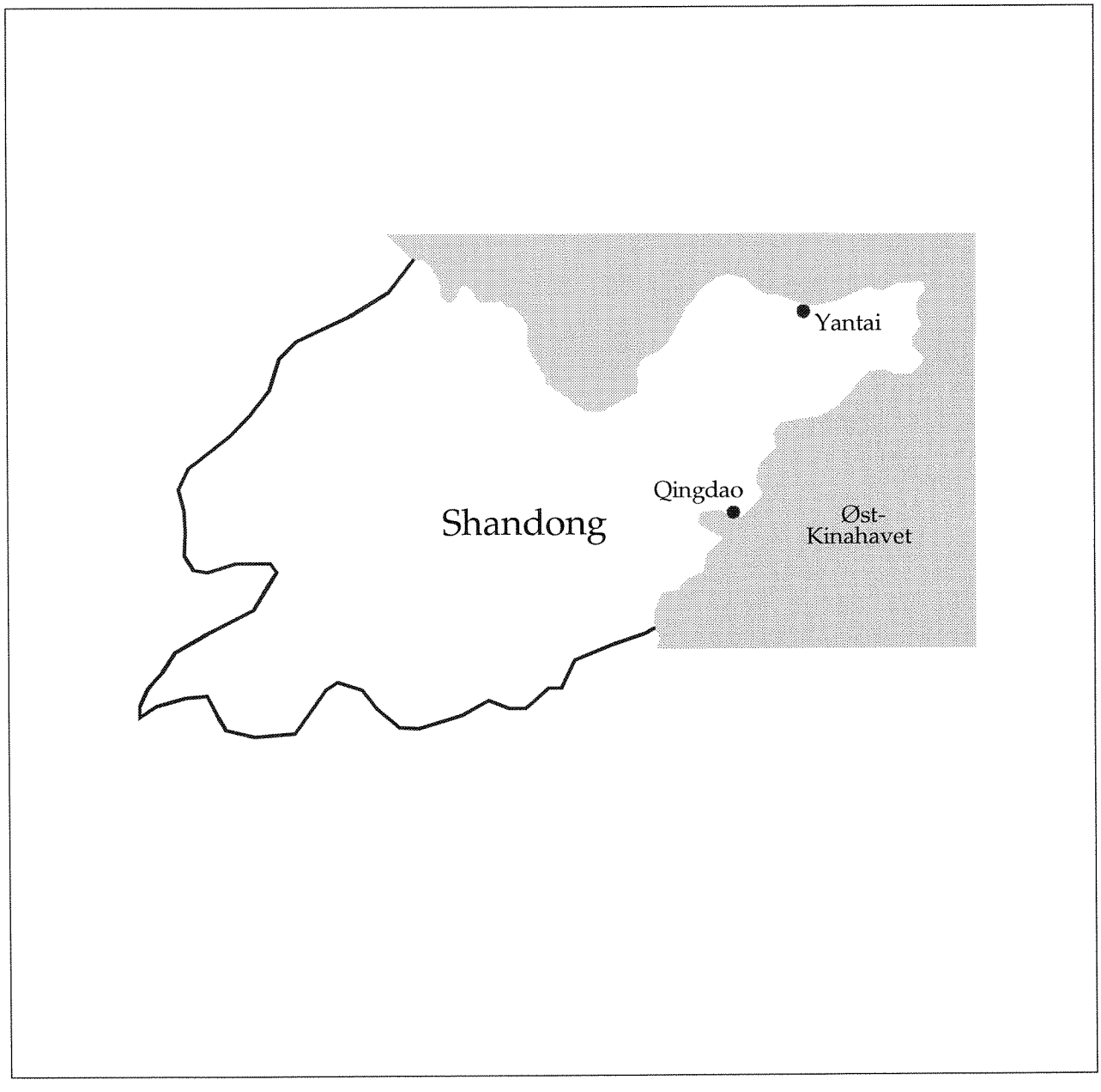
REPORT SNO 3816-98

1997 Activities on the Water Part of the Project

Environmental Surveillance and Information System for Yantai, P.R. of China



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RAPPORT

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Sammendrag

This report describes activities in 1997 on the water part of the project Environmental Surveillance and Information System for Yantai. The report consists of three main parts namely, a summary and introduction section, a Summary Report of NIVA's mission to Yantai 4-7 March 1997, and a Status Report for the Data Collection and Monitoring Equipment in the River Jia Catchment.

Fire norske emneord	Fire engelske emneord
1. ENSIS	1. ENSIS
2. Overvåking	2. Surveillance
3. Vassdrag	3. River system
4. Samlerapport 1997	4. Activity Report 1997

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1997 Activities on the Water Part of the Project:

Environmental Surveillance and Information System for Yantai, P.R. of China

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1997 Activities on the Water Part of the Project: Environmental Surveillance and Information System for Yantai, P.R. of China

PART 1: SUMMARY

1. Content

This report consists of three main parts namely:
1. A summary and introduction section
2. A Summary Report of NIVA's mission to Yantai 4-7 March 1997
3. A Status Report for the Data Collection and Monitoring Equipment in the River Jia Catchment

A special report "Workshop Report from the Project Meeting in Yantai 3-7 November 1997" is under preparation and will be printed by Norwegian Institute for Air Research (NILU). This report includes topics discussed and agreed between The Yantai Environmental Monitoring Centre (YEMC) and the Norwegian Institute for Water Research (NIVA) at the said workshop.

2. Administration

The NIVA report from the project meeting in Yantai 4-7 March 1997 outlines important information on administrative matters as well as a detailed workplan for the project (see Part 2). A general feature as regards this project is that the administration activities have been considerably more time consuming than originally predicted, both before and after the Yantai 1997 meeting. This is due to a slow progress as regards data collection and extensive deliberations as regards the purchase of equipment.

An addendum to the contract between SSTC and NORAD was signed in September 1997. This addendum approved *i.a.* the final project budgets, giving in more detail also allocations for 1997 and 1998. The 1997 budget should have been agreed in March 1997. This 6 months delay has affected and will also affect the further running of the project, i.e. the agreed workplan will need to be revised. It should also be noted that the above mentioned deliberations as regards purchase of equipment and the difficulties encountered in the data collection phase add to the relatively slow progress made to date.

3. Data collection in the River Jia river catchment

NIVA has taken stock of the information provided by YEMC. Part 2 of this report outlines the agreements made between YEMC and NIVA in March 1997 as regards the information to be provided, the status as regards submission of information and further requirements, whilst Part 3 shows the status per February 1998.

Some general points appear to be of importance for many of the sections below, i.e.:

1. The project would benefit greatly from having maps of the whole catchment area.
2. The point sources need to be georeferenced.
3. The 1997 monitoring data should be made available as soon possible.
4. Most of the data submissions were agreed to take place by 1 July 1997, but it appears that YEMC has had difficulties to collect the data within 1 July 1997.
5. YEMC provided NIVA with a substantial part of the data and maps required during NIVA's visit in Yantai 3-7 November 1997.
6. It would be of interests if YEMC could participate in an intercalibration exercise either between the NIVA laboratory and YEMC only or together with the Harbin and Jiaxing Monitoring stations.

Furthermore it should be mentioned that the work on the identified 'tasks' of the project are strongly related. This means for example that the tasks of 'Screening river water data. Quality Assurance' and ' Water discharge inventory' will need a successful outcome before the task 'Water Pollution Abatement Strategy' can be fully developed.

PART 2

SUMMARY REPORT

NIVA's mission to Yantai 4-7 March 1997

Yantai Environmental Monitoring Centre (YEMC)

Meeting between:
The Yantai Environmental Monitoring Centre (YEMC) and
The Norwegian Institute for Water Research (NIVA)

Participation

YEMC
Mr GAO, Zhan jun
Mr ZHANG, Peng lang
Mr JI, Yong zhi
Ms SUN, Cheng jun
Ms WANG, Ming Ling
Ms MA, Shang run
Mr WANG, Xiao jun
Mr FU, Chun

NIVA
Ms Kjersti Dagestad, Scientific adviser
Mr Stig A. Borgvang, Scientific adviser

1. Agenda

The agenda for the visit, as suggested by NIVA, was agreed with one amendment, and is at Annex 1. YEMC wished to discuss some issues related to the instrument list submitted by NIVA, and in particular the choice of ion selective electrodes for measuring nitrate and ammonia instead of the colorimetric method.

2. Main Activities of the "Water part" of the Project

YEMC questioned whether an assessment of the sea water quality is a part of the project. After discussion, YEMC/NIVA agreed that only the freshwater recipient assessment is included in the current project. The development of the ENSIS database, including the pollution inventory carried out during this project, will be very important in any future co-operation that focuses on the coastal waters.

The main activities of the "water part" of the project are:

1. To establish an inventory of all the main sources of pollution in the catchment area of the river Jia. The activities/pollution sources to be taken into account are:
- industrial activities;
- agriculture[1]; and
- domestic sewage.

2. To implement a database and its applications, such as manual punching applications for water quality and discharge data. To import functions from existing databases, and collection of data from on line stations, on the basis of the results of the monitoring in the Jia River System and in the Menlou Reservoir, as well as of the discharges to water from industrial and municipal sources. GIS and graphical presentation of the results will also be a part of the system.

3. To assess the water quality in the rivers and in the Menlou Reservoir, and to propose an abatement strategy for the polluting activities in the catchment. Since all the industrial sources discharge directly to the sea and there will be built a WWTP for municipal and industrial waste water from the city of Yantai, the focus of the work will be on reducing the input of nutrients from agricultural activities and from municipal sewage.

4. To establish on-line monitoring stations of the water quality at three locations within the Jia River System.

3. Maps

YEMC will provide NIVA with original paper maps of the whole catchment area of the Jia River System (see detailed description of some of the maps in Annex 2).

---

[1] The ENSIS database will only contain information about point pollution sources (industry and sewage). The agriculture sector will, however, be included as part of the abatement strategy.

