APPENDIX F

FIGURE F.1 (1) ORGANIZATION CHART OF SOFIA WATER SUPPLY COMPANY

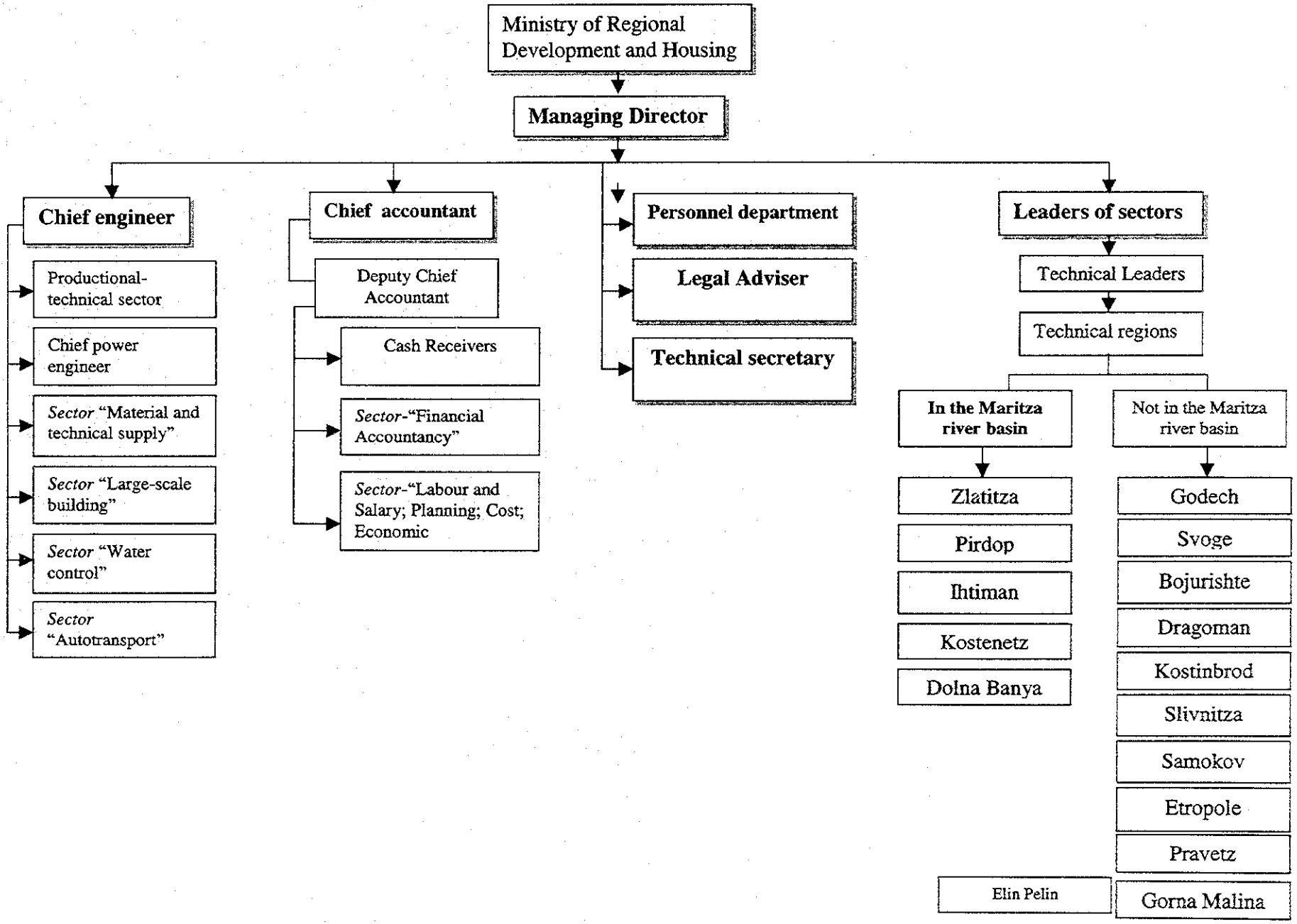


FIGURE F.1 (2) ORGANIZATION CHART OF PLOVDIV WATER SUPPLY COMPANY

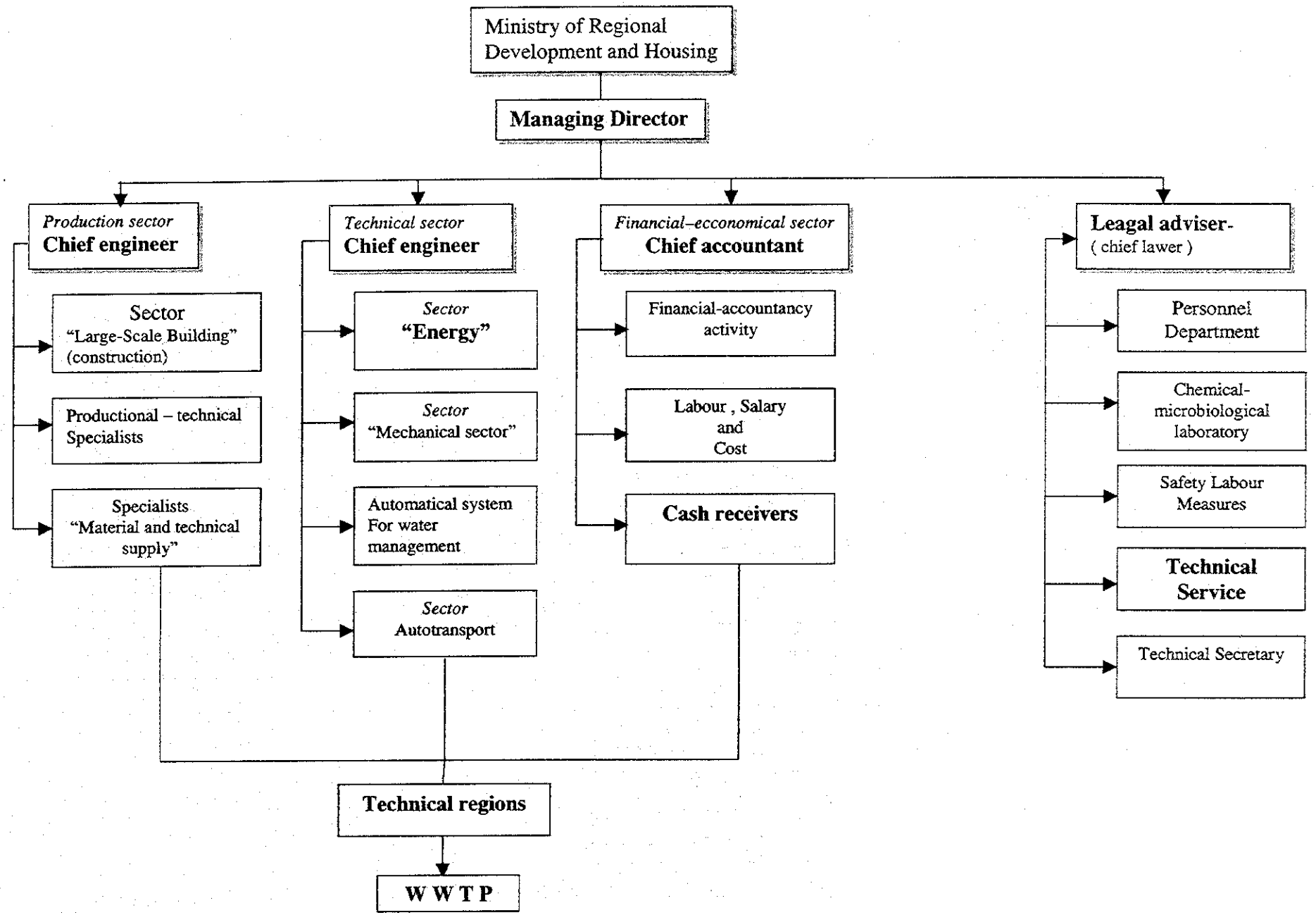


FIGURE F.1 (3) ORGANIZATION CHART OF PAZARDJIK WATER SUPPLY COMPANY

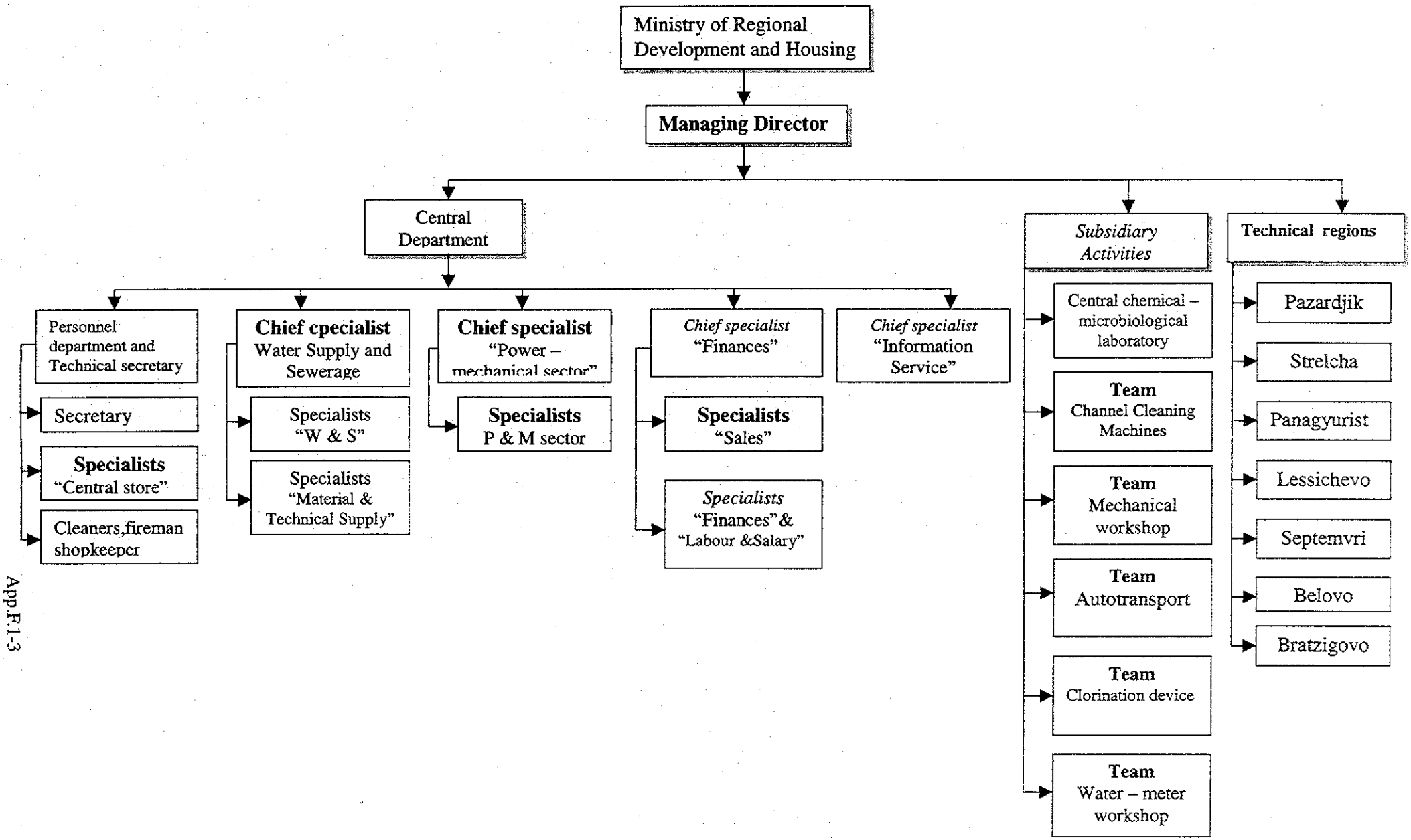


FIGURE F.1 (4) ORGANIZATION CHART OF HASKOVO WATER SUPPLY COMPANY

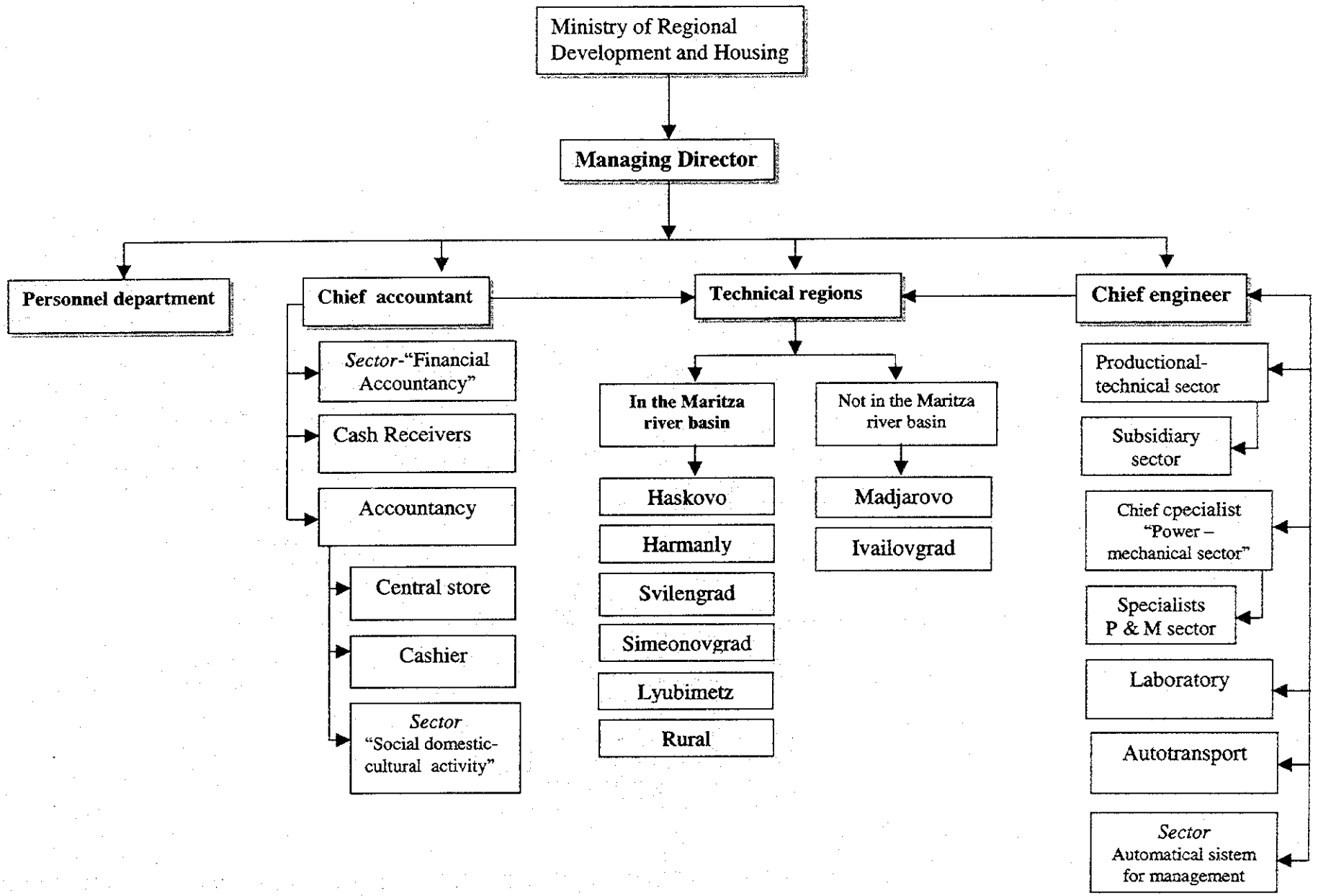
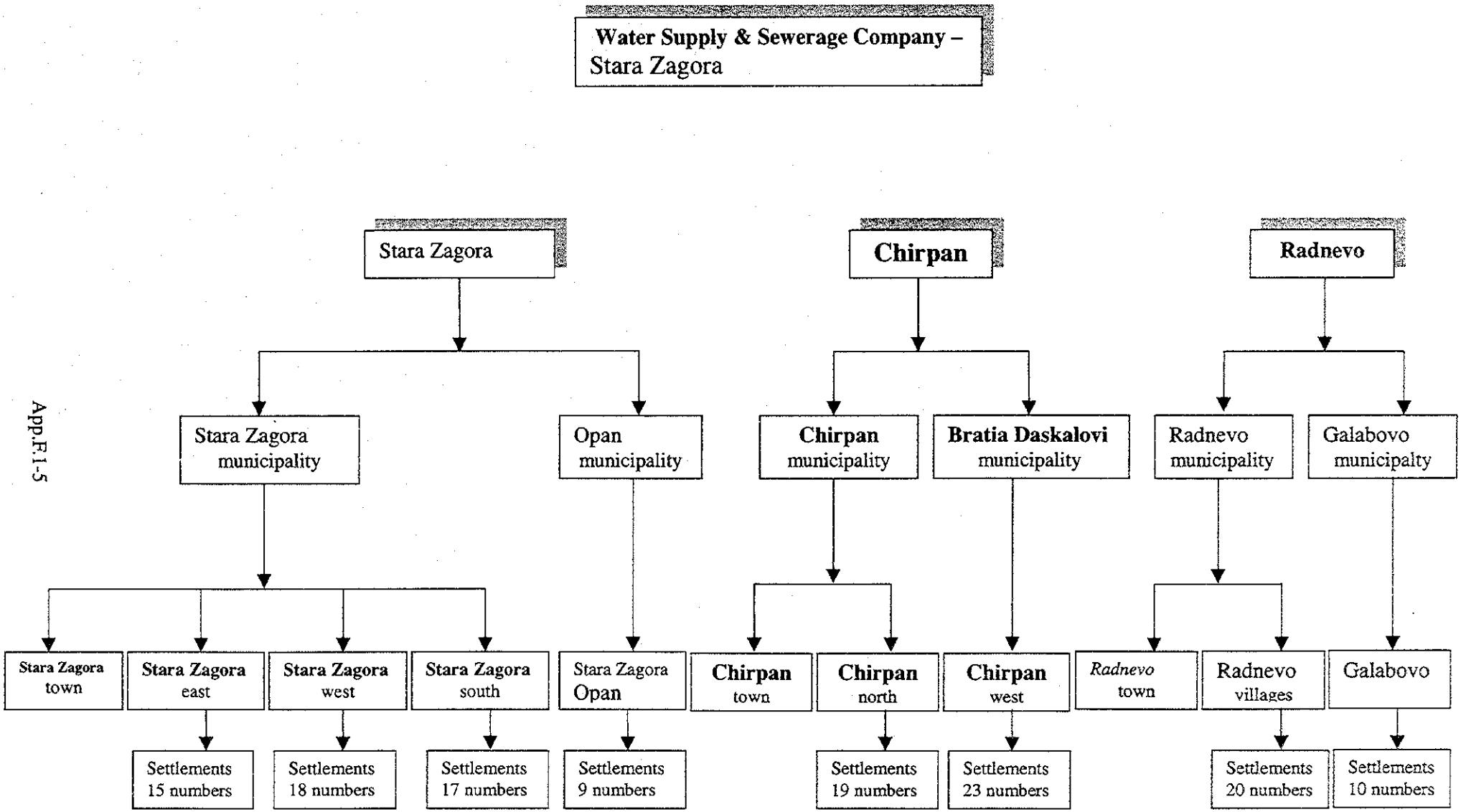


FIGURE F.1 (5) ORGANIZATION CHART OF STARA ZAGORA WATER SUPPLY COMPANY



SUPPORTING REPORT G

WATER QUALITY

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SUPPORTING REPORT G

SUPPORTING REPORT G WATER QUALITY

1. Introduction

There are more than 100 tributaries in the Maritza River basin. This study divides into 16 main basins and 110 sub-basins for the whole Maritza River basin.

Surface water quality is mainly monitored by NCESD with extensive stations in the basin. The quality is not well appeared. Main pollution is from domestic and industry for organic and nitrogen compound, respectively.

The reason for polluting water quality is, at first, a lack of WWTP. Then penalty for illegal emission from industry is not strict. Therefore, industry prefers to pay penalty instead of treating its wastewater.

Water quality should be improved. To do so, it needs to review existing conditions and systems, then propose the water quality management.

2. Water Quality

In this study, water quality includes surface and groundwater. Groundwater, however, is mentioned in the section "C", Hydro-geology. Therefore, this section does not mention about groundwater.

Water quality is evaluated with the Regulation No. 7 and Biotic Indices for chemical and biological characterization, respectively.

2.1 Monitoring System

Water quality in river is monitored by NCESD and NIMH. NCESD has more frequency sampling and more station than NIMH.

NCESD

In 1993, the monitoring system of the MoE and the REIs consisted out of about 60 observation and sampling points. They have been concentrated along the Maritza River and its main tributaries of Sazliyka, Banska Luda Yana, Topolnitza, Harmanliyska, Chepelarska, and Chepinska.

In 1998, NCESD updated the monitoring stations and sampling system, shown in Table G.2.1 and G.2.2, and Fig. G.2.1. NCESD added 13 new stations in Jan, 98 and deleted several stations.

NIMH

NIMH mainly measures discharge of river. The institute also measures water quality with much less frequency than NCESD (Fig. G.2.2).

2.2 Water Quality based on Chemical Characterization

For the chemical characterization, the water quality is evaluated by the regulation No. 7 issued in 1989. The regulation categorizes water quality into four:

- Category I - usable for drinking water source
- Category II - acceptable for recreational use and fish farming
- Category III - acceptable for irrigation and industrial use
- Beyond Category III - unsuitable to use water for any purpose

NCESD

Fig. G.2.3, G.2.4 and G.2.5 show the seasonal water quality for BOD, NH4 and NO3 in 1994 to 1996 based on percentile of 75%. Fig. G.2.6, G.2.7 and G.2.8 show water quality and pollution load (quantity data from NIMH) in main towns. The other parameters and comments are summarized in Table G.2.3.

Concentration and load varied seasonally with some tendency; the pollution load dropped in summer. It is not investigated exact reason. However, a large amount of water is utilized for irrigation in summer. This matter makes it change to the pollution load in river.

It can be concluded by Table G.2.3 that the most polluted river by general parameter and heavy metal is Sazliyka and Luda Yana, respectively.

NIMH

NIMH also works for water quality sampling. However, the frequency of sampling is much less than NCESD. Between 1994 and 1995, the sampling was made at most 3 times a year for one station. It is not enough to evaluate water quality with the data. However, it is enough to use the data as a comparison of pollution tendency. NIMH data was summarized in Table G.2.4.

Some parameters do not belong to the same category as NCESD. However, the parameters appeared in the table is almost same as Table G.2.3. Concerning parameters are BOD, NH4, NO2, PO4, and SO4.

JICA Study

JICA Study team conducted water quality investigation in 1997 to 1998. The monitoring stations selected are shown in Table G.2.5 and Fig. G.2.9. Result for river water quality is

described in Table G.2.6.

Pollution by general parameters show similar result compared to NCESD. Again Sazliyka is the most polluted river in the study area.
However, results for heavy metal pollution is described more detail by JICA's investigation. NCESD measured only Fe and Mn. In the other hand, JICA measured Cu, Zn, Pb, Fe, Mn, Cd, As, and Hg. Hg pollution was found in Maritza and Topolnitza. According to this survey, it is concluded that the most severe problem by heavy metal is Topolnitza.

The other data such as water from municipal WWTP, industries, and sewerage are listed in data book, "4 Water Quality".

2.3 Water Quality based on Biological Characterization

NCESD assesses surface water quality with the help of macroinvertebrates.
From 1996 to 1997, the water quality was studied at 71 sites with an interval of about 5 km. Biotic indices (B.I.) and biotic scores are applied to assess the water quality of running waters, in most cases based on benthic macroinvertebrate community.

A relationship between the biotic indices and a characterization of the analyzed water (regarding chemical, biological points of view) is given in Table G.2.7.

The water classes are:
-BI 1 : bad water quality
-BI 2 : poor water quality
-BI 3 : doubtful water quality
-BI 4: fair quality
-BI 5 : good quality

Intermediate classes such as BI 1.5, 2.5, 3.5, and 4.5 are also possible.

Fig. G.2.10 shows the biological assessment. Major concerning rivers with heavily pollution is Sazliyka, Haskovska, Banska, and a part of Stara and Chepelarska. Pollution

