UNDP/GEF Danube Regional Project

Strengthening the Implementation Capacities for Nutrient Reduction and Trans-boundary Cooperation in the Danube River Basin

FINAL REPORT

Project Component 1.5: Industrial reform and the development of policies and legislation towards the reduction of nutrients and dangerous substances

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Abbreviations

BAT	Best Available Technique
B&H	Bosnia and Herzegovina
BOD	Biological oxygen demand
BREF	Best Available Techniques Reference Documents
BWD	Bathing Water Directive
F B&H	Federation of Bosnia and Herzegovina
COD	Chemical oxygen demand
DPSIR	Driving Force-Pressure-State-Impact-Response framework
DRB	Danube River Basin
DRBMP	Danube River Basin Management Plan
DRP	Danube Regional Project
DRPC	Danube River Protection Convention
DSD	Dangerous Substances Directive
DWD	Drinking Water Directive
EMAS	Eco-Management and Audit Scheme
EMIS	Emission Inventory made by ICPDR
EMIS/EG	Emission Expert Group of ICPDR
EPER	European Pollutant Emission Inventory
GEF	Global Environmental Facility
ICPDR	International Commission for the Protection of the Danube River
IPPC	Integrated Pollution Prevention and Control
JAP	Joint Action Program
MLIM /EG	Monitoring, Laboratory and Information Management Expert Group
PE	Population Equivalent, a unit to measure pollution
RBM/ EG	River Basin Management Expert Group
SIA	Significant Impact Area

SM	Serbia Montenegro
SS	Suspended Solids
SWD	Surface Water Directive
TOR	Terms Of Reference
UNDP	United Nations Development Program
UNIDO	United Nations Industrial Development Organization
UNIDO-TEST	United Nations Industrial Development Organization -Transfer of Environmentally Sound Technology in the Danube River Basin
UNOPS	United Nations Office for Project Services
UWWT	Urban Waste Water Treatment
WW	Waste water
WWTP	Waste Water Treatment Plant

Executive Summary

The Danube River Protection Convention (DRPC) is the overall legal instrument for trans-boundary water issues in the Danube River Basin (DRB). The International Commission for the Protection of the Danube River (ICPDR) is the organization which facilitates the implementation of the DRBC.

This document is the Final Report of the UNDP-GEF Danube Regional Project (DRP) "Industrial Reform and the Development of Policies and Legislation Towards the Reduction of Nutrients and Dangerous Substances". This industrial policy project is a component of the larger DRP, which is a 5 year project managed by the GEF Danube Regional Project Team in Vienna. The methodology for this project involved four activities; secondary source analysis; site visits; review and verification of the information and the development of recommendations. Local consultants were hired to participate in the development of data in countries with the greatest need and in preparation of the industry case studies.

A policy framework approach was taken for the project. Simply stated a policy approach is a predictable, consistent response to a similar set of issues or situations. The advantage of a policy approach is that the emphasis on applying a proven response to future similar situations is more effective because the response has already been applied. It is also more efficient because the emphasis is on identifying and grouping situations with common set of characteristics rather than doing a detailed independent evaluation for each new situation.

This report provides an analysis and recommendations for the EMIS Inventory. It also reviews policies and identifies gaps between EU and existing and future legislation for industrial pollution control and enforcement mechanisms. Finally it examines alternatives for the further support for the application of Best Available Techniques in the DRB. While addressed in separate sections of this report the policy and EMIS Inventory are very much interrelated. The Industrial component of the Inventory provides data for the development of policies and is used as the basis of the analysis of the pressures and human impacts to be used in the DRBMP. When an industrial policy change is accepted in the DRB the EMIS Inventory may be used to identify the impacts of the policy change on the industrial emission reduction patterns in the DRB. The executive summary is organized into three sections; study process, findings and recommendations and next steps.

Study Process

A kick off meeting was held with the GEF Danube Project Manager, the ICPDR Executive Secretary and the ICPDR staff person responsible for the EMIS EG. During the inception period available documentation and changes which had taken place after the ToR was written were reviewed. Discussions were held with selected individuals including the EMIS EG Chair, representatives of the ICPDR and the DRP and individuals involved in the UNIDO-TEST Project. A revised work plan was developed at the end of the inception period

Key considerations which went into the revised work plan included:

- The steps taken by the ICPDR toward the implementation of the "Strategic Paper for the Development of a Danube River Basin Management Plan"
- The invitation from the European Union to the Czech Republic, Hungary, Slovakia and Slovenia to become EU Member States.
- Activities related to the implementation of Best Available Techniques (BAT) were growing rapidly in the DRB

These and other considerations were incorporated in the Inception Report which resulted in the work plan activities being organized into the following three groups:

1) Updating the EMIS Methodology
2) Policy and legislative analysis
3) BAT pollution reduction at industrial establishments

The three groups are interrelated in that the inventory data generally come from data sources required by national law, and the analysis of the data provides a basis for improving government policy and enforcement. Effective enforcement in turn is a key factor in causing pollution reduction in industrial establishments. During the inception period given the changing circumstances it was decided to produce a "road map" of recommendations. A road map provides options on how to get to a destination. A road map can also show routes under construction and the anticipated time of opening. In view of the changing situation in the DRB the "road map" approach would provide options and flexibility in data collection and policy activities to respond to developing conditions in the DRB. The "road map" provides both specific recommendations and strategic recommendations. The strategic recommendations allow the ICPDR to analyze ongoing changes in the DRB which the ICPDR may want to consider in the future activities and programs. Operational recommendations are more specific and can be implemented in a shorter time frame.

The project team made a presentation at the 17th EMIS EG meeting in Brno Feb 16-17, 2003 to outline the project approach. EMIS EG members were also given general information on the forthcoming country site visits at the Brno meeting. The Inception Report was put on the project website for review and comment. A structured interview guide was designed for the site visits. The EMIS EG member for each country was contacted to arrange for a site visit. The country EMIS EG member also arranged for discussions with other relevant people, for example, those involved in data collection, legislative development and BAT implementation. Site visits were made to 9 of the 11 countries. One country was not interested in participating and for the second mutually agreeable dates for the site visit could not be found. In two countries, Bosnia Herzegovina and Serbia Montenegro the project team had an additional task to fill data gaps. The project team, working with the national EMIS EG member and local consultants, provided data on 53 additional industrial installations. These were forwarded by the BiH EMIS EG for inclusion in the 2002 Inventory. In Serbia Montenegro, because of the almost continuous conflict for a long period of time, the data do not exist. However, systems and procedures are now being put in place for future data collection. The data collected from the site visit interviews were combined with information available from other sources was into a single consolidated country profile. To ensure that the information was accurate the final step in the process was to send a questionnaire and completed country profile to each EMIS EG member to verify the information collected by the project team. The information was incorporated into the draft final report. The draft final EMIS Methodology report was presented to the EMIS EG meeting in Ljubljana Feb 16-17, 2004. The comments made at that meeting are incorporated into the final report.

Findings

The study identified the institutional and legislative base in each country. The institutional base includes the organizations involved in water management and decision making in each country. The legislative base determines the pollutants regulated the allowable limits, the pollution charges and the data available on a continuing basis. The EU Directives were used as a framework for the legislative analysis. Both legislation and the institutional capacity to collect data, monitor and enforce the provisions of the water related legislation are necessary for effective water management.
The summary of the institutional base is included in detail is provided in section 4 of this report. The analysis of the institutional structure shows that, all of the countries have permitting, inspection and monitoring in place, however, the specifics differ on a country by country basis. Most countries rely on self-monitoring by individual installation and data are centrally collected and assessed.

The legislative situation at the national level appears below. The EU Water Directives, including the Water Framework Directive were used as the framework for the analysis because of the comprehensiveness of the Directives. In the 2000 plenary session in Sofia it was decided the EC Water Framework Directive would be the highest priority for the ICPDR.

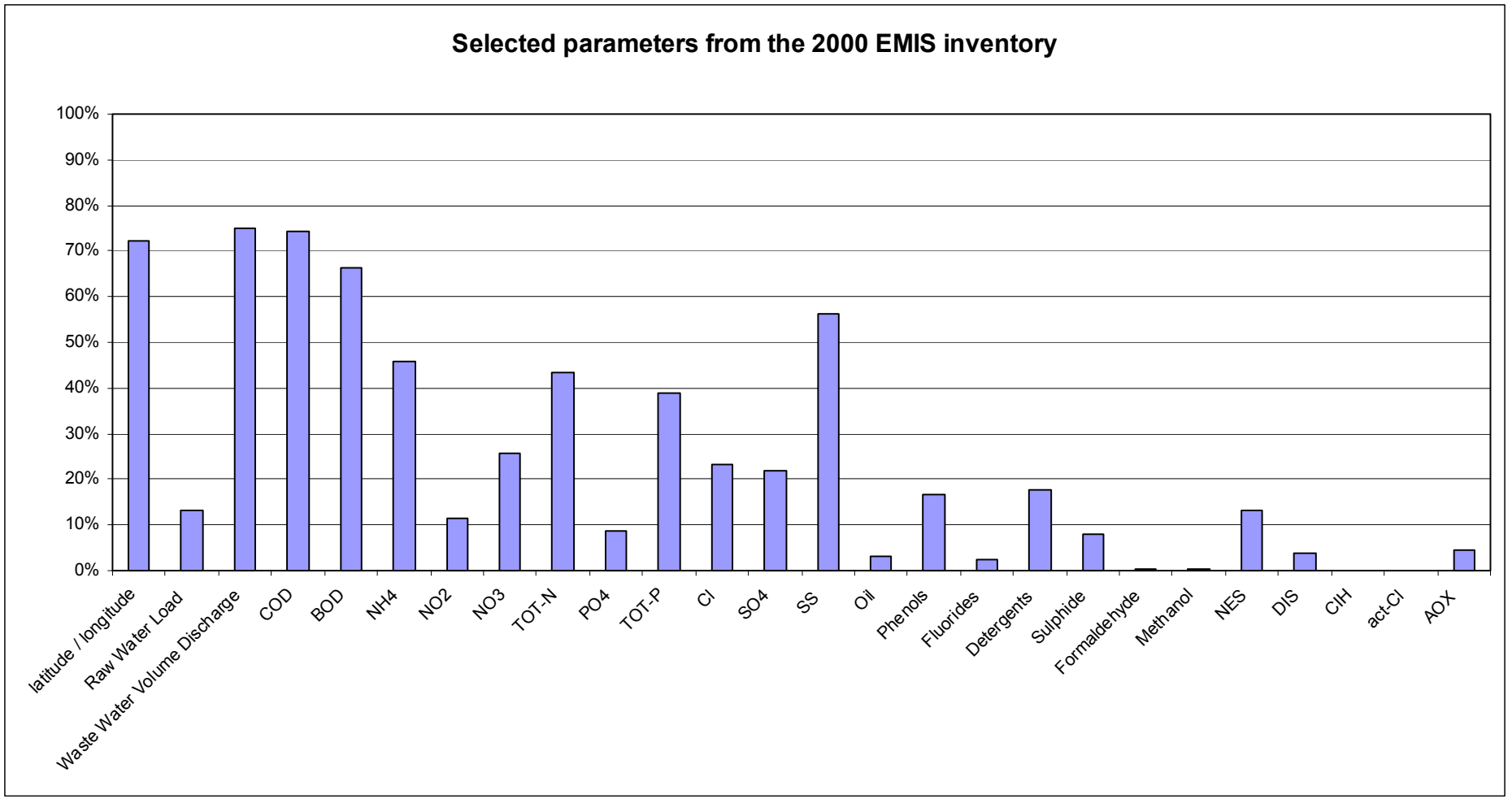
Summary of national legislation

Country/ Directive	Water Framework	Dangerous Substances	Integrated Prevention and Pollution Control	Seveso	Environmental Impact Assessment	Environmental Management and Audit Schemes
Bosnia & Herzegovina	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive
Bulgaria	Partially implemented using as future framework for national legislation	Transposed and substantially implemented in National Legislation	Partially implemented using as future framework for national legislation	Partially implemented using as future framework for national legislation	Fully implemented in National Legislation	Partially implemented using as future framework for national legislation
Croatia*	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive
Czech Republic	Transposed and substantially implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation
Hungary	Transposed and substantially implemented in National Legislation	Fully implemented in National Legislation	Transposed and substantially implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation
Moldova	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive
Romania	Partially implemented using as future framework for national legislation	Partially implemented using as future framework for national legislation	Partially implemented using as future framework for national legislation	Partially implemented using as future framework for national legislation	Transposed and substantially implemented in National Legislation	Partially implemented using as future framework for national legislation
Serbia - Montenegro	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive
Slovakia	Transposed and substantially implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation
Slovenia	Transposed and substantially implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation
Ukraine	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive

*Following the collection of this information Croatia was invited to begin the accession process. As part of that process Croatia has committed to adopting the EU legislation.

The analysis of legislation comparability with EU Directives results in the identification of three groups of countries. The first group; the Czech Republic, Hungary, Slovakia and Slovenia will have fully transposed the EU legislation by May 1st 2004. The second group; Bulgaria, Croatia and Romania is in the process of transposing the EU Directives into national law. For the third group Bosnia Herzegovina, Moldova, Serbia and Montenegro and the Ukraine EU legislation is not a major consideration in legislation development. The first group will become Member States in May 2004; the second includes those in the accession process, and the third group is comprised of those not yet involved in the accession process. Therefore on May 1st, 2004 nine out of the 13 DRB countries will be using the EU Directives or in the process of incorporating them into their national legislation. The legislative base in the DRB countries is proving a more consistent base for ICPDR activities including the implementation of the "Strategy Paper on a Danube River Basin Management Plan".

The first EMIS inventory was published in 1998. It was updated in 2000 and contains data on 12 countries in the DRB (no data are available for Serbia Montenegro). The 2000 inventory is divided into municipal sources (approximately 500 treatment plants) and industrial sources (approximately 220 installations). The following chart shows the data provided in graph form. The vertical axis provides the percentage of installations providing this data for all reporting installations in all countries. The horizontal axis identifies the individual parameter. The nine heavy metal parameters have been excluded from the chart because of the low general reporting rate for these parameters.


Selected parameters from the 2000 EMIS inventory
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
latitude / longitude
Raw Water Load
Waste Water Volume Discharge
COD
BOD
NH4
NO2
NO3
TOT-N
PO4
TOT-P
Cl
SO4
SS
Oil
Phenols
Fluorides
Detergents
Sulphide
Formaldehyde
Methanol
NES
DIS
ClH
act-Cl
AOX

The chart indicates the following:

- Location and waste water discharge and COD data are available for more than 70 % of the installations.

- COD data are available for between 60% and 70% of the installations.

- For fifteen or more that 50% of the parameters less than 20% of the installations provided data

There are no data available except for the industrial code for 24 or almost 10% of the installations
This is considerably less data in the Industrial Inventory than is available in the Municipal section of the EMIS Inventory.

The analysis shows that there is a high degree of consistency of the data parameters in the EMIS Inventory and other data bases with the most consistency occurring for dangerous substances. Data parameter comparisons are found in Appendix 7. However, the data is organized differently which limits computer based comparisons with data bases kept by other organizations.

Quality assurance is provided at the national level and varies widely in the DRB so that comparison of data among the countries contributing to the EMIS Industrial Inventory is limited.

The EMIS Inventory of industrial installations is being used to identify human activity and pressures for the Danube River Basin Management Plan (DRBMP). A chart of ICPDR activities related to the DRBMP including EMIS is provided in Section 3 of this report.

Recommendations

Detailed recommendations are contained in the body of the report and are summarized as follows:

For the EMIS Inventory there are two strategic recommendations:

- The EMIS EG should consult the users of the EMIS Inventory including the ICPDR Secretariat, the RBM EG, the MLIM EG and public users of the data in the inventory to identify and determine future uses of the inventory data

- The EMIS EG should analyze other developing sources which provide data for a significant portion of the DRB for example, the data reporting required under the EU Directives, to see if that data will be useful in assisting the work of the EMIS EG. An initial comparison of EMIS Inventory and the reporting requirements of the UWWT, Dangerous Substances and IPPC Directives indicates the following. The EMIS Inventory requires reporting on the basis of tons of BOD and COD emitted. The UWWT Directive requires the reporting for the agro food industry on the basis of sources emitting more than 4,000 PE. The data for 2004 will be published in 2006 under the UWWT Directive. The European Pollution Emission Register (EPER),created as part of the IPPC Directive, requires reporting from all installations which fall under the IPPC. An IPPC institution is one that uses one or more of the six categories of technology. Data is reported on the basis of threshold limit values of parameters. Data from the new EU member states should be included in the 2006 publication which will have the data from 2004.The Dangerous Substances Directive contains parameters which are most consistent with the EMIS Inventory and a comparison is included in Appendix 7 to this report. Under the Dangerous Substances Directive data will be collected annually and will be available to the EU Commission upon request. The EMIS Inventory requirements should be adapted to the DRBMP and the methodologies should be harmonized the WFD methodologies in the same manner as the Strategic Paper for the Danube River Basin Management Plan sets out for the MLIM.