Furthermore, YEMC undertook to prepare as complete information as possible (on 1:50 000 paper copy maps) about :

- monitoring stations in the rivers and in the Menlou Reservoir (manual and automatic), and hydrological monitoring stations, by 1 May 1997;
- personal equivalents per administrative statistical unit within the Jia River System and the city of Yantai (1:50 000), by 1 July 1997;
- river systems i.e. Jia river and its main tributaries, Menlou Reservoir and the relevant catchment/sub-catchments[2] (1:50 000), by 1 July 1997;
  the coverage of agricultural practices, mountain areas, forested areas and other themes specified in Annex 2, per administrative statistical unit (1:50 000), by 1 July 1997;
- user interests (1:50 000), by 1 July 1997; and
- industrial pollution sources in the city of Yantai (1:10 000), by 1 July 1997.

4. Monitoring data

4.1 Monitoring Stations

YEMC agreed to provide a map by 1 May 1997 indicating:

- the 20 monitoring points, on a 1:50 000 map, following an agreed code, in order to allow the link to the monitoring data (monitoring station code); and
- the hydrological monitoring stations followed by a table that indicates the monitoring station codes and gives an overview of responsible monitoring organisation.

4.2 Monitoring in the rivers

YEMC provided a complete data set from the Foxpro data base for the 1995 monitoring year (floppy disk), as well as a complete paper set of monitoring results for the period 1991-1996.

4.3 Water flow

Furthermore YEMC agreed to provide, by 1 July 1997, the water flow data from 1995 at:

- the inlet and outlet of the Menlou Reservoir (continuous measurements); and
- the three hydrological stations in the river Jia between the Menlou Reservoir and the city of Yantai (6 measurements a year).

4.4 Menlou Reservoir

YEMC provided a complete data set from the Foxpro database for the 1995 monitoring year (floppy disk), as well as a complete set of monitoring results for the period 1990-1994 on paper. Six field trips are carried out each year. Samples are taken at 5 locations in the Menlou Reservoir- at 0,5m depth, mid-depth and 0,5m above the bottom.

---

[2]This overview should, as a minimum, contain information about the whole catchment area of the Jia River System and the Menlou Reservoir catchment.

Furthermore, YEMC agreed to provide NIVA, by 1 July 1997, with:

- sediment data from the Menlou Reservoir:
- a bathygraphic map of the Menlou Reservoir; and
- information about the surface area of lake the Menlou Reservoir.

4.5 Industry

YEMC agreed to provide data on discharges and other relevant information from the industrial plants in the catchment area of the river Jia, according to the notification form provided by NIVA (see Annex 2.3). This notification form also includes different deadlines for the various data requirements, with a first deadline by 1 July 1997.

NIVA emphasised that it was important that YEMC provided a list of unique identification codes for each industrial plant. The industrial plants should be marked with this code on the map(s).

4.6 Domestic waste water

YEMC agreed to provide, by 1 July 1997:

- data on the personal equivalents per statistical administrative units;
- information about which administrative units the defined catchments/sub-catchments[3] drain into; and
- data on the number of habitants in Yantai and the main villages located in the catchment area of the Jia River.
- information about the sewerage outlets into freshwater recipients.

4.7 Agriculture

YEMC agreed to provide data on:

- agriculture coverage per administrative unit by 1 July 1997;
- the use of pesticides, on the basis of the sale statistics areas, and the yearly application of pesticides per administrative unit, by 1 July 1997; and
- the use of artificial fertiliser on the basis of the sale statistics areas and the yearly application per administrative unit, by 1 July 1997.

Furthermore YEMC agreed to provide NIVA, by 1 November 1997, with information about any measures taken or to be taken with regard to the agricultural practices in the catchment area of the Jia River System

[3] Subject to the availability of appropriate maps NIVA, in co-operation with YEMC, will carry out this work

5. Instrument list

YEMC wished to discuss some issues related to the instrument list submitted by NIVA and, in particular:

- the choice of ion selective electrodes for measuring nitrate and ammonia instead of the colorimetric method; and
- a replacement of the TOC instrument with a COD instrument for measuring organic matter.

NIVA explained that following price negotiations made by NIVA, the instruments have become much cheaper than the budgeted 1,4 million NOK. Furthermore NIVA explained that according to the standard NORAD procedure, YEMC and NIVA could suggest how to reallocate the spare money. NIVA would then submit the proposals to NORAD.

YMEC expressed the wish to consider the possibility of purchasing the instruments in China. NIVA explained that NIVA had no mandate to decide on such a change. However, NIVA would convey YMEC's wishes to NORAD. NIVA also stressed the importance of finding a solution to the outstanding issues related to the instrument list as soon as possible in order to comply with the current timetable for the project (purchasing, testing of instruments, installation).

YEMC explained that they would return to the issue of instruments at a later stage.

6. Work Plan

A detailed workplan for the water as part of the project was agreed, and is at Annex 3.

7. Quality Assurance procedures

7.1 Classification of water quality based on chemical measurements

7.1.1 Information

The classification of the water quality in the Jia River System is based on the following methods and data:

- the water quality in Jia River is monitored at 15 locations; the Menlou Reservoir is monitored at 5 locations. The province-controlled sections are monitored 6 times a year, the other sections 3 times a year. The monitoring takes place during three periods which represent typical water flow patterns:
  - low flow season (March and May)
  - 'normal season' (October-November)
  - flood season (July-August)

  The samples are taken in May, August and October.

- the water quality is analysed on 17 standard parameters in the Jia River and on 19 standard parameters in the Menlou Reservoir. The parameters correspond to the Chinese National

Criteria for water quality, and are listed in Annex 4.

- the arithmetic yearly mean is calculated for each parameter, and the water quality for each parameter is classified according to this value. Occasionally, an average period of less than one year is used.

- all 17 or 19 parameters are used to determine the final water quality class. The class is not necessarily determined by "the worst parameter " as an assessment of the importance of the parameter is carried out. This assessment is made by the YEMC.

The Menlou Reservoir water quality is classified according to the same principles as for the Jia River. The reservoir must meet class III criteria according to the Local Regulations.

7.1.2 Agreements

- YEMC and NIVA agreed that the ENSIS system should be based on water quality monitoring data in order to:

  -classify the water quality for each parameter according to the Chinese Water Quality Criteria for Surface Water, based on yearly average values.

  -list the parameters which are different from the Local Requirements. For instance, for the Menlou Drinking Reservoir, the parameters that do not meet the class III requirements should be listed, as well as the parameters that meet class III requirements.

- the final classification, based on all parameters, also includes an assessment. The ENSIS system can only produce the results if YMEC provides specific criteria for how this is done in practise.

- NIVA can only incorporate special requirements from YEMC with respect to the presentation of the water quality data if these are submitted to NIVA. YEMC undertook to provide such specifications as soon as possible.

- The first version of the information system for the Jia River (to be demonstrated during the workshop in Norway, spring 1998) will contain the above mentioned functionality.

7.2 Quality assurance/ Quality Control for sampling and analysis in laboratory

YEMC informed NIVA about
- sampling instructions/methods/procedures; and
- adopted methods/instructions/procedures at laboratories (National Standards) to increase the quality of the analysis.

The sampling is carried out according to the National Sampling standard[4]. Preservation

[4] Special sampling procedures for lakes:

chemicals are added to the samples according to this standard.

In addition, YEMC has an office for quality assurance of laboratory analysis. This office add certified reference material to the samples. The laboratory analyses on one sample containing reference material and on one sample without reference material. Approximately 30% of the samples are quality assured by using this method.

YEMC undertook to provide NIVA with a detailed description in English of both quality controls for sampling and analysis in laboratories, by 1 July 1997 at the latest. This description should as a minimum address the following elements:

Sampling: Collection procedures (method and equipment used), field treatment of samples (preservation) and procedures for transport and storage of samples.

Laboratory: Comparison of results with other analytical methods, comparison of results with other laboratories, use of certified reference material (for instance to calibrate instruments), and use of ionic balance.

8. Contact persons

YEMC and NIVA revised the provisional project organisation overview. The revised version is at Annex 5.

9. Adoption of the Summary report

After examination of the draft Summary Report and some amendment, YEMC and NIVA agreed:

- that the report is a fair summary of the work carried out during NIVA's March 97 visit to Yantai;
- on the content of the Summary Report and the various commitments therein;
- that the information to be provided by YEMC should be in English.

Depth of Lake	Number of samples	Location
≤5m	1	0,5 below the surface
5-10 m	2	0,5 below the surface and 0,5 m above the bottom
>10 m	3	0,5 below the surface, in the middle of the lake, and 0,5 m above the bottom

ANNEX 1: Agenda for the March 1997 visit of NIVA in Yantai

DATE	ISSUE	COMMENTS
4 March 1997	• Agenda for the visit • Maps • Instruments	
5 March 1997	• Workplan for the "Water-part of the project" • Summary of the meeting on the 4 March 1997 • Work on the maps • Inventory of discharges from industrial point sources	
6 March 1997	• Inventory of discharges from industrial point sources • Instruments • User interests • Sampling-Quality Assurance and Classification Procedures	
7 March 1997	• Summary Report of the visit	

ANNEX 2: Data Requirements

Explanation to data requirements on:
Land coverage
User interests
Industrial point sources
Monitoring Stations (Chemical and Hydrological)

The fulfilment of the commitments is subject to the availability of the data required.

1. Land coverage

YEMC has agreed_ to submit to NIVA a map with information about the land coverage in the Jia River system catchment area by 1 May 1997. A detailed description and an explanation are given in Annex 2.1.

2. User interests

2.1 Maps

Y/EPB agreed to submit to NIVA a map with information about the user interests in the Jia River System catchment area by 1 May 1997 (see also Annex 2.2). This information should comprise the following user interests:

- Drinking water including overview of points for withdrawal
- Irrigation;
- Water supply for quality demanding industry (e.g. food processing, pharmaceutical)
- Recreation including swimming;
- Fishing, divided into "leisure fishing", commercial fishing and fish-farming;
- Protected (landscape and animals)
- Groundwater sources
- Others, to be specified.