mechanism to Sazliyka is clear from this map. Stara Zagora contributes significant pollution to Sazliyka.

It can explain same thing to Stara from Peshtera and Haskovska from Haskovo.

Many part of biotic index shows similar to chemical characterization.

3 Pollution Source

In this study, pollution source such as domestic, industry, and livestock is estimated. Of course, there is other pollution. However, data is not available and above three sources are considered to be major pollution in the Maritza River basin. Therefore, the three kind of pollution is enough to evaluate for the study area. For TN, landuse pattern is able to quantified and added. Pollution from landuse pattern is more dependent on rainfall. Unit load is estimated with several references (Table G.3.1).

Pollution based on source and sub-basin is summarized in Fig. G.3.1 to G.3.4. Domestic pollution emits the most with 46%. And Industry is the largest emission for TN with 33%.

For pollution load based on sub-catchment, SAZ-7 is the largest on both BOD and TN. The pollution is loaded from concentrated area; top 5 sub-basins load 48% and 46% of BOD and TN pollution, respectively. High loading sub-basin for BOD tends to high loading for TN, too.

High pollution loading and polluted water quality region are linked.

3.1 Domestic

About 1,750,000 people live in the Maritza river basin. Among them, 68 % lives in town/village more than 5,000 inhabitants.
The distribution of the population is shown below.

DISTRIBUTION OF POPULATION

Size of town	Number	% in Maritza basin*1)	Sum, %	Towns
>250,000	1	20	20	Plovdiv
100,000 – 250,000	1	9	28	Stara Zagora
50,000 –	5	18	46	Haskovo, Pazardjik, Assenovgrad,

100,000				Dimitrovgrad, Velingrad
20,000 – 50,000	4	6	52	Karlovo, Nova Zagora, Harmanli, Panagyurishte
10,000 – 20,000	10	9	60	Chirpan, Peshtera, Parvomay, Svilengrad, Rakovski, Radnevo, Stamboliyski, Ihtiman, Sopot, Kostenetz
5,000 – 10,000	19	8	68	Galabovo, Septemvri, Hissarya, Krichim, Rakitovo, Lyubimetza, Pirdop, etc

*1): based on population

Roughly it can be said that in the 10 biggest towns about 3/4 of the urban population lives and about 1/2 of population of the total Maritza river basin.

The biggest three towns along Maritza River are Plovdiv, Pazardjik, and Dimitrovgrad, which cover 27% of total population in the study area.
In the sub-basin, Stara Zagora is the biggest town, 8% of total population in the whole Maritza river basin.

Pollution load by domestic is categorized into three;

- population not connected sewer
- population connected to sewer without WWTP
- population connected to sewer with WWTP

Table G.3.2 shows connection rate of sewer system. 58% of population connected sewer and 21% are connected WWTP based on the whole Maritza river basin.
Domestic load based on sub-basin is described on Fig. G.3.3 to G.3.5. High loading basin is Sazliyka, Harmanliyska, Maritza around Pazardjik, Plovdiv and Dimitrovgrad, up stream of Stryama and Chepinska, and downstream of Chepelarska.
All of the high loading basin locates top ranked town such as Plovdiv, Stara Zagora, Haskovo, Pazardjik, Assenovgrad, Dimitrovgrad, Velingrad, and so on, described in above table. As well as total pollution, emission of domestic pollution is from the limited area. Top 5 catchments load 48% of BOD and 50% of TN.

3.2 Industry

TN emission by industry is the largest among four pollution sources. Table G.3.3 shows top 50 industries, and Fig. G.3.5 describes loaded by sub-basin and top 20 industries.

Top 3 industries emit 54% of BOD and 88% of TN. The pollution is loaded only a few industries.
This tendency is the same as domestic source.

3.3 Livestock

Livestock pollution is distributed over the basin compared other source mentioned previously (Fig. G.3.3 to G.3.5). Sazliyka region is the highest loading. 73% of BOD and 65% of TN load is from pig and cattle, respectively.
Fig. G.3.6 shows a number of cattle, sheep, pig, and fowl in 1989, 1992, and 1994. As shown in the figure, all animal decreases from 1989 to 1994 in the Maritza River basin. One of the reason is expected the economical condition.
Fig. G.3.7 and G.3.8 show pollution by pig, fowl, and cattle per sub basin in 1994. SAZ is identified high loading by all three animals. Detail data is shown in Table G.3.4.

3.4 Landuse Pattern

The pollution from landuse discharges during rain. The distribution of pollution based on sub-basin is spread whole basin (Fig. G.3.4, G.3.5). Among them, SAZ is the highest load because of the largest agriculture landuse. Pollution effect by fertilizer and pesticide could not quantified. However, these area largely used for agriculture has high potential of fertilizer and pesticide pollution.

Pollution from domestic, industry, livestock, and landuse pattern is summarized in Table G.3.5.

3.5 Mining

The Maritza River basin has over 100 mines and their relating facilities (Table G.3.6, Fig. G.3.9). Pollution from mining activity is dangerous. Several type of heavy metal is detected (Table G.2.6). The pollution mechanism by heavy metal in rivers is not investigated. However, mining activity and heavy metal pollution in river is related. For example, there is a large copper mine in Panagyurishte, up stream of Luda Yana. Table G.2.6 shows copper in category III. This could be effect by mining activity.

There are also closed mines. Without proper management, it may have severe pollution.

3.6 Solid Waste Dumping Site

Pollution from dumping site is considered to leachate. However, data for leachate is not identified.

4 Water Quality Management Plan

Water quality is evaluated and pollution source is described in previous chapter. To improve water quality, it is necessary to improve water quality management in the basin.

The management plan is proposed for strengthening of monitoring system, reduction of pollution load, and necessary investigations.

Fig G.4.1 explained schematically the basic procedure of a water quality management plan. The integrated water quality management plan is developed through several steps from the awareness for the necessity of the management.