The operational recommendations address the completeness, quality assurance and comparability of data in the inventory. With respect to completeness, the number of industrial installations needs to be increased and the gaps in reporting parameters reduces. Quality assurance varies widely and it is recommended that a uniform system be put in place. The EU Water Framework Directive requires a river basin approach for European Union Member States. It would be useful if the data provided in the EMIS Inventory uses international standard coding so that comparisons can be made with other data from other European river systems.

The detailed next steps are outlined in the body of the report.

For the legislation and policy analysis there are the following recommendations

- The EU Directives and policy have become increasingly important in the DRB now that 6 ICPDR member countries are also EU Member States. The ICPDR should establish a mechanism to support the six ICPDR national governments which are also EU Member States to advocate for future EU policy and decisions which are directed toward the reduction and prevention of the industrial water pollution in the DRB. This mechanism also could be used to support other ICPDR policy initiatives.
- For each of the ICPDR member countries, not involved in EU accession, it is recommended that a targeted three year support program for industrial pollution reduction policy and capacity building be developed. The components should include legislation drafting, institutional development, technical assistance and training among others. The program would be developed in cooperation with the individual national government and tailored to the needs

of each country. These activities should be complementary similar activities by other international organizations which are either underway or planned for these countries.

For the Further Application of BAT the following is recommended:

- There are an increasing number of sources providing information on legislation, BAT BREFs, BAT methodology and other BAT related materials available to national governments, industrial organizations and individual industrial installations in the DRB. It is recommended that a link on the ICPDR website be developed which will allow all interested parties to access the major sources and the experts which have worked with the EMIS EG on BAT issues.

1. Introduction and Study Process

The Danube River Protection Convention (DRPC) is the overall legal instrument for trans-boundary water management in the DRB. The International Commission for the Protection of the Danube River (ICPDR) was created to facilitate the implementation of the DRPC.
The Danube Regional Project (DRP) supports the ICPDR. The DRP is a five year project managed by the GEF Danube Regional Project Team in Vienna. The four immediate objectives of the Danube Regional Project are:

Objective 1: Creation of sustainable ecological conditions for land use and water management,

Objective 2: Capacity building and reinforcement of trans-boundary cooperation for the improvement of water quality and environmental standards in the DRB,

Objective 3: Strengthening of public involvement in environmental decision making and reinforcement of community actions for pollution reduction and protection of ecosystems,

Objective 4: Reinforcement of monitoring, evaluation and information systems to control trans-boundary pollution, and to reduce nutrients and harmful substances.

This project is component 1.5 "Industrial Reforms and the Development of Policies and Legislation Towards the Reduction of Nutrients and Dangerous Substances" (Industrial Policy Project) under Project Implementation Plan Phase One (2002-2003). An expert group within the ICPDR, the EMIS EG produces an EMIS Inventory which includes industrial sources.

The project will assist the EMIS/EG in its work and also the ICPDR in facilitating future policy and institutional development. Following the inception phase, as recommended in the Inception Report the activities for component 1.5 were organized into three groups:

- how to improve the EMIS inventory
- analysis of national industrial environmental legislation
- promotion of BAT in the region.

These three groups are interrelated. The inventory data generally comes from data sources required by national law, and the analysis of the data provides a basis for improving government policy and enforcement. Effective enforcement in turn is a key factor in causing pollution reduction in industrial establishments which results in reduced harmful emissions to the Danube and improved water quality.

Study Process

In September 2002 a kick off meeting was held with the GEF Danube Project Manager, the ICPDR Executive Secretary and the ICPDR staff person responsible for the EMIS EG. At that meeting the project consulting team was asked to use the inception period to conduct a preliminary review of documentation for example the "Strategic Paper for the Development of a Danube River Basin District Management Plan" and have preliminary interviews with selected individuals in order to develop a revised work plan .During the inception period a review of the available documentation both from the ICPDR and other sources was undertaken, along with discussions with selected individuals including the EMIS EG Chair, representatives of the ICPDR and the DRP and individuals involved in the UNIDO-TEST Project.

In 2000, at a Plenary Session in Sofia it was decided that the implementation of the Water Framework Directive for would be the highest priority for the ICPDR. The ICPDR produced the "Strategic Paper

for the Development of a Danube River Basin District Management Plan" This paper analyses, in detail, the Water Framework Directive requirements and applies them to the DRB. It includes a phased timeline and outlines the responsibilities of the Expert Groups within the ICPDR including the EMIS EG in developing the Danube River Basin Management Plan.

Another important event, which occurred during the inception period, was the invitation from the European Union to the Czech Republic, Hungary, Slovakia and Slovenia to become EU Member States. This has important implications for future pollution reduction policy initiatives in the DRB from two different perspectives. First, during the pre accession period these four countries were required to report regularly to the Commission on number of issues including progress in implementing the environmental component of the *Acquis communautaire.* This resulted in more data, with respect to water pollution, being updated regularly. There were also substantial funds available to address water pollution and other environmental issues. Foreign investment in the industrial sector was accelerated in anticipation of the EU membership. From a policy perspective each of these four countries had to transpose the EU Directives into their national legislation providing a solid legal basis for water management. The EU initiated changes went beyond these four countries as two other countries, Bulgaria, and Romania are also involved in the EU pre accession to become future Member States of the EU. Croatia has also applied to become part of the accession process. From May 1st 2004, nine out of the 13 DRB countries will have adopted the environmental section of the *Acquis communautaire* are actively working toward it.

It also became evident during the inception period that, in addition to the EMIS EG sector guidelines, other activities related to the implementation of Best Available Techniques (BAT) were growing rapidly in the DRB. Many of these activities occurred because of the requirement to implement BAT for those industrial installations falling under the jurisdiction of the Integrated Pollution, Prevention and Control (IPPC) EU Directive. For example, a BAT Centre has been established by the EU in Seville to provide Best Available Techniques Reference Documents (BREFs). The BREFs are very detailed and some are more that 1000 pages. Each EU Member State is putting in place a system to adapt the BREFs into national circumstances. Also the UNIDO-TEST project had developed a methodology and examples of BAT applications in conjunction with national Cleaner Production Centers in the DRB.
The progress toward implementation of the "Strategic Paper for the Development of a Danube River Basin District Management Plan", the implications of the expansion of the EU and the rapidly developing events with respect to the implementation of BAT in DRB countries were taken into consideration in producing revised work plan in the Inception Report.

During the inception period, given the changing circumstances, it was decided to produce a "road map" of recommendations. A road map provides options on how to get to a destination. A road map can also show roads under construction and the anticipated time of opening. In view of the changing situation in the DRB the "road map" approach would provide options and flexibility in data collection and policy activities to respond to developing conditions in the DRB. The "road map" provides both specific recommendations and strategic recommendations. The strategic recommendations allow the ICPDR to analyze ongoing changes in the DRB which the ICPDR may want to consider in the future activities and programs. Operational recommendations are more specific and can be implemented in a shorter time frame.

The project team made a presentation at the 17th EMIS EG meeting in Brno Feb16 -17, 2003 to outline the project approach. EMIS EG members were also given general information on the forthcoming country site visits at the Brno meeting. The Inception Report was put on the DRP website for review and comment. A structured interview guide was designed for the site visits. The EMIS EG member for each country was contacted to arrange for a site visit. The country EMIS EG member also arranged for discussions with other relevant people, for example, those involved in data collection, legislative development and BAT implementation. Site visits were made to 9 of the 11 countries. One country was not interested in participating and for the second mutually agreeable dates for the site visit could not be found. In two countries, Bosnia & Herzegovina and Serbia Montenegro the project team

had an additional task to fill data gaps. The project team, working with the national EMIS EG member and local consultants, provided data on 53 additional industrial installations. These were forwarded by the B&H EMIS EG for inclusion in the 2002 Inventory .In Serbia Montenegro, because of the almost continuous conflict for a long period of time, the data do not exist. However, systems and procedures are now being put in place for future data collection. The data collected from the site visit interviews were combined with information available from other sources was into a single consolidated country profile. To ensure that the information was accurate the final step in the process was to send a questionnaire and completed country profile to each EMIS EG member to verify the information collected by the project team. The information was incorporated into the draft final report. The draft final EMIS Methodology report was presented to the EMIS EG in Ljubljana. The comments made at that meeting are incorporated into the final report.

This report is organized into two main sections. The first section addresses issues related to the EMIS and the second industrial policy issues and the implementation of BAT in the Danube River Basin.

2. EMIS Inventory

The first EMIS inventory was published in 1998. It was updated in 2000 and potentially contains data on 13 countries in the DRB. The 2000 EMIS Inventory is divided into municipal sources (approximately 500 treatment plants) and industrial sources (approximately 220 installations). The methodology consists of a one pages set of instructions for filling in the country worksheets. This analysis is based upon the 2000 EMIS Inventory because it was the last version completed before the start of this project. The analysis is focused on the industrial installation component of the inventory data.

The EMIS Inventory provides base data in a number of key areas. The inventory may potentially be used as an input into the development of the DRBMP and effective industrial policy. The inventory is designed to identify the major polluters, loads, locations and future costs of upgrading.

Danube River Basin Management Plan (DRBMP)

At the 3rd Plenary Session in Sofia in November 2000 the following resolution was passed. "The Implementation of the EC Water Framework Directive is considered as being the highest priority of the ICPDR" The following chart shows the ICPDR approach to the development of the DRBMP.

The EMIS EG is responsible for providing input into identifying pressures and effects from human activities as input into the DRBMP process. The approach of this project is to build upon prior EMIS EG achievements. Therefore, existing documents on the methodology were reviewed and the gaps in the 2000 inventory were identified. This provided the basis for the recommendations and strategies identified in this report.

2.1 Objectives of EMIS inventory

Historically, the EMIS inventory was developed to provide the base data supporting the identification and development of policies aimed at pollution reduction in the Danube Basin. Thus data from inventory can help to identify industrial pollution sources by industrial sector, pollutant impact, location or other criteria.

The objectives of the inventory are to identify sources for 75% of the municipal discharges into the Danube River. For industrial sources, the focus was devoted to selected industries in which polluters discharge more than 1 ton of BOD per day or 2 tons of COD per day into the DRB.

The EMIS inventory has been used in several research and development projects:

- The formulation of the Joint Action Program (JAP) 2001-2005
- Monitoring program (TNMN) conducted by MLIM EG and Joint Danube Survey Trip (2001)
- The Concept Paper on Pressures and Impacts (2003)
- the UNDP/GEF project on Strengthening the Implementation Capacities for Nutrient Reduction and Trans-boundary Cooperation in the DRB
- The selection of priority industries in the GEF/UNDP Industrial Policy Project (1.5).

The EMIS inventory is placed on DANUBIS, so it is accessible to the public.

The DRBMP uses a conceptual approach that has been used by the European Environmental Agency, the OECD and others. This approach shows the causality between human activities and environmental policies. It is shown in the figure below.

In this conceptual framework driving forces describes human activities, for instance, industrial production or wastewater treatment plants. Pressure describes the problems caused by the driving force on the function/use in the river basin. State means, for example, what concentration of pollutants are present or what are the characteristics of the ecosystem. The impact describes the loss of function/use e.g. toxicity that causes a decrease in the fish population. Finally, responses describe the political action taken to deal with the problems.

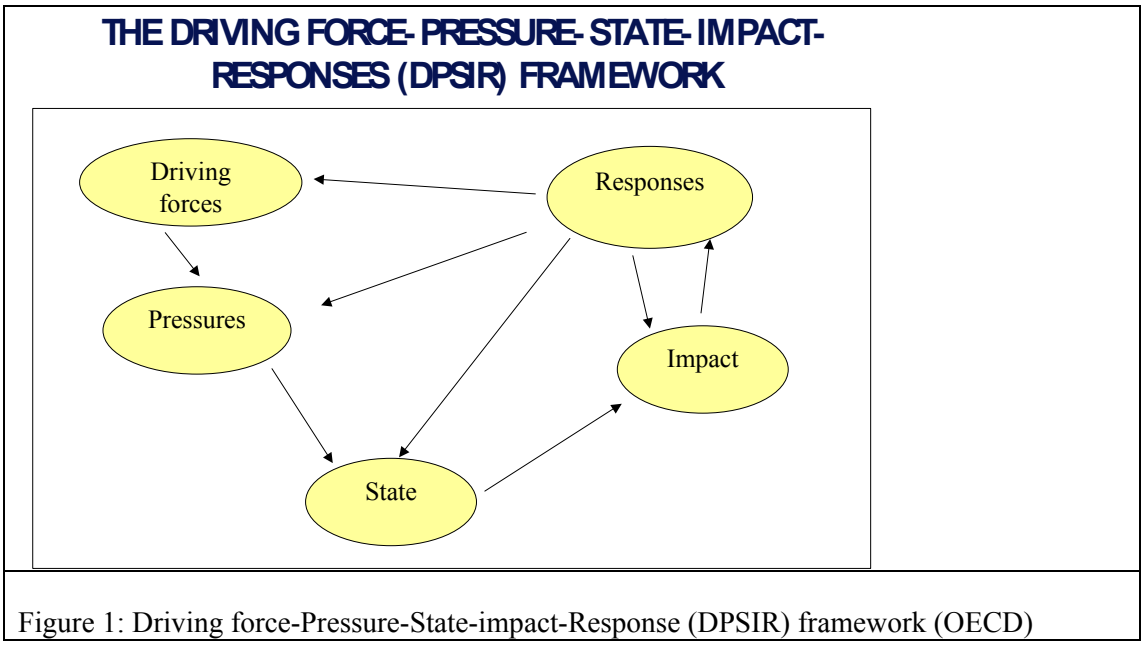


Figure 1: Driving force-Pressure-State-impact-Response (DPSIR) framework (OECD)

Within this framework the EMIS Inventory data will be used to identify and analyze pressures and the effect of human activities.

2.2 Current status

In order to develop recommendations for the update of the EMIS inventory, the current status with respect to procedures and basic features of the EMIS inventory was assessed. The assessment was based upon an analysis of the existing EMIS inventory, review of existing guidelines and procedures for the inputs into the EMIS inventory, and personal interviews with members of the EMIS EG and other experts.

2.2.1 Compilation of data in the EMIS inventory

The EMIS inventory is based upon national data sources. Individual countries do not specifically collect data for the EMIS Inventory. The data provided is collected for other purposes. The most common source of data for the inventory is national data from the pollution permit and pollution charges. National governments have an incentive to keep accurate data in these data bases because they provide revenue for them in the form of fees and fines.

The industrial component of the EMIS Inventory includes selected industries, in which polluters discharge more than 1 t of BOD per day or 2 tons of COD per day into the DRB. Data are compiled in different ways at the national level and then transferred to the EMIS/ EG. However, the list of designated institutions responsible for providing the data to the EMIS EG members for the EMIS Inventory is not available therefore it is difficult to evaluate the base data sources. These sources differ

from country to country. The EMIS EG members provide as consistent as possible approach to the process subject to individual country conditions and constraints.

There are also large variations in procedures used for reporting of both at the level of individual installation and monitoring agencies to the national authority or designated institution. The variations include frequency of sampling, parameters monitored, and reporting format. The EMIS EG members are responsible for the facilitation of the collection process but not the data collection itself. The Guidelines of the ICPDR that are regularly distributed to the representatives of EMIS EG are limited to "the transfer" of the compiled data. The one page guidelines contain information on format and how and when to transfer data from a national database to the ICPDR. The situation is most complicated in countries that have not yet developed a national database or where comprehensive monitoring does not exist.

2.2.2 Parameters in the industrial component of the EMIS inventory

The following parameters are included:

- AV code
- River basin and river codes and name of main river
- raw water load (in thousand of pe),
- volume of WW discharged (m^3/year)
- industrial sector code
- BOD and COD
- nutrients (NH_4-N, NO_2-N, NO_3-N, TOT-N, PO_4-P and TOT-P)
- enlarged parameters (Cl, SO_4, SS, Pb, Cr, Cd, Cu, Fe, Mn, Ni, Zn, As, Mg, Al, Hg, oil, phenols, fluorides, detergents, sulfides, formaldehyde, methanol, NES, DIS, CIH, act-Cl, AOX)[1]

In addition, the 2000 EMIS inventory, latitude and longitude information was collected to provide the basis for the design of maps.