The information should be marked with a line on the map according to the colour code specified in annex 2.2. In cases where the extent of the user interest on the map correspond to a length of less than 0,5 km, this should be marked with a dot according t o the same colour code, and the exact length should be specified on a separate sheet.

3. Industrial point sources
See Annex 2.3

4. Monitoring stations
See Annex 2.4

Annex 2.1

"First step" information needed to describe Land Coverage in the catchment of the Jia River System

Deadline: 1 July 1997

Main type	Sub-type	Description	Map Reference	Legend
Agricultural Area				
	Farm land (crop production)	• Indicate areas with crop production on a map (preferably categorised on the "catchment area map" or on the "statistical unit map" • On a separate page, give a description of the type of crop produced within the catchment and, if possible, the coverage percentage of each crop of the total production. • The size of the area should be given in km^2. • The areas should be marked with a map reference code that should be in the description.	The areas should be marked with the letters AF, followed by a number 1,2,3,4 etc.	

Main type	Sub-type	Description	Map Reference	Legend
	Grazing land, (meadow)	• Indicate areas with grazing land (preferably categorised on the "catchment area map" but, if difficult, on the "statistical unit map" • Give any description/comments on a separate page. • The size of the area should be given in km^2. • The areas should be marked with a map reference code that should be in the description.	The areas should be marked with the letters AG, followed by a number 1,2,3,4 etc.	
Forest		Indicate areas covered with forest on the map, (preferably categorised on the "catchment area map", but if difficult on the "statistical unit map"). Give a verbal description/comments (if any) on a separate page. The size of the area should be given in km^2. The areas shall be marked with a map reference code, and this must be used as a reference in the verbal description.	The areas shall be marked with the letter F and accompanied with a number 1,2,3,4 etc.	

Main type	Sub-type	Description	Map Reference	Legend
Non Cultivated Areas	*(e.g. mountain areas, marshes,)*	• Indicate non-productive areas on the map, (preferably categorised on the "catchment area map", but, if difficult, on the "statistical unit map"). • Give any verbal description/comments on a separate page. • The size of the area should be given in km^2. The areas should be marked with a map reference code that should be in the description.	The areas should be marked with the letters NP, followed by a number 1,2,3,4 etc.	
Villages		• Indicate the areas of the villages in the catchment on a map, (preferably categorised on the "catchment area map" but, if difficult, on the "statistical unit map"). • Give any description/comments on a separate page. • The size of the area should be given in km^2. The areas should be marked with a map reference code that should be used in the description.	The areas should be marked with the letters NP, followed by a number 1,2,3,4	

Main type	Sub-type	Description	Map Reference	Legend
Water Surface	*Rivers*	• Indicate rivers in the Jia River System on a map that shows the catchment and sub-catchments of the Jia River System. • Calculate the surface area of the river in the three season: 1. dry season, 2. normal season, and 3. flood season. • The size of the surface area of the river should be given in km^2. • Give any description/comments on a separate page, and use the map reference code in this description.	The codes shall correspond to the code given for the sub-catchment.	
	Lakes	• Indicate the lakes in the Jia River System on the same map as the catchment and sub-catchment map. • Calculate the surface area of the lakes (the size of the area should be given in km^2) • Give any description/comments on a separate page. • The areas should be marked with a map reference code that should be in the description.	The codes should correspond to the code given for the sub-catchment followed by numbers 1, 2, 3, 4 etc.	

Annex 2.2

Information required describing User Interests in the catchment of Jia River System

Deadline: 1 July 1997

User Interest	Description	Map Reference	Legend
Drinking water, including overview of points for abstraction	• On the user interest map, indicate the locations of drinking water supply water abstraction; • On a separate page, specify the amount of water abstracted, using the same reference code as on the map. • Specify if the water from the drinking water abstraction is used for other purposes as well such as industry, irrigation etc.	The drinking water abstraction should be marked with the letter code DW, should be followed a number 1,2,3…etc.	
Water supply for quality demanding industry (e.g. food-processing, pharmaceutical)	• On the user interest map, indicate the location of the water outlet to the industrial plants; • On a separate page, specify the amount of water abstracted , using use the same reference code as on the map.	The water supply for industrial plants should be marked with the letter code IW, followed by a number 1,2,3…etc.	

User Interest	Description	Map Reference	Legend
Irrigation	• On the user interest map, indicate the location of the outlet for irrigation. • On a separate page specify the amount of water abstracted, using the same reference code as on the map • Specify the main type of crop the water is used for.	The water supply for irrigation should be marked with the letter code IW followed by a number 1,2,3…etc.	
The water supply for irrigation should be marked with the letter code IW, followed by a number 1,2,3…etc.	• Indicate the location of abstraction from groundwater wells. • On a separate page, specify the amount of water abstracted, using the same reference code as on the map. • Specify the use of the water.	The water supply from groundwater wells should be marked with the letter code GW, followed by a number 1,2,3…etc.	
Recreation, including swimming	• Indicate the stretches of the river that are used for recreational purposes. • Locations used for swimming should be marked with a dot. • On a separate page, specify the type of recreation, using the same reference code as on the map	• Recreational sites should be marked with the letter code R, followed by a number 1,2, 3. etc. • The swimming sites should be marked with the letter code RS, followed by a number 1,2,3 …	

User Interest	Description	Map Reference	Legend
Fishing, divided into "leisure fishing", commercial fishing and fish-farming;	• Indicate the stretches of the river that are used for: 1. leisure fishing; 2. commercial fishing; 3. fish-farming. • On a separate page, quantify the catches by using the same reference code as on the map	• Leisure fishing should be marked with the letter code FR, followed by a number 1,2, 3. etc.. • Commercial fishing should be marked with the letter code FC, followed a number 1,2,3 … • The fish farming locations should be marked the letter code FF, followed by a number 1, 2,3…	
Protected Areas (landscape and animals)	• Indicate the stretches of the river adjacent to protected areas. • Indicate the location of the protected areas • On a separate page, describe the type of protected area and other relevant information by using the same reference code in the description as on the map.	The stretches of the river should be marked with the letter code PA, followed by a number 1,2, 3..etc.	
Others, to be specified	Please provide information about other relevant user interest information		

Annex 2.3

Data requirements for discharges from industrial point sources

The data requirements for the Industry are listed in table 1. The collection of data is divided into 4 phases.

Table 1: Data requirements for industry, phases 1-4

Data group	Data	Description	Timeframe
Phase 1			**01 May 1997** (about 500 industrial points)
General Information			
	Name in Chinese	Please provide the name of the industrial plant in Chinese	
	Name in pin yin	Please provide the name of the industrial plant in pin yin	
	Location	The location of the industrial plants should will be given on the 1:10 000 map	
	Type of Industry	Please indicate the type of industrial activity	

Data group	Data	Description	Timeframe
Phase 2			1 July 1997
Sewer Network		Please indicate if the process water is discharged: • into sewer system for treatment • into sewerage without treatment and subsequently into a freshwater recipient • directly into a freshwater recipient.	
Discharges			
	Water flow	Please provide the figures for the quantities of water from each production step	
	Pollution parameter	Please provide the list of pollution parameters which are measured, if different from the parameters in the database, as well as information about the values measured	
Discharge permits		Please provide information about discharge permits and procedures for routine inspections	

Data group	Data	Description	Timeframe
Phase 3			**1 September 1997**
Waste water treatment plant for the industry	Treatment processes	Please describe the treatment processes for treating the waste water from industry If possible, draw a flow diagram.	
	Treatment efficiencies	Please provide the overall treatment efficiencies for the different substances measured	
	Hydraulic load	Please provide the quantity of water treated at the waste water treatment plant	
	Hydraulic capacity	Please provide the figure of waste water flow for which the waste water treatment plant is designed	
Production			
	Raw material	Please indicate the type and amount of raw material used in the production process	
	End products	Please describe the type and amount of products produced	
	Sub-products	Please describe the type and amount of sub-products from the production process	
	Production lines	Please describe the production processes and the production lines (technology used) If possible, draw a flow diagram	
Pollution parameters	Waterflow	Please provide the figures of the amount of water from each production line	
Phase 4		To be specified at a later stage	**1998**

Table 2: Phase 1 Format,
data to be submitted with the map in scale 1:10 000

Number	Data Base Code	Name in Pin Yin	Name in Chinese	Type of Industry	Comments
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
500					

ANNEX 2.4

Monitoring Stations

Requirements

The chemical monitoring sites should be located on a map with scale 1:50 000. The information listed in table 1 and 2 should also be submitted. Two different legends/symbols to should be used to distinguish chemical monitoring stations from hydrological monitoring stations.

The material should be received by NIVA by 1 July 1997.

Station Number: Please number the monitoring station on the map and use the same number in the table
Database code: Please indicate the code used in YEMC's existing database
Responsible institution: Please indicate if YEMC or the province have the responsibility for the monitoring.
Number of sampling trips: Please indicate the number of sample trips every year
Number and location of samples: If there are more than one profile that are monitored at each monitoring station, Please indicate the number and location of profiles.
Comments: Please write down any comments if any

Table 1. Chemical Water Quality monitoring stations

Station Number	Data Base Code	Responsible institution[5]	Number of field trips pr year	Number and location of sampling point at each monitoring location	Comments
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Table 2 Hydrological monitoring stations

Station Number	Data Base Code	Responsible institution	Comments
1			
2			
3			
4			
5			
6			
7			

[5] Such as province (EPB), YMEC etc.