The water quality management plan was formulated as following steps:

- Assessment of existing water quality management system
- Scenarios for water quality management
- Countermeasures
- Water quality monitoring tools and equipment plan
- Cost
- Investigation
- Proposed stage program

4.1 Assessment of Existing Water Quality Management System

Existing water quality management system is assessed in this section. The problems of the existing management system are explained:

(1) Monitoring System

What is important for monitoring system is to identify the water quality and analyze pollution mechanism. Then the analysis is applied to the improvement of water quality.

NIMH and NCESD measure surface water quality. However, the sampling is not regularly taken, and data is not summarized. In addition, no data is exchanged between the institutes even though many of their stations are very close. In term of the location of the monitoring station, some place such as Pazardjik do not have monitoring station after town. Or even though there is a station after Plovdiv, no measurement took place after 1993.

The problems of the monitoring station are summarized below:

- Irregular frequency of data collection
- No data exchange between the institutes
- Insufficient summarize of data collected
- Inappropriate location of monitoring stations

NCESD updated monitoring system in January 1998. Some stations were added and deleted (Fig. G.2.1). "Frequency of sampling" and "Phys-Chem analysis" is described in Table G.2.1 and Table G.2.2. The sampling parameter is separated very detail. However, it is better to make simple system at first. After having appropriate amount of data, sampling parameter and frequency can be separated detail.
Some of the new stations are added in up stream of river. In this moment, these stations are not necessary even though sampling is twice a year. These stations should be added after well performance of monitoring in downstream.

(2) Control of Domestic Wastewater

There are only five WWTPs in the Maritza River basin. First, additional WWTPs are definitely needed to control domestic wastewater. Among 5 WWTPs, only Plovdiv is operated properly to the secondary treatment. However, including Plovdiv, all WWTPs are necessary to be rehabilitated or strengthening maintenance.

Also the sewer pipe should be rehabilitated. Overlapping part of pipe to pipe is very short and there is no proper protection for leakage. Therefore, wastewater leaks and groundwater flows into the sewer pipe. It makes groundwater pollution and inefficiency work of WWTP

regarding the pollution reduction.

In other aspect, the direct impact of domestic pollution to river is not investigated. The effluent quality to river should be measured. This measurement is applied to estimate sewerage leakage, too.

The problems are summarized below:

- Shortage of WWTPs
- Need of rehabilitation and lack of maintenance for WWTPs
- Pipe connection
- No measurement of sewer effluent quality

(3) Control of Industrial Effluent

Industrial effluent is controlled by MoEW. However, MoEW does not measure industrial effluent. Industry declares the effluent quality individually. MoEW gives penalty to industries according to the declaration. One third of TN is produced by industry. Pollution by NH4 and NO2 are found in many parts of the rivers. Therefore, it is expected that the declaration is incorrectly reported.

Industries emitting over the regulated effluent quality are imposed penalty. However, the amount of penalty is relatively low. In this moment, it is cheaper to pay money for illegal level of effluent than spending money for the treatment.

The problems are summarized below:

- Incorrect declaration of effluent quality by industry
- Low amount of fine over the regulated effluent level

(4) Mining

There are over 100 active and closed mines, and their relating facilities in the study area. The pollution from mining industry is significantly dangerous. The management such as water use, effluent quality, treatment of mining waste and wastewater, and monitoring system, etc. is not investigated.

Soil contamination survey was conduced around Zlatitza and Pirdop, down stream of Topolnitza and Luda Yana, and the north of Plovdiv. The contamination mechanism is not clearly defined. However, it is expected there is some relations between them.

(5) Solid Waste

Illegal solid waste dumping is found many places in the Maritza River basin. It is because insufficient public (municipal) service. One of the organized solid wastes dumping sites is located in Plovdiv. The site is well constructed. However, there is no fixed plan for leachate treatment.

The problems are summarized below:

- Insufficient public service
- No fixed plan for leachate

4.2 Scenarios for Water Quality Management

The target water quality in year 2015 is to meet class II. Three scenarios of water quality management are proposed for this achievement:

- Scenario 1: Reduction of pollution load
- Scenario 2: Strengthening of monitoring system
- Scenario 3: Investigations

In this section, Scenario 1 is discussed. Scenario 2 is discussed in the part of the sub-section 4.3. Scenario 3 is discussed in the sub-section 4.6.

The characteristic of pollution is mentioned in section 3. The pollution is emitted largely from limited catchments, towns and industries. Therefore, the reduction from big towns and top ranked industries is significant improvement to the study area. The approach of pollution reduction is proceeded:

- Select priority regions by high loading and deteriorated water quality regions
- Review pollution load from major towns in each region
- Select priority towns and its priority order
- Make draft alternatives for reduction of pollution
- Evaluate the water quality improvement of the alternatives by water quality model
- Select the optimum plan for water quality improvement

(1) Selection of Priority Regions

At first, main polluter giving a large effect to water quality is defined. The evaluation is based on catchment. From Fig G.2.3 and Fig G.3.3, the relationship of pollution load and water quality is definitely linked. So main polluter giving a large effect to water quality is designated. A few catchments are selected and formed as the priority regions (Fig. G.4.2).

- Up stream, Maritza - MU2, STA, MM1, CPE-1
- Mid-stream, Maritza - MM2, MM3
- Down stream, Maritza - HAR
- Sazliyka - SAZ

Fig G.4.3 shows the pollution load in regions. Eighty percent of pollution is loaded from these four regions. It means four regions are defined as main polluter in the study area. Among them, the largest polluter is up stream of Maritza emitting 26% of total pollution in the study area.

(2) Selection of Priority Towns and Priority Order

Priority towns are selected with three steps:

- Review and select priority towns from prioritized four regions (Fig G.4.4)
- Consider towns chosen by the National Plan of the Ministry of Construction in 1989 (Fig G.4.5)
- Select an important spot such as tourism area and mining activity area

The first priority is to reduce the pollution from the most effected town. Fig G.4.4 shows the pollution load from 19 major towns in 4 priority regions. A few major towns are loaded 66 – 90% in each priority regions. Therefore, the pollution reduction from these major towns makes it strong impact to water quality.

These 19 major towns are considered to be the priority towns. In addition, 13 towns and 2 districts are added from the non-prioritized region. The added towns are the selected towns by the National Plan (Fig G.4.5).

Some towns need severe consideration to environment such as tourist and mining activity area. Even though they may not load a large amount of pollution, these towns should be included for the priority towns. Four towns are selected from an important spot.

The selected priority towns should reduce the pollution load by implementation or rehabilitation of facilities by the year of 2015. It is proposed to separate 3 stages with 3 type of priority order. The execution period and priority order is as follows:

- 1st priority order – project execution in the year of 2001 to 2005
- 2nd priority order – project execution in the year of 2006 to 2010
- 3rd priority order – project execution in the year of 2011 to 2015

The priority order for four prioritized regions and the important spots is determined with the present total pollution load and the future potential domestic load, shown in Table G.4.2. Towns with pollution of the present load over 3000 kg BOD/d and the future load over 2000 kg BOD/d are chosen as 1st priority. The selected 7 towns are:

- Pazardjik
- Plovdiv
- Assenovgrad
- Dimitrovgrad
- Haskovo
- Stara Zagora
- Velingrad

All towns in the non-prioritized region are considered as the third order because of relatively low load and much less impact to the Maritza River and the Basin.

(3) Alternative for BOD and TN Reduction

Next is how much pollution should be reduced to meet the target of class II for BOD and NH4. To achieve this goal, the three basic alternatives are made, shown in Table G.4.3. These alternatives are simulated and the pollution reduction plan is determined.

Alt. 1 is to reduce more domestic pollution load than industry and livestock pollution. Alt. 3 is the opposite concept of reduction plan. It is reduced more industrial and livestock load than domestic load. The reduction concept between Alt. 1 and Alt. 3 is Alt. 2.

Both the basic alternatives and the impact of only domestic reduction are simulated (Table M.3.1 in Supporting Report M). The result is applied to the selection of the alternative.

4.3 Countermeasures

Countermeasures for improvement of water quality management are composed of structural plan and non-structural plan. Structural plan is pollution reduction by WWTP. Non-structural plan is strengthening of monitoring system, regulation and investigation.

(1) Pollution Reduction

The reduction alternative is determined with evaluation of Table M.3.7 and Table M.3.8 in Supporting Report M. Alt. 3_3 and Alt. 4_3 meet the target of the class II for BOD. For NH4, Alt. 4_3 is the best quality among the Alternatives. However, it does not meet the class II in upstream and mid-stream of Maritza in some area, and Sazliyka. Alt. 3_3 is the same as Alt. 4_3 except no nitrification at WWTP in Stara Zagora and Haskovo. The difference of the result is the category of Harmanliyska is down to the class III. The reduction of TN is more efficiency from industry and livestock. And it is possible to reduce pollution from industries largely by their production system and management. It is necessary to review and adjust the pollution reduction such as to keep the enough space for advanced nitrification/denitrification in WWTP.

It is proposed Alt. 3_3 execute for pollution reduction plan. The following is the Alt. 3_3:

BOD reduction

Domestic load reduction by WWTP

- 1st priority town 90% (primary and secondary treatment)
- 2nd priority town 30% (primary treatment)
- 3rd priority town 30% (primary treatment)

Industrial load reduction by regulation

- Top 1-10 90%
- Top 11-20 30%

  (equivalent to 80% reduction of industrial load)

Livestock load reduction by regulation

- farm 30%
- household 30%

  Currently most animals are raised and kept in low number in small farmers. They are regarded as non-point pollution source. As for reduction of pollution load from household livestock, it is recommended to apply dry cleaning method instead of wet

cleaning for household livestock and to use sludge for agriculture after dried. This recycle is simple and inexpensive method for small number of livestock.

TN reduction

Industrial load reduction by regulation

- Top 2 fertilizer industries 90%
  (equivalent to 79% reduction of industrial load)

(2) Strengthening of Monitoring System

Monitoring of water quality:

Strengthening of monitoring system is necessary for the water quality management. At first the measurement organizations should be combined. Only one organization is enough to measure water quality.

Then the importance of the monitoring stations is evaluated. The updated monitoring system is not bad at all. However, It is recommended that the start of the new sampling system be simple. For example, frequency of sampling and measurement parameters are too detail. At first it is important to understand water quality and pollution mechanism. Then to execute countermeasure, additional stations are necessary on purpose. In addition, monitoring station in the very up stream is not necessary in this moment.
Two type of monitoring stations is recommendable. The principal and the auxiliary stations are selected and shown in Fig G.4.6.

Principal Station	–	6 stations in Maritza River
		6 stations in the tributaries
Auxiliary Station	–	7 stations in Maritza River
		24 stations in the tributaries

Water quality is necessary to grasp the impact of town pollution. New station is added in one place as the principal station on the Maritza River: after Luda Yana where existing

sewer in Pazardjik and effluent of future WWTP are discharged. Four new stations are added on tributaries as auxiliary station. Tributary of Topolnitza and Blatnitza where effluent from WWTP flows out. And one station is added in mid stream of Luda Yana for tracing the heavy metal pollution. Fourth station is in Batak reservoir, the largest reservoir in the study area. The study proposes frequency and parameter of sampling. Some are overlapped the existing system. The system is summarized:

The frequency of sampling should be:

Principal station	– strictly once in a month
Auxiliary station	– strictly once in two months (monthly sampling is recommendable)

The measurement parameters are:

General parameter:	air temp, water temp, pH, DO, BOD, SS, NH4, NO2, NO3, PO4, SO4, H2S, coliform
Heavy metal:	Cu, Zn, Pb, Ni, Fe, Cr, Mn, Mg, Cd, As, Hg

The parameter and sampling frequency of heavy metals are to be modified considering the result.

Biological measurement:

In order to characterize and to support the assessment with the physical/chemical parameters, a biological parameter (Biotic Index) has been shown. To identify ecological "hot spots" these measurements have to be extended. Just nowadays the bacteriological load, as a thread to the health to the population, is measured in the Sazliyka Region. Microbiological parameters should be used at least for all other organic polluted rivers, so at least also for Maritza and Harmanliyska Rivers.

Industrial effluent:

For industrial effluent, each industry should have obligation to declare the effluent quality correctly. In addition, REIs are necessary to conduct effluent quality survey of industry occasionally. The strict observation is needed and recommendable to start from top 20

industries, then the others. With the observation, the effluent regulation should be reviewed. It is recommended that the effluent quality be the same as effluent level of WWTP.

Livestock:

Each farm should declare the effluent quality. And REIs conduct effluent quality survey occasionally. The strict observation is necessary.

For household animal, it is recommended for REIs to inspect cleaning methods and to change wet cleaning method to dry cleaning method. In addition, REIs had better to instruct the application of manure dried up for agriculture.

4.4 Water Quality Monitoring Tools and Equipment Plan

Equipment of water quality measurement is prepared and organized. There is no need for additional apparatus for the proposed sampling parameters.

HD (hydrodynamic) and WQ (water quality) models are well developed in this project. This is a powerful tool for water quality management. The model can verify the pollution impact to the rivers.

4.5 Costs of the Countermeasures

For structure cost, it is mentioned as follows;

	Costs (US$ 1000)
Construction of municipal wastewater treatment plants (refer to Table G.4.4)	
- 1st Stage towns	122,021
- 2nd Stage towns	36,437
- 3rd Stage towns	55,272
Total cost for WWTP	213,730

Above cost will be checked again and revised, if necessary, in the next study stage in Bulgaria. The detail is mentioned in Supporting Report H.

For non-structure, only software is needed.

4.6 Rough Cost Estimation for Industrial Wastewater Treatment

Rough cost estimation for the top 20 industrial wastewater treatment is conducted. The location of the industries is shown in Fig. G.4.7.

Rough cost for industrial LWWTP or rehabilitation of existing LWWTP is estimated with following assumption:

- Treated water quality from industry is as the one from municipal WWTP meeting the class III of Regulation of No. 7.
- Land is available for LWWTP.
- If industrial wastewater is necessary for municipal WWTP in terms of carbon source or others, the cost is not estimated. However, cost is estimated if the rehabilitation of pipe is needed.
- The cost is estimated the combined WWTP from several industrial wastewater if it is cheaper.

With the above assumption, the cost for top 20 industries is estimated.

Top 1-5	USD 36.5 mil
Top 5-10	USD 5.8 mil
Top 11-20	USD 13.3 mil
Total	USD 55.5 mil

4.7 Investigations

The reduction of pollution and strengthening of monitoring stations are mentioned previous section. Still data is not enough to execute the integrated water quality management. Some investigations are needed such as sewer system and its effluent, industrial effluent, mining waste and its wastewater, and solid waste. Then the implementation of improvement and management are planned.

The detail investigations are discussed as follows:

(1) Sewer System and Its Effluent

Sewer network in each town and the pipe connection should be investigated. Then effluent concentration to river should be measured. It is the direct impact of domestic load.

(2) Industrial Effluent

It is mentioned in the section 4.3.

(3) Mining Waste and Its Wastewater

The investigation should be carried out for water use, effluent quality, treatment of mining waste and wastewater, monitoring system, and duration of activity.

(4) Solid Waste

The capacity (duration), treatment of leachate, and monitoring system should be investigated.