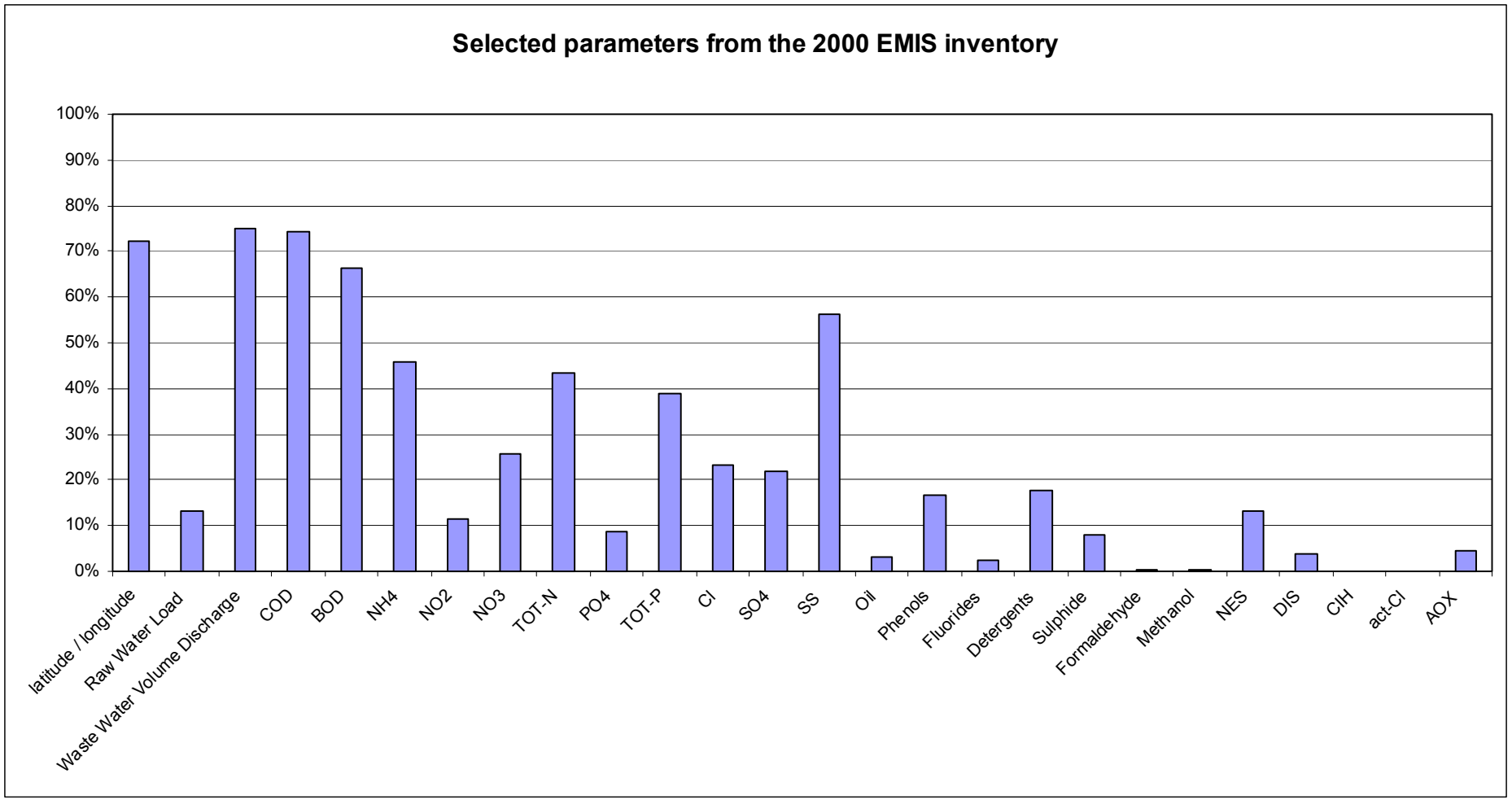
2.3 Gaps in the EMIS inventory

As a part of this analysis, a questionnaire was used to collect information with respect to the mechanism of data collection. EMIS EG representatives from six DRB countries (of the eleven requested) submitted the questionnaire. This level of response restricts the overall evaluation and comparison with the Report on the Summary of National Practices concerning the Monitoring of Wastewater Discharges conducted in 1998-99 (ICPDR Report, IC/20/2000). However, it is still a useful indicator and the summary of the questionnaire is appended to this report

2.3.1 Data Gaps

There are gaps with respect both with respect to installations included in the EMIS Inventory and data from reporting installations. There are 265 installations in the 2000 EMIS industrial Inventory. A summary for selected parameters are shown in the chart below. . The vertical axis provides the percentage of installations providing this data for all reporting installations in all countries. The horizontal axis identifies the individual parameter. Heavy metals have been excluded from the chart because of the low general reporting rate for these parameters.

[1] Parameters in the EMIS inventory 2000. For the EMIS inventory 2002, the Danube List of Priority Substances is to be included.


Selected parameters from the 2000 EMIS inventory
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
latitude / longitude
Raw Water Load
Waste Water Volume Discharge
COD
BOD
NH4
NO2
NO3
TOT-N
PO4
TOT-P
Cl
SO4
SS
Oil
Phenols
Fluorides
Detergents
Sulphide
Formaldehyde
Methanol
NES
DIS
ClH
act-Cl
AOX

The chart shows the following:

- Location and waste water discharge data are available for 70 % of the installations.
- COD and BOD data are available for more that 60% of the installations
- For fifteen (more that 50%) of the parameters less than 20% of the installations provided data

There are no data available except for the industrial code for 24 or almost 10% of the installations. This is considerably less data than is available in the Municipal section of the EMIS Inventory.

2.3.2 Procedural Differences

Reporting procedures differ from country to country. Several countries require self-monitoring of polluters and self-monitoring data are published in the inventory. In other cases the information is obtained from a central database originating from designated laboratories. Because these have different levels of accuracy and reliability the aggregate data require careful interpretation.

2.3.3 Quality assurance

The quality of data relies on the nationally designated reporting institution. There are several factors that might influence the quality of data in the inventory. The factors include monitoring systems and sampling methodology as well as recording and reporting requirements within the country. Periodic checks have been made however there is no continuing quality assurance procedure in place at the EMIS EG level. As a result of this, the data included in the EMIS inventory have limited use in comparing individual countries or parameters for the DRB generally.

2.3.4 Financial Support

There is no internal money available to pay the extra costs to collect data on parameters in the EMIS Inventory that are not collected for national purposes. This is a limiting factor in data collection.

2.4 Recommendations to up-date the methodology of the EMIS inventory

Two types of recommendations; strategic and operational are outlined in this section. Strategic recommendations address the question of how the EMIS Inventory will be used in the future. Operational recommendations address more specific issues within the inventory itself.

2.4.1 Strategic Recommendations

There are two strategic recommendations:

- The EMIS EG should consult the users of the EMIS Inventory including the ICPDR Secretariat, the RBM EG, the MLIM EG and public users of the data in the inventory to determine future uses of the inventory data
- The EMIS EG should analyze other developing sources which provide data for a significant portion of the DRB for example, the data reporting required under the EU Directives, to see if that data will be useful in assisting the work of the EMIS EG. An initial comparison of EMIS Inventory and the reporting requirements of the UWWT, Dangerous Substances and IPPC Directives indicate the following. The EMIS Inventory requires reporting on the basis of tons of BOD and COD emitted. The UWWT Directive requires the reporting for the agro food industry on the basis of sources emitting more than 4,000 PE. The data for 2004 will be published in 2006 under the UWWT Directive. The European Pollution Emission Register (EPER), created as part of the IPPC Directive, requires reporting from all installations which fall under the IPPC. An IPPC institution is one that uses one or more of the six categories of technology. Data is reported on the basis of threshold limit values of parameters. Data from the new EU member states should be included in the 2006 publication which will have the data from 2004.The Dangerous Substances Directive contains parameters which are most consistent with the EMIS Inventory and a comparison is included in Appendix 7 to this report. Under the Dangerous Substances

Directive data will be collected annually and will be available to the EU Commission upon request.

The EMIS Inventory requirements should be adapted to the DRBMP and the methodologies should be harmonized the WFD methodologies in the same manner as the Strategic Paper for the Danube River Basin Management Plan sets out for the MLIM.

2.4.2 Operational Recommendations

The operational recommendations address the completeness, quality assurance and comparability of data in the inventory.

There are very significant gaps in the industrial section of the 2000 EMIS Inventory. Therefore, it is recommended that the EMIS EG take the following steps. First, update the number of industrial installations in the DRB. Second, review the parameters in the inventory for which significant gaps in data have been identified in this report. Discuss with national governments the reason for the gaps and whether if the data will be provided in the future. For the data for which national governments do not plan to provide data remove the parameters from future inventories or find other possible sources.

Quality assurance is the responsibility of each national government. The data in the inventory is gathered from self monitoring and government monitoring and reporting systems. Sampling, measurement methods and analytical procedures vary widely within the DRB. Therefore it is recommended that future inventories indicate the data gathering method e.g. self monitoring. Also, the EMIS EG should review the quality assurance system in place in each country and recommended changes as necessary to ensure that the data published in future inventories are of uniformly high quality.

The EU Water Framework Directive requires a river basin approach for European Member States. The implementation of the "Strategic Paper on Danube River Basin Management Plan" places the ICPDR at the forefront of river basin management in Europe. The approaches, experiences, and data collection system of the ICPDR will likely be used as an example for other river basins in Europe. Therefore, it would be very useful if the data provided in the EMIS Inventory uses international standard coding so that comparisons can be made among river basins and the transfer of knowledge and information from the ICPDR to other basins will be facilitated.

2.4.3 Next Steps

The next steps for the implementation of are addressed in this section.

IDENTIFY FUTURE USES

Specify current users and uses of the data. Future EMIS Inventories should be directed toward the users and uses of the data. The following steps should be taken by the EMIS EG:

- Identify the current users and uses for the EMIS Inventory including RBM EG, MLIM EG, and public users of the EMIS Inventory data.
- Develop a questionnaire for users including the following:
  - Existing uses of EMIS EG Inventory
  - Suggestions for changes in future EMIS Inventories to facilitate existing uses
  - Future potential data needs
  - Suggestions on how future EMIS Inventories could provide data and analysis relating to -these future data needs
- Organize a stakeholder workshop to discuss future users and uses for the EMIS Inventory
- Conduct a stakeholder analysis using the questionnaire and results from the workshop
- Revise future inventories to reflect the results of the user analysis.

REVIEW DEVELOPING DATA SOURCES TO IDENTIFY SYNERGISM

The purpose of the review is both to see what data, collected by other organizations such as the EU, might be useful to the EMIS EG. At the same time an understanding of other data collection systems provides the basis for future discussions among the institutions collecting data on industrial sources in the DRB.

Identify emerging sources of data for example the data collection and reporting requirements in the, European Pollution Emission Register, Urban Waste Water Treatment Directive and the Dangerous Substances Directive.

Within these emerging sources analyze the parameters, methods and timing of publication as possible input into future EMIS EG activities including future EMIS inventories. The EMIS Inventory requires reporting on the basis of tons of BOD and COD emitted. The UWWT Directive requires the reporting for the agro food industry on the basis of sources emitting more than 4,000 PE. The data for 2004 will be published in 2006. EPER created as part of the IPPC Directive requires reporting from all installations which fall under IPPC. An IPPC institution is one that uses one or more of the six categories of technology. Data is reported on the basis of threshold limit values of parameters. The Dangerous Substances Directive is the most consistent with the EMIS Inventory. The EU Directive Reporting Requirements are in Appendix 5 of this report.

Develop a plan to use as appropriate emerging sources as input into the EMIS EG activities.

REVISE FUTURE INVENTORIES

Develop an updated list of industrial institutions using information collected by other organizations. For example information can be found in EU accession reports including country reports and the national lists of industrial installations requiring permitting under the IPPC Directive.

The EMIS Inventory requirements should be adapted to the DRMP and the methodologies should be harmonized the WFD methodologies. This will have the EMIS Inventory following a parallel path with the one recommended for MLIM in the Strategic Paper for the Danube River Basin Management Plan.

The operational recommendations provided in this report, the results of the user analysis and emerging data sources should be used in revising future inventories.

3. Policy and Legislation

This section of the report addresses the following items in the ToR:

1.5.4 Review policies and relevant existing and future legislation for industrial pollution control and identification enforcement mechanisms at the country level.
1.5.5 Compare and identify gaps between relevant EU and national legislation
1.5.6 Develop necessary complementing policy and legal measures for the introduction of BAT

3.1 Methodology

The methodology involved three activities; secondary source analysis; site visits; review and verification of the information. For the secondary source analysis general country documentation and more specialized studies for the World Bank and the EU as well as other available sources were used. The EU studies were particularly detailed and useful for those countries in the process of joining the EU. Country visits were offered to each of the countries. Only one country did not want to participate and a second was not visited due to problems in finding a suitable date. Local consultants were hired to participate in the development of data in countries with the greatest need and in preparation of the industry case studies for the application of BAT. A country profile was prepared for each country including a general overview of the institutional structures and legislation in place or being prepared using EU legislation to provide the framework. The information on individual countries was then summarized recommendations developed to address all of the countries in the basin.

3.2 Policy Framework

Simply stated a policy approach is a predictable and consistent response to a similar set of issues. The advantage of a policy approach is that the emphasis on applying a proven response to future similar situations is more effective because the response has already been applied and proven itself. It is also more efficient because the emphasis is on identifying and grouping situations with common set of characteristics rather than doing a detailed independent evaluation for each new situation.

The policy development process involves data collection and analysis, education and awareness and the implementation of the appropriate measures to address the issue being addressed. The process is not always sequential. A negative environmental event such as an oil spill or the leakage of toxic waste which results in an immediate and highly visible impact including the loss of human or animal life may raise awareness that results in pressure to implement immediate measures to prevent future occurrences. On the other hand, substances such as PCB's, which only become evident over longer periods of time, are often first discovered through the painstaking data collection and analysis by experts.

Policy makers sometime try to speed up the expert analysis in order to be able to make an informed decision. In other situations they find themselves resisting the pressure to take immediate action after a highly visible event so that enough information is available to put in place the appropriate solutions. As the cross border nature of environmental issues and policies becomes more apparent, it is necessary for decision makers in several jurisdictions to make compatible decisions. Political boundaries do not always coincide with ecological systems. The Danube River Basin is an example of a situation where this occurs. International conventions and agreements are often used to address trans-boundary environmental issues. However, the impact of the convention is dependent upon the actions of individual national governments. These governments may have different legislation and institutional frameworks.
In the Danube River Basin, in addition to the DRPC is the legal instrument for dealing with trans-boundary water issues in the DRB. In addition there is EU Directives and national legislation. Initially

only two countries in the DRB were EU Member States. However as of May 1 2004, four more will become Member States and an additional three are aligning their national legislation and supporting systems to become members. The majority of Danube countries will have very similar legal environmental management systems. This has important implications for future industrial pollution reduction and prevention activities within the context of the Danube River Basin Management Plan which is currently being developed. The EU IPPC Directive will legally require the application BAT mandatory for the majority of the Danube countries and result in the creation of the European Pollution Emission Registry. Therefore the IPPC Directive will be the driving force for BAT in the majority of countries. IPPC and other directives such as the Water Framework Directive have data reporting requirements which need to be taken into account for future data collection activities of the ICPDR, for example, the EMIS Inventory.

In the following section a description of the existing and future situations is compared with the EU requirements on a country by country basis. The policy and legislation is reviewed, gaps identified, and the IPPC Directive of the EU also provides the basis for addressing issues relating to the implementation of BAT.

3.3 Country Profiles

In this section the country profiles are presented. Each profile begins with a general description including the political structure, economic indicators and similar information. This is followed by sections on legislation, institutions, permitting, monitoring, inspection and selected industrial pollution information.

3.3.1 Bosnia-Herzegovina

General Background

The relatively new state of Bosnia-Herzegovina is an administratively decentralized state, organized into two entities: Federation B&H (F B&H) and Republic of Srpska (RS), both having a high degree of autonomy. F B&H is further decentralized, into ten cantons each of which has a high degree of authority in decision making. The Republic of Srpska is more centralized.

Main characteristics of FB&H and macroeconomic indicators, 2001/2002

Indicator	**Unit**	
Population	Inhabitants	3 964 388
GDP	USD	7 billion (estimate in2001)
GDP per capita	USD	1 800 (estimate in2001)
Inflation rate	%	5
Unemployment rate	%	40 (estimate 2001)

1 EURO = 1.95BAM (Bosnian convertible mark)

GDP remains far below the 1990 level. Real growth of the GDP in 2001 was estimated at 6%. GDP distribution is agriculture 16%, industry 28%, services56% (1998 estimated). The main industries are: steel, coal, iron ore, lead, zinc, manganese, bauxite, vehicle assembly, textiles, tobacco products, wooden furniture, tank and aircraft assembly, domestic appliances, oil refining.

Environmental issues include air pollution from metallurgical plants; limited sites for disposing urban waste; water shortages and destruction of infrastructure because of the 1992-95 civil strife.