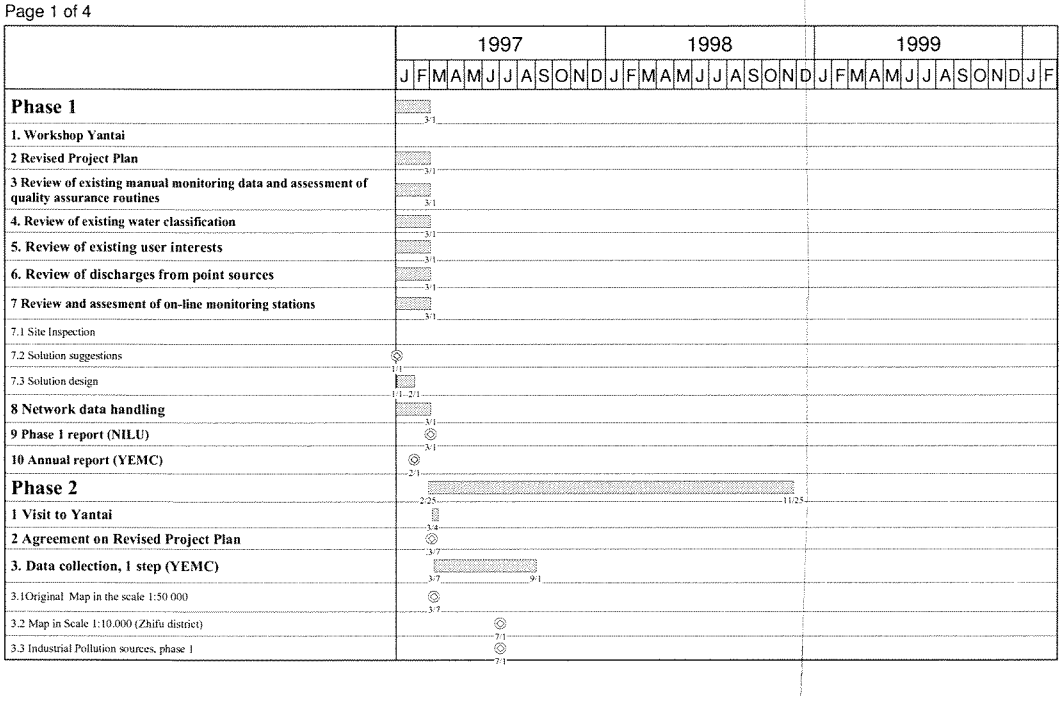
ANNEX 3: Detailed Workplan for the 'Water' Part of the Project

Detailed Workplan, water

Yantai

Phase 1, 2 and 3

Page 1 of 4

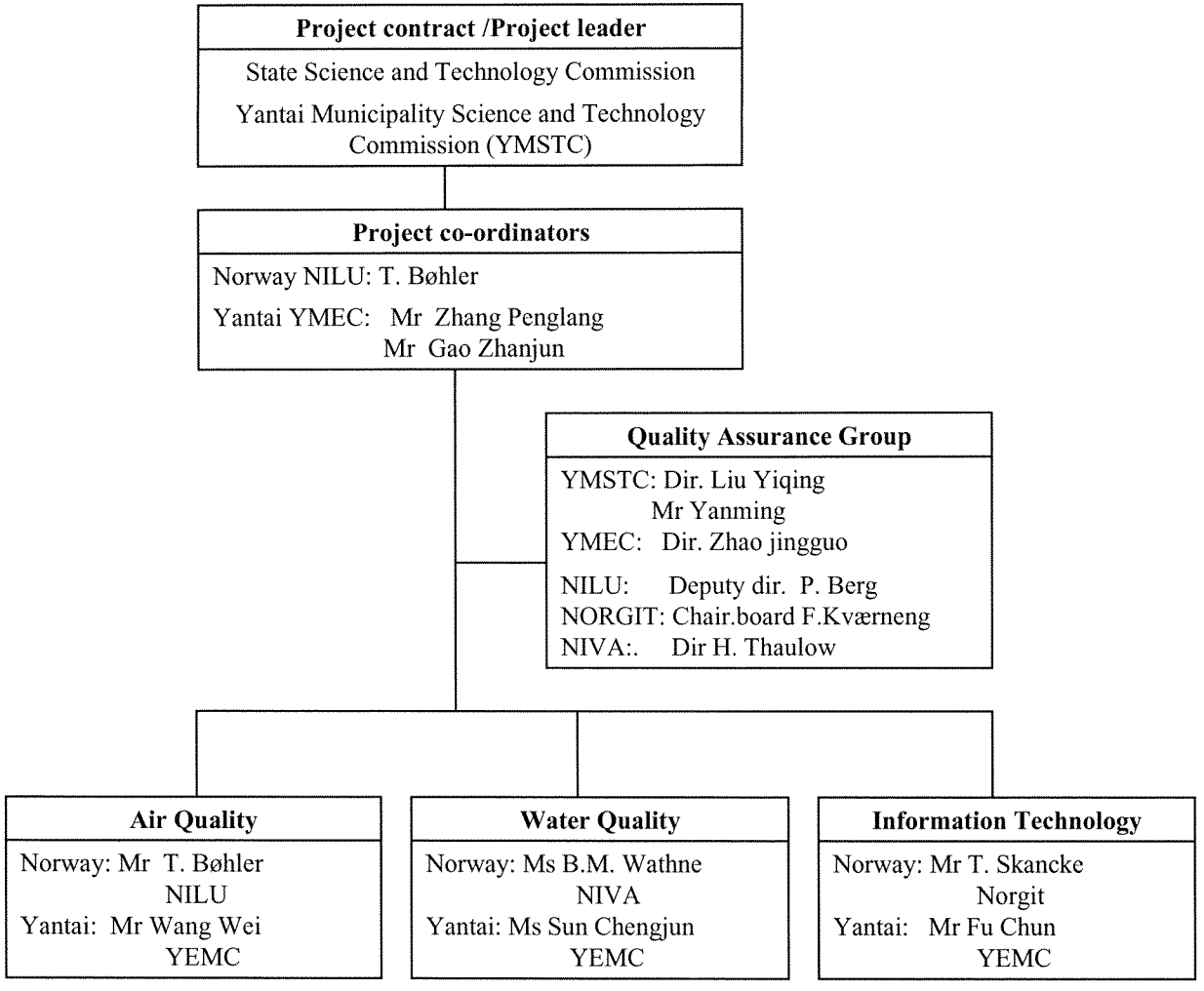


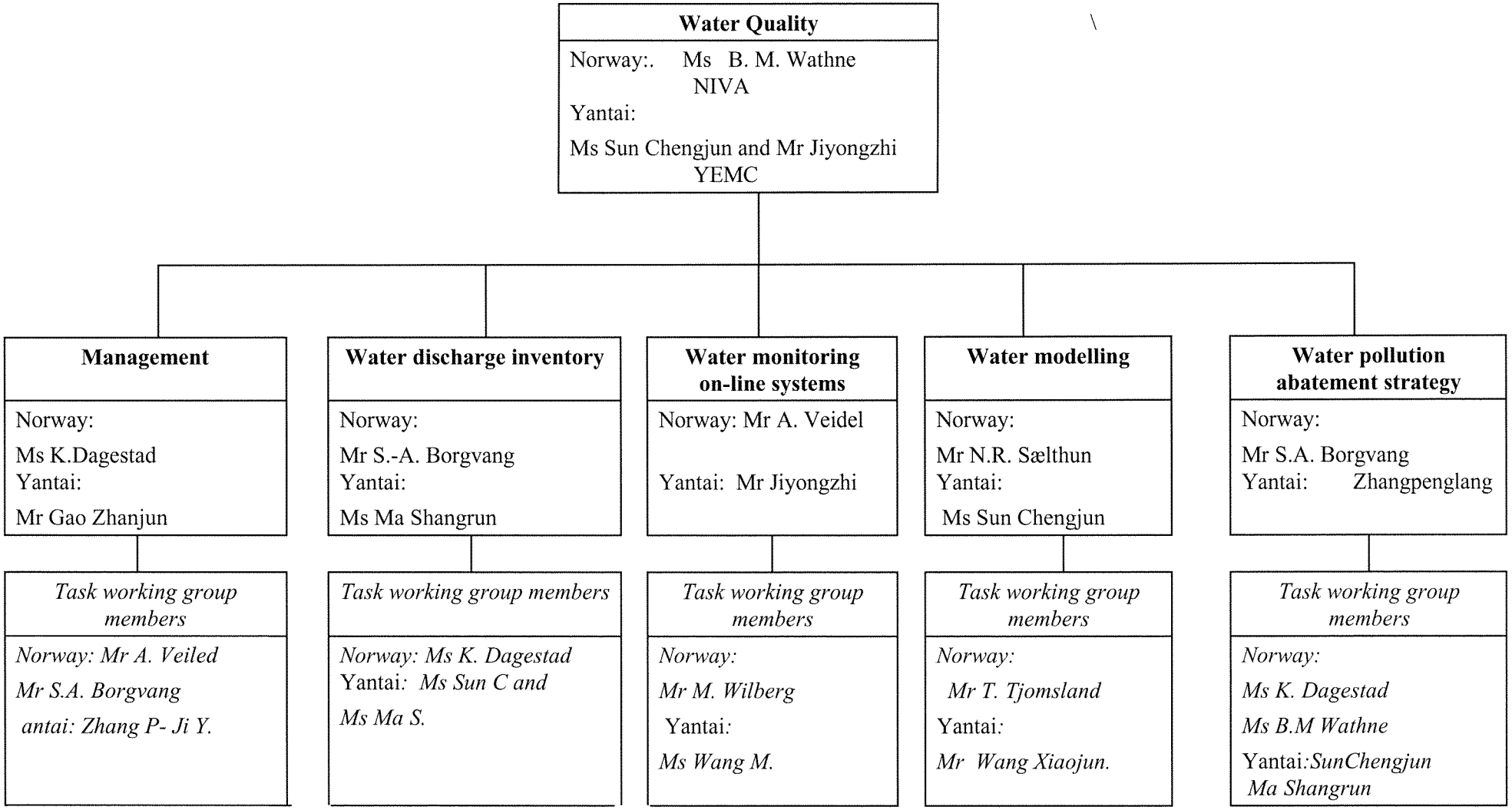
ANNEX 4: List of Parameters Monitored

Parameter	River	Menlou Reservoir
1. pH	x	x
2. Copper	x	x
3. Zinc	x	x
4. Nitrate	x	x
5. Nitrite	x	x
6 Ammonia	x	x
7 Total-Kjeldahl Nitrogen		x
8 Total Phosphorus		x
9 COD_{Mn}	x	x
10 Dissolved Oxygen	x	x
11 COD_{Cr}	x	x
12 BOD_5	x	x
13 Mercury	x	x
14 Cadmium	x	x
15 Chromium	x	x
16 Lead	x	x
17 Cyanide	x	x
18 Phenols	x	x
19 Oil	x	x
20 Anionic surfactants[6]	xx	xx

[6] Will be included in the monitoring programme.