4.8 Proposed Stage Program

Proposed programs are proceeded four stages:

1) Preparation stage Year 1999 - 2000
2) Short term stage 2001 - 2005
3) Mid term stage 2006 - 2010
4) Long term stage 2011 - 2015

The detail is shown in Table G.4.5.

TABLE G.2.1 MONITORING STATION OF NCESD

No	Samling point code	Sampling point	Frequency of sampling	Type of Phys-chem analysis*1	Frequency of Radiological control	Date of opening	Hydrom erty	NIMH Stations	
								Old No.	New No.
133	30060256	Maritza river at Radnil village, HMS	2	Background			NIMH	231	71650
134	30060085	Maritza river at Belovo	12	Reference			NIMH	248	71700
135	30060521	Chepinska river at GS Cheldyovo	2	Background		1/1/1998	NIMH	256	71390
136	30060522	Matnitza river before Batak res.	12	Reference		1/1/1998	RIEW		
137	30060523	Batak res. before reservoir dam	4	Reservoir		1/1/1998	Dams & Cascade s		
138	30060524	Matnitza river after Batak res.	2	Reservoir		1/1/1998	RIEW		
139	30060156	Chepinska river before inflow Maritza river at Kobachevo village	12	Reference	1		NIMH	249	71420
140	30060387	Topolnitza river before town of Koprivshtitza	2	Background			NIMH	422	71450
141	30060099	Topolnitza river at the bridge of town of Panagyurishte-town of Pirdop	12	Reference			NIMH	250	71470
142	30060100	Topolnitza before "Topolnica" res.-at village of Poibrene	12	Reference			NIMH	240	71480
143	30060101	Topolnitza' res. before reservoir dam	4	Reservoir			Dams & Cascade s		
144	30060525	Topolnitza after "Topolnica" res.	2	Reservoir		1/1/1998	RIEW		
145	30060259	Topolnitza before inflow Maritza river	12	Reference	1		RIEW		
146	30060260	Maritza at town of Pazarjik on the bridge of Sofia-Plovdiv	12	Reference			NIMH	252	71800
147	30060526	Luda Yana river above town of Strelcha	2	Background		1/1/1998	NIMH	336	71250
148	30060102	Luda Yana river at village of Rosen	12	Reference	1		NIMH	251b	71550
149	30060468	After WWTP - Stamboliyski	12	Reference			NIMH	253	71850
150	30060527	Vacha river above Trigrad	2	Background		1/1/1998	NIMH	275	72020
151	30060107	Vacha river after town of Devin	12	Reference			NIMH	421	72340
152	30060108	Vacha river at village of Y.Gruevo	12	Reference	1		RIEW		
153	30060265	Maritza river at town of Plovdiv(HMS 301)	12	Reference	1		NIMH	301	72700
154	30060091	Maritza river after Plovdiv to 1km.after municipal collector	12	Reference			RIEW		
155	30060528	Chepelarska river above village of Progled	2	Background		1/1/1998	Calculat ed by NIMH		
156	30060110	Chepelarska river on the bridge to village of Bachkovo	12	Reference			NIMH	324	72460
157	30060111	Chepelarska river before inflow Maritza river(stop Kemera)	12	Reference	1		Calculat ed by NIMH		
158	30060529	Stryama river above town of Klisura	2	Background		1/1/1998	NIMH	326	72500
159	30060530	Stryama river at village of Banya	12	Reference		1/1/1998	NIMH	325	72520
160	30060103	Stryama river before inflow Maritza at village of Manole	12	Reference	2		Calculat ed by NIMH		
161	30060092	Maritza river at town of Parvomay(HMS 304)	12	Reference			NIMH	303	72850
162	30060094	Maritza river - 3km. after discharge of the sewerage	12	Reference	1		NIMH	autom.	
163	30060104	Bedechka river - village of Mogila	12	Reference			RIEW		
164	30060531	Blatnitza river above village of Konyovo	2	Background		1/1/1998	RIEW		
165	30060330	Blatnitza river before town of Radnevo	12	Reference			Calculat ed by NIMH		
166	30060532	Siutlliyka river above village of Rakitnitza	2	Background		1/1/1998	NIMH	305	73400
167	30060105	Sazliyka river at town of Galabovo	12	Reference	2		NIMH	342	73480
168	30060270	Sazliyka river before inflow Maritza river	12	Reference	2		Calculat ed by NIMH		
169	30060533	Harmanliyska river before village of Trakietz	2	Background		1/1/1998	RIEW		
170	30060394	Harmanliyska river at village of Dinevo	12	Reference			NIMH	308	73550
171	30060096	Maritza river after town of Harmanli(HMS)	12	Reference	1		NIMH	307	73750
172	30060097	r. Maritza after the town of Svilengrad	12	Border	1		NIMH	309	73850

*1: Detail is shown in Table G.2.2

TABLE G.2.2 SAMPLING PARAMETER

Genaral Parameter

Type of Analysis	T_{air}	T_{wat}	Ph	DO*1	DO_{sat}*2	EC*3	BOD5	Oxid*4 (perman)	COD_{cr}	DS	SS	Cl	SO4	NH4-N	NO2-N	NO3-N	PO4
Reference	X	X		X	X	X		X	X*1	X	X	X	X				
Background	X	X	X	X	X	X	X	X		X	X			X	X	X	X
Reservoir	X	X		X	X	X	X	X		X	X			X	X	X	X
Mouth of river	X	X		X	X	X	X	X	X*1	X	X	X*3	X*3	X	X	X	X
Border of country	X	X	X	X	X	X		X	X*2	X	X	X*3	X*3				X

*1: when BOD>10 mg/L
*2: when BOD>5 mg/L
*3: Frequency of sampling is 4 times a year

Additional Parameter

Type of Analysis	Heavy Metal	detergents	Surface active substance	Phenol	Cyanides	Petroleum products	Chlorine org pesticides	Polyaromatic hydrocarbons	PCBs	Triazine pesticides	Mn
Reference	X	X	X	X	X	X	X	X	X	X	
Background											X
Reservoir	Depending on region and expected polluter's type										
Mouth of river	X	X	X	X	X	X	X	X	X	X	
Border of country	X	X	X	X	X	X	X	X	X	X	
Frequency of sampling per year	4	4	4	4	4	12	2	2	2	2	

TABLE G.2.3 SUMMARY OF WATER QUALITY IN 1994-1996 BY NCESD

Basin	River	Location	Code No	Category II		Category III		Worse than Cat III *1		Comments
				General *2	Heavy Metal *3	General	Heavy Metal *3	General	Heavy Metal *3	
MU1	Maritza	Kostenetz	84	BOD,NH4 ,PO4		NO2				- Cosiderably clean in Maritza River
	Maritza	Belovo	85	BOD,NH4 ,NO2						
	Maritza	Vetren	257	NH4,NO2						
MU2	Maritza	Pazaardjik	260	NH4,PO4		NO2				
MM1	Maritza	Govedare	263	NH4,PO4	Fe			NO2		- More polluted in down stream - Heavy metal pollution in mid-stream - Banska - most polluted river (impact from Haskovo industrial WWTP)
	Maritza	Stamboliyski	468	BOD,NH4 ,PO4	Fe			NO2		
	Maritza	Plovdiv	265	NH4,PO4		NO2				
MM2	Maritza	Mirovo	157	NH4	Mn	NO2,PO4				
	Maritza	Parvomay	92	BOD,NH4		NO2,PO4	Mn			
	Mecha	Parvomay	392	NH4,NO2		PO4				
	Maritza	Skobelevo	267	BOD,NO2 ,NH4		PO4	Mn			
MM3	Banska	Dobrich	393		Mn	H2S,NH4		BOD,NO2 , PO4		
	Maritza	Dimitrovgarad	93	BOD,NH4	Mn	NO2		PO4		
	Maritza	Simeonovgrad	268	NH4				NO2		
MD	Maritza	Harmanli	96	BOD	Mn	NH4		NO2,PO4		- Polluted by N and P compound
	Maritza	Svilengrad	272	BOD,NH4	Mn	PO4		NO2		
TOP	Pirdopska	Pirdon	98	BOD,NH4 ,SO4,PO4	Fe			NO2		- Better water quality after Topolnitza reservoir
	Topolnitza	Pirdon	99	NH4,NO2, PO4			Mn			
	Topolnitza	Petrich	388	NH4	Mn	NO2				
	Topolnitza	Poibrene	100	NH4,NO2	Mn					
	Topolnitza	Pazardjik	259	NH4,NO2						
CPI	Chepinska	Nikolov	106	NH4,PO4	Fe			NO2		- Only problem by NO2
	Chepinska	Kovachevo	156	NH4,PO4		NO2				
LUD	Luda Yana	Panagyurishte	390	PO4	Fe	BOD,NH4	Mn	NO2		- Worst condition by heavy metal in the study area - More polluted in up stream
	Banska Luda Yana	Banya	391	NH4,NO2		SO4	Fe		Mn	
	Luda Yana	Popintzi	262	BOD,PO4	Fe	NH4	Mn	NO2		
	Luda Yana	Rosen	102	BOD,NH4 ,SO4,PO4	Fe			NO2	Mn	
	Luda Yana	Pazardjik	154	NH4,NO2						
STA	Stara	Byaga	264	BOD	Fe	NH4,PO4		NO2		- N and P compound pollution
VAC	Vacha	Gruevo	108	NH4,NO2						- Cleanest river shown in this table
CPE	Yugovska	Yugovo	109	NH4,NO2	Mn					- Polluted after Assenovgrad
	Chepelarska	Bachkovo	110	NH4,NO2, PO4						
	Chepelarska	Kemera	111	PO4		NO2	Mn	NH4		
STR	Stryama	Manole	103	NH4,NO2, PO4						- Considered to be clean
SAZ	Sazliyka	Mogila	104	NO3		BOD,H2S		NH4,NO2		- Most polluted river in whole Maritza river basin - No heavy metal pollution
	Blatnitza	Radnevo	330	BOD,NO3		NH4		NO2		
	Sazliyka	Radnevo	331	BOD,NO3		NH4		NO2,PO4		
	Sazliyka	Konstantinovetz	269	BOD,SO4		H2S		NH4,NO2, PO4		
	Sazliyka	Galabovo	105	BOD				SO4,NH4, NO2		
	Sazliyka	Simeonovgrad	270	BOD				SO4,NH4, NO2		
HAR	Harmanliyska	Dinevo	394	BOD,NH4	Mn			NO2,PO4		- Highly polluted, especially in Haskovo
	Harmanliyska	Haskovo	158		Mn			BOD,NH4 ,NO2, PO4,H2S		
	Harmanliyska	Harmanli	271		Mn	NH4,H2S		BOD,NO2 , PO4		

*1: Worse than Category III
*2: Assessment of parameters - BOD, NH4, NO3, NO2, Cl, SO4, PO4, H2S
*3: Assessment of parameters - Fe, Mn

TABLE G.2.4 SUMMARY OF WATER QUALITY IN 1994-1995 BY NIMH

Basin	River	Location	Code No	Category II		Category III		Worse than Cat III[*1]	
				General[*2]	Heavy Metal[*3]	General	Heavy Metal[*3]	General	Heavy Metal[*3]
MU1	Maritza	Raduil	71650	NH4				NO2	
	Ochushnitza	Ochusha	71330	BOD,NH4, NO2,PO4					
	Maritza	Belovo	71700	NH4,PO4		BOD,NO2			
MU2	Maritza	Pazadjik	71800	NH4,NO2		PO4			
MM1	Maritza	Plovdiv	72700	NH4,NO2, PO4					
MM2	Maritza	Parvomay	72850	BOD,NH4, NO2,PO4					
MD	Maritza	Harmanli	73750		Fe	NH4		BOD,NO2, PO4	
	Maritza	Svilengrad	73850	BOD		PO4		NH4,NO2	
TOP	Topolnitza	Medet	71470	BOD,NH4, NO2,PO4	Fe			SO4	
	Topolnitza	Poibrene	71480	BOD,NH4, NO2	Fe				
CPI	Chepinska	Nikolovo	71420	NH4,NO2, PO4					
CPE	Yugovska	Yugovo	72240	NH4,NO2					
	Chepelarska	Bachkovo	72460	BOD,NH4, NO2,PO4					
SAZ	Sazliyka	Galabovo	73480	SO4,PO4		DO		BOD,NH4, NO2	
HAR	Harmanliyska	Harmanli	73550			BOD,NH4		PO4,NO2	

*1: Worse than Category III
*2: Assessment of parameters - DO, BOD, NH4, NO3, NO2, Cl, SO4, PO4
*3: Assessment of a parameter - Fe

TABLE G.2.5 LIST OF WATER QUALITY SAMPLING POINTS

River

No	Code-No	Location	Sampling Per Month	Total Number
1	256	Maritza river - Raduil	2 times	12
2	86	Maritza after Septemvry - the bridge to Zlokutchene	1 time	6
3	260	Maritza in Pazardjik - the bridge Sofia-Plovdiv	2 times	12
4	263	Maritza after Pazardjik - Govedarc	1 time	6
5	612	Maritza before junction of Vatcha	2 times	12
6	90	Maritza after junction of Vatcha - 6th klm	1 time	6
7	265	Maritza in Plovdiv /HMS 301/	2 times	12
8	267	Maritza after Parvomay - the bridge Skobelevo	1 time	6
9	94	Maritza-3 klm after NEOCHIM Dimitrovgrad	1 time	6
10	95	Maritza after junction of Sazliyka	2 times	12
11	97	Maritza after Svilengrad	1 time	6
12	100	Topolniza before Topolniza reservoir - Poibrene	1 time	6
13	259	Topolniza before junction in Maritza	1 time	6
14	156	Tchepinska before junction in Maritza - Kovatchevo	1 time	6
15	262	Luda Jana -Popintzi	1 time	6
16	154	Luda Jana - the bridge to Ognyanovo	1 time	6
17	103	Stryama before junction in Maritza - Manole	1 time	6
18	111	Chepelarska before junction in Maritza /Kemera/	1 time	6
19	329	Bedetchka - after junction of 4 sewage collectors of Stara Zag	1 time	5
20	104	Bedetchka- Mogila	1 time	6
21	628	Sazliyka - the bridge to Znamenosetz	1 time	6
22	331	Blatniza before junction in Sazliyka	1 time	6
23	270	Sazliyka before junction in Maritza	1 time	6
24	394	Harmanliyska in Dinevo	1 time	5
25	271	Harmanliyska in Harmanli	1 time	6

Municipal WWTP - inlet and outlet

No	Code-No	Location	Sampling Per Month	Total Number
1	4	WWTP-Ihtiman - intlet	1 time	6
2	5	WWTP-Ihtiman - outlet	1 time	6
3	10	WWTP-Peshtera - inlet	1 time	6
4	11	WWTP-Peshtera - outlet	1 time	6
5	20	WWTP-Plovdiv - inlet	1 time	6
6	21	WWTP-Plovdiv - outlet	1 time	6
7	36	WWTP-Nova Zagora - inlet	1 time	6
8	37	WWTP-Nova Zagora - outlet	1 time	5
9	44	WWTP-Haskovo, Cooperative WW Station - inlet	1 time	6
10	45	WWTP-Haskovo, Cooperative WW Station - outlet	1 time	5