B&H water courses are part of the Black Sea and Adriatic Sea catchment areas. Of the 51,129 km2, which is the total area of B&H, 38,719 km2 or 75.7% is part of the Black Sea, that is, the Sava River catchment area, while 12,410 km2 or 24.3% is part of the Adriatic Sea catchment area. The Black Sea watershed is the larger. The complete Sava river basin is part of the Danube River basin. The B&H national legislation defines 5 sub-river basins of the Sava River: Una-Sana, Vrbas, Bosnia, Drina and

additional sub-river basin with small rivers that are direct tributaries to the Sava River. There are three sub-river basins Trebisnjica, Neretva and Cetina which are part of the Adriatic Sea watershed.

Federation of Bosnia and Herzegovina (F B&H)

Water related legislation

There is a new water law, which was approved by the state Parliament in both entities. The law mainly provides for the establishment and financing of the public water companies, but there are problems providing sufficient data on permits, legal procedures, international standards and conditions for water use.

The Federal Water Law (OJ F FBiH 18/98) states that it is necessary to adopt 22 regulations, decrees and by-laws. Cantonal water laws exist in Sarajevo, Tuzla Zenicko-dobojski and Srednjebosanski canton. Unsko-sanski and Bosanskopodrinjski cantons use the federal law. Furthermore, the Water Law does not clearly state what matters are to be regulated by cantonal water laws. The Federal Water Law creates basic requirements for the control of industrial water pollution.

There is a Regulation on Dangerous Substances which stipulates substances which must not be discharged into water and a regulation on maximal concentrations of contaminants as well as radio nuclides.

The country lacks an effective framework for environmental licensing. However, a new set of laws on environment related issues were recently adopted by the Assembly in both entities – F B&H and RS. Environmental Framework Law includes the following sectoral environment laws, Law on Water Protection, Law on Waste Management, Law on Nature Protection, and Law on Air Protection. This new framework will build upon the principles of the integrated permit system. The laws do not correspond with the water regulation within EU.

EU Directive	**Compliance**
Water Framework	not transposed
Dangerous Substances	not fully transposed but partially covered in existing Water Law
Integrated Prevention and Pollution Control	not transposed but the principle is contained in the Environmental Framework Law
Seveso	not fully transposed, some proposals considered
EIA	not transposed but is addressed in the Environmental Framework Law
EMAS	not transposed

Institutions

The Federation consists of ten cantons. According to the Federation Constitution, the cantons have all competencies not expressly granted to the Federation Government. The cantons exercise self-government through their own legislatures, executives and judiciaries.

Bosnia-Herzegovina does not have either a ministry or agency responsible for environmental issues. Instead the responsibility is shared among at least four ministries: Ministry of Foreign Affairs, Ministry of Foreign Trade and Economic Relations, Ministry of European Integration, and Ministry of Civil Affairs and Communications. In the F B&H (similarly to the Republika Srpska) there are two ministries responsible for environmental protection –Ministry of Agriculture, Forestry and Water Management and the Ministry of Physical Planning and Environment. The first concentrates on water management, the second on the water and air protection and waste management.

The main functions and tasks related to water are assigned to the cantons. The Cantonal Ministry responsible for water management is usually the ministry of Agriculture, Water Management and Forestry. They are responsible for licensing and allocation of water resources (drainage, irrigation, water supply, waterways for navigation, hydropower, and water protection). The other water sector responsibilities are split among cantonal ministries of physical planning and environment. The former

have jurisdiction over the ownership of water utilities and are responsible for the operation and maintenance as well as investments in these facilities. The latter will be responsible for water resources, new water sources, flood control, water pollution control and new investments in the relevant facilities.

In order to coordinate environmental issues between the two entities two inter-entity bodies, called the Commission for Water and the Environmental Steering Committee, were established in 1998. There are some overlapping duties referred to in the memoranda of understanding on the establishment of these steering committees. The Water Steering Committee is in charge of co-operation between the competent ministries of the entities in water matters, aiming to eliminate eventual conflicts in water management. Some of the tasks for the Commission for Water are:

- International relations
- Harmonize the water management regulations
- Harmonize water quality standards and monitoring of water quality
- Compile and exchange information between the two entities

The tasks of the Environmental Steering Committee (ESC) are similar but related to environmental issues. ESC deals with all issues related to the environment, coordinating between the competent ministries of the entities.

The major sources of pollution usually come from government-owned companies, which cause problems in regulation. The relationship between the polluter and the regulator has a tendency to be too close and thus the laws are poorly enforced. The direct relationship between the government and the companies has made it difficult for the public administration to acknowledge environmental problems.

F B&H has only a few cleaner production initiatives and the environmental regulation does not fully support these initiatives.

Permitting

Water acts describe conditions, approvals and permits for water. They also give conditions for other permits e.g. construction, mining. Permits are issued by cantonal and the federal (FB&H) Ministry of Water Management. Permits contain conditions for water consumption (quantity, site and way of extraction), conditions for water discharge (degree of water treatment/cleaning, quantity, quality and site of water discharge), fees, etc. Permits are time limited having validity between one and 30 years.

The organizational structure causes problems and overlaps in the permit system. Both the Ministry of Physical Planning and Environment and the cantons have permit systems for large companies. The central ministry has a uniform applications procedure throughout the Federation on permitting and inspecting large and medium-sized companies. During the permit procedure the Ministry of Agriculture, Water Management and Forestry should be consulted. The permit is given in three steps: 1) Location permit, 2) Building permit and 3) Resource use permit. In the case where the cantons also have permit systems it complicates the process for the companies and in some cases they do not know where to apply.

Monitoring

There are different lists, which attempt to identify the major companies but since the war there has not been regular reporting of industries. Consequently there is no updated database in the area.

There is no uniform system monitoring the emissions from the companies. In some cantons monitoring is mentioned in the legislation, however even when it is in the legislation generally it is not done. A few cantons monitor on an ad-hoc basis. The major monitoring agencies are the Public Enterprise for the Sava River Basin and the Hydro meteorological Institute of the FB&H.

There is no national monitoring.

Inspection

Water management inspection is performed at both the cantonal and federal level (Ministry of Agriculture, Water management and Forestry). It can be either a planned (regular) inspection or for a specific purpose.

Inspection includes:

- check of documents (permits)
- site inspection
- check of specific parameters check (quantity and quality of water, waste water, technology, fees
- check of daily records
- identifying corrective measures as necessary

The inspection function is limited due to lack of resources.

Republic of Srpska (RS)

Water related legislation

The RS Water Law was enacted in 1998 (OG 10/1998). The general provisions define the principal concepts used in the Law. Water belongs to the category of goods of public interest and it cannot be privately owned. The Water Law provides for the systematic control of water quality, an obligation to install measuring instruments in water supply companies (municipal or other) and requirements for reporting the volume of abstracted water. The laws do not fully correspond with the water regulation within the EU; however the Water Law is supplemented by several Books of Rules as follows:

- Book of Rules on treatment and discharge of waste waters for cities and settlements where there is no sewerage system;
- Book of Rules on conditions of waste water discharge into public sewerage system;
- Book of Rules on conditions of waste water discharge into surface waters;
- Book of Rules on way and methods of determination of pollution level of waste water as basis for determination of water management fee;
- Book of Rules on conditions that water management laboratory must fulfill in order to perform surface, ground and waste water quality examination;
- Decree on water course classification and categorization.

Additional national legislation (book of rules), are harmonized with the main requirements of the WFD (pollutant list, monitoring requirements, water management bodies responsibilities, pollutants parameters and emission limits are defined by those Book of Rules, and most are harmonized with the WFD). Although the Act does not fully correspond with the EU water regulation the basic WFD requirements are already transposed.

There is another Act on Water Protection prepared by the Ministry of Urbanism, Space Planning, Civil Engineering and Environment published in 2002 (OG 53/2002). There is some overlap between these two pieces of legislation.

EU Directive	**Compliance**
Water Framework	not fully transposed – but basic requirements already in compliance
Dangerous Substances	not transposed
Integrated Prevention and Pollution Control	not transposed
Seveso	not transposed
EIA	not transposed
EMAS	not transposed

Institutions

The water management in the RS is under the responsibility of the Ministry of Agriculture, Forestry and Water Management (MoAFW). However, also the Ministry of Health and Social Protection, Ministry of Space Planning, Civil Engineering and Environment, the Ministry of Industry and the Ministry of Energy and Mining are involved in industrial environmental regulation. Unlike the Federation of Bosnia-Herzegovina the republic is not divided in cantons. The only decentralized authority is the municipalities.

The Ministry of Agriculture, Forestry and Water Management (MoAFW) is among other things responsible for:

- defining the provisions relative to harmful and hazardous substances and sanitary-technical conditions for wastewater;
- proposing programs for systematic water and wastewater control and provisions relative to the control methods;
- defining conditions (staff, equipment etc.) for companies authorized to control surface and groundwater quality;
- proposing to the Government the basis of and rates for the general and specific water management fee, and the calculation method.
- establishing an inventory of existing water management facilities, financed by grants, taxes or public contributions.

Under the MoAFW is the Republic Directorate for Waters (RDW).

- The RDW is in charge of implementing the long-term, medium-term and annual plans for water management development. The Directorate for Water prepares the Plan for budget allocation, to be adopted and implemented by the Government.. It decides about the projects needed and tasks to be performed and also acts as a central data collection body. The Ministry of the Finance collects the fees. The Republic of Srpska Government determines the size of the budget for the Directorate. The fees are used/distributed centrally and only a small portion goes to the water protection sector. The RDW also finances water quality monitoring.

The Republic Directorate for Waters has close cooperation with the following institutions:

- The Institute for Water (WI) in Bijeljina which is responsible for water quality monitoring and discharge monitoring from industries and other polluters. Even if the WI conducts the majority of the monitoring tasks it is not an institution appointed by the legislation to be responsible for water quality monitoring.
- The Institute for Water Management is responsible for water management (river basin management, water supply and consumption, sewerage, etc.).

According to the Water Law, the MoAFW and the Ministry of Health and Social Protection (MoHSP) cooperate by performing several water management duties as follows:

- plans for protection against pollution ;
- regulations on the classification of waters and categorization of water streams;
- approval of regulations on the methods for monitoring water pollution and methods for wastewater quality tests;
- approval of regulations on the quality of water used for the irrigation of agriculture and water supply for fish ponds; and
- approval of regulations on the conditions that companies authorized for wastewater quality tests must meet, and approval of such companies .

The MoHSP also approves regulations on the quality of drinking water and water used for food processing and recreation, and defines zones for protection of potable water supplies.

Permitting

Regarding the permit system, large companies submit the application to the local municipality, which is forwarded to the Ministry of Space Planning, Civil Engineering and Environment where the Urbanism, Housing-Communal Services, Civil Engineering and Ecology departments handle the application. This Ministry consults with the municipality when making the permit decision. The permit covers building location, construction and operation. Further requirements can be added if necessary. Permits for smaller companies consist of the same parameters as for larger ones but are under the responsibility of the municipalities.

Monitoring

The water quality monitoring is done at the central level. In accordance with the above-mentioned legislation the WI prepares an Annual Plan of monitoring which is approved by the Directorate for Water. Currently 4 series of surface water monitoring are performed annually, at 25 measurement points, 4 points on the Sava River and the others on the Sava tributaries in B&H. A professional team of the WI directly takes the necessary number of water samples, transports them to the laboratory and performs the laboratory analysis. The Laboratory uses Standard Methods of control for certain parameters. Results are then distributed to the Directorate for Water, in written and electronic format.

The quantity parameters of surface water and groundwater are reviewed and examined by RS Hydro-Meteorological Institute. These data are public and can be obtained free of charge.

The Book of Rules on conditions of waste water discharge into surface waters and the Book of Rules on the methods and measurements of determination of pollution level of waste water as a basis for determination of water management fee are defining way, methods and obligation of waste waters quality and quantity monitoring. According to the latter one, all industrial facilities are obliged to engage authorized laboratory annually for waste water quality control. Polluters that have ≤ 500 PE are obliged to perform waste water quality control once a year. Polluters that have > 500 PE are obliged to perform at least 4 controls a year. Authorized laboratories for waste waters quality control in RS are: The Laboratory of the Institute for Water Bijeljina, Hemix laboratory in Banja Luka and Laboratory of the Faculty for Chemical Engineering in Zvornik. According to valid book of rules a laboratory is obliged to transmit one copy of analysis to the Republic Directorate for Waters that collects and stores all data. According to the law, major polluters are obliged to do self-monitoring in their own laboratories or in authorized ones.

Since 1991 no data were sent from RS to the ICPDR. Republic Directorate for Waters or an authorized institution is in position to deliver such data.

Inspection

The inspection situation in the RS is similar to the one in B&H. The Ministry of Space Planning, Civil Engineering and Ecology carry out inspections. But they are random due to lack of staff and equipment. However, also, the municipalities perform the environmental inspections. The situation with registration of the companies and environmental monitoring is similar to the one in the Federation.

Industrial pollution in the FB&H and RS

Industrial pollution in B&H

The industrial pollution in B&H origins from following industries

- steel production
- coal, iron ore, lead, zinc, manganese and bauxite mining
- vehicle assembly
- textiles, tobacco products, wooden furniture and domestic appliances production
- tank and aircraft assembly
- oil refining

Industrial pollution in RS

Republic of Srpska has data on all industrial polluters before the war. After the war due to transition process and economic situation, most of industries stopped working or they work with small capacities.

In RS there are all kinds of industries:

- in agriculture fruit and vegetable processing
- wood processing;
- smaller capacities of meat and meat products processing;
- smaller capacities of steel producing;
- two oil refineries;
- two steam power plants;
- production of paper;
- smaller capacities of leather processing and textile industry

3.3.2 Bulgaria

General background

The territory of Bulgaria covers about 111 000 km^2. Administratively, the country is divided into 28 regions and 262 municipalities. The population is 8 million. Most of population is concentrated in urban areas (about 69%). The average density of the population is 74, 2 persons/km^2. The most urbanized parts of the country are the metropolitan areas Sofia, Plovdiv and Varna.

Main characteristics of Bulgaria and macroeconomic indicators

	Unit	Indicator
Population	Inhabitants	7 621 337 (July 2002 estimated)
GDP	USD	50,6 billion (2002 estimate)
GDP per capita	USD	6 600 (2002 estimate)
Inflation rate	%	5,9 (2002 estimate)
Unemployment rate	%	18 (2002 estimate)

Exchange rate 1 EURO = 2.21 Lev (BGL)

Bulgaria, a former socialist country striving to enter the EU, has experienced macroeconomic stability and positive growth rates since a major economic downturn in 1996 led to the fall of the socialist government. A $300 million stand-by agreement negotiated with the IMF at the end of 2001 will help the government maintain economic stability as it seeks to overcome high rates of poverty and unemployment and, at the same time, cut the budget deficit and contain inflation.

The main industries are: electricity, gas and water; food, beverages and tobacco; machinery and equipment, base metals, chemical products, coke, refined petroleum and nuclear fuel. Environmental pollution issues include: air pollution from industrial emissions; rivers polluted from raw sewage, heavy metals, detergents; deforestation; forest damage from air pollution and resulting acid rain; soil contamination from heavy metals from metallurgical plants and industrial wastes.

The percentage of the Bulgarian territory draining to the Danube River, Black Sea and Mediterranean Sea is 31.6%, 20.1% and 48.3%, respectively. The country has a well-developed water supply system, servicing about 98% of the population. The sewerage connection covers 49% of which 70% is towns.

Water related legislation

Based upon the Strategy for Integrated Water Management, the Water Act was adopted in 1999 and entered into force in 2000. The Act provides for water management at three levels: the Council of

Ministers, the Ministry of Environment and Water, and the Basin Directorates. It transposes the basic principles of the EU water policy. The Water Act has 16 Regulations, which transpose the requirements of the all EU water related directives. These are the Regulation on the Emission Limit Values of Dangerous Substances in wastewater discharged in water bodies (State Gazette No 97/2000); Regulation on Wastewater discharge in the sewage systems (State Gazette No 98/2000), and Regulation on Requirements for water quality of coastal sea waters (State Gazette No 10/2001).

The new requirements concerning the Water Framework Directive need some amendments of the national legislation (Water Act).

The following table summarizes the compliance of Bulgaria with the main EU directives dealing with industrial water pollution.

Directive	Compliance
Water Framework	Partially transposed, the amendment of Water Act is planned. Full harmonization is expected in the 2005.
Dangerous Substances	Transposed, Act on Emission Limit Values of Dangerous Substances adopted in 2000
Integrated Prevention and Pollution Control	Transposed, The Act on Environmental Protection adopted in 2002,
Seveso	Not transposed
EIA	Transposed and implemented, Act on EIA adopted in 1998
EMAS	N/A

Institutions

Environmental protection is administered by the Ministry of Environment and Waters (MEW), the Executive Agency of the Environment (EEA), and 15 regional bodies and municipalities. The Ministry of the Environment and Waters (MEW) with Regional Inspectorates in the country is responsible for development and implementation of environmental legislation, decision-making including water quality and quantity monitoring. The water management is carried out through the Water Directorate. The country is divided into four river basins – Danube, Black Sea, East Aegean and West Aegean river basins.