ANNEX 5: Project organisation




Water Quality
Norway:. Ms B. M. Wathne
NIVA
Yantai:
Ms Sun Chengjun and Mr Jiyongzhi
YEMC
Management
Norway:
Ms K.Dagestad
Yantai:
Mr Gao Zhanjun
Water discharge inventory
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Mr S.-A. Borgvang
Yantai:
Ms Ma Shangrun
Water monitoring on-line systems
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Water modelling
Norway:
Mr N.R. Sælthun
Yantai:
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Water pollution abatement strategy
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antai: Zhang P- Ji Y.
Task working group members
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Yantai: Ms Sun C and
Ms Ma S.
Task working group members
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Mr M. Wilberg
Yantai:
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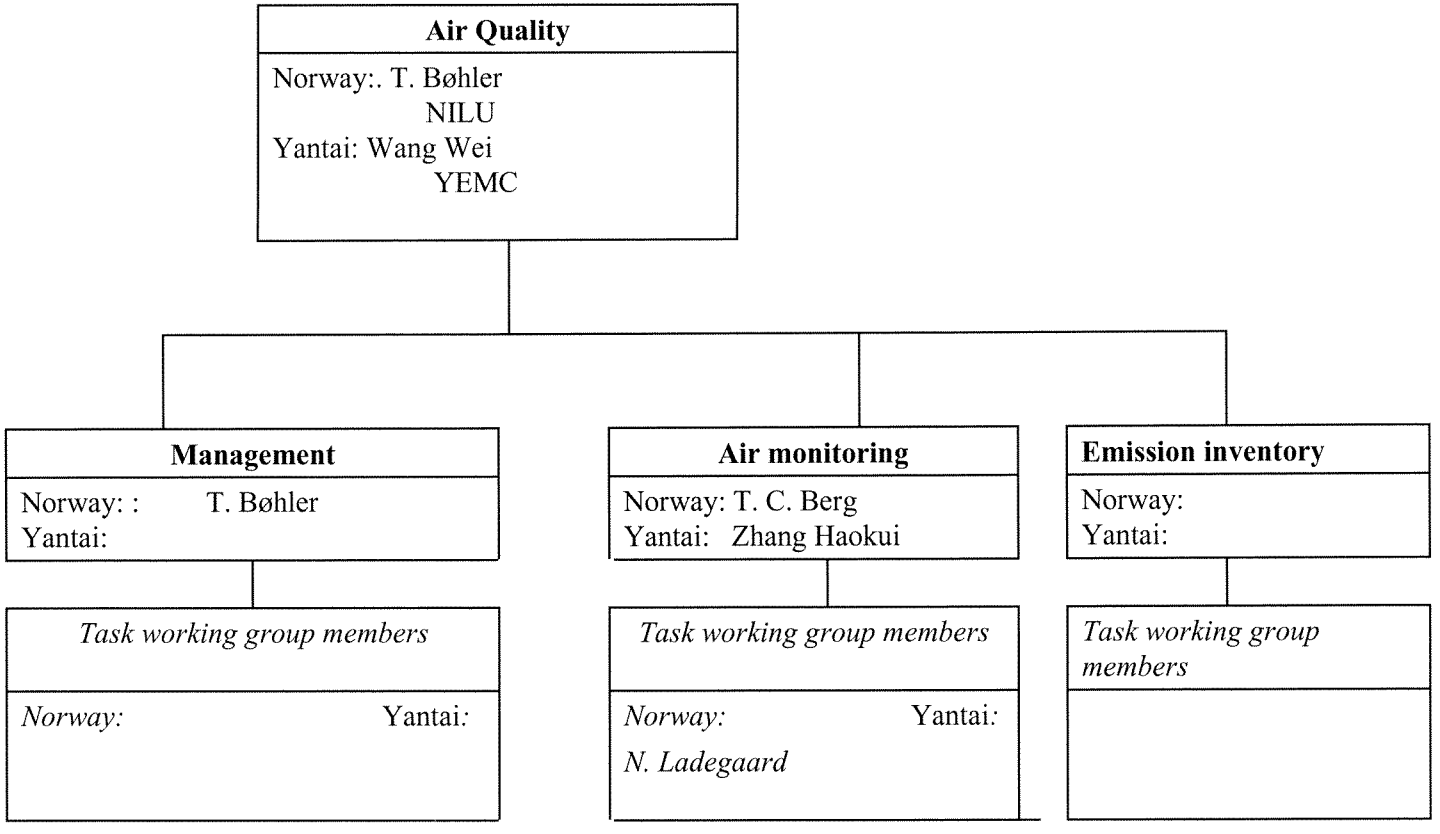
Task working group members
Norway:
Mr T. Tjomsland
Yantai:
Mr Wang Xiaojun.
Task working group members
Norway:
Ms K. Dagestad
Ms B.M Wathne
Yantai:SunChengjun
Ma Shangrun

:


Air Quality
Norway:. T. Bøhler
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Yantai: Wang Wei
YEMC
Management
Norway: : T. Bøhler
Yantai:
Task working group members
Norway:
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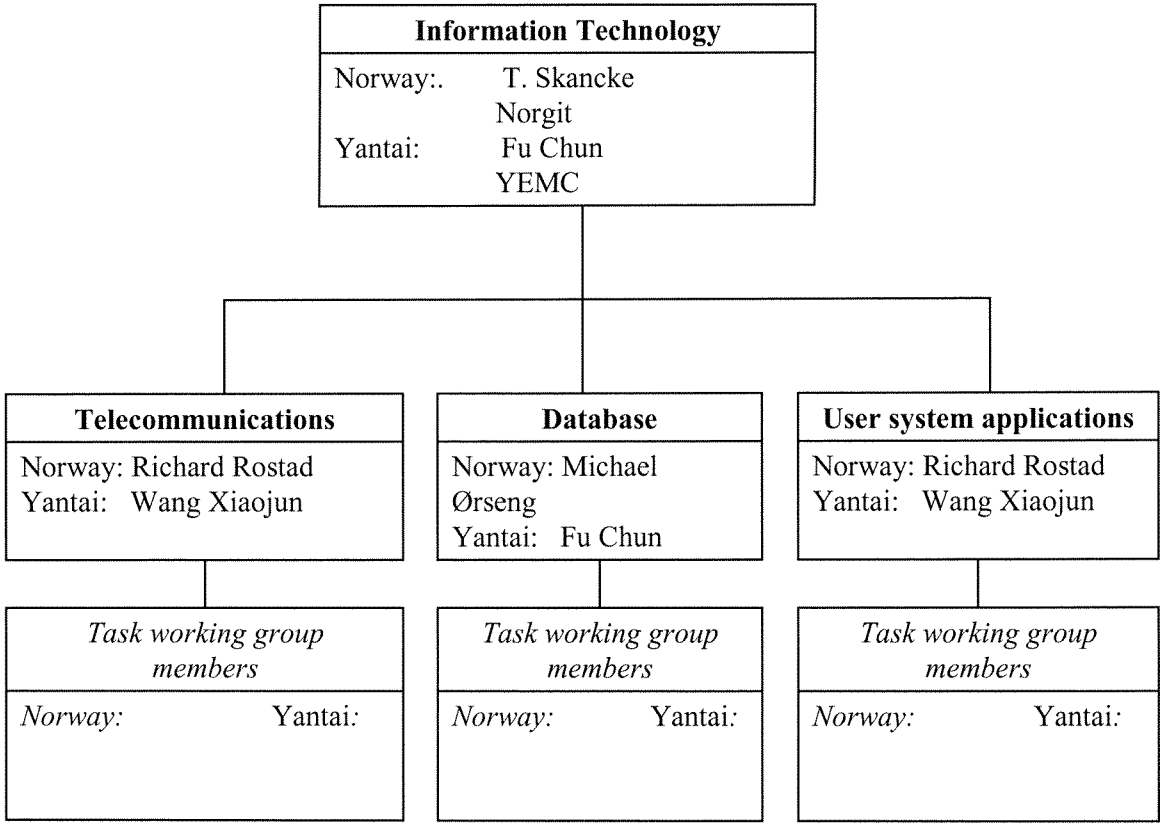
Yantai: Zhang Haokui
Task working group members
Norway:
Yantai:
N. Ladegaard
Emission inventory
Norway:
Yantai:
Task working group members


Information Technology
Norway:. T. Skancke
Norgit
Yantai: Fu Chun
YEMC
Telecommunications
Norway: Richard Rostad
Yantai: Wang Xiaojun
Database
Norway: Michael
Ørseng
Yantai: Fu Chun
User system applications
Norway: Richard Rostad
Yantai: Wang Xiaojun
Task working group members
Norway: Yantai:
Task working group members
Norway: Yantai:
Task working group members
Norway: Yantai:

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PART 3

STATUS REPORT

SURVEILLANCE OF WATER QUALITY IN THE RIVER JIA CATCHMENT

DATA COLLECTION AND MONITORING EQUIPMENT

1 Introduction

The status report on the data collection is based on the data requirements agreed at the March 1997 meeting in Yantai. As indicated in Part 1 of this report there has been a general delay in most of the data collection procedure as shown in the following sections.

2 Maps

2.1 Overview maps

YEMC has undertaken to provide NIVA with original paper maps of the whole catchment area of the Jia River System

Status:
YEMC has provided one map, scale 1:50 000, of one part of the catchment of the River Jia and one map, scale 1:75 000, of an other part of the catchment of the River Jia. It is uncertain if the whole catchment of the river Jia is covered as the catchment area itself has, as yet, not been identified.