Outflow From Industrial Waterwater

No	Code-No	Location	Sampling Per Month	Total Number
1	I*	WWTP-MDK Pirdop - inlet	1 time	1
2	II*	WWTP-MDK Pirdop - outlet	1 time	1
3	III*	"Assarel-Medet" Corp.- Pump Station before Medet river	1 time	1
4	1	"Assarel-Medet"Corp.- Banska Luda Jana, before Banya	1 time	6
5	27	Bulcons-Parvomay	1 time	4
6	16	Celhart-Stamboliyski	1 time	6
7	22	Cristal-Katunitza	1 time	6
8	26	Manole-pig breading farm	1 time	6
9	30	Neohim-Dimitrovgrad	1 time	6
10	34	Agrobiohim-Stara Zagora	1 time	6
11	40	TEC Maritza III, Galabovo	1 time	5

Outlet From Sewage System

No	Code-No	Location	Sampling Per Month	Total Number
1	13	Pazardzhik	1 time	6
2	24	Plovdiv-North collector	1 time	6
3	29	Dimitrovgrad	1 time	5
4	33	Stara Zagora - collector	1 time	5
5	43	Haskovo-Haskovska river after Junction of all collectors WW	1 time	6

TABLE G.2.6 SUMMARY OF WATER QUALITY SURVEY IN 1997-1998 BY JICA

Basin	River	Location	Code No	Category II		Category III		Worse than Cat III*1	
				General*2	Heavy Metal*3	General	Heavy Metal*3	General	Heavy Metal*3
MU1	Maritza	Raduil	256	NO2					
	Maritza	Zlokuchene	86	NO2					
MU2	Maritza	Pazaardjik	260	NO2			Hg		
MM1	Maritza	Govedare	263	COD, BOD NH4	Fe, Mn			NO2	
	Maritza	Jcn of Vacha	612	NH4		NO2			
	Maritza	Orizare	90	COD, BOD					
	Maritza	Plovdiv	265	NH4, NO2			Hg		
MM2	Maritza	Skobelevo	267	COD, BOD NH4	Fe	NO2			
MM3	Maritza	Dimitrovgrad	94	COD, BOD NH4	Cu, Fe, Mn			NO2	
MD	Maritza	Simeonovgrad	95	NH4,PO4				NO2	
	Maritza	Svilengrad	97	COD,BOD NH4	Fe, Mn		Hg	NO2	
TOP	Topolnitza	Poibrene	100	NH4	Fe, Mn, As		Zn, Hg	NO2	
	Topolnitza	Pazardjik	259	NO2	Cu,Fe, Mn				
CPI	Chepinska	Kovachevo	156	NH4				NO2	
LUD	Luda Yana	Popintzi	262	COD,BOD NH4,PO4			Cu	NO2	
	Luda Yana	Pazardjik	154	NO2	Cu				
STR	Stryama	Manole	103	NO2					
CPE	Chepelarska	Kemera	111	NH4	Zn	NO2	Pb		Cd
SAZ	Bedechka	Stara Zagora	329	BOD,NH4 PO4	Fe	COD		NO2	
	Sazliyka	Mogila	104	PO4				COD,BOD NH4,NO2	
	Sazliyka	Radnevo	628	COD,BOD PO4				NH4,NO2	
	Sazliyka	Radnevo	331	COD,BOD NH4,PO4				NO2	
	Sazliyka	Simeonovgrad	270	COD,BOD PO4				NH4,NO2	
HAR	Harmanliyska	Dinevo	394	NO2					
	Harmanliyska	Harmanli	271	COD,BOD NH4,PO4				NO2	

*1: Worse than Category III
*2: Assessment of parameters - COD, BOD, NH4, NO3, NO2, Total P.
*3: Assessment of parameters - Cu, Zn, Pb, Fe, Mn, Cd, As, Hg.

TABLE G.2.7 BIOTIC INDICES (Q VALUES) AND WATER QUALITY CHARACTERISTICS

Q Ratings	5	4	3_4	3	2	1
Water quality	Good	Fair	Doubtful to Fair	Doubtful	Poor	Bad
Pollution Status	Unpolluted	Unpolluted	Slight pollution	Moderate pollution	Heavy pollution	Gross pollution
Biodegradable organic wastes	Absent	Absent	Absent	In advanced stages of mineralization	Heavy load	Very heavy load
BOD	Normal i.e.less than 3 mg/l	Normal i.e.less than 3 mg/l	Close to or normal	May be high at times	High	Very high
DO	Typically ranges from 80-120% of saturation	May fluctuate above and below 80-120%	Fluctuates widely	Fluctuates very widely. Potential fish-kills	Low during the day. May be zero at night	Very low or zero at all times
Bottom Siltation	None	None	May be light	May be considerable	Heavy	Heavy and commonly anaerobic
'Sewage Fungus'	Absent	Absent	Absent	May be small amounts	Usually abundant	Usually abundant
Algae	Diverse communities not excessive in development	Moderate, sometimes abundant	Abundant	Abundant. May completely blanket river bed	May be abundant	Ranges from none to abundant
Macrophytes	Usually diverse communities. Development not excessive	May be well developed	Usually abundant	Abundant. May completely overgrow river if blanket algae allows	Tolerant forms only. May be abundant	Only the most tolerant types
Macroinvertebrates (from fast areas)	Usually diverse communities.Sensitive species numerous.	Some reduction in diversity; density increases	Sensitive forms absent or scarce. Total numbers may be very high	Sensitive forms absent. Diversity falls. Tolerant species common	Tolerant forms only.	Only the most tolerant types or none
Potential Beneficial Uses	High quality waters suitable for supply and all other abstractions. Game fisheries. High amenity value	Waters of somewhat less high quality than Q5 but usable for substantially the same purposes	Usually good game fisheries but fish at risk due to possible fluctuations in DO. Suitable for supply. Moderate to high amenity value	Coarse fisheries. Not likely to support a healthy game fishery. Suitable for supply after advanced treatment.	Fish absent or only sporadically present. May be used for low grade industrial abstraction. Low amenity value	Fish absent. Likely to produce nuisance smells. Very low or zero amenity value
Condition	Satisfactory	Satisfactory	Transitional	Unsatisfactory	Unsatisfactory	Unsatisfactory

TABLE G.3.1 UNIT LOAD

	Category of Pollution Source	BOD (kg/d)	TN (kg/d)	NH4 (kg/d)	NO3 (kg/d)	Q (L/d)	Reference
Domestic	***Non-sewered***	***0.0135***	***0.0032***	***0.00119***	***0.0012***		***UNDP report***
	Sewered without treatment	***0.054***	***0.008***	***0.00476***			
	Sewered with Treatment	***0.0054***	***0.0032***	***0.0012***	***0.00168***		***JICA WQ survey 1997***
Livestock	Pig wet cleaning no treatment	0.145	0.038	0.027	0	0.085	TN&NH4: Danish Standard pig, Q: Manole pig farm
	Pig dry cleaning, Liquid manure only	0.07	0.017	0.015	0	0.004	TN, NH4 &Q: Danish Standard pig BOD :UNDP report
	Pig wet cleaning 3 step WWTP	***0.014***	***0.008***	***0.001***	***0.006***	***0.085***	***JICA investigation, Manole pigfarm***
	Pig wet cleaning mechanic WWTP	***0.035***	***0.01***	***0.008***	***0***	***0.085***	***Getimate***
	Cow wet cleaning no treatment	0.682	0.285	0.18	0	0.04	BOD, TN, NH4 & Q:Danish Standard cow
	Cow dry cleaning, liquid manure only	0.06	0.12	0.11	0	0.024	TN: Danish Standard cow BOD: UNDP report
	Cow wet cleaning mechanical WWTP	***0.045***	***0.09***	***0.083***	***0***	***?***	***Getimate***
	Sheep total	0.06	0.027	0.016	0	-	Danish Standard sheep
	Fowl wet cleaning liquid manure	0.006	0.00147	0.001	0	?	Danish Standard chicken
	Fowl wet cleaning mechanical WWTP	***0.003***	***0.0007***	***0.0005***	***0***	***?***	***Getimate***
Landuse	***Bare+urban+water body***	***0***			***0.2***		
	forest+grass	***0***			***0.2***		***Japanese related textbook***
	non-irrigate+irrigate+fruit	***0***			***0.68***		***(Forest+Grass) + 5% of applied fertilizer (3500kgN/km2/yr in 1995)***

: used for estimation of pollution loads

TABLE G.3.2 CONNECTION RATE OF SEWER SYSTEM BASED ON POPULATION

Main Basin	Sub-Basin	Sewered		Non-Sewered	Total	% of Sewered	% of Treated
		Not Treated	Treated				
CPE	CPE-1	51649	0	16117	67766	76	0
	CPE-2	2713	0	2393	5106	53	0
	CPE-3	1200	0	9035	10235	12	0
Sub-Total		55562	0	27545	83107	67	0
CPI	CPI-1	0	0	0	0	-	-
	CPI-2	2566	0	13501	16067	16	0
	CPI-3	49321	0	17390	66711	74	0
Sub-Total		51887	0	30891	82777	63	0
HAR	HAR-1	17013	0	7854	24867	68	0
	HAR-2	75869	0	21799	97667	78	0
	HAR-3	0	0	8227	8227	0	0
Sub-Total		92881	0	37880	130761	71	0
LUD	LUD-1	0	0	0	0	-	-
	LUD-2	0	16323	15243	31566	52	52
	LUD-3	1748	0	4590	6338	28	0
Sub-Total		1748	0	19833	21581	8	0
MD	MD-1	0	0	1066	1066	0	0
	MD-2	0	0	0	0	-	-
	MD-3	0	0	243	243	0	0
	MD-4	0	0	0	0	-	-
	MD-5	0	0	336	336	0	0
	MD-6	0	0	1018	1018	0	0
	MD-7	0	0	343	343	0	0
	MD-8	7322	0	10079	17401	42	0
	MD-9	0	0	2778	2778	0	0
	MD-10	0	0	0	0	-	-
	MD-11	0	0	137	137	0	0
	MD-12	0	0	858	858	0	0
	MD-13	0	0	1741	1741	0	0
	MD-14	0	0	774	774	0	0
	MD-15	0	0	0	0	-	-
	MD-16	0	0	676	676	0	0
	MD-17	0	0	0	0	-	-
	MD-18	2892	0	7558	10450	28	0
	MD-19	0	0	6636	6636	0	0
	MD-20	0	0	2410	2410	0	0
	MD-21	0	0	837	837	0	0
Sub-Total		10214	0	37491	47705	21	0
MM1	MM1-1	0	0	2088	2088	0	0
	MM1-2	0	0	12740	12740	0	0
	MM1-3	0	0	0	0	-	-
	MM1-4	0	0	4587	4587	0	0
	MM1-5	6709	0	11681	18390	36	0
	MM1-6	0	0	5186	5186	0	0
	MM1-7	0	0	0	0	-	-
	MM1-8	0	0	0	0	-	-
	MM1-9	0	0	63912	63912	0	0
	MM1-10	0	0	4665	4665	0	0
	MM1-11	0	305685	349	306034	100	100
	MM1-12	7786	0	6416	14201	55	0
Sub-Total		14494	305685	111623	431803	74	71
MM2	MM2-1	17483	0	10959	28442	61	0
	MM2-2	0	0	176	176	0	0
	MM2-3	0	0	11697	11697	0	0
	MM2-4	0	0	4599	4599	0	0
	MM2-5	0	0	0	0	-	-
	MM2-6	444	0	10940	11384	4	0
	MM2-7	0	0	0	0	-	-
	MM2-8	0	0	4419	4419	0	0
	MM2-9	15584	0	1969	17553	89	0
	MM2-10	0	0	5633	5633	0	0
	MM2-11	0	0	0	0	-	-
	MM2-12	0	0	7857	7857	0	0
	MM2-13	9905	0	10344	20248	49	0
	MM2-14	0	0	7182	7182	0	0
	MM2-15	2611	0	6983	9594	27	0
	MM2-16	0	0	0	0	-	-
Sub-Total		46027	0	82758	128785	36	0

Main Basin	Sub-Basin	Sewered		Non-Sewered	Total	% of Sewered	% of Treated
		Not Treated	Treated				
MM3	MM3-1	4892	0	3261	8153	60	0
	MM3-2	0	0	1965	1965	0	0
	MM3-3	2567	0	3024	5591	46	0
	MM3-4	0	0	0	0	-	-
	MM3-5	0	0	0	0	-	-
	MM3-6	0	0	1277	1277	0	0
	MM3-7	0	0	132	132	0	0
	MM3-8	0	0	0	0	-	-
	MM3-9	50285	0	2844	53129	95	0
	MM3-10	0	0	9947	9947	0	0
	MM3-11	0	0	4320	4320	0	0
	MM3-12	0	0	568	568	0	0
Sub-Total		57743	0	27339	85082	68	0
MU1	MU1-1	0	0	0	0	-	-
	MU1-2	8005	0	24513	32517	25	0
	MU1-3	3465	0	7802	11267	31	0
	MU1-4	0	0	0	0	-	-
	MU1-5	0	0	0	0	-	-
	MU1-6	0	0	0	0	-	-
	MU1-7	0	0	0	0	-	-
	MU1-8	8397	0	2099	10496	80	0
	MU1-9	0	0	1744	1744	0	0
	MU1-10	4958	0	5292	10250	48	0
Sub-Total		24825	0	41449	66275	37	0
MU2	MU2-1	0	0	0	0	-	-
	MU2-2	71840	0	58754	130594	55	0
	MU2-3.	0	0	0	0	-	-
	MU2-4	0	0	1210	1210	0	0
	MU2-5	0	0	0	0	-	-
	MU2-6	0	0	0	0	-	-
Sub-Total		71840	0	59964	131804	55	0
PYA	PYA	0	0	16170	16170	0	0
Sub-Total		0	0	16170	16170	0	0
SAZ	SAZ-1	0	0	0	0	-	-
	SAZ-2	0	0	2630	2630	0	0
	SAZ-3	0	0	1625	1625	0	0
	SAZ-4	8223	0	12033	20256	41	0
	SAZ-5	0	0	0	0	-	-
	SAZ-6	9107	24192	28372	61671	54	39
	SAZ-7	135822	0	48217	184039	74	0
	SAZ-8	0	0	0	0	-	-
Sub-Total		153152	24192	92877	270221	66	9
STA	STA	12075	9322	31223	52620	41	18
Sub-Total		12075	9322	31223	52620	41	18
STR	STR-1	0	6186	21414	27600	22	22
	STR-2	0	0	10327	10327	0	0
	STR-3	38535	0	26471	65005	59	0
Sub-Total		38535	6186	58212	102932	43	6
TOP	TOP-1	0	0	0	0	-	-
	TOP-2	0	12685	8751	21436	59	59
	TOP-3	16783	0	4972	21755	77	0
	TOP-4	0	0	0	0	-	-
Sub-Total		16783	12685	13722	43190	68	29
VAC	VAC-1	5578	0	18438	24016	23	0
	VAC-2	0	0	2917	2917	0	0
	VAC-3	0	0	12529	12529	0	0
	VAC-4	2120	0	3938	6058	35	0
Sub-Total		7698	0	37821	45519	17	0
Total		655464	365071	726798	1747334	58	21