The EEA is an administrative body established in 1999 to carry out and coordinate information and monitoring services. It is the governing body of the National System for Environmental Monitoring and is a National Reference Center for the European Environment Agency.

The main institution responsible for most of the water supply systems and sewerage facilities in Bulgaria is the Ministry of the Regional Development and Public Works (MRDPW). At the end of 2001, there were 48 Water Supply & Sewerage Companies (WSSCs) set up in Bulgaria.

Permitting

Permits are issued under the Water Act, which stipulates that a permit shall be required in all cases of water use of more than 10 m^3/day. The water use includes taking water from river bodies as well as the utilization of water energy. In addition, permits for use of water bodies are required for:

- new construction, reconstruction or upgrade of existing systems and facilities adjusting flows, exploration and drawing from underground water, discharge of water, the extraction of sand, ballast and recreation and water sports
- engagement in activities such as commercial fishing, fish breeding,
- other actions that affect the natural state of a water body.

Permits are issued under the provision of the Water Act, except in cases when an EIA is required as stipulated by the Environmental Protection Act and the decision on assessment contains all components of a permits required by the Water Act. Permits are issued by:

- the Council of Ministers when related to the needs of defense and national security
- the MEW for water and dam use, use of domestic sea waters, and of the Danube River, discharge of wastewater containing dangerous substances into the ground,

- the MEW, after gaining consent from the Ministry of Defense and the Ministry of Transport for use of parts of the Danube river, domestic sea waters, or the territorial sea, and
- the Director of the Water Basin Directorate for all other cases of water use and use of water bodies under public state ownership.

The IPPC legislation has been fully harmonized in 2002. It is partially covered by the Environmental Protection and the IPPC Regulation. There are following competencies

Assessment of the application is done by the Executive Environmental Agency, Regional Inspectorates (RI) and Basin Directorates

The Executive Environmental Agency and/or Regional Inspectorate Preparation prepare the permit which is then issued by the Ministry of Environment or Director of RI.

Regional Inspectorates control and inspect the permits.

The Ministry of Environment and Water prepares of methodologies and the BAT database

The Executive Environmental Agency registers the permits and results of monitoring.

Regional Inspectorates have prepared the inventory installations falling under the scope of the industrial pollution control legislation. There is a strong tendency to issue single permit for all installation at one site (company).

All the procedures for issuing permits are legally specified, including the scope of information required and periods for issuing a permit. In general, any official documentation has to be considered and answered by the competent authority. There is a tendency to increase the negotiation elements in permitting between the applicant and the competent authority, especially by consultations before the application for a permit.

Monitoring

The institutions responsible for water monitoring are:

- Bulgarian Environmental Agency (National System for Environmental Monitoring)
- Regional inspectorates for monitoring of all environmental components

Hydrological monitoring is managed and implemented by the National Institute of Meteorology and Hydrology, a branch of the Academy of Science. The Institute operates 209 stations on rivers and 461 for ground water monitoring. The monitoring equipment is rather old and inefficient. All data for the year are not publicly available and there are few publications.

Urban and industrial discharges are monitored through forms completed annually by the regional water companies and about 1 070 industrial facilities. The reports include the volumes treated and discharged. Similar but different forms have to be completed for the national statistical agency and for the Executive Environmental Agency. For control purposes, occasional sampling and analysis of discharged water is carried out. No information is available about industries discharging into urban sewage networks.

In general the laboratories are internal to the institutions (EEA, Regional Inspectorates). In a few cases there are contracts with external laboratories on specific tasks. All the laboratories in the EEA and some of the laboratories in the Regional inspectorates are accredited and others are in the process of being accredited. It should be noted that when new standards are applied then additional accreditation will be required.

Data collection, analysis and dissemination are not well developed. However, currently monitoring data are communicated to the public by:

- Ministerial Bulletin
- Year book on the Environment
- The primary monitoring data are available only under by written request.

Inspection

The main institutions responsible for inspection are:

- The Regional Inspectorates, in certain cases assisted by the EEA or MEW experts
- The municipalities also have also responsibilities related to urban planning and communal services.

The level of integration is not very high. Usually inspections are carried out on an individual medium basis – water, air, waste. Practically all of the inspectors in Regional Inspectorates are specialized in different media. The level of integration will increase significantly as integrated permitting is being implemented. At present some training on such inspections is provided in parallel to the issuing of pilot integrated permits.

In general the inspections are oriented towards the large enterprises and problematic facilities. Inspectors may suspend the operation of production lines in an installation if necessary and the Minister for Environment can issue an order to stop the whole operation of the installation. The Inspectorate can levy administrative penalties as defined by Law. For of small infringements only prescriptions are made. The sanctions and fines are implemented where the violations are severe. However, charges need to be increased and require greater correlation with the pollution impact.

Industrial pollution

The main industries are electricity, gas and water; food, beverages and tobacco; machinery and equipment, base metals, chemical products, coke, refined petroleum and nuclear fuel.

Environmental pollution issues include air pollution from industrial emissions; rivers polluted from raw sewage, heavy metals, detergents; deforestation; forest damage from air pollution and resulting acid rain; soil contamination from heavy metals from metallurgical plants and industrial wastes.

3.3.3 Croatia

General background

Croatia has been an independent state from 1991. Although Croatia declared its independence from Yugoslavia in 1991, it was 1998 before the current territory was brought under the Croatian Government. The country is divided into 20 counties and one city (Zagreb). Croatia has an area of 56542 km2.

Main characteristics of Croatia and macroeconomic indicators

Indicator	**Unit**	
Population	Inhabitants	4,390,751 (July 2002)
GDP	USD	38.9 billion (2002 est.)
GDP per capita	USD	8,800 (2002 est.)
Inflation rate	%	4
Unemployment rate	%	20,2

1 EURO = 7.74 (HRK) hrvatska kuna (in 2002)

Before the dissolution of Yugoslavia, the Republic of Croatia, after Slovenia, was the most prosperous and industrialized area, with a per capita output perhaps one-third above the Yugoslav average. The economy emerged from its mild recession in 2000 with tourism the main factor, but massive structural unemployment remains a key negative element. The government's failure to press the economic reforms needed to spur growth is largely the result of coalition politics and public resistance, particularly from the trade unions, to measures that would cut jobs, wages, or social benefits. As a result, the country is likely to experience only moderate growth without disciplined fiscal and structural reform.

The main water problem in Croatia is that a large part of population do not have public water supply. Also, and there are not enough sewage systems and the existing ones are in bad condition. The majority of municipalities discharge untreated water. Thirty percent of the companies discharge through a municipal sewage system, even though the discharge is not properly pre-treated.

Water related legislation

In the Constitution of Croatia (1990) conservation of nature and human environment is a high priority. This is supported by the Declaration of Environmental Protection (34/1992) that describes the course for future environmental legislation. It declares that Croatia should work towards a legislative system in accordance with international and European standards. Further it stresses the importance of using physical planning to achieve sustainable development. Another important law is the Law on Environmental Protection (82/1994). It lays down the principles for sustainable development. Further it introduces environmental impact assessment, the Polluter Pay Principle and an Environmental Protection Information System. The law also includes water management objectives and principles.

In 1992 the Strategy for Water Protection identified three goals in water management.

- To supply 90% of the population with public water supply
- To repair and construct sewage treatment plants
- Increase the protection against floods.

The Water Act (107/1995) is an umbrella law that integrates the previous regulations. It establishes the ownership and legal status of water and delegates the responsibilities among the different authorities. The laws do not correspond with the water legislation within the EU.

EU Directive	Compliance
Water Framework	not transposed
Dangerous Substances	not transposed
Integrated Prevention and Pollution Control	not transposed
Seveso	not transposed
EIA	not transposed
EMAS	not transposed

Articles 72 and 73 of the Water Act (Official Gazette No. 107/95) determine that in order to prevent deterioration of water quality and to protect the environment in general, the limit values of hazardous and other substances shall be prescribed, as follows: for technological waste water before its release into public sewerage system or other receiving water; for water being released, after treatment, from the public sewerage system into natural receiving water; and for waste water and substances discharged into sumps and collector tanks." According to the Ordinance on limit values of parameters, hazardous and other substances in waste water (Official Gazette Nos. 40/99, 6/01), the limit values and permitted concentrations for technological waste water are defined by parameters and in relation to the recipient waters. For discharges into a natural recipient there are four limit values defined depending on the class (planned type) of water (classes II., III., IV., and V.), including the fifth limit value, which is related to waste water discharge into the public sewerage system.

Allowed limit values of parameters and allowed concentrations of hazardous and other substances discharged into the public sewerage system or natural water courses as well as special measures for emissions reduction of substances in waste water from individual industrial sectors should be also determined based upon the specific technologies and the use of best available technology which may be different from the prescribed values for parameters in the special annexes of the Ordinance on limit values. Currently, the only completed annex is the annex for leather and fur producing plants.

There is no integrated permitting and the IPPC directive has not been implemented.

Institutions

In 2000 the Ministry of Environmental Protection and Physical Planning (MoEPPP) was established. Before that environmental responsibilities were divided between many different ministries. Even though Croatia now has an environmental ministry other ministries and state organizations are involved in environmental issues. These are Ministry of Agriculture and Forestry, Ministry of Health, Ministry of Maritime Affairs, Transport and Communication and Ministry of Economy and State Water Directorate.

In accordance with the Law on Structure and Scope of State Ministries and State Administrative Institutions (Official Gazette Nos. 48/ 98, 15/00, 29/00), the State Water Directorate performs

administrative and other tasks related to management of waters and water management system; monitoring and adapting of water management development to the needs of economic development; regulation of watercourses and other water bodies and the protection from adverse effects of water and ice; protection from erosion and torrents, hydro amelioration drainage and irrigation; management and use of water estate; protection of water and sea from land-based pollution; securing water reserves for water supply of settlements with drinking water and industries with industrial water; use of hydropower; planning and harmonizing development and construction of public water supply and sewerage systems of national interest and performing inspection activities.
In line with Article 156 of the Water Act, Hrvatske Vode (Croatian Water) - the legal entity for water management - was established for the purpose of performing of the activities constituting the management of state and local waters.

Several weaknesses have been identified in the administrative organization. First, there is a shortage of staff and adequate qualifications in all parts of the administration. Second, the different authorities tend to disagree over competences thus there is a problem coordination similar activities between different authorities. Also the authorities lack proper equipment.

Permitting

Both the Inspectorate under the MoEPPP and the Environmental County Offices issue permits and carry out inspections. The permit covers three steps: 1) location permit, 2) EIA and 3) building permits. The EIA is supposed to be carried out before the location permit or any special permits on e.g. water or nature are approved. However this is not always achieved.

Water management approval

The legal entity or physical person which has obtained the water management terms must, before the start of the construction or other works, apply for the Water Management Approval from the relevant body. The Water Management Approval confirms that the documentation for construction or other works is prepared in accordance with the water management terms.
The validity of water management terms, for which the approval has not been obtained, shall expire two years following the issue date.
The validity of water management terms for which the approval has been issued shall expire two years from the date of issuing of the approval if the date of the application for construction permit has not started.

Water management permit

The water management permit regulates the permission for water use and defines the purpose, location, method, conditions and extent of water use and discharging of waste water: hazardous or other substances that may pollute or contaminate water.
The water management permit is required for water use and discharging of waste water in connection with industrial and other activities, and with activities involving water intake and use and discharging of waste water.

The water management permit is issued by the relevant County office, based on the previously obtained opinion from Hrvatske Vode. In certain cases, the water management permit is issued by Hrvatske Vode, with confirmation of State water Directorate for:

- industrial and other activities involving the intake and use of the water from an interstate watercourse or discharging of waste water into an interstate watercourse,
- for activities in chemical, textile, leather, food-processing, metal, construction, petrochemical and other industries involving hazardous substances in the technological process,
- activities and services in sea and river transport (ports and harbors),
- hydropower plants with the capacity of 20 MW or more,
- transport and storage of oil, gas and other hazardous substances,
- water supply systems exceeding the capacity of 10 l/sec,
- running the public sewerage systems.

The water management permit is issued for specific period of no longer than 15 years (in practice no longer than 5 years).
In order to prevent deterioration of water quality and to protect the environment in general, the limit values of hazardous and other substances are prescribed in water management permits.

Permit ordinance

The permit ordinance is a document issued along with the water management permit in order to adjust the behavior and activities of the permit holder with the conditions and responsibilities resulting there from. The permit ordinance orders the holder of the water management permit to take an action, carry out an investment or to abstain from some action in order to eliminate the risk possible or already existing disturbance, or non-compliance with the conditions and responsibilities under ta water management permit, and to establish the conditions in compliance with this Act.

The permit ordinance is issued by the same body which has issued the water management permit.

A permit ordinance may be issued during the entire period of validity of a water management permit.

The copy of the water management and permit ordinance are sent to the relevant water management inspector. The water management inspector shall advise the State Water Directorate to cancel the water management permit and permit ordinance, or propose temporary withdrawal of the permit, permit ordinance for following reasons:

- if the holder fails, within a specified period, to carry out the activities or investment, or to obtain from some activities as required by the permit ordinance,
- if non-compliance with the permit ordinance is likely to result in serious hazard to human lives and health or in economic problems.

The detail procedure related to the issuing of the water management legal acts is specified within Regulation on issuing of water management legal acts. The procedures of issuing of water management legal acts are subject to the provisions of the General Administrative Procedure Act.

Monitoring

The environmental law (1994) introduced the Environmental Protection Information System. The system consists of ten components of which water is one. Each of these components is supposed to have an independent information system. However none of these systems are functioning yet possibly because of the complexity because several authorities are involved. However, in general, the country needs adequate data on the state of the environment, information on what data already exist and adequate statistical data. Hrvatske Vode, which monitors the status of waters and provides the State Water Directorate with information, has made great progress. They have established a GIS center, which should be responsible for the water information systems. The initiation and development of the Water Information System (WIS) is seen as the measure aimed at creating timely and available information in the field of water management. This forms the basis for ensuring public access to information, systematic and continuous collection, processing and adequate presentation of data and information.

The Water Act, Chapter 10, in Articles 113 – 118 outlines the obligation of keeping of water-related documentation, and in Article 158 the managing of the integrated water information system, which should enable the keeping of water related documents in accordance with current information technology.

A Water Information System project due to be completed in 2007 has the objective to the task of the WIS to systematically and timely collect, process, exchange and enable access to data and information both internally, to the Water State Directorate and Hrvatske Vode, and externally, to state administration authorities, international institutions and all interested parties, the general public in particular.

Water pollution is registered at Hrvatske Vode. All polluters with permits must provide information about emissions to the counties. The emission is then forwarded to Hrvatske Vode which obtains data on all the discharges to the waters. Currently the data are available on request.

The data on monitoring of polluters and pollution are delivered to the ICPDR through national members of EMIS EG, MLIM EG and APC EG.

Inspection

Inspection according to the Water Act and subsidiary regulations is carried out by the State Water Directorate (hereafter: State Water Management Inspection) and the County offices in charge in water management (hereafter: County Water Management Inspection). Water management inspection may also be performed by other government officials authorized by the Director of the State Water Directorate.

Water management inspection supervises in particular:

- the conditions of the watercourses,
- technical condition and proper use of water works and plants,
- the use of water and water estate in accordance with this Act, water management legal acts and concession agreements,
- the status of water pollution and contamination and implementation of water protection measures, the compliance with the conditions determined by the water management legal acts,
- preparing and implementation of flood protection measures and other measures for protection from adverse effects of water.

The State Water Management Inspection supervises the application of the provisions hereof and other regulations, and implementation of measures in water management referring to interstate commitments, works and the conditions of water system on interstate and national waters and the coastal sea, preparing and implementing, between others, the National Water Protection Plan, compliance with water management legal acts.

The State Water Management Inspection may directly carry out the responsibilities of a County, if this is considered the only way to implement the provisions of this Act and other regulations. This occurs when the authorized water management inspection has failed to carry out the supervision in time, or has not completed the procedure by the specified time-limit.

In case of a violation of the environmental regulations the Inspectorate can impose a fine or suspend the work permit.

Industrial pollution

The main industries include chemicals and plastics, machine tools, fabricated metal, electronics, pig iron and rolled steel products, aluminum, paper, wood products, construction materials, textiles, shipbuilding, petroleum and petroleum refining, food and beverages and tourism.

The most serious pollution issues: air pollution (from metallurgical plants) and resulting acid rain is damaging the forests; coastal pollution from industrial and domestic waste; landmine removal and reconstruction of infrastructure consequent to 1992-95 civil war.

The main industrial waters are released from the food, chemical, pulp and paper and fertilizer industries.

Every industrial company must have a Waste Water Discharge Permit, proscribing the quantity and quality of waste water discharged into the recipient-surface water or sewerage. To meet these obligations in the majority of cases it is necessary to build a site specific waste water pre-treatment plant.