At the 1997 Yantai Workshop a map, scale 1:220 000 was made available, but it is uncertain as to whether it covers the whole catchment area or is based on administrative units only.

Information about the tributaries, Menlou Reservoir and the relevant catchment/sub-catchments is also required.

2.2 Land coverage

YEMC has agreed to submit to NIVA a map with information about the land coverage in the Jia River system catchment area by 1 May 1997 (see Part 2, Annex 2.1).

Status:
At the 1997 Yantai Workshop a map indicating land coverage and administrative codes was made available.

2.3 User interests

Y/EPB agreed to submit to NIVA a map with information about the user interests in the Jia River System catchment area by 1 May 1997 (see Part 2, Annex 2.2).

Status:
At the 1997 Yantai Workshop a map indicating the different user interests was made available. In NIVA's view this map seems to give a good overview of the user interests involved.

YEMC informed NIVA that in view of the fact that the river is used for drinking water purposes, fishing and swimming activities are not allowed. Drinking water outside the city of Yantai and in the villages are taken from small wells. This is not indicated on the map. The five drinking water plants supplying water to Yantai city are indicated on the map.

This issue is of particular interest for the task 'Water Pollution Abatement Strategy'.

2.4 Industrial point sources

YEMC has undertaken to prepare information, as complete as possible on paper copy maps about industrial pollution sources in the city of Yantai (1:10 000) (see Part 2, Annex 2.3 for the 4 phases collection procedure).

At the 1997 Yantai Workshop, YEMC undertook to provide similar information also for the development district and for the Fushan district.

Comments:
NIVA has emphasised that it is important that YEMC provides a list of unique identification codes for each industrial plant. The industrial plants should be marked with this code on the map. In the case of several industrial plants within a small area, the industries should only be marked once, but indicated with a number range with detailed specification on the list (e.g. sources 12-20). Furthermore the primary recipient for the industrial outlets should be indicated for each industrial plant.

Status:
At the 1997 Yantai Workshop, YEMC made available a map indicating 321 industrial point sources. It is hoped that similar information for the development district and for the Fushan district will be made available shortly.

2.5 Monitoring stations

YEMC has agreed to provide a map about monitoring stations in the rivers and in the Menlou Reservoir.

Status:
At the 1997 Yantai Workshop, YEMC made available a map indicating all the different monitoring stations.

YEMC informed NIVA that the Monitoring Centres in the five districts of Yantai are responsible for the sampling on their respective sections of the catchment area. These Monitoring Centres report every second month their monitoring results to YEMC.

YEMC undertook to provide a list of the names of the sampling points. The five said districts are: Qixia, Fushan, Leshan, Muping and Yantai City (monitored by YEMC). In addition to the five districts, the catchment area is divided into 26 administrative 'towns'.

2.6 Population

YEMC has undertaken to prepare information, as complete as possible (on 1:50 000 paper copy maps) about personal equivalents per administrative statistical unit within the Jia River System and the city of Yantai.

Status:
At the 1997 Yantai Workshop, YEMC made available a map of the catchment area which codes reflect the information concerning population data for each of the administrative 'towns', listed in the database.

3 Monitoring data

3.1 Monitoring in the rivers

Status:
YEMC has provided a complete data set from the Foxpro database for the 1995-monitoring year (floppy disk) as well as a complete set of monitoring results for the period 1991-1996 on paper (see Introduction as regards 1997 data).

3.2 Monitoring in the reservoir

Comments:
There are 6 field trips each year. Samples are taken at 5 locations in the Menlou Reservoir, at 0,5 m depth-mid-depth and 0,5 m above the bottom of the Menlou Reservoir.

Status:
YEMC has provided a complete data set from the Foxpro database for the 1995-monitoring year (floppy disk) as well as a complete set of monitoring results for the period 1990-1994 on paper (see Introduction as regards 1997 data).

3.3 Water flow

YEMC has agreed to provide the data from 1995 on the water flow at:

- the inlet and outlet of the Menlou Reservoir (continuos measurements);
- the three hydrological stations in the river Jia between the Menlou Reservoir and the city of Yantai (6 measurements a year).

Status:
At the 1997 Yantai Workshop, YEMC informed NIVA that part of the outlet from the Menlou Reservoir namely the inlet to the Fourth Drinking Water Plant, has a water flow of 1 m^3/s. The outlet over/through the damming section is not monitored.

The hydrological data for the three monitoring stations in the River Jia were submitted during the November Workshop.

3.4 Industry

YEMC has agreed to provide data on discharges and other relevant information from the industrial plants in the catchment area of the river Jia (see Part 2, Annex 2.3 for the 4 phases collection procedure).

Status:
At the 1997 Yantai Workshop, YEMC provided NIVA with the data requested.

3.5 Sediment data

YEMC has agreed to provide NIVA with sediment data from the Menlou Reservoir.

Status:
Information on analysis of sediments from 1991 to 1995 and for 1997 were submitted during the Yantai Workshop in November.

3.6 Physical data

YEMC has agreed to provide NIVA with:

- a bathygraphic map of the Menlou Reservoir.
- surface area of the lake

Status:
At the 1997 Yantai Workshop, YEMC explained that there is no bathymetric map available. Information about the surface area of the lake (max. and min.) were submitted during the Yantai Workshop in November.

3.7 Domestic waste water

YEMC has agreed to provide data related to domestic wastewater (see Part 2, section 4.6)

Status:
At the 1997 Yantai Workshop, YEMC submitted the data according to the data requirements.

3.8 Agriculture

YEMC has agreed to provide data related to the use of fertiliser and pesticides as well as measures taken or planned within the agricultural sector (see also Part 2, section 4.7).

Status:
At the 1997 Yantai Workshop, YEMC submitted the data according to the data requirements.

4. Quality Control Procedures

YEMC has agreed to provide NIVA with a detailed description in English of quality control for both sampling and analysis in laboratory. This description should, as a minimum, address the following elements:

Sampling: Collection procedures (method and equipment used), field treatment of samples (preservation) and procedures for transport and storage of samples.

Laboratory: Comparison of results with other analytical methods, comparison of results with other laboratory, use of certified reference material (for instance to calibrate instruments), and use of ionic balance as a control procedure.

Comments:
Any special requirements that YEMC might have for quality assurance cannot be implemented in the ENSIS system before phase 3 of the project (provided that YEMC describe these procedures). However, some standard quality assurance procedures will be part of the ENSIS system that will be demonstrated as part of the workshop to take place in Norway spring/summer 1998.

Status:
At the 1997 Yantai Workshop, YEMC submitted the information according to the information requirements.

5. Water Quality

YEMC has been offered the possibility of providing NIVA with a description of special procedures for classifying water quality data in order to include these procedures in the ENSIS system.

Comments:
The ENSIS version to be demonstrated in Norway spring/summer 1998 will contain a functionality to classify water quality data according to the Chinese water quality classification criteria (based on yearly average). It will also be possible to list parameters which do not meet the local requirements in the Menlou reservoir.

All the 17 and 19 standard water quality parameters analysed are used to determine the final class. The class is not necessarily determined by "the worst parameter ", but there is an assessment of the importance of the parameter. This assessment is made by the YEMC.

The Menlou Reservoir is classified according to the same principles as Jia River. The reservoir must meet class III criteria according to the Local Regulations.

Status:
At the 1997 Yantai Workshop, YEMC explained that only national standards are used, hence there are no special local classification procedures.

6. Deposition data

At the 1997 Yantai Workshop, YEMC agreed to provide deposition data in order to assess the variation over the year.

7. Monitoring equipment

7.1 Instrumentation evaluation and selection process

It has been NIVA's responsibility to find the best equipment for the water quality monitoring of the Jia River, and much effort has been put into the evaluation and selection process. The evaluation process was build on NIVA's extensive experience

in instrumentation for water quality assessment and the following guidelines were applied:

Functional quality: Selecting instruments that over time produce the most reliable data with minimal operator maintenance.

Price: Selecting instruments with a price/quality ratio that satisfies the project.

Availability and Logistics: Selecting instruments from manufacturers with an international network and reputation.

Products from the following producers were screened: ABB, GLI, YSI, Fox, Bran & Luebbe, Polymetron, Applicon and ISCO. An in depth evaluation was performed, and the results based on whether the instruments could meet the criteria set.

7.1.1 Status

This evaluation process was completed before the end of February 1997, i.e. before the March 1997 annual meeting between NORAD and SSTC in Beijing. NIVA's recommendations were presented before the said meeting.

As the agreement for the 1997 budgets was signed as late as in September 1997, the ordering process to follow the instrument selection was delayed. However, an instrument list is agreed and the ordering process started in late October and some of the instruments are delivered in Yantai.