TABLE G.3.3 TOP 50 INDUSTRIAL LOAD

No	MOE Ref.	Location	Catch	Institution	Business	Tributary	Discharge to	LWWTP	Working days/yr	Quantity (m3/d)	Conc (mg/L)		Load (kg/d)		% of BOD		% of TN	
											BOD5	TN	BOD5	TN	Relative Load	Accum. of Rel. Load	Relative Load	Rel. Accum. Load
1	55	Katunitza	MM2-15	"Kristal 91"	Food processing	Maritza	Maritza		260	3000	4500	90	9616	192	26.6	27	1.2	1
2	89	Stara Zagora	SAZ-7	"Agrobiohim"	Chemical	Sazliika	Bedetcka	Y	365	69120	105	125	7258	8640	20.1	47	55.3	57
3	3	Stara Zagora	SAZ-7	"Zagorka" Brewery Ltd	Food processing	Sazliika	TS	Y	365	4200	600	20	2520	84	7.0	54	0.5	57
4	29	Dimitrovgrad	MM3-9	SC Neohim	Chemical	Maritza	Maritza	Y	365	45100	38	103	1698	4645	4.7	58	29.7	87
5	19	Stamboliiski	MM1-12	"Vitamina" Ltd.	Food processing	Maritza	Maritza	Y	260	12700	150	2	1357	18	3.8	62	0.1	87
6	1	Pazardjik	MU2-2	"Maritsa" KK Ltd.	Food processing	Maritza	TS	Y	260	15297	120	10	1308	109	3.6	66	0.7	88
7	56	Plovdiv	MM1-9	"Kristal 91" sweet factory	Food processing	Maritza	TS	Y	260	5240	300	20	1120	75	3.1	69	0.5	88
8	1 to 5	WWTP-Haskovo industry	HAR-2	Joint Ind TWWKS	Waste Treatment	Banska r.	Banska r.	Y	365	5375	152	10	817	54	2.3	71	0.3	88
9	14	Galabovo	SAZ-4	TEPS "Maritza East" 1	Electric Power	Sazliika	slag pond	Y	365	49740	15	1.3	746	65	2.1	73	0.4	89
10	6	Parvomai	MM2-13	"Bulkons" Ltd.	Food processing	Maritza	TS	Y	260	6340	150	10	677	45	1.9	75	0.3	89
11	78	Stara Zagora	SAZ-7	Meat Factory Ltd.	Food processing	Sazliika	TS	Y	260	1281	500	50	456	46	1.3	76	0.3	89
12	2	Stamboliiski	MM1-12	"Tzelhart" Ltd.	Pulp and paper	Maritza	Maritza	Y	260	67400	9.2	10	442	480	1.2	78	3.1	92
13	45	Plovdiv	MM1-9	"Plovdivska konserva" dep.1	Food processing	Maritza	TS	Y	260	4000	150	10	427	28	1.2	79	0.2	93
14	77	Stara Zagora	SAZ-7	"Gali Zagoretz" Ltd.	Food processing	Sazliika	TS	Y	260	1167	500	50	416	42	1.2	80	0.3	93
15	35	Belovo	MU1-3	KMH "Belovo" Ltd.	Pulp and paper	Maritza	Maritza	Y	365	16500	25	2	413	33	1.1	81	0.2	93
16	3	Pazardjik	MU2-2	"Trakia papir" Ltd.	Pulp and paper	Maritza	Pismanka	Y	260	10000	50	3.18	356	23	1.0	82	0.1	93
17	108	Plovdiv	MM1-9	"Alen mack" Ltd.	Cosmetics	Maritza	TS		260	2450	200	10	349	17	1.0	83	0.1	93
18	100	Plovdiv	MM1-9	"Pulpudeva" Ltd.	Tannery	Maritza	TS	Y	260	1600	300	20	342	23	0.9	84	0.1	94
19	88	Stara Zagora	SAZ-7	"Biser Oliva" Ltd.	Food processing	Sazliika	TS	Y	260	6000	80	20	342	85	0.9	85	0.5	94
20	2, 5	Oriahovitza	SAZ-7	Stoianovi Brothers Maenad 1901	Wine Production	Sazliika	TS		260	290	1500	56	310	12	0.9	86	0.1	94
21	91	Assenovgrad	CPE-1	"Askon" Ltd.	Food processing	Chepelarska	TS	Y	260	2800	150	10	299	20	0.8	87	0.1	94
22	7	Pazardjik	MU2-2	"Mletchana promistenost" Ltd.	Food processing	Maritza	TS	Y	260	1096	360	40	281	31	0.8	87	0.2	94
23	57	Plovdiv	MM1-9	"Mletchana promistenost" Ltd.	Food processing	Maritza	TS		260	1300	300	30	278	28	0.8	88	0.2	95
24	87	Karlovo	STR-3	"Mesokombinat"	Food processing	Striama	Striama	Y	260	1172	300	50	250	42	0.7	89	0.3	95
25		Velingrad	CPI-1	Milk Industry	Milk Industry	Maritza		Y	260	500	600	70	214	25	0.6	89	0.2	95
26	79	Stara Zagora	SAZ-7	"Serdika"Ltd.	Food processing	Sazliika	TS	Y	260	770	300	40	165	22	0.5	90	0.1	95
27	8	Stara Zagora	SAZ-7	"Petko Enev" [Can FactoryJLtd	Food processing	Sazliika	TS		260	1500	150	10	160	11	0.4	90	0.1	95
28	20	Panagjurishte	LUD-2	"Oborishte" Ltd.	Textile	Luda Iana	TS	Y	260	1800	112.6	10	144	13	0.4	91	0.1	95
29	29	Sopot	STR-2	"VMF Sopot"	Machinery	Manastirska	Manastirska	Y	260	4492	45	2	144	6	0.4	91	0.0	95
30	3	Karlovo	STR-3	"Karlovska Koprina" Ltd.	Textile	Striama	TS	Y	260	2870	70	5	143	10	0.4	92	0.1	95
31	7	Chirpan	MM2-1	"Zagorka Malt Factory"	Food processing	Maritza	Dry Gully	Y	260	1260	150	5	135	4	0.4	92	0.0	96
32	15	Mednikarovo	SAZ-2	TEPS "Maritza East" 3	Electric Power	Sokolitza	Sokolitza	Y	260	28500	6.6	1.65	134	33	0.4	92	0.2	96
33	16	Velingrad	CPI-1	"Kristal" Ltd.	Chemical	Maritza	Tchepinska		60	2487	305	18	125	7	0.3	93	0.0	96
34	27	Tzerovo	TOP-1	"Vitehprom" Ltd.	Wine	Topolnitza	Topolnitza		260	33	5000	50	118	1	0.3	93	0.0	96
35	26	Kalugerovo	TOP-1	"Vitehprom" Ltd.	Wine	Topolnitza	Topolnitza	Y	260	100	1600	10	114	1	0.3	93	0.0	96
36	89	Plovdiv	MM1-9	"KCM" Ltd.	Lead, cooper	Chepelarska	Chepelarska	Y	365	32400	3.5	3	113	97	0.3	94	0.6	96
37	47	Plovdiv	MM1-9	"Plovdivska konserva" dep.3	Food processing	Maritza	TS	Y	260	714	200	10	102	5	0.3	94	0.0	96
38	13	Chirpan	MM2-1	"Vinprom Tchirpan" Ltd	Food processing	Maritza	TS	Y	160	700	300	10	92	3	0.3	94	0.0	96
39		Brezovo	CPE-1	"Vinprom" Ltd	Food processing	Maritza	non existing		60	100	5000	20	82	0	0.2	94	0.0	96
40	14	Ljubimetz	MD-18	BK "Sakar" ltd	Wine	Maritza	TS		60	100	5000	25	82	0	0.2	95	0.0	96
41	16	Velingrad	CPI-1	"Kristal" Ltd.	Chemical	Maritza	Tchepinska		200	2487	60	3.6	82	5	0.2	95	0.0	97
42	58	Pestera	STA	"Biovet" Ltd.	Pharmaceutical	Stara Reka	Stara Reka	Y	365	5338	15	0.13	80	1	0.2	95	0.0	97
43	6	Haskovo	HAR-2	Manuella	Textile	Harmanliiska	TS	Y	260	2160	50	0.16	77	0	0.2	95	0.0	97
44	25	Dimitrovgrad	MM3-9	TEPS: Maritsa 3	Power Plant	Maritza	Maritza	Y	365	5000	15	1.65	75	8	0.2	95	0.1	97
45		Velingrad	CPI-1	Mototecnika	car repair & cleaning	Maritza	TS	Y	260	993.6	100	6	71	4	0.2	96	0.0	97
46	46	Plovdiv	MM1-9	"Plovdivska konserva" dep.2	Food processing	Maritza	TS	Y	260	443	200	10	63	3	0.2	96	0.0	97
47	110	Plovdiv	MM1-9	"Rodina" Ltd.	Paper	Maritza	TS	Y	260	1260	70	5	63	4	0.2	96	0.0	97
48	70	Parvomai	MM2-13	"Mletchna promishlenost" (dairy)	Food processing	Maritza	TS	Y	260	237	360	40	61	7	0.2	96	0.0	97
49	6	Pazardjik	MU2-2	"M&M - 90" Ltd.	Food processing	Maritza	TS	Y	260	693	120	25	59	12	0.2	96	0.1	97
50	86	Bania	STR-3	"Vinzavod Bania" Ltd.	Food processing	Striama	TS	Y	260	270	300	10	58	2	0.2	96	0.0	97
		Other (186 industries)											1272	504	3.5	100	3.2	100
		Total											36104	15628	100	100	100	100

TABLE G.3.4 POLLUTION LOAD OF LIVESTOCK

(unit: kg/d)

Main Catch	Sub-Catch	Pig		Cattle		Fowl		Total	
		BOD	TN	BOD	TN	BOD	TN	BOD	TN
CPE	CPE-1	58	17	57	113	83	20	198	150
	CPE-2	37	11	28	57	0	0	65	68
	CPE-3	19	5	56	112	13	3	88	120
Sub-Total		113	32	141	282	96	24	351	338
CPI	CPI-1	49	14	27	54	0	0	76	68
	CPI-2	14	4	28	56	0	0	42	60
	CPI-3	76	22	107	214	0	0	183	235
Sub-Total		139	40	162	324	0	0	301	363
HAR	HAR-1	151	43	41	82	2	1	194	125
	HAR-2	68	20	45	90	3	1	116	110
	HAR-3	165	47	134	269	7	2	306	318
Sub-Total		384	110	220	440	13	3	617	553
LUD	LUD-1	481	138	47	94	5	1	533	233
	LUD-2	48	14	32	65	0	0	80	78
	LUD-3	37	11	11	21	0	0	48	32
Sub-Total		566	162	90	180	5	1	661	343
MD	MD-1	1	0	0	1	0	0	2	1
	MD-2	1	0	0	1	0	0	1	1
	MD-3	1	0	0	1	0	0	1	1
	MD-4	1	0	1	1	0	0	2	1
	MD-5	23	7	10	19	0	0	33	26
	MD-6	16	5	7	13	0	0	23	18
	MD-7	44	13	18	37	0	0	62	49
	MD-8	120	34	27	54	0	0	147	88
	MD-9	38	11	14	28	0	0	52	39
	MD-10	122	35	15	30	0	0	137	65
	MD-11	81	23	9	18	0	0	90	41
	MD-12	90	26	9	18	0	0	99	44
	MD-13	142	40	14	28	0	0	156	69
	MD-14	58	17	9	18	0	0	67	34
	MD-15	18	5	5	9	0	0	23	14
	MD-16	26	7	11	21	0	0	36	28
	MD-17	59	17	18	36	0	0	77	53
	MD-18	20	6	6	13	0	0	26	19
	MD-19	380	109	83	165	1	0	464	274
	MD-20	52	15	6	12	0	0	58	27
	MD-21	104	30	17	33	0	0	121	63
Sub-Total		1397	399	278	557	1	0	1677	956
MM1	MM1-1	117	34	3	6	0	0	120	39
	MM1-2	689	197	57	114	0	0	746	311
	MM1-3	38	11	1	1	0	0	39	12
	MM1-4	69	20	1	2	0	0	70	22
	MM1-5	1011	289	75	151	1	0	1087	440
	MM1-6	262	75	6	13	0	0	268	87
	MM1-7	434	124	21	41	1	0	456	166
	MM1-8	17	5	10	21	0	0	28	26
	MM1-9	420	120	51	102	118	29	588	250
	MM1-10	1279	366	29	59	0	0	1309	424
	MM1-11	251	72	6	12	0	0	257	83
	MM1-12	116	33	3	5	0	0	119	39
Sub-Total		4703	1344	263	526	120	29	5086	1899
MM2	MM2-1	60	17	42	84	64	16	166	117
	MM2-2	9	3	7	14	1	0	17	17
	MM2-3	49	14	59	119	15	4	124	136
	MM2-4	13	4	14	28	0	0	27	32
	MM2-5	18	5	30	60	3	1	51	66
	MM2-6	31	9	39	78	6	2	76	89
	MM2-7	1	0	1	1	0	0	1	1
	MM2-8	114	33	78	155	8	2	200	190
	MM2-9	331	95	33	66	0	0	364	161
	MM2-10	33	9	26	52	0	0	59	62
	MM2-11	4	1	3	6	3	1	10	7
	MM2-12	63	18	77	155	0	0	141	173
	MM2-13	45	13	31	63	0	0	76	76
	MM2-14	48	14	66	132	0	0	114	146
	MM2-15	40	11	24	49	0	0	65	60
	MM2-16	4	1	3	6	0	0	6	7
Sub-Total		862	246	534	1068	102	25	1497	1339
MM3	MM3-1	86	25	38	76	1	0	125	101

(unit: kg/d)