3.3.4 Czech Republic

General Background

The territory of the Czech Republic covers 78 866 km^2. The area within the Danube basin is about 21 000 km^2. The country is administratively divided into 13 regions and one (capital) city. Within this broader administrative division there are 6 323 municipalities. The Czech Republic has a population of around 10 million of which 2,7 million of inhabitants live in the Danube basin.

Main characteristics of Czech Republic and macroeconomic indicators

	Unit	Indicator
Population	Inhabitants	10,256,760 (July 2002 .)
GDP	USD	58,1 bill. (OECD, 2002)
GDP per capita	USD	5 600 (2002)
Inflation rate	%	2,2
Unemployment rate	%	8,5

1 EURO = 33,1 CZK (Czech crown) in 2002

The Czech Republic is one of the advanced transition economies entering the EU in 2004. The following industrial sectors contributed to the total GDP as follows: services 56%, industry 41% and agriculture 4%.

Water related legislation

The Czech Republic will enter the EU in 2004 and all water related legislation was transposed and is being implemented. Some changes in the Water Act (254/2001) will be required to fully harmonize with the Water Framework Directive. There are also implementing regulations on emission limits (Government Order 61/2003 Coll.), River Basin Management Planning (Ministerial Decree 140/2003 Coll.) and a range of administrative matters (definition of River Basin Districts, record keeping requirements for water authorities etc.). Further secondary legislation pursuant to the Water Act is being prepared in respect of monitoring of the water environment.

The Water Act requires that anybody discharging wastewater into ground or surface water must ensure that the quality of the receiving water will not be deteriorated. It should be noted that direct discharge of wastewater to groundwater is not generally permitted. Also, appropriate treatment of discharged waters must be established and a permit issued prior to discharging to the receiving water. A new Act on IPPC has been adopted and is being implemented through the Regional Authorities, the Ministry of Environment, the Czech Ecological Institute and the Czech Environmental Inspectorate.

EU Directive	**Compliance**
Water Framework	The Directive has been substantially transposed. The Water Act and the Decree on River Basin Management Planning will be amended before the date of accession in order to ensure full transposition.
Dangerous Substances	Fully transposed. Implementation underway.
Integrated Prevention and Pollution Control	Fully transposed, being implemented. Existing installations to be permitted by October 2007
Seveso	Fully transposed, but some elements of implementation still require attention
EIA	Fully transposed and implemented[2]
EMAS	Fully transposed

Institutions

Two main ministries are involved in the administration of water issues: Ministry of Environment (MoE) and Ministry of Agriculture (MoA). The MoE is the environmental supervisory body and flood

[2] Strategic EIA implementation to be completed by July 2004

prevention body, MoA is the authority responsible for water management (including urban wastewater). The Ministry of Agriculture is also responsible for issues associated with state water management policy and planning, river basin administration, technical works and amelioration, sewerage and water mains.

There are five River Basin Administrations (Povodí) which are state enterprises under the supervision of the Ministry of Agriculture. The cover the whole of the country, are responsible for investment in water management projects, participate in permitting of certain water uses and levy charges on water users. The MoE directs the Czech Hydrometeorological Institute (the expert body covering meteorological and hydrological issues and ambient air monitoring) and the T.G. Masaryk Water Research Institute (the research center).

Permitting

There are 205 Authorized Municipal Offices and 14 Regional Offices (inc. Prague) that are permitting institutions. In many cases the same organization is responsible for both permitting and inspection/enforcement, so the approach allows feed-back. However, in practice a great deal of inspection is undertaken by the Czech Environmental Inspection.

The integrated permitting system was recently developed for the IPPC installations. Act on IPPC the Act on Integrated Pollution Prevention and Control came into effect in 1st January 2003. The Decree 554/2002, establishing the template of the application for integrated permit, the scope and method of filling in of the application The Government regulation No. 63/2003 on the BAT Information exchange system came into force in January 2003 and the Government regulation will come into force in January 2004. The permitting bodies are regional offices and the Czech IPPC Agency is an expert body that reviews the submitted applications. It is estimated that around 1400 - 1500 installations are affected by IPPC. By the end of the year 2003 there will be about 30 integrated permits issued.

Monitoring

The majority of monitoring responsibilities is carried out by the Czech Hydrometeorological Institute which undertakes hydrological and water quality monitoring for both surface water and groundwater. Additional monitoring is also undertaken by the Agricultural Water Management Authority. At the site level, monitoring is mainly self-monitoring, linked to permitting standards and enforcement actions. Only accredited laboratories can be used for monitoring. Where an agency undertakes self-monitoring, a different (also accredited) laboratory must be used. Self-monitoring data is generated by the permitted site and passed to the regulators.

The Czech Hydrometerological Institute is the main agency that collects environmental monitoring data. It is also responsible for the reporting to the ICPDR and other international institutions in cooperation with the Ministry of Environment and the Water Research Institute.

Inspection

Inspection and enforcement is the responsibility of the Regional Authorities and the Czech Environmental Inspectorate (CEI). The Czech Environmental Inspectorate is the main body responsible for environmental enforcement. It has a national office and nine regional offices.

Regional Authorities also have a role in relation to air pollution control, water and nature protection, while smaller local authorities (Municipalities/Towns) are responsible for the smallest sites. The Ministry of Health is responsible inspection of drinking water and bathing water quality.

Inspecting authorities can require self-monitoring data to be provided to them. They can also commission their own monitoring for comparison purposes. Plants do not have full-time inspectors, only company employees (e.g. environmental managers).

Water discharges are inspected when conditions are changed. Large industrial enterprises are inspected minimally once a year.

Inspectors of CEI have power of entry to installations. They have right to limit, or to stop immediately damaging activity, if it is a hazard to human health.

Industrial pollution

Main industry branches are: metallurgy, machinery and equipment, motor vehicles, glass and chemical production (explosives), armaments.

Environment pollution issues include air and water pollution in areas of northwest Bohemia and in northern Moravia around Ostrava present health risks; acid rain damaging forests.

More specific about water pollution from industrial dischargers into the Danube catchment area can be seen in the Emission Inventory for the Danube Basin undertaken in 2000 under the auspices of the ICPDR.

3.3.5 Hungary

General background

The Territory of Hungary covers 93 030 km^2. The country is administratively divided into19 districts (megyek) and 20 urban counties. Hungary has a population of 10,3 million and a population density 109,6 inhabitants per km2. Hungary is a country of average urbanization. Nearly two thirds of the population (64.6%) live in towns and one third in villages (some of them on farmsteads). In the year 2000 the country had 237 towns and 2,898 villages. Almost 40 % of the urban population live in Budapest, and even more people have ties to the capital city through their jobs.

Main characteristics of Hungary and macroeconomic indicators

	Unit	Indicator
Population	Inhabitants	10 075 034
GDP	USD	134,7 Billion (2002)
GDP per capita	USD	13 300 (2002)
Inflation rate	%	5,3
Unemployment rate	%	5,8

1 EURO = 258 HUF (Hungarian forint) in 2003

Hungary continues to demonstrate strong economic growth. . The private sector accounts for over 80% of GDP. Foreign ownership of and investment in Hungarian firms is widespread, with the cumulative foreign direct investment totaling more than $23 billion since 1989. Hungarian sovereign debt was upgraded in 2000 to the second-highest rating among all the Central European transition economies. Inflation and unemployment - both priority concerns in 2001 - have declined substantially. The key short-term issue is the reduction of the public sector deficit from 6% of GDP to 4.5% in 2003 and 3% in 2004. The following industrial sectors contributed to the total GDP (2000) as follows: services 62%, industry 34% and agriculture 4%.

90% of drinking water relies upon vulnerable groundwater. Almost 98% of the population is served by public water. The level of sewerage is only about 45% while that of biological wastewater treatment is 30%.

Water related legislation

By the end of 2001, harmonization with EU legislation was completed. Water legislation in Hungary includes most of the elements of the WFD and, consequently no major changes in legislation are needed specifically for this directive. Lower level legislation, however, is awaiting significant reshaping (decrees related to the use and protection of water resources, regulation of wastewater discharges to surface water, protection of groundwater resources, protection against nitrate pollution, urban water management, defining quality objectives, river basin management plans preparation and approval procedures regulation, etc.). The deadline for legal harmonization, December 2003 should be met.

The most comprehensive law is the Act on Water Management (LVII/1995). An important legislative tool is the Act on the General Rules of Environmental Protection (LIII/1995), and there are an additional 7 laws having significant water management implications (Act LXV/1990 on local

municipalities, Act XI/1991 on State Health Services, Act LIII/1996 on Nature Protection, Act XXI/1996 on Regional Development, Act LXXVIII/1977 on the Development and Protection of Man-made Environment, Act XLVIII/1993 on Mining, Act LXXIV/1999 on the Control of Catastrophes.) The practical application is described in approximately150 decrees.

The Act on Water Management defines two major groups of tasks: public and individual tasks. Public tasks are to be managed by the state and municipalities. The law includes the following items:

- surface and groundwater resources;
- any establishment or activity that influences runoff and hydraulic conditions of waters, water quantity, quality, riverbed, shoreline, or the aquifer conditions;
- use and surveillance of water users, management of water resources;
- monitoring activities, evaluation of the state of aquatic environment, research;
- control and protection of water damages.

The following table summarizes the compliance of Hungary with the main EU directives dealing with industrial water polluters

EU Directive	**Compliance**
Water Framework	Partially transposed
Dangerous Substances	Transposed in 201/2001 governmental decree
Integrated Prevention and Pollution Control	Transposed in 193/2001 governmental decree
Seveso	Transposed, Act entered into force in 2002
EIA	Transposed, governmental decree EIA adopted
EMAS	It will come into force automatically on the date of accession,

Institutions

The water management and environmental protection belonged to different ministries until May 2002. Ministries were organizationally merged but regional offices currently remain divided. The regional organization of water, environment and nature protection is under the umbrella of the Ministry of Environment and Water. These, however, operate within a regionally independent organizational frame. Second-degree authority levels and institutions (National Chief Directorate of Water Management and National Chief Directorate of Environmental and Nature Protection) also act independently.

Share of tasks between the water and environmental sectors is as follows:

- Water directorates: there are 12 water directorates issuing water right permits and surveillance (professional control of urban water works and irrigation works, protection of quantity of water and long-term aquifers), collection of levies and taxes, implementation of large scale state investments, flood control and access water protection, monitoring and spill control, international relations.
- Regional environmental inspectorates (REI): authority permissions and control. This practically means the regional tasks of the protection of the quantitative and qualitative state of the waters, setting fines, monitoring, and handling water quality emergencies.

The 12 water directorates manage complex tasks in their jurisdiction, except for legislation and financing. Directorates are managers of the state-owned water structures, and act as investors and the permitting authority regarding the projects. The priority task is the management and access to waters, flood control measures, and water protection. Total employment at the water directorates is about 5,000 people.

In addition, there are 12 REIs with areas overlapping the water directorates. The focal point of their activities is administrative (permitting, control, surveillance, setting and administering fines). Inspectorates operate water quality labs that are the basis of water quality monitoring in Hungary. Tasks also include authority measurements to set wastewater fines. They employ power about 1200 people.

Presently the managed tasks of the two authorities are partially overlapping and complementary (quantitative protection of water resources, state assessment, monitoring and water quality emergency control). The regulation is theoretically correct but there are tensions and redundancies in practice. Many practical questions can only be solved by complicated regulation, i.e., the management of water quality emergencies, and various permitting procedures.

There is also the Ministry of Internal Affairs responsible for state tasks related to municipalities, The Ministry of Agriculture and Regional Development responsible for state tasks related to agriculturally utilized water bodies and water structure, and the Ministry of Health, Social and Family affairs responsible for human biological aspects (drinking water, bathing, etc.) of water. Coordination amongst the different ministries is based upon administrative rules of operation including financial issues. There is no inter ministerial forum for handling water management issues generally. There are several inter ministerial committees among which two are particularly important:

- Regional and/or governmental committee that manages emergency situations (floods, water quality emergencies, large scale spills, access water, etc.). This committee is an integrated part of the flood control and access water management.
- Inter ministerial committee responsible for the introduction EU WFD – a governing body that could fulfill the role of the missing coordination forum.

The Ministry of Environment and Water is responsible for the legal aspects of the IPPC. An IPPC Unit was established in 2002 in the Institute of Environmental Management dealing mainly with BAT activities, and of course the regional environmental inspectorates are responsible for the implementation (permitting procedure and control)

Permitting

The present permitting system in Hungary is complicated and several different permits are required for new installations to start operation. The water license permitting authority is the Water Directorate.

The Regional Environmental Inspectorates issue the permits for the following:

- Parts of the sewage discharges licensing procedure
- permitting of activities having significant impact on the environment on the basis of EIA.
- IPPC permit

In addition, the National General Directorate for the Prevention of Disasters started operation in January 2000. It is controlled by the Ministry of the Interior and is responsible for authorizing establishments in which dangerous substances are produced, used, handled or stored. It also includes the National Command for Civic Defense and the National Command of the Fire Brigade.

Permitting and inspection are not separated in Hungary. All authorities have the responsibility of checking and enforcing their own conditions.

Separate permits are issued for different media. 1075 installations are affected by IPPC (as existing installations) and only a handful will be classified as new installations. The highest portion of IPPC installations is represented by various farms. The implementation of IPPC legislation started in June 2002 (for new installations) and for existing ones it is planned to start after the accession to the EU.

Monitoring

The 12 Regional environmental inspectorates are responsible for monitoring and processing the data that are collected. The REIs have their own laboratories.

A national surface water monitoring system is in place with sampling taking place at 150 sites throughout the country. In March 2000 three new automatic water quality-monitoring stations were installed along rivers, to assist with the implementation of the Directive on the quality of surface water used for the abstraction of drinking water.

The results of the REI's monitoring activity are fed into regional registers which provide the basis for the National Environmental Protection Information System. The REIs also compile summary reports on the potential sources of pollution, the major polluters and the number/quality of licenses issued. So far, only the computerized data register on wastewater is compatible with EU standards. In addition

in other areas there is no unified data register and an adequate system of data supply is not yet in place, which makes the exchange of information at the international level difficult.

The VITUKI institute is responsible to transfer the emission data to the ICPDR. It is an appointed National Reference Laboratory.

Inspection

Enforcement is carried out by the 12 Regional Environmental Inspectorates (REIs) and, in the nature protection section, the Nature Conservation Authority and its 9 National Park Directorates.

The REIs are responsible for on-the-spot inspections and monitoring of implementation/ enforcement. They have the power to impose fines. The REIs also have responsibility for permitting and monitoring, as well as for inspection/enforcement. Around 1400 people work in the 12 REIs, of these around 350 is responsible for inspection and permitting.

Industrial pollution

Main industrial branches are mining, metallurgy, construction materials, processed foods, textiles, chemicals (especially pharmaceuticals), and motor vehicles

3.3.6 Moldova

General background

Moldova became independent from the USSR in 1991. Russian forces have remained on Moldovan territory east of the Dniester River supporting the Slavic majority population, mostly Ukrainians and Russians, who have proclaimed a "Transnistria" republic. The territory is 33 843 km2. The country is divided into 9 counties, 1 municipality, 1 autonomous territorial unit and 1 territorial unit.

Main characteristics of Moldova and macroeconomic indicators

	Unit	Indicator
Population	Inhabitants	4,434,547 (July 2002)
GDP	USD	11 billion (2002 est.)
GDP per capita	USD	3 300 (2002 est.)
Inflation rate	%	5,5
Unemployment rate	%	8

1 EURO = 11.73 MDL (Moldovan leu)

Moldova has a favorable climate and good farmland but has no major mineral deposits. As a result, the economy depends heavily on agriculture, featuring fruits, vegetables, wine, and tobacco. Moldova must import all of its supplies of oil, coal, and natural gas, largely from Russia. Energy shortages contributed to sharp production declines after the breakup of the Soviet Union. As part of an ambitious reform effort, Moldova introduced a convertible currency, freed all prices, stopped issuing preferential credits to state enterprises, backed steady land privatization, removed export controls, and freed interest rates. The government entered into agreements with the World Bank and the IMF to promote growth and reduce poverty. The economy returned to positive growth, of 2.1% in 2000 and 6.1% in 2001. Growth remained strong in 2002, in part because of the reforms and because of starting from a small base. The economy remains vulnerable to higher fuel prices, poor agricultural weather, and the skepticism of foreign investors.

The GDP in 2000 generated by sector was as follows: agriculture: 28%, industry: 23%, services: 49%.

Water related legislation

Moldova has the following water and environmental legislation:

- Protection Areas of Rivers and Lakes (1983)
- The law on Environmental protection (1993)
- Water Code of the Republic of Moldova (1993)
- The Law on Industrial Waste (1997)

The main law on water management in Moldova is the Water Code from 1993. According to this law, the discharge of wastewater is only permitted if the discharges do not cause the water to exceed the quality values. Further the polluter has to treat the wastewater in accordance to the ecological, water management and sanitary authorities. It also states who is responsible for monitoring and inspecting the industries and the municipal treatment plants.