7.2 Necessary equipment for all the on-line monitoring stations

The instruments at each station should be placed in a housing meeting specific needs. Two pumps are normally necessary for taking river water into the instruments in the most secure way. To prevent sampling water from freezing during winter, the feeding pipeline has to be dug into the ground. The water outlet must be placed downstream the water intake or directly into the sewage system. Heating is needed inside the sampling room during winter time. The following specifications are given:

Feeding pipeline:	1" tubing, covered by soil for insulation
Filter:	Providing filtrated water to 500 µm
Pumps: suggested	Delivering approx. 15 l/min at the instrumentation level. It is to use a pump with approx. 1,5 kg/cm^2
Room temperature:	5 - 40^o C
Tap water:	In-house for cleaning the instruments.
Electricity:	220 V AC, 50 Hz single phase preferably 10 - 16 amps. for the monitoring instruments and the water pump.
Telephone line:	To transfer the data

ANNEX A

Information delivered by YEMC at the Workshop in Yantai 3-7 November 1997

The Main Tributaries for Jia River

Code	Name of main tributaries for Jia river
0	Feng su River
1	Guo jialing River
2	Han jiatan River
3	Zhong qiao River
4	Gao gu River
5	Qin River
6	Bao shan River
7	Shan dong River
8	Lou di River
9	Zhen quanshan River
10	Dong feng River
11	Tao cun River
12	Chu liu River
13	Guan shui River
14	Zhong cun River
15	Mu yu River
16	Chui liu River

Code	type of national economy trades
1	agriculture
2	forestry
3	animal husbandry
4	fishery
5	service trades
6	coal mining
7	oil and natural gas mining
8	ferrous metal mining
9	nonferrous metal mining
10	nonmetal mining
11	other mining
12	timber and bamboo felling and transferring
13	food processing trade
14	food making trade
15	beverage making trade
16	tobacco processing trade
17	textile trade
18	cloth and other fiber processing trade
19	leather 、fur and eider down processing trade
20	timber、bamboo、cane、palm and straw products trade
21	furniture making trade
22	paper making and paper products trade
23	printing trade ,copy of recorded media
24	cultural 、educational and P.E products making trade
25	oil processing and coking trade
26	chemical material and chemical products making trade
27	medicine making trade
28	chemical fiber making trade
29	rubber products trade
30	plastics products trade
31	nonmetal mine products trade
32	ferrous metal smelting and processing trade
33	nonferrous metal smelting and processing trade
34	metal products trade
35	general mechanism making trade
36	special equipment making trade
37	communications and transportation equipment making trade
38	aerospace equipment making trade
39	weapon and ammunition making trade
40	electrical mechanism and equipment making trade
41	electronic and communication equipment making trade
42	instrument and culture,office mechanism making trade
43	other making trade
44	production and supply of electricity,vapour and hot water
45	production and supply of gas
46	production and supply of tap water

47 civil engineering building trade
48 line,pipe and equipment installing trade
49 decorating and fitting up of building trade
50 geological prospecting trade
51 hydraulic management trade
52 railway transportation trade
53 highway transportation trade
54 pipe transportation trade
55 boat transportation trade
56 air transportation trade
57 traffic transportation assistant trade
58 other traffic transportation trade
59 storing trade
60 post and communication trade
61 food, beverage, tobacco and family
62 energy, material, and mechanism electronic equipment wholesaling 1
63 other wholesaling trade
64 retailing trade
65 commercial broking and agency trade
66
67 meal trade
68 financial trade
69
70 insurance trade
71
72 real estate developing and managing trade
73 real estate managing trade
74 real estate agency and broking trade
75 public service trade
76 resident service trade
77
78 hotel trade
79 hiring service trade
80 travel service
81 amusement service trade
82 information and consulting service trade
83 computer application service trade
84 other social service trade
85 health
86 P.E
87 social welfare ensurance trade
88
89 education
90 culture art trade
91 broadcast film television trade
92 scientific research trade
93 synthetical technology service trade

94	government office
95	political party office
96	social organization
97	primary mass autonomous organization
98	
99	the others

The Sediment data for Menlou Reservoir from 1991 to 1995

monitoring section	item / section	pollutant concentration(mg/Kg)					
		As	total Hg	total Cr	Pb	Cd	Cu
reservoir inlet	sampler amount	5	5	5	4	5	5
	maximum value	18.5	0.085	61.80	77.8	0.860	50.9
	minimum value	6.20	0.000	6.50	50.0	0.000	23.9
	average value	12.4	0.048	18.10	61.4	0.488	35.5
reservoir outlet	sampler amount	3	3	3	3	3	3
	maximum value	7.70	0.010	7.80	4.00	0.000	21.6
	minimum value	5.50	0.000	6.10	0.00	0.000	6.80
	average value	6.57	0.004	6.99	1.33	0.000	12.7

The Sediment data for Menlou Reservoir in 1997 (mg/Kg)

section	As	total Hg	Cr^{+6}	Pb	Cd	Cu	Zn	Sulphide
inlet	11.3	0.017	5.82	14.3	0.132	11.7	26.8	5.56
center	3.24	0.011	6.91	11.9	0.088	11.1	29.5	10.6
outlet	1.37	0.013	4.73	13.1	0.167	12.8	28.5	10.3

* The maximum area of Menlou Reservoir is 17.33 — 18.67Km^2
* The minimum area of Menlou Reservoir is 14.67 — 16.00Km^2

country controlled section:Menlou Reservoir inlet
Menlou Reservoir outlet
province controlled section:Dongmuotang
Menlou Reservoir outlet
municiple controlled section:Anli Reservoir inlet,
Anli Reservoir outlet
Nanqiao
Xingjiaqiao
Menlou reservoir outlet
Ji Village
Dashabu
Fushan sluice
Jingzibu
Buxitou
Huili
Dongmotang
Taokou
The fourth Water Plant
New Jia River Bridge

table1 **Distribution Monthly of Average Natural Runoff for Many Years of Fushan Station**

month / item	1	2	3	4	5	6	7	8	9	10	11	12	whole year	6-9 flood season
average runoff depth(10^6 m^3)	0.027	0.027	0.036	0.024	0.047	0.085	0.541	0.882	0.390	0.075	0.049	0.038	2.221	1.898
distribution monthly (%)	1.2	1.2	1.6	1.1	2.1	3.8	24.4	39.7	17.6	3.4	2.2	1.7	100	85.5

table2 **Maximum and Minimum Annual Runoff of Stations of Jia River**

name of river	code of station	name of station	catchment area (Km^2)	maximum annual runoff (10^6 m^3)	minimum annual runoff (10^6 m^3)	specific value
Jia river	1	Fushan	997	5.56	0.64	8.83
Qingyang river	2	Menlou	1079	5.53	0.658	8.40
Qingyang river	3	Zanggezhuang	458	2.58	0.265	9.74

table3

Character of Annual Runoff of Hydrological Stations

name of river	code of station	name of station	drainage area(Km^2)	maximum annual runoff (10^6 m^3)	minimum annual runoff (10^6 m^3)	average runoff (10^6 m^3)	average runoff depth(mm)
Outer Jia river	1	Fushan	997	5.65	0.64	2.57	257.5
Qingyang river	3	Zanggezhuang	458	2.58	0.265	1.05	229.9
Qingyang river	2	Menlou	1079	5.53	0.658	2.46	228.0

table4

Annual Precipitation and Runoff of Section

name of section	area (Km^2)	average				different guarantee rate of annual runoff (10^6 m^3)				
		annual precipitation(mm)	annual runoff (mm)	annual precipitation (10^6 m^3)	annual runoff (10^6 m^3)	20%	50%	75%	95%	97%
Fushan	997	774.1	257.8	7.718	2.57	3.700	2.290	1.440	0.668	0.538
Menlou	1079	734.5	230.0	7.925	2.48	3.520	2.190	1.400	0.664	0.492
whole catchment	2239	753.1	242.5	16.86	5.430	7.79	4.83	3.07	1.44	1.07

table1

chemical Water Quality monitoring stations

Section number	Database code	Responsible institution	Number of field trips pr year	Number and location of sampling point at each monitoring location	section name
1	11	Yantai city	6	1(0.5m below the surface)	Anli reservoir inlet
2	12	Yantai city	6	1(0.5m below the surface)	Anli reservoir centre
3	13	Yantai city	6	1(0.5m below the surface)	Anli reservoir outlet
4	14	Yantai city	6	1(0.5m below the surface)	Nanqiao
5	15	nation	6	1(0.5m below the surface)	Menlou reservoir inlet
6	16	Yantai city	6	2(0.5m below the surface) (0.5m above the bottom)	Menlou reservoir upcentre-stream
	17				
7	18	Yantai city	6	3(0.5m below the surface) (in the middle of the lake) (0.5m above the bottom)	Menlou reservoir centre
	19				
	110				
8	111	Yantai city	6	2(0.5m below the surface) (0.5m above the bottom)	Menlou reservoir east-south
	112				
9	113	nation , province and Yantai city	6	1(0.5m below the surface)	Menlou reservoir outlet
10	121	Yantai city	6	1(0.5m below the surface)	Ji village
11	120	Yantai city	6	1(0.5m below the surface)	Fushan sluice
12	122	Yantai city	6	1(0.5m below the surface)	Jingzibu
13	114	Yantai city	6	1(0.5m below the surface)	Huili
14	115	province and Yantai city	6	1(0.5m below the surface)	Dongmotang
15	116	Yantai city	6	1(0.5m below the surface)	Taokou
16	119	Yantai city	6	1(0.5m below the surface)	Dashabu
17	117	Yantai city	6	1(0.5m below the surface)	The fourth water plant
18	118	Yantai city	6	1(0.5m below the surface)	New Jia river bridge

Database for Yantai city

A00	declaration year
A01	declaration ~~year~~ code
A02	name of the industrial plant in Pinyin
HYDM	type of industrial activity
B02	name of product
B04	annual amount of product
B05	unit of product
D02	annual quantity of water (including recycled water)
D03	tap water(10^4 ton)
D04	~~ground~~ surface water(10^4 ton)
D05	~~under~~ground water(10^4 ton)
D08	annual quantity of freshwater(10^4 ton)
E02	annual discharge amount(10^4 ton) (to sewage system)
E03	discharge amount after treatment(10^4 ton/year)
E04	discharge amount up to standard after treatment(10^4 ton/year)
E05	discharge amount up to standard(10^4 ton/year)
F01	name of pollutant
F03	annual real discharge amount of water pollutant(ton)
F05	annual discharge amount of water pollutant permitted(ton)
F07	annual reduce amount of water polluant(ton)
G02	name of discharge outlet
G07	code of discharge direction
G08	code of discharge into river,reservoir or sea
G22	annual discharge days(day/year)
G24	max most discharge amount daily(ton/day)
G25	discharge amount after treatment at outlet(ton)
G26	discharge amount up to stardard at outlet(ton)
H03	name of treatment equipment
H04	name of sewage type
H06	treatment efficiency designed(ton/day)
H07	treatment efficiency actually(ton/day)
H12	annual working days
A0	content of A grade treatment code
B0	content of B grade treatment code
C0	content of C grade treatment code
D0	content of D grade treatment code
E0	content of E grade treatment code