Main Catch	Sub-Catch	Pig		Cattle		Fowl		Total	
		BOD	TN	BOD	TN	BOD	TN	BOD	TN
	MM3-2	296	85	124	248	102	25	523	358
	MM3-3	67	19	49	99	30	7	146	125
	MM3-4	90	26	63	127	98	24	252	176
	MM3-5	28	8	20	39	31	8	78	55
	MM3-6	2	1	2	3	0	0	4	4
	MM3-7	20	6	15	30	1	0	36	36
	MM3-8	3	1	2	5	2	1	8	6
	MM3-9	91	26	52	104	1	0	144	131
	MM3-10	97	28	80	160	1	0	179	188
	MM3-11	29	8	22	43	0	0	50	52
	MM3-12	86	25	69	137	0	0	155	162
Sub-Total		896	256	536	1072	268	66	1700	1394
MU1	MU1-1	109	31	18	37	0	0	127	68
	MU1-2	53	15	8	17	0	0	62	32
	MU1-3	15	4	12	23	0	0	26	28
	MU1-4	3	1	1	2	0	0	4	3
	MU1-5	9	3	3	6	0	0	12	9
	MU1-6	3	1	1	2	0	0	4	3
	MU1-7	23	7	6	12	0	0	29	18
	MU1-8	1	0	0	1	0	0	2	1
	MU1-9	38	11	17	34	0	0	56	45
	MU1-10	56	16	95	191	4	1	155	208
Sub-Total		311	89	162	324	4	1	477	414
MU2	MU2-1	216	62	19	38	2	0	237	100
	MU2-2	109	31	10	20	1	0	120	51
	MU2-3	55	16	5	10	1	0	60	26
	MU2-4	99	28	15	31	20	5	134	64
	MU2-5	395	113	41	81	4	1	440	195
	MU2-6	103	29	10	20	1	0	114	50
Sub-Total		977	279	100	201	28	7	1105	487
PYA	PYA	299	86	63	126	0	0	363	212
Sub-Total		299	86	63	126	0	0	363	212
SAZ	SAZ-1	110	31	31	62	0	0	141	94
	SAZ-2	75	21	41	82	0	0	116	103
	SAZ-3	453	129	151	302	63	15	666	446
	SAZ-4	262	75	90	181	12	3	364	258
	SAZ-5	24	7	7	15	1	0	32	22
	SAZ-6	601	172	210	419	136	33	946	624
	SAZ-7	1786	510	409	818	239	58	2434	1387
	SAZ-8	10	3	6	12	0	0	16	14
Sub-Total		3320	948	945	1891	450	110	4715	2949
STA	STA	51	14	37	73	27	7	114	95
Sub-Total		51	14	37	73	27	7	114	95
STR	STR-1	434	124	150	300	7	2	591	426
	STR-2	32	9	46	92	2	1	81	102
	STR-3	109	31	141	282	0	0	251	313
Sub-Total		576	165	337	674	10	2	923	841
TOP	TOP-1	345	99	56	112	3	1	404	212
	TOP-2	101	29	71	142	0	0	172	171
	TOP-3	61	17	89	178	0	0	150	195
	TOP-4	7	2	15	31	0	0	22	33
Sub-Total		514	147	232	463	3	1	748	611
VAC	VAC-1	111	32	111	222	199	49	421	302
	VAC-2	1	0	11	22	0	0	12	23
	VAC-3	2	1	43	87	0	0	45	87
	VAC-4	24	7	34	68	0	0	58	75
Sub-Total		138	39	199	399	199	49	536	487
Total		15245	4356	4299	8599	1325	325	20870	13279

TABLE G.3.5 SUMMARY OF POLLUTION LOAD

Main Catch	Sub-Catch	Domestic (kg/d)		Industry (kg/d)		Livestock (kg/d)		Landuse (kg/d)		Total (kg/d)		% of Load*	
		BOD	TN	BOD	TN	BOD	TN	BOD	TN	BOD	TN	BOD	TN
CPE	CPE-1	3048	471	526	54	198	150	0	53	3772	729	3.6	1.6
	CPE-2	181	30	0	0	65	68	0	85	247	182	0.2	0.4
	CPE-3	189	39	0	0	88	120	0	128	277	288	0.3	0.6
Sub-Total		3419	540	526	54	351	338	0	266	4295	1199	4.1	2.6
CPI	CPI-1	0	0	553	48	76	68	0	51	629	167	0.6	0.4
	CPI-2	325	65	3	0	42	60	0	72	371	197	0.4	0.4
	CPI-3	2938	456	0	0	183	235	0	129	3121	821	3.0	1.7
Sub-Total		3263	521	557	48	301	363	0	252	4120	1185	3.9	2.5
HAR	HAR-1	1039	163	42	4	194	125	0	79	1274	372	1.2	0.8
	HAR-2	4452	686	936	60	116	110	0	89	5504	945	5.3	2.0
	HAR-3	113	27	0	0	306	318	0	281	419	625	0.4	1.3
Sub-Total		5603	876	978	65	617	553	0	449	7198	1943	6.9	4.1
LUD	LUD-1	0	0	0	0	533	233	0	122	533	355	0.5	0.8
	LUD-2	298	102	161	17	80	78	0	145	540	342	0.5	0.7
	LUD-3	159	29	0	0	48	32	0	63	206	124	0.2	0.3
Sub-Total		456	131	161	17	661	343	0	330	1279	822	1.2	1.7
MD	MD-1	15	3	0	0	2	1	0	1	16	6	0.0	0.0
	MD-2	0	0	0	0	1	1	0	42	1	43	0.0	0.1
	MD-3	3	1	0	0	1	1	0	26	4	28	0.0	0.1
	MD-4	0	0	0	0	2	1	0	28	2	29	0.0	0.1
	MD-5	5	1	0	0	33	26	0	43	37	70	0.0	0.1
	MD-6	14	3	0	0	23	18	0	18	36	39	0.0	0.1
	MD-7	5	1	0	0	62	49	0	8	67	58	0.1	0.1
	MD-8	539	92	31	5	147	88	0	39	717	225	0.7	0.5
	MD-9	38	9	0	0	52	39	0	58	90	106	0.1	0.2
	MD-10	0	0	0	0	137	65	0	21	137	86	0.1	0.2
	MD-11	2	0	0	0	90	41	0	171	92	212	0.1	0.5
	MD-12	12	3	0	0	99	44	0	2	111	49	0.1	0.1
	MD-13	24	6	0	0	156	69	0	19	179	93	0.2	0.2
	MD-14	11	3	0	0	67	34	0	37	78	74	0.1	0.2
	MD-15	0	0	0	0	23	14	0	1	23	16	0.0	0.0
	MD-16	9	2	0	0	36	28	0	3	45	33	0.0	0.1
	MD-17	0	0	0	0	77	53	0	31	77	84	0.1	0.2
	MD-18	262	48	99	1	26	19	0	27	387	94	0.4	0.2
	MD-19	91	22	0	0	464	274	0	63	555	359	0.5	0.8
	MD-20	33	8	0	0	58	27	0	75	91	110	0.1	0.2
	MD-21	11	3	0	0	121	63	0	56	132	122	0.1	0.3
Sub-Total		1072	204	130	6	1677	956	0	769	2879	1936	2.7	4.1
MM1	MM1-1	29	7	0	0	120	39	0	12	149	58	0.1	0.1
	MM1-2	174	41	22	1	746	311	0	62	943	415	0.9	0.9
	MM1-3	0	0	0	0	39	12	0	23	39	35	0.0	0.1
	MM1-4	63	15	0	0	70	22	0	9	133	46	0.1	0.1
	MM1-5	527	92	2	0	1087	440	0	187	1617	720	1.5	1.5
	MM1-6	71	17	13	1	268	87	0	7	352	113	0.3	0.2
	MM1-7	0	0	0	0	456	166	0	10	456	176	0.4	0.4
	MM1-8	0	0	0	0	28	26	0	262	28	288	0.0	0.6
	MM1-9	2548	1199	2988	617	588	250	0	26	6124	2092	5.8	4.5
	MM1-10	64	15	0	0	1309	424	0	66	1373	505	1.3	1.1
	MM1-11	5	1	0	0	257	83	0	20	261	105	0.2	0.2
	MM1-12	514	84	1799	498	119	39	0	119	2432	739	2.3	1.6
Sub-Total		3995	1471	4825	1117	5086	1899	0	804	13906	5292	13.3	11.3
MM2	MM2-1	1107	177	329	30	166	117	0	60	1602	385	1.5	0.8
	MM2-2	2	1	0	0	17	17	0	55	20	72	0.0	0.2
	MM2-3	160	38	0	0	124	136	0	3	284	178	0.3	0.4
	MM2-4	63	15	0	0	27	32	0	144	90	191	0.1	0.4
	MM2-5	0	0	0	0	51	66	0	61	51	127	0.0	0.3
	MM2-6	174	39	9	0	76	89	0	132	259	260	0.2	0.6
	MM2-7	0	0	0	0	1	1	0	48	1	50	0.0	0.1
	MM2-8	60	14	0	0	200	190	0	6	260	210	0.2	0.4
	MM2-9	880	133	13	4	364	161	0	14	1257	312	1.2	0.7
	MM2-10	77	18	0	0	59	62	0	151	136	231	0.1	0.5
	MM2-11	0	0	0	0	10	7	0	38	10	46	0.0	0.1
	MM2-12	108	25	0	0	141	173	0	83	248	281	0.2	0.6
	MM2-13	684	114	771	53	76	76	0	72	1531	315	1.5	0.7
	MM2-14	98	23	0	0	114	146	0	1	212	170	0.2	0.4
	MM2-15	239	44	9616	192	65	60	0	136	9919	432	9.5	0.9
	MM2-16	0	0	0	0	6	7	0	70	6	77	0.0	0.2
Sub-Total		3652	642	10738	281	1497	1339	0	1075	15888	3337	15.2	7.1

Main Catch	Sub-Catch	Domestic (kg/d)		Industry (kg/d)		Livestock (kg/d)		Landuse (kg/d)		Total (kg/d)		% of Load*	
		BOD	TN	BOD	TN	BOD	TN	BOD	TN	BOD	TN	BOD	TN
MM3	MM3-1	312	50	0	0	125	101	0	76	438	227	0.4	0.5
	MM3-2	27	6	0	0	523	358	0	121	550	486	0.5	1.0
	MM3-3	182	31	0	0	146	125	0	34	328	190	0.3	0.4
	MM3-4	0	0	0	0	252	176	0	99	252	275	0.2	0.6
	MM3-5	0	0	0	0	78	55	0	196	78	251	0.1	0.5
	MM3-6	17	4	0	0	4	4	0	75	21	83	0.0	0.2
	MM3-7	2	0	0	0	36	36	0	74	37	110	0.0	0.2
	MM3-8	0	0	0	0	8	6	0	24	8	30	0.0	0.1
	MM3-9	2792	417	1828	4658	144	131	0	2	4764	5208	4.5	11.1
	MM3-10	136	32	0	0	179	188	0	24	315	244	0.3	0.5
	MM3-11	59	14	0	0	50	52	0	3	109	69	0.1	0.1
	MM3-12	8	2	0	0	155	162	0	67	163	231	0.2	0.5
Sub-Total		3535	557	1828	4658	1700	1394	0	795	7063	7403	6.7	15.8
MU1	MU1-1	0	0	0	0	127	68	0	108	127	175	0.1	0.4
	MU1-2	774	144	104	6	62	32	0	77	939	260	0.9	0.6
	MU1-3	296	53	417	34	26	28	0	51	740	165	0.7	0.4
	MU1-4	0	0	0	0	4	3	0	30	4	33	0.0	0.1
	MU1-5	0	0	0	0	12	9	0	11	12	19	0.0	0.0
	MU1-6	0	0	0	0	4	3	0	23	4	26	0.0	0.1
	MU1-7	0	0	0	0	29	18	0	9	29	27	0.0	0.1
	MU1-8	488	75	0	0	2	1	0	25	490	101	0.5	0.2
	MU1-9	24	6	0	0	56	45	0	2	80	53	0.1	0.1
	MU1-10	344	57	0	0	155	208	0	54	499	319	0.5	0.7
Sub-Total		1926	336	521	40	477	414	0	389	2924	1179	2.8	2.5
MU2	MU2-1	0	0	0	0	237	100	0	43	237	144	0.2	0.3
	MU2-2	4737	773	2057	181	120	51	0	20	6913	1025	6.6	2.2
	MU2-3	0	0	0	0	60	26	0	11	60	37	0.1	0.1
	MU2-4	17	4	0	0	134	64	0	25	151	93	0.1	0.2
	MU2-5	0	0	0	0	440	195	0	83	440	278	0.4	0.6
	MU2-6	0	0	0	0	114	50	0	27	114	77	0.1	0.2
Sub-Total		4753	777	2057	181	1105	487	0	210	7915	1654	7.6	3.5
PYA	PYA	221	52	22	2	363	212	0	176	606	442	0.6	0.9
Sub-Total		221	52	22	2	363	212	0	176	606	442	0.6	0.9
SAZ	SAZ-1	0	0	0	0	141	94	0	57	141	151	0.1	0.3
	SAZ-2	36	9	134	33	116	103	0	161	286	306	0.3	0.7
	SAZ-3	22	5	0	0	666	446	0	363	689	814	0.7	1.7
	SAZ-4	615	106	749	65	364	258	0	261	1727	690	1.6	1.5
	SAZ-5	0	0	0	0	32	22	0	17	32	39	0.0	0.1
	SAZ-6	1019	244	33	1	946	624	0	343	1999	1212	1.9	2.6
	SAZ-7	8095	1258	11749	8960	2434	1387	0	557	22278	12162	21.3	25.9
	SAZ-8	0	0	0	0	16	14	0	9	16	24	0.0	0.1
Sub-Total		9788	1622	12665	9059	4715	2949	0	1767	27167	15398	25.9	32.8
STA	STA	1088	199	103	4	114	95	0	122	1306	420	1.2	0.9
Sub-Total		1088	199	103	4	114	95	0	122	1306	420	1.2	0.9
STR	STR-1	327	90	39	11	591	426	0	313	957	839	0.9	1.8
	STR-2	141	34	145	6	81	102	0	81	367	223	0.4	0.5
	STR-3	2472	398	573	77	251	313	0	284	3295	1073	3.1	2.3
Sub-Total		2940	521	756	94	923	841	0	679	4619	2135	4.4	4.5
TOP	TOP-1	0	0	232	2	404	212	0	188	636	401	0.6	0.9
	TOP-2	189	70	0	0	172	171	0	234	361	475	0.3	1.0
	TOP-3	987	152	0	0	150	195	0	175	1137	522	1.1	1.1
	TOP-4	0	0	0	0	22	33	0	60	22	93	0.0	0.2
Sub-Total		1176	222	232	2	748	611	0	657	2156	1491	2.1	3.2
VAC	VAC-1	558	105	3	0	421	302	0	182	982	589	0.9	1.3
	VAC-2	40	9	0	0	12	23	0	70	52	102	0.0	0.2
	VAC-3	171	41	0	0	45	87	0	116	217	244	0.2	0.5
	VAC-4	170	30	0	0	58	75	0	91	228	196	0.2	0.4
Sub-Total		939	185	3	0	536	487	0	459	1478	1131	1.4	2.4
Total		47828	8858	36104	15628	20870	13279	0	9199	104801	46965	100	100