Institutions

Environmental protection and water management are under the responsibility of the Ministry of Ecology, Construction and Territorial Development (MECT). The ministry was established in early 2000. Other institutions involved are:

- Sanitary-Epidemiological Services under the Ministry of Health
- The Hydrological Department under the MECT
- Pollution Control Center under MECT
- Ecological Inspectorates under MECT
- The national water management consortium Apele Moldovei under the Ministry of Agriculture and Food

The Ecological Inspectorates function at three different levels. The State Ecological Inspectorate is responsible at the national level. Further the country is divided in three regions: north, central and south, with regional offices in Chisinau, Balti and Cahul. Also, most municipalities have a smaller local inspectorate.

Permitting

As stated in the Water Code all installations are required to obtain a wastewater license before discharging wastewater into the surface water. The MECT and Sanitary-Epidemiological Services under the Ministry of Health issue the licenses. The license is valid for a period from one to five years and then it has to be renewed.

Monitoring

Several institutes monitor the quality and quantity of the surface water:

- The Hydrological Department monitors surface water quantity.
- Pollution Control Center monitors surface water quality. The monitoring is done from 15 sampling stations and the quality is measured by 30 hydro-chemical and 5 biological parameters.
- Ecological Inspectorates monitor both water quality and quantity however the resources at the local level are extremely limited.
- Apele Moldovei monitors the surface water quality primarily related to fertilizers.

There is a need to enhance the cooperation and coordination between these institutes in order to avoid overlaps etc. Further, there is no national database compiling the different data and no other kind of information exchange between the ministries involved.

As mentioned before the Ecological Inspectorate is subdivided into three regions. The regional offices are responsible for monitoring both municipal treatment plants and industrial sites. The frequency of the monitoring varies from once every 1-3 month depending on the amount of discharge. The regional offices send quarterly reports to the national office which publishes an annual report that prescribes the state of the environment.

The Water Supply Companies, which own the treatment plants, are obliged to monitor the wastewater discharge every day. The data is submitted to the Ecological Inspectorate once a month. The Water

Supply Companies also monitor the wastewater coming from industries. This is done once a month and is submitted in the monthly report to the Inspectorate.

The data for the EMIS inventory are compiled from the Ecological Inspectorates. The data are sent to the responsible person in the Ministry that recalculates the data into annual amounts.

Inspection

The State Ecological Inspectorate makes sure the companies apply the conditions in the licenses. The conditions can be on transportation, use of specified materials, construction, operation and close down of operation. In case of none compliance the inspectorate is authorized to take legal action, impose fines, and in serious cases may close down an installation.

Industrial pollution

Main industrial branches are food processing, agricultural machinery, foundry equipment, refrigerators and freezers, washing machines, hosiery, sugar, vegetable oil, shoes, textiles

The pollution issues include heavy use of agricultural chemicals, including banned pesticides such as DDT, has contaminated soil and groundwater; extensive soil erosion from poor farming methods.

3.3.7 Romania

General background

Romania has a population of 22.68 millions inhabitants, of which 56% are living in urban areas and 44% in rural areas. The average population density is 95.8 inhabitants/km^2, varying from 1291.7 inhabitants/km^2 in Bucharest, to 32.1 inhabitants/km^2 in the county of Tulcea. Romania is divided into 42 counties (judet), and one municipality Bucharest. Romania covers an area of 237,500 km^2.

98% of the Romanian territory is in the Danube River Basin and the remaining 2% is in the Black Sea catchment area. Romania shares several other trans-boundary river basins with neighbor countries. Most of the year the rivers have a low level of water except during the spring flood.

Main characteristics of Romania and macroeconomic indicators

Indicator	Unit	
Population	Inhabitants	22,317,730 (July 2002
GDP	USD	152,7 billion (2002)
GDP per capita	USD	6 800
Inflation rate	%	34,5
Unemployment rate	%	9,1

Euro = 32.1 LEI (ROI) in January 2002

65% of the population has drinking water supply, which primarily originates from surface water, and 40-43% has sewerage systems in place. There is an unsatisfactory situation in villages, as far as these utilities are concerned, both for the water supply system (16,1 % in average) and the sewerage system (2,4% in average). Of 3,033 million m^3/year of wastewater requiring treatment, about 18% is treated adequately. The highest amount of untreated wastewater is generated by the same entities: municipalities (urban wastewater, about 85%), chemical industry (4%), metal-processing and the machine-construction industry (3%).

Romania, one of the poorest countries of Central and Eastern Europe, began the transition from Communism in 1989 with a largely obsolete industrial base and a pattern of output unsuited to the country's needs. Over the past decade economic restructuring has lagged behind most other countries in the region. Consequently, living standards have continued to fall - real wages are down perhaps 40%. The country emerged in 2000 from a punishing three-year recession thanks to strong demand in EU export markets, and despite the global slowdown in 2001, strong domestic activity in construction, agriculture, and consumption led to 4.8% growth. A standby agreement with the IMF - covering the period October 2001 to March 2003 - provides a key opportunity for vigorous privatization, regulatory reform, deficit reduction, and the curbing of inflation. The government in the past has not been able to fully implement IMF agreements; its degree of success in this case will affect prospects for joining the

EU. GDP in 2000 was generated by sectors as follows: agriculture: 15%, industry: 30%, services: 55%.

Water related legislation

The Water Law (107/1996) is the main law specific for the water field. The law covers all water bodies except mineral and geothermal waters and establishes the ownership of the water. Further the law states that it is required to have a license both to use and discharge water.

The Water Law confirmed and strengthened the role of the pre-existing River Basin Authorities regarding integrated water resources administration. This provides a single institution at the river basin level, with functions relating to all aspects of water resources management: surface water, ground water, atmospheric water, and water quantity and water quality.

According to Water Law, any kind of water resource pollution is forbidden. The Ministry of Waters and Environmental Protection (MWEP) establishes water quality standards. A Government Decision approves the effluent limits of pollutants in wastewater discharge. The effluent limits provided in the water management license are the maximum allowable limits and it is forbidden to exceed such limits.

Romania was the last country to open negotiation with the EC on the environmental chapter in March 2002. Presently the directives are at different stages of transposition. Parts of the WFD have been transposed for example the prevention of nitrates pollution from agriculture and the action plan for reducing pollution of ground waters and of the aquatic environment. Also, norms have been set on discharges of wastewater, the quality of surface waters to support fish life and the quality of bathing water. For industrial pollution control and risk management norms for technical and the procedural framework for environmental inspections have been set.

EU Directive	**Compliance**
Water Framework	to be transposed by 2007
Dangerous Substances	to be transposed by 2007 and it is envisage to receive transition period by 2015
Integrated Prevention and Pollution Control	to be transposed by 2007 and it is envisage to receive transition period by 2015
Seveso	to be transposed by 2007
EIA	Is transposed, but there is resource problems in implementation
EMAS	

Institutions

The institutions for the implementation of the water management activity include:

- Ministry of Water and Environmental Protection (MWEP)
- County Environmental Protection Inspectorates (EPI)s under the MWEP
- National Company “Romanian Waters” (Apele Romane)
- Basin Committees, where each Committee consists of 15 representatives of all related authorities ranging from the national to local level

The MWEP is responsible for implementing the national water and environmental policy.

The EPIs are in charge of the enforcement of the environment protection strategy at the county level. There are 41 branch Inspectorates having an office at each County plus one in Bucharest. The tasks being performed by each Inspectorate are:

- Issuing the water management and environmental permits/licenses in accordance with the Environmental Protection Law and regulations for the application of this law;
- Control of the economic/social units such as industrial plants, ports, agricultural farms and the public utilities authorized under the environmental permits/licenses;
- Surveillance of quality of the environmental factors: air, water and others, and reporting the monitored data to the MWEP.

Permitting

In order to operate all companies must obtain an environmental permit as well as a permit to discharge water, both of which are issued by the MWEP. There are two permitting systems concerning the water:

- water management permit and licenses, and notification

The permit is issued on the basis of a project proposal showing the technical parameters of the work, the way in which this work affects the water quantity and quality regime and the measures to mitigate its impact on the water resources. Through these permits, the quality parameters of the wastewater discharged into the recipient are established. The permits are given in close cooperation with Apele Romane. It expires two years after the date of issue, if the works have not been started.

In order to begin operating a work or an installation it is necessary to obtain a water management license. This license establishes the operational conditions of the work. The license is valid for a limited period of time, no more than 5 years, and should be periodically reviewed. The license may also contain special conditions valid for a limited period (e.g. certain concentration for the substances discharged to waters, in a special situation).

- environmental protection permit and licenses

The environmental protection authorities conduct the permitting procedure and issue an environmental permit and an environmental license. There is a specific list of activities that require an environmental impact assessment for issuance of an environmental permit and/or an environmental license. Water management permits and licenses are necessary for obtaining environmental permit/licenses.

During the permit process the EPIs verify the data in the application and make recommendations for the permit. The recommendations are then forwarded to the MWEP, which issue the actual permit. At least every five years the permit has to be renewed. The environmental permit contains pollution limits for each pollutant. Also the permit indicates if the company is obliged to self-monitor and when to report to the Inspectorate.

Monitoring

In the year 2000, the MWEP began to compile data from the different monitoring institutions into the "National Integrated Monitoring System". In addition to indicating the status of the environment it is also meant as an alarm system in case of a rapid rise in pollution. The monitoring of the water quality and emissions to water are under the responsibility of Apele Romane. Apele Romane monitors water quantity in 1016 hydrometric stations by measuring the flows. In about 40% of the locations the water quality and quantity are measured together. For the other stations, information about the discharge is transmitted from the nearest hydrometric station. With respect to the surface water, there are 65 control stations upstream of the big polluters which are in rapidly flowing water quality being monitored daily. There are another 240 control sections, which are in the slow flowing water quality being monitored monthly

The wastewater discharges for 2100 point sources are monitored by the authorities from 1-24 times per year depending on the type of pollution. Although, most companies also are required to self-monitor, there is a lack of information of pollution at the source. This occurs mainly because the authorities lack the necessary monitoring equipment and the companies self-monitoring is very poor.

Inspection

The EPI inspects companies with environmental permits. The inspectors rarely monitor the discharges when inspecting, due to the lack of adequate equipment. In case they need to monitor they can bring in an authorized monitoring laboratory. In total the 42 inspectorates employ 400 environmental inspectors.

In case of violations of the permit conditions or any environmental laws the EPIs are authorized to issue penalties and collect fines. It case of danger to humans or the national economy the penalty can be imprisonment.

The Inspectorates list all companies in two categories: Type A and B, where Type A is the most polluting having a significant impact on the environment. The list is sent once a year to the Ministry of Water and Environmental Protection giving the Ministry a national list of such installations.

Industrial pollution

The main industries include textiles and footwear, light machinery and auto assembly, mining, timber, construction materials, metallurgy, chemicals, food processing, petroleum refining

The main environmental problems include soil erosion and degradation; water pollution; air pollution in south from industrial effluents; contamination of Danube delta wetlands.

3.3.8 Serbia – Montenegro

General Background

After the split of former Federal Republic of Yugoslavia and declaration of sovereign states from former federal states - Slovenia, Croatia, Bosnia & Herzegovina, Macedonia, Serbia and Montenegro existed from 1992 till 2003 as Republic of Yugoslavia. In February 2003 a loose federation of two states Serbia and Montenegro was created. The territory is 102 350 km^2.

Administrative division includes two republics - Serbia, Montenegro; and two nominally autonomous provinces - Kosovo, Vojvodina. Data on unemployment are rather high as those on poverty. According to the Government statistics, some of the 10% of the population are down the poverty line of 2$ per day and further 10% are just above the line, thus making the 800.000 citizens bellow the poverty line or 250.000 of families.

Main characteristics of Serbia and Montenegro and macroeconomic indicators

Indicator	Unit	
Population	Inhabitants	10 656 259 (2002)
GDP	USD	25,3 billion (2002
GDP per capita	USD	2370
Inflation rate	%	18
Unemployment rate	%	28

Euro = 59,6 Dinar (YUM) in 2002

After renewing the membership in the IMF in December 2000, Yugoslavia continued to reintegrate into the international community by rejoining the World Bank (IBRD) and the European Bank for Reconstruction and Development (EBRD). A World Bank-European Commission sponsored Donors' Conference held in June 2001 raised $1.3 billion for economic restructuring. An agreement rescheduling the country's $4.5 billion Paris Club government debts was concluded in November 2001; it will write off 66% of the debt and provide a basis for Belgrade to seek similar debt relief on its $2.8 billion London Club commercial debt. The smaller republic of Montenegro severed its economy from federal control and from Serbia during the MILOSEVIC era and continues to maintain it's own central bank, uses the euro instead of the Yugoslav dinar as official currency, collects customs tariffs, and manages its own budget. Kosovo, while technically still part of the Federal Republic of Yugoslavia (now Serbia and Montenegro) according to United Nations Security Council Resolution 1244, is moving toward local autonomy under United Nations Interim Administration Mission in Kosovo (UNMIK) and is dependent on the international community for financial and technical assistance. The euro and the Yugoslav dinar are official currencies, and UNMIK collects taxes and manages the budget. The complexity of Serbia and Montenegro political relationships, slow progress in privatization, and stagnation in the European economy are holding back the economy; nonetheless, growth may be 4.5% in 2003. The GDP in 2001 was generated by sectors as follows: agriculture: 26%, industry: 36%, and services: 38%.

In 2000, 98% of the FRY population had access to the public drinking water supply. However the majority of rural households have septic tanks, many of them improperly designed and located. In the past two years, IFIs and donors have initiated projects in the water supply and wastewater sector, in large and medium-sized cities and rural areas. Most of the population has access to sanitation: 57% are linked to a sewage system. However, wastewater treatment is almost non-existent. Ten years of little

maintenance and no investments in the wastewater supply sector has resulted in a situation whereby most municipal and industrial wastewaters are discharged, largely untreated. It is estimated that only 13% of he total number of treatment plants work satisfactorily.

Quantities of municipal and industrial wastewater discharges have changed significantly in the past decade. Roughly 10% of total wastewater discharged in Serbia is from households and this figure has remained steady throughout the 1990s. What has changed dramatically is the combined wastewater from both households and industry. Both have dropped by about 60% since the early 1990s. Meanwhile, wastewater treatment capacity has remained roughly the same for both domestic and industrial wastewater treatment and the treated amount remains similar in 2000 to that of 1990.

Generally the environmental and industrial regulatory competences have shifted from federal level to the republics. However the federal government still plays an important role in international matters such as negotiation, ratification and implementation of international agreements and conventions. Besides the shift from federal to republic level there has also been a comprehensive decentralization, which moved authority to the municipalities.

There is no federal ministry with the overall responsibility of water protection and management. The responsibility is divided between several ministries (agriculture, forestry and water management, civil engineering, health and finance), which regulate water under their area of interest. Because there is no clear division of tasks between the different authorities, the environmental regulation seems fragmented with lack of planning.

The environmental management of industrial development is primarily the responsibility of the Environmental Department of the Federal Secretariat for Labor, Health and Social Care, however at least four other federal institutes are involved. Their main task is to develop overall strategies and policies to be reflected and detailed in the legislation of the two republics.

Two federal institutes are involved in monitoring and collection of data and information on environmental and industrial development.

- The Federal Hydrometeorological Institute has the responsibility for international water issues and interpretation of data on air quality, radioactivity and water pollution
- The Federal Institute for Public Health collects and report data on health protection.

However it is the responsibility of the republic's hydrometeorology institutes to monitor the ambient waters. There is no environmental information system to describe the emissions and environmental impacts from the industry. Consequently, there is a lack of reliable data to analyze the present situation in order to make environmental priorities.

Serbia

Water related legislation

The Serbian Law on Waters covers protection of waters, utilization and management of waters, goods of general interest, conditions and methods for performing water-related activities, organization and financing of such activities, and supervision and monitoring for enforcement. The enforcement of the law refers to surface and groundwater, including drinking water, thermal and mineral waters, border and trans-boundary water flows, and inter-republic water bodies within the boundaries of the Republic of Serbia.

In addition to the Law on Water, there are different regulations, where the Regulation of Hazardous Substances in Waters regulates the wastewater. In 2002 the Water Master Plan for Serbia was approved. It presents a strategy to meet the increased demands including the financial cost of the expansions. Further, Serbia has developed a program of water pollution control improvements. The financial priority is improving the sewer system and industrial pre-treatment plants. The establishments of new plants are based on environmental criteria, primarily the protection of the drinking water resources. Wastewater is also regulated by Regulation on Methods and Minimal Number of Wastewater Quality Assessments (47/1983, amendment 13/1984).

The water legislation is not in compliance with the EU directives however the new act on the environment is under preparation and will be approved in the Serbian parliament soon. It will regulate also IPPC.

Through a two phase Project ”Development of Environmental Legislation in the Federal Republic of Yugoslavia” which in the finalized nowadays also the preparation of guidelines for BAT (within the framework of IPPC Directive) for the certain industries in Serbia – BREF Reference Documents – by the end of 2005 will be finished.

Directive	**Compliance**
Water Framework	Not transposed
Dangerous Substances	Not transposed
Integrated Prevention and Pollution Control	Not transposed
Seveso	Not transposed
EIA	Not transposed
EMAS	Not transposed

Institutions

The Ministry of Protection of Natural Resources and Environment and the Republican Water Directorate within the Ministry for Agriculture and Water management is responsible for implementation of the WFD and IPPC Directive. Both ministries are responsible for large parts of the water management as water resource management water supply is under their jurisdiction.

Permitting

Ministry of Protection of Natural Resources and Environment gives permits for:

- Environmental impact analysis for new installations or when reconstructing existing ones
- Chemical-accident risk evaluation for large installations with heavy consumption of chemicals.

The municipalities are also involved in industrial regulation. They are responsible for permitting and inspecting smaller industries.

It is expected (according to the currently prepared Act of the Environment Protection) that there will be transition period by the end of the year 2010.for IPPC permits required
Preliminary analysis of Serbian industries shows that about 170 installations are subject to IPCC and another 673 might potentially be subject to the Directive. From all 840 installations about 154 are located in the DRB. However, their number can potentially grow to 336.

Monitoring

Water quality monitoring is conducted by Serbia’s Hydrometeorological Institute, which is responsible for measuring and recording quantities of wastewater discharged, and submitting the data to the relevant public agency. Monitoring also includes tracking the performance of wastewater treatment facilities.

Inspection

The inspections are under the responsibility of the Water Resource Management Inspectorate. The Inspectorate has little power to enforce the legislation. The coordination with the courts is poor, so the inspectors do not know whether the court proceedings took place or if there any penalty was issued. The actual proceedings take a long time and sanctions are so low that it does not have any effect on polluters. Even the most heavily polluting companies cannot be closed down because the Ministry has no legislative authority.

The Ministry of Protection of Natural Resources and Environment only has 39 inspectors allocated for industrial activities, which is inadequate. Further the inspectorate needs vehicles and computers to fulfill their tasks properly.

Montenegro

Water related legislation

In 1996, the Environmental Law (12/1996) was adopted as a general environmental framework. The Law also contains general provisions regarding environmental monitoring, liability for environmental pollution, environmental financing, and compliance and enforcement, including penalties. Only a few regulations pertaining to the Environment Law have been issued, such as the Regulation on Environmental Impact Assessment (1997). In addition, a number of laws under the authority of other ministries are also relevant, particularly regulations on quality of soil and agricultural land, water quality and wastewater. According to the Ministry of Environment and Physical Planning (MEPP), all recently issued sector laws and by-laws are compatible with respective EU legislation. However, there seems to be little, real appreciation of what the process requires in terms knowledge of the Community *acquis* and ability to formulate policy and draft legislation which are EU-compatible, and which consider monitoring, costs and enforcement capacity.

EU Directive	**Compliance**
Water Framework	Not transposed
Dangerous Substances	Not transposed
Integrated Prevention and Pollution Control	Not transposed
Seveso	Not transposed
EIA	Not transposed
EMAS	Not transposed

Institutions

Like Serbia, several ministries and the municipalities are involved in water regulation. However, in Montenegro the Ministry of Environmental Protection and Physical Planning has taken the lead role in planning and organizing water management. The ministry is also one of the primary authorities responsible for implementing the environmental legislation relating to industry. Another important authority is the Ministry of the Economy, which is responsible for mining, energy and industry. Unlike Serbia, Montenegro only has one local level of authority - the municipalities. They are also involved in the protection of water and nature, but generally they lack resources and experience. Several other authorities are involved in environmental regulation in Montenegro, which complicates the system. There is a need for coordination and cooperation between the different authorities.

Permitting

The permits are required by all operations that may cause pollution of the environment. The permits are given in accordance with an environmental impact assessment. The assessments are done by expert organizations and a part of the requirement is to draw up the draft conditions for the permits. The Ministry of Environmental Protection and Physical Planning issues the permits.

A condition of the permit may be self-monitoring. The requirements in the environmental legislation are transferred into site-specific conditions in the permit. Reporting conditions are related to fees for use and emission of natural resources. The companies have to make an annual report regarding the use and discharge of water.

Monitoring

The Ministry of Environmental Protection and Physical Planning is in the fist phase of implementing a national information system. The system should among other things contain information about company and sector environmental impact. The data for this is generally collected by self-monitoring of the companies, through inspections and through the permitting authorities own monitoring.

The monitoring of ambient water is done by the Centre for Eco-Toxicology Research and the Republic Hydro-Meteorological Institute. Together these institutes have a well-established monitoring network of stations. The monitoring has improved quickly recently. Monitoring programs are being developed for air pollution, radioactivity, soil pollution and water quality.

Inspection

The Ministry of Environmental Protection and Physical Planning is the main organization responsible for the inspection. The inspectors are not involved in the permit process. There are four environmental inspectors at the Ministry and they are responsible for inspections for the entire country. The inspections can either focus on the environment as a whole or on one parameter. In the former different expert inspectors with different area of expertise (wastewater, air pollution etc.) participate. Three or four inspectors carry out these inspections. For a single media one or two inspectors participate to examine whether or not the company meets the requirements for e.g. wastewater. In case of none compliance with the legislation the inspectors can issue fines or prevents the sale or import of certain material that do not meet the requirements. Criminal charges and imprisonment are also possible. . In some municipalities there is an environmental inspector, but they do not really have authority to inspect on their own, hence their work is mostly to support and cooperate with the inspector from the Ministry. The inspection unit needs staff and equipment. Currently the documentation is in paper files but it would improve the efficiency of the office if computers were available.

Industrial Pollution in Serbia and Montenegro

Industries include machine building (aircraft, trucks, and automobiles; tanks and weapons; electrical equipment; agricultural machinery); metallurgy (steel, aluminum, copper, lead, zinc, chromium, antimony, bismuth, cadmium); mining (coal, bauxite, nonferrous ore, iron ore, limestone); consumer goods (textiles, footwear, foodstuffs, appliances); electronics, petroleum products, chemicals, and pharmaceuticals.

Main pollution problems include pollution of coastal waters from sewage outlets, especially in tourist-related areas such as Kotor; air pollution around Belgrade and other industrial cities; water pollution from industrial wastes dumped into the Sava River which flows into the Danube.

3.3.9 Slovakia

General background

The territory of Slovakia covers 49.034 $km^{2.}$ The country is divided into 8 regions and 79 districts. Within this broader administrative division there are 2 883 municipalities. Slovakia has a population of around 5,4 million and a population density 109,9 inhabitants per km^2. Slovakia is a rural country of small settlements. The urban population is 56%of the total concentrated in a few larger cities.

Slovakia is country in economic transition. In 2000, the GDP reached 887.2 bill. SK (constant prices). The average unemployment rate in 2002 was 19.6%. The rate of inflation increased dramatically in 1999, when large price reforms for public services were introduced (including water services). Since 2000, inflation continues to decline. The pace of decline slowed in 2002 when the Government put a brake on the process of price deregulation.

Main characteristics of Slovakia and macroeconomic indicators

	Unit	Indicator
Population	Inhabitants	5 402 547
GDP	USD	23,7 (2002)
GDP per capita	USD	12 000
Inflation rate	%	8,4
Unemployment rate	%	18,6

1 EURO = 44 SK (2002)

In the past, Slovakia was dominated by the heavy machinery industry, chemical industry and food processing industry. In economic transition, most of large state owned enterprises ceased to operate. Presently, the main economic sectors are metallurgy, production of automobiles, and the chemical industry. These are the largest polluters of the environment. As almost all companies are private and have foreign investment which brought an upgrade and reconstruction towards BAT and other environmental improvement systems.

Slovakia is drained by ten major rivers, of which nine are part of the Danube river basin. The Danube catchment area in Slovakia is 47.064 km^2. The basic water infrastructure falls short of what is required by EU directives. The total inhabitants connected to a public water supply network in 2000 represented 83% of the population. The development of the sewerage systems lags behind the development of water supply systems. In comparison with other countries this represents a relatively serious underdevelopment. The number of people connected to public sewerage systems is 2.8 mill. inhabitants, or 54,7 % of the total population (2000)

Water related legislation

Slovakia enters the EU in 2004 thus most of the European environmental legislation has been transposed. The Water Act 184/2003 was adopted in 2003 and transposed all EU water related legislation (except for some provisions of the WFD). The Water Act requires that anybody discharging wastewater in ground or surface water must ensure that the quality of receiving water will not be deteriorated. Also, appropriate treatment of discharge waters must be established prior to discharging to the recipient water. Each withdrawal larger that 15 000 m3/year or 1 250 m3/month is subject of a permit. Permits are granted by the environmental departments of the District Offices (DO).

There is a Regulation 491/2002 on permissible levels of pollution discharges and ambient quality standards of receiving waters. The Regulation sets the maximum limits of pollution discharged into the recipient and the DO should take into consideration also the ambient water quality of the recipient (approach of emission – AWQ standards is applied as required by the WFD).

There is also Regulation (35/1979) on Pollution Charges however, it does not provide for reduction control measures of major industrial polluters.

EU Directive	**Compliance**
Water Framework	Partially transposed, the amendment of the Water Act planned in 2004
Dangerous Substances	Transposed and implemented, Water Act Reduction programs for List I and List II substances are under the development Transition period obtained for specific industries by 2006
Integrated Prevention and Pollution Control	Transposed, Act adopted in 2003, integrated permits will be introduced from 2004 Transition period obtained for specific industries by 2011
Seveso	Transposed and implemented, the Act on Prevention of Major Industrial Accidents entered into force in 2002
EIA	Transposed and implemented, Act on EIA was amended in 2002
EMAS	Transposed and implemented, Act on Environmentally Oriented Management and Audit Scheme entered into force in 2003

Institutions

The Slovak Ministry of Environment is the central body of the state environmental administration and it is responsible for policy development as well as the management and protection of the environment, including nature protection, water management and water protection, air protection, waste management, environmental information system and environmental monitoring.

There are 8 regional (RO) and 79 District Offices (DO), which have environmental units in charge of the state environmental administration. The main functions of these offices involve decision-making, permitting, supervision and enforcement.

From 2004, RO and DO will be cancelled and some responsibilities should be transferred to the municipal level. Also there will be a newly established environmental administration that will cope with hydrological borders of the main river basins based upon a previously existing organization. This proposal is under discussion.

The main institution with respect to the implementation of IPPC will be the Slovak Environmental Inspection (SEI).

The Ministry of Environment also directs supporting agencies:

- The Slovak Hydrometeorological Institute (SHMI)
- The Water Research Institute (WRI)
- Slovak Environmental Agency (SEA).

Permitting

Any activity that might impact environmental quality requires permits. These are issued by the DO of the appropriate jurisdiction. The activity is also reviewed for compliance with the local and regional land use plan and environmental impact assessment. However, the final statement of the EIA is not an obligatory (legally binding) document for the decisions on future industrial or other activities.

The DO grants approval for operators of pollution sources based upon an application. A complex application is reviewed with respect to all of the requirements including technical, operational and organizational parameters of the proposed activity. Also, the authority can request an expert opinion and/or can invite the Slovak Environmental Inspectorate (SEI) to review the application.

DOs are legally obliged to issue permits within the limits set up in the legislation. The water authority might issue stricter limits or conditions of the operation. The legislation allows for exemption from the limits for a limited time (also set up in the Acts).

Prior to November 2003, permits have not been integrated. A new Act on IPPC No. 245/2003 provides for issuing of integrated permits for selected companies that falls under the IPPC Act as required by the IPPC Directive.

There are following competent bodies in the integrated permitting process:

The Slovak Environmental Inspectorate – with four new regional IPPC departments and an IPPC Headquarter in Bratislava are responsible for reviewing the applications submitted to them. They issue integrated permits. The IPPC Act appoints a number of affected bodies that enter into the permitting process (district offices, municipalities, hygiene institutes, etc.). The Regulation 391/2003 authorized persons (by the SMoE) can help installation in the preparation of the application. The Slovak Environmental Inspectorate – IPPC Department is building also a BAT center. Slovak Environmental Agency is an appointed institution for EPER (and other reporting to the EC). The total number of IPPC installation is around 540, among them 33 “new” ones.

Until 2002, the permits were not time limited. The Water Act of 2003 requires a regular revision of permits; special attention is paid to dischargers of dangerous substances from List I and List II where a maximum 4-year permit would be issued. Also, annually, the facility has to report (and ask for permit – approval) on discharge into the recipient waters. A summary of water related permits required from industry is as follows:

Water and wastewater permits

- withdrawal of surface and ground waters
- withdrawal or use of mining waters
- discharge of waste waters into surface or ground waters
- discharge of special waters (mineral waters, mining waters)

Other water permits

- water management facilities (dams, reservoirs, irrigation facilities, melioration facilities, facilities for protection against floods)
- geological and hydrological activities in protected zones
- extraction of sand, gravel, silt from the water flows beds

Special water authorizations

- constructions and facilities in water flows
- long-distance pipes, storage, tanks, landfills
- any industrial activity or change in technology that might impact the quality of quantity of water

Monitoring

There are several monitoring institutions dealing with monitoring of water quality:

- The Slovak Hydrometeorological Institute (SHMI) is responsible for monitoring of environmental quality standards for air and water (both generally and in relation to specific discharges/sites).
- River Basin Enterprises monitor surface waters (both generally and in relation to specific discharges/sites) and discharges of polluters. However, the monitoring is focused only on substances that are the subject of pollution charges.
- The Water Research Institute keeps a record on monitoring of municipal WWTPs discharges that are operated by the Water Works Utilities. Industries that discharge into public sewage system must prior to discharge pre-treat their waters in order to avoid damaging the public WWTP. No information is available about industries discharging into urban sewage networks.
- There is self-monitoring of polluters that submit data on voluntary basis to the SHMI. The SHMI recently developed the monitoring and reporting protocol for the industry with respect to reporting on dangerous substances.

The surface and ground water quality monitoring is processed at the SHMI. It consists of 176 basic and 3 special sampling locations (1999). The sampling is conducted once per month for all sampling locations of the parameters of the basic group (t, color, oil substances, dissolved oxygen, BOD, COD, soluble substances, insoluble substances, pH, conductivity, chlorides, sulfates, NH4+, NO3-, NO2-, total P, coliform bacteria, bioseston saprobity). Special (enlarged) sampling is conduced specifically according to the purpose of monitoring. Heavy metals are measured 4 – 6 times per year, chlorophyll "a" during the vegetation period, pesticides 2-6 times per year.

The National Reference laboratory (for water) tests and ensures the analytical quality control of labs conducting the sampling. Monitored data are available to the public. The SHMI is the responsible institution to submit monitoring data to the ICPDR.

Inspection

The Slovak Environmental Inspectorate (SEI) includes a central (headquarters) body reporting to the MoE, with separate, media-based inspectorates covering water, waste, air and nature and operating at the regional level. The inspectorates check compliance with the requirements of permits through a program of site inspections. Inspectors can also check self-monitoring data. Penalties can be imposed for non-compliance, and recommendations can be made for technical improvements (this is not a legal requirement, and is often done informally).

Inspectorates are not integrated but they are closely coordinated; compliance is checked per environmental medium.

As described in the previous chapter the SEI is since July 31, 2003 also an IPPC permitting and inspecting institution.

Industrial pollution

Industrial production contributes 26% of the GDP in Slovakia (1999). The main industrial sectors are metallurgy, production of cars and production of food. Production of wastewater from industrial production has had a decreasing trend both in total volume of wastewater discharged and quality of discharged wastewaters. Not only environmental policy measures but also the general reduction in industrial production contributed to the positive trend of reducing emission levels.

In 2003, all water pollution permits are being revised and stricter limits are being issued. Each discharger of dangerous substances must develop a reduction plan that will ensure the elimination of List I and the reduction of List II substances. BAT will be required for IPPC installations.

3.3.10 Slovenia

General background

Slovenia is a relatively small country covering 20 253 km^2. It is administratively divided into 182 municipalities and 11 urban municipalities. It has the highest GDP per capita of the CEE countries. The GDP is even higher than some of the EU Member States. The country is rich in water resources and 80% of the population has drinking water supply. The country has made great environmental progress in recent years and the amount of GDP spent on environmental issues has increased from 1.5 to 2-2.5%. The environmental consciousness of the population is high compared to the other ECC countries. Due to the size and wealth and previous transition progress the country experienced very easy negotiations with the European Commission and it was the first country to close the environmental chapter in the beginning of 2001. Hence Slovenia is among the countries to join EU in 2004.

Indicator	Unit