DM Database for Jia River

FIELD_NAME	FIELD_TYPE	FIELD_LEN	FIELD_DEC	FIELD_MEAN
U00	C	4	0	code of town
U01	C	16	0	name of town
U02	C	8	0	under the jurisdiction of city
U03	C	10	0	name of river basin
U04	N	6	2	population amount
U05	N	6	2	area of village
U06	N	6	2	area of farm land
U061	N	6	2	area of wheat
U062	N	6	2	area of corn
U063	N	6	2	area of peanut
U064	N	6	2	area of fruit tree
U065	N	6	2	area of vegetable
U07	N	6	2	area of forest
U071	C	16	0	type of forest
U08	N	6	2	area of mountain
U081	C	16	0	type of mountain
U09	C	8	0	river function
U10	N	8	2	total amount of using water
U101	N	8	2	amount of using ~~ground~~ surface water
U1011	N	8	2	drinking water
U1012	N	8	2	water for irrigation
U1013	N	8	2	water for industry
U102	N	8	2	amount of using ~~under~~ground water
U1021	N	8	2	drinking water
U1022	N	8	2	water for irrigation
U1023	N	8	2	water for industry
U11	N	8	2	total sewage amount
U111	N	8	2	COD
U112	N	8	2	SS
U113	N	8	2	NH_3-N
U12	N	6	2	agriculture chemical amount
U121	N	6	2	pestide
U1211	N	6	2	organic phosphate
U1212	N	6	2	organic chlorine
U1213	N	6	2	others
U122	N	6	2	bactericide
U123	N	6	2	weedicide
U13	N	6	2	fertilizer amount
U131	N	6	2	nitrogenous fertilizer
U132	N	6	2	phosphate fertilizer
U133	N	6	2	potash fertilizer
U134	N	6	2	compound fertilizer
U14	C	4	0	code of water abstraction
U15	N	8	2	amount of abstracted
U16	C	10	0	the use of water

Collection and Reserve of Environmental Water Sample

I. Collecting method

Before sampling, the sample bottle and stopper should be washed 2~3 times with sampling water.

1.Surface water

In some places, such as river, lake, water sample can be directly collected using appropriate vessels like bucket. When sampling from bridge, a bucket linked to rope or bottle with plummet will be downed into water. It should be noticed that floating things on the surface of water can not be collected.

2.water on fixed depth

When collecting water on fixed depth in lake or reservoir, vertical vessel or organic glass water sampler may be used. Water flows through these vessels in the downing process. and when vessel comes to fixed depth, it will close and stop collecting.

3.Well water

When collecting water from well, the well must be drawn properly so that water sample can represent ground water source.

II. Assign of sample site

Ordinarily, surface water sample is taken from under the surface 10~15cm. Sampling points in different depth refer to the chart below.

Requirement of sampling on different depth from river

Water depth	Amount of sample	Specification
≤ 5m	one (0.5m under the surface)	1、Sample at one half of the total depth when the water depth do not reach 1m.
5~10m	two (0.5m under the surface ; 0.5m above the bottom)	2、Sample at 0.5m under ice when river is iced.
>10m	three (0.5m under the surface ; one half of the total depth ; 0.5m above the bottom)	3、If there is enough data to prove that water is equal along the vertical line, sample sites may be deduced appropriately.

III、Sampling equipment

1、Sampling vessels

Sampling vessels should be made from inert materials, anti-broken, easy to clean. At the same time, sampling vessels must be able to protect sample

from adsorption, evaporation and pollution by other materials.
Ordinary vessels are as follows:

- rigid glass bottle with stopper and without color
- polyethylene bottle with stopper
- Vessels are made of special materials for sampling dissolved oxygen, bacterium etc.

2、 Sampling apparatus

Surface water may be collected with vessels directly if without any special requirements. But some samples have been specially required, for example, dissolved oxygen must avoid air bubble; oil sample must fix capacity.
Water on fixed depth may be collected directly with vertical vessel or organic glass sampler.Dissloved oxygen sample should be collected with reversing sampler.

IV、 Reserve of samples

Some measurement items are easy to change and must be determined on the spot. Some items may be reserved for a period of time after taking some easy pre-treatments.
Basic requirements for reserving water samples are :
(1)slow down biological reaction
(2)slow down hydrolysis and oxidation-reduction of chemical compound or complex .
(3)slow down volatilization and adsorption losses of compositions.

Reserving technical of sampler(take on the spot)

order	item	reserve method	reserve time	notice
1	temperature			measured on the spot
2	suspended solid	refrigeration within 2~5 ℃		measured as soon as possible
3	turbidity			measured on the spot
4	PH	refrigeration below water temperature 2~5 ℃	6h	best measured on the spot
5	conductivity	refrigeration within 2~5 ℃	24h	best measured on the spot
6	Cu,Cd,Pb Zn,Mn	add HNO_3,PH<2	6 months	
7	Cr^{+6} / (total)	add NaOH,PH8 ~ 9 add HNO_3,PH<2		measured at the same day
8	Hg	add HNO_3,PH<2,then add $K_2Cr_2O_7$	several months	

9	dissolved oxygen	add $MnSO_4$ and KI-KOH	4 ～ 8h	
10	NH_3-N NO_3-N K-N	add H_2SO_4 ,PH<2,refrigeration within 2 ～ 5 ℃	24h	
11	NO_2-N	refrigeration within 2 ～ 5 ℃		analyze at once
12	ΣN	add H_2SO_4,PH<2	24h	
13	dissolvable phosphate	Filter at once after sampling, refrigeration within2~5 ℃	48h	
14	ΣP	add H_2SO_4,PH<2 refrigeration within 2~5 ℃	several months	
15	ΣCN^-	add NaOH, pH>12	24h	
16	COD	add H_2SO_4, pH<2	7d	best to determine as early as possible
17	BOD_5		4d	
18	TOC	add H_2SO_4, pH <2, refrigeration	7d	
19	oil	add H_2SO_4, pH<2 refrigeration	24h	
20	volatility phenol	add $CuSO_4$ 1g add H_3PO_4, pH<2	24h	
21	ion-surfactant	add chloroform , refrigeration 2~5 ℃		
22	bacteria amount, coliform group	refrigeration	6h	

V. Management of samples

Record every water sample and mark on the corresponding bottle , record enough information so as to identify sample correctly later. Vessels contained water samples should be protected properly and sealed. In the process of transport, notice not to shake, avoid sunlight directly, and prevent new pollutant from polluting bottle. After the samples carried to laboratory, the first thing is to check the samples and corresponding marks ,then accept them. If the samples can't be analyzed immediately then they should be reserved appropriately so as to prevent the compositions from volatile ,changing or being polluted.

Quality Control in Analysis Chemistry

Quality control in analysis chemistry includes in lab and among labs. Quality control in lab is a necessary base to promise every lab to provide accurate analysis result, and is key to promise. quality control among labs to process smoothly. So our station is mainly to do quality control of lab inside. This includes two sides: precision control and accuracy control. Besides, there is control of void test value.

Control methods:

During daily analysis, two programming void test parallel sample should be measured every time, and its relative error generally should be no more than 50 per cent. Use its average value as void verify value of these samples measurement results. Operation sequence of void test of standard series should be same as the standard series'.

I. Precision control

1. Parallel double samples

Measuring parallel double samples could reduce random error. Principally, samples all need to do parallel measurement. When amount of a set of samples is large, we may take 10~20 percentage samples to do parallel measurement .

Control methods :

When analysis persons fetch sample to measure, they divide a sample into two at the same time. Or quality control persons give numbers to every sample and form password samples, then give them to analysis person to measure. Finally, analysis person reports measurement results. Quality control person will check according to the following requirements:

i.Permit error:

Relative error of parallel double samples should be no more than 2.83 times of relative standard error of standard method. When the method has no relative standard error, and the samples have good uniformity and stability, refer to following table.

Parallel double sample relative error table

grade of analysis result(g/ml)	10^{-6}	10^{-5}	10^{-6}	10^{-7}	10^{-8}	10^{-9}	10^{-10}
largest permit value of relative error (%)	1	2.5	5	10	20	30	50

ii. Drawing and using precision control figure

II. Accuracy control

1. Recovery of criterion material added(add criterion in order to self-control and quality-control)

Recovery rate of criterion material added may reflect the accuracy of measurement result to a certain extent. Among a set of samples, select 10~20 per cent samples randomly and add criterion material to measure. When the amount of samples is little ,we should increase measurement rate properly. In a set of samples, samples added criterion material should not less than two.

Control methods:

While analysis person takes samples ,he takes one additional and add criterion material with the right amount(self-control). Or quality control person selects samples and adds criterion material to form password samples (include number and amount of criterion material added), then give them to analysis person to measure. Finally analysis person reports measurement results. Quality-control person calculates and checks according to the number whether it is qualified.

The amount of criterion material added should not be high. Ordinarily ,it is 0.5~2 times of that sample self contains. And after adding criterion material, the total content should not exceed the up-limit of the measurement method. The concentration of criterion material added should be high ,but its volume should be small ,better not to exceed 1% of the volume of the original sample.

Qualified range :

Check every recovery rate measured separately. When the sample has good uniformity, the recovery rate of criterion material should not exceed the recovery rate range listed in standard or unite method.

Recovery rate = (sample concentration after adding criterion material — sample original concentration)/concentration of criterion material added × 100%

2. Use of standard reference

i. Values transform:

When analysis quality is controlled, the unite sample or control sample may be checked whether its measurement value is reliable through comparing with standard reference.

ii.Apparatus demarcate:

The apparatus which may fix capacity directly often needs to use standard reference to demarcate in order to control the measurement to have a certain accuracy. The apparatus which adopt indirect capacity determining method may use standard reference liquid to check the standard save liquid

used by the apparatus.

3. Contrasting analysis

While analyzing samples, analyze standard reference material of close concentration or its dilute liquid. When their basic effect is known to have no or little deference ,we could define whether the accuracy of sample analysis result could be accepted or not according to the consistency degree of the fit of the measured value and ensure value of standard reference material.

4. Qualities check:

Using standard reference material as unknown sample, check analysis person's technique level so as to help them find problem.