*: % of pollution load to the study area

TABLE G.3.6 LIST OF MINES AND RELATING FACILITIES

No on the map	Name and type of the object (Company)	Status	Products	
			main	others
1	Medet mine, open pit (" Assarel-Medet" Corp.)	mined out	Cu, Mo	
1a	Medet floatation plant	closed	Cu, Mo	
2	Medet tailings pond (in the Topolnitsa r. bed)	closed	Cu, Mo	
3	" Union Minier Pirdop - Copper" smelter (former: MDC - Pirdop)	active	Cu, Au	Ag, Se, Te, H_2SO_4
4	Chelopech floatation plant (BIMAC)	active	Au, Cu	pyrite
5	Chelopech mine, underground (" Chelopech" Corp.)	active	Au, Cu	pyrite, Ag, Se, Te
5a	Karlievo deposit	unassimilated	Cu	Mo
6	Chelopech tailings pond - slimes from floatation plant Chelopech (BIMAC)	active	Cu	As, Fe, Pb, Zn etc.
7a	Elatsite mine, open pit (" Elatsite Copper" Corp.)	active	Cu, Au, Mo	Se, Re, Pt
7	Mirkovo floatation plant - ores from Elatsite open mine pit (" Elatsite Copper" Corp.)	active	Cu	Mo, Au
8	Benkovsky 1 and Benkovsky 2 tailings ponds - slimes from Mirkovo floatation plant and from MDC - Pirdop	active	Cu	Mo etc.
9	Svishti Plaz gold deposit - ancient surface extraction, contemporary geological exploration - drills, tunnels	unassimilated	Au	U, Pb, Zn, As etc.
9a	Kapalu (Svishti Plaz west) - ancient surface extraction	closed	Au	Pb, Zn, As etc.
10	Assarel mine, open pit (" Assarel-Medet" Corp.)	active	Cu	Au, As, Pb, Zn, Mn, Fe
10a	Orlovo Gnezdo deposit	unassimilated	Cu, Au, Ag	Mo, Pb, Zn
11	Assarel floatation plant	active	Cu	pyrite etc.
12	WWTP Assarel	active	Cu, As	Pb, Zn, Mn, Fe, Al, S
13	Lyulyakovitsa tailings pond - slimes from Assarel floatation plant	active	Cu, As	Pb, Zn, Mn,

No on the map	Name and type of the object (Company)	Status	Products	
			main	others
				Fe, Al, S
14 14a	Mechka (Oborishte vill.) manganese deposits - small extraction before 1944	closed	Mn	Fe
15	Milkina Cheshma and Tangur (Panagyurishte) - manganese deposits - small extraction before 1944	closed	Mn	Fe
16	Strelcha pegmatite field - 8 deposits: Nyagolovitsa VI, Stramonos, Chimerikite, Djafaritsa I, Cherny Bachii III, Smilovene V, Vluk III, Varbeto	closed	feldspar	beryl (Be)
16a	Panagyurishte pegmatite field - 3 deposits: Muleiska Chukara, Mulei, Stara Reka	closed	feldspar	
17	Byalata prast (Engl.: " White soil") copper-pyrite deposit - small extraction before 1944	closed	Cu	pyrite
18	Krassen mine, underground (" Panagyurski mini" Corp.), mine dump	closed	Cu, Au	pyrite
19	Petelovo gold deposit - geological exploration: drills, tunnel	unassimilated	Au	Cu, Fe
19a	Kominsko Chukarche deposit	unassimilated	Cu	
20	Chervena Mogila (Engl.: " Red Hill") mine, underground - shaft, small extraction before 1944	closed	Cu, Au	pyrite
21	Radka mine, underground and open pit, 1928 - 1996 (" Panagyurski mini" Corp.)	mined out	Cu, Au, Ag	pyrite, Pb, Zn
22	Radka floatation plant (" Panagyurski mini" Corp.)	closed	Cu, pyrite	As, Pb, Zn, Fe etc.
23	Radka tailings pond	closed	Cu, Fe, S, As	Pb, Zn, Au etc.
24	Tcar Assen 1 mine, open pit (" Panagyurski mini" Corp.)	active	Cu	Au
24a	Tcar Assen 2 mine, same	active	Cu	Au
25	Momin Skok manganese deposit - small extraction before 1944	closed	Mn	Fe
25a	Toplika manganese deposit - small extraction before 1944	closed	Mn	Fe
25b	Goliya Vrah manganese deposit - small extraction before 1944	closed	Mn	Fe
26	Elshitsa mine, underground (" Panagyurski mini" Corp.)	active	Cu, Au	pyrite, Ag
27	Elshitsa floatation plant - ores from Elshitsa, Tcar Asen, Radka and Vlaikov Vrah (" Panagyurski mini" Corp.)	active	Cu, Au	pyrite, Ag

No on the map	Name and type of the object (Company)	Status	Products	
			main	others
28	Vlaikov Vrah mine, open pit (" Panagyurski mini" Corp.), huge mine dump	mined out	Cu	
28a	Popovo Dere deposit, geological exploration	unassimilated	Cu	Au
29	Luda Yana r. (Popintsi) placer gold deposit - alluvial, small production	active?	Au	gravel
29a	Luda Yana r. (Chernogorovo) placer gold deposit - alluvial	active?	Au	gravel
30	Topolnitsa r. (Dinkata) placer gold deposit - alluvial, exploration and production	active?	Au	gravel
30a	Topolnitsa r. (Kalugerovo) placer gold deposit - alluvial, exploration and production	active?	Au	gravel
31	Grancharitsa tungsten deposit - geological exploration: drills and tunnels	unassimilated	W	Mo, Pb, Zn, Au
32	Mihalkovo ore field - fluorine deposits - CaF_2 (underground mining): a - Neitchov Chiflik, b - Baalaka, c - Gagovi Nivi, d - Kirezlika, e - Mineralen Izvor, f - Petvar, g - Koteshnitsa	closed	fluorine	
33	KCM - Combine for non-ferrous metals - Plovdiv, smelter (KCM Corp.)	active	Pb, Zn	Cd, Ag, Au
34 34a	Chaya r. (Chepelarska r.) placer gold deposit - alluvial	active?	Au	gravel
35	Narechen (Levi Tsarvul) tungsten deposit - geological exploration: tunnel	closed	W	Mo, U
35a	Narechenski Bani occurrence	unassimilated	Mo	
35b	Visokat Kamak occurrence	unassimilated	Mo	
36a	Yugovo fluorine deposit, small, geological exploration	unassimilated	fluorine	Pb, Zn, Mo, U
36b	Yugovo molybdenum deposit	unassimilated	Mo, U	Pb, Zn
36c	Yugovo fluorine occurrence	unassimilated	fluorine	Pb
37	Chepelare kyanite deposit, open mine pits: a - Sivkovo - Chiflika, b - Chepelare 1, c - Chepelare 2	closed	kyanite	industrial minerals
38	Lakki ore field (" Gorubso" Corp., Madan) - lead-zinc deposits (underground mines): c - Braikovitsa (Mo, Pb, Zn), d - Persenk (Tcar Assen) (Pb, Zn, Ag, Cu), e - occurrence of Hg, f - Goranska Padina (Pb, Zn), g - Lakavitsa (Pb, Zn, Cu), h - Belitsa (Pb, Zn), i - Pilevo (Pb,	active	Pb, Zn, Ag	Au, ±U

No on the map	Name and type of the object (Company)	Status	Products	
			main	others
	Zn), j - Djurkovo (Pb, Zn), k - Chetroka (mine Han Asparuh) (Pb, Zn, U), l - Karnar Dere (Pb, Zn, Ag), m - Garkovitsa (Pb, Zn), n - Govedarnika (mine Druzhba) (Pb, Zn), o - Balkan Mahala (Pb, Zn, Ag), p - Kenan Dere - zones 1, 2, 5 (Pb, Zn), q - Studenets (Pb, Zn), r - Yanchova Reka (Sv. Duh) (Pb, Zn), s - Karachelebiitsa (Pb-Zn)			
38a	Lakki floatation plant (" Gorubso" Corp.) - in the town of Lakki	active	Pb, Zn, Ag	Au
38b	Lakki tailings pond (in the Yugovska r. bed)	active	Pb, Zn, Ag	Au
39	Spahievo ore field - lead-zinc, gold and uranium deposits (underground and open mining): a - Bukovo (Pilashevo) occurrence (Pb, Zn), b - Madjarsko Dere occurrence (Pb, Zn, Cu), c - Kotkite occurrence (Pb, Zn), d - Bryastovo (Pb, Zn, Cu, U), e - Mineralni Bani occurrence (Pb, Zn, Cu), f - Ramadanska Chuka occurrence (Pb, Zn, Cu), g - Chala (Au, Pb, Zn, Cu, U), h - Ramadanska (Dimitrova) Chuka occurrence (Mo), i - Erek Dere (Pb, Zn, Au), j - Severen Kontakt - SKMI (Pb, Zn, Cu), k - Kain Bunar (Pb, Zn, Au), l - Iredje Dere (Pb, Zn, Cu), m - Sazhe (Spahievo) (Pb, Zn, Cu, U), n - Mezarlak Sart (Pb, Zn, Cu), o - Sarnitsa - South (Pb, Zn, Cu), p - Gabrovo (Pb, Zn, Cu)	active	Pb, Zn, Ag, Au	Mo, Cu, ±U
40	Lozen ore field (" Madjarovo" Ltd.) - small lead-zinc deposits: a - Eremichki Dupki, b - Hvoinija Yamach, c - Madanya - Chinarya	closed	Pb, Zn, Cu	Ag, (Au)
41	Krepost iron deposit, small	closed	Fe	
42	Polski Gradets deposit, small - geological exploration	unassimilated	W, Au	Mo
43	Prohorovo porphyry copper deposit - geological exploration: drills, shaft	unassimilated	Cu	Au, Mo
43a	Zlatari occurrence	unassimilated	Cu	Au
44	Hristo Danovo deposit, occurrence exploration: tunnel	unassimilated	Mo	pyrite
45	Kazanite occurence - geological exploration: trench works	unassimilated	Mo	Cu
46	Sarnena Gora ore field - a number (about 25) of small vein gold deposits: a - Kolyo Marinovo, b -	closed	Au	Ag, Pb, Zn, W,

No on the map	Name and type of the object (Company)	Status	Products	
			main	others
	Chehlare SW, c - Chehkare - Kucheshki Vrah, d - Lisichi Dupki, e -Yamite , f - Sveti Nicola, g - Slavyanin, h - Gorno Novo Selo, i - Malko Dryanovo, k - Nova Mahala etc. - Ancient surface extraction of gold and small extraction of gold about 1922 - 1924. Source of gold for alluvial placer deposits along the rivers flowing southwards			Mo, As, Sb, Bi etc.
47	Ruda molybdenum deposits: a - Minata, b - Kazanka - Small extraction in the near past	closed	Mo	Cu, Pb, Zn, Au
48	Stara Zagora barite deposit - open mine pit	mined out	barite	Au
49	Stara Zagora ore field - small copper deposits: a - Rakitnitsa, b - Starozagorski Bani, c - Zmeevo, d - Hrishteni	closed	Cu	Ba, Fe, Au, Pb, Zn
50	Elenovo quartz deposit	mined out	quartz	
51	Sakar vein quartz deposits (10): Bogomil, Radovets, Hlyabovo, Glavan, Bulgarksa Polyana, Mladinovo, Lissovo, etc.	active	quartz	
52	Radnevo gypsum deposits ($CaSO_4.2H_2O$) - 9 deposits in the areas of Radnevo and villages of Gypsovo, Gledachevo, Kovachevo, Staroselets, Radetski and Novoselets	unassimilated	gypsum	
53	East Maritza coal basin - 7 deposits: a - EMCB, b - Malka Detelina, c - Skalitsa, d - West of Polski Gradets, e - West of Kovachevo, f - Kovachevo, g - Madrets. Opencast mining (" Maritza-East" Corp.)	active	lignite coal	
54	West Maritza coal basin (" Maritza basin" Corp.) - Dimitrovgrad (mines G. Gospodinova and Sminensky)	active	lignite coal	
55	Karlovo coal basin	unassimilated	lignite coal	
56	West Rhodope pegmatite field: 56a - Vlashkite Chuki (feldspar, mica), 56b - Sofan Dere (feldspar)	closed?	feldspar	mica
57	Lepenitsa deposit - quarry (" Chepino" Corp., Velingrad)	active	marble	
58	Pravoslav deposit - quarry (" Chepino" Corp., Velingrad)	active	breccia marble	
58a	Ognyanovo deposit	active	lime	
59	Golak deposit	closed	Fe	
60	Sarnevets deposit	closed	Fe, Au	Pb, Zn

No on the map	Name and type of the object (Company)	Status	Products	
			main	others
61	Gornoslav deposit	mined out	magnesite	
62	Gornoslav deposit	mined out	chromite	
63	Peyuvi Nivi deposit	mined out	Mn	
64	Vodenitsite small deposit	closed	Au	Pb, Zn, Cu As
65	Topolovo occurrence	unassimilated	Pb, Zn, Cu	
66	Novakovo - East occurrence	unassimilated	Au, Sb	As
67	Banska Reka occurrence	unassimilated	Cu	
68	Mostovo occurrence	unassimilated	Cu, Au	
69	Haikanska Chuka occurrence	unassimilated	P, agate, Au	
70	Malko Gradishte occurrence	unassimilated	U	
71 - 81	**Placer gold deposits - alluvial**			
71	Maritza (Belovo) placer gold deposit	active?	Au	gravel
72	Maritza (Septemvri) placer gold deposit	active?	Au	gravel
73	Chepinska r. (Lozen) placer gold deposit	active?	Au	gravel
74	Pyasachnik r. (Lyuben) placer gold deposit	active?	Au	gravel
75	Stryama r. (Pesnopoy) placer gold deposit	active?	Au	gravel
76	Luda Yana r. (Dolnoslav) placer gold deposit	active?	Au	gravel
77	Mechka r. placer gold deposit	active?	Au	gravel
78	Rahmanliiska r. (Zelenika) placer gold deposit	active?	Au	gravel
79	Medovska r. (Medovo, Chehlare, Slavyanin) placer gold deposit	active?	Au	gravel
80	Omurovska r. (Gorno Novo Selo - Bratya Daskalovi) placer gold deposit	active?	Au	gravel
81	Suha r. (Malko Dryanovo) placer gold deposit	active?	Au	gravel
82 - 100	**Uranium deposits:**	closed	U	
A.	*Infiltration (exogenic) sediment-hosted deposits* (" geotechnological method of mining" - wet mining, leaching with sulfuric acid solutions by a system of injection boreholes):	closed	U	
82	Kaloyanovo			
83	Momino			

No on the map	Name and type of the object (Company)	Status	Products	
			main	others
84	Tzeretelevo			
85	Trilistnik			
86	Belozem			
87	Pravoslaven			
88	Haskovo			
89	Navassen			
90	Maritza			
91	Troyan			
92	Madrets			
93	Vladimirovo			
94	Orlov Dol			
B.	*Hydrothermal (endogenic) deposits* (classic mining):	closed	U	
95	Kostenetz 1			
96	Kostenetz 2 (Byalata Voda - Dolna Banya)			
97	Zdravetz			
98	Byala Cherkva 1			
98a	Byala Cherkva 2			
99	Narechen (incl. Central, West and East sectors)			
99a	Narechen - Yugovo Sector			
100	Sarnitsa (Spahievo ore field)	unassimilated	U	Pb, Zn, Cu
101	Sveta Marina ore field: a - Altan Dere occurrence (Pb, Zn), b - Golyamata Reka occurrence (Pb, Zn, Cu), c - Sveta Marina deposit (Pb, Zn, Cu)	closed	Pb, Zn	Ag, Cu

Source:
Metallogenic map of Bulgaria (Dokov et al., 1989)
Metallogenic-prognosticating map of Bulgaria (Naphtali et al., 1991)
Metallogenic map for uranium in Bulgaria (Dragomanov et al., 1994)
Maps of the mineral resources (Vassilev et al., 1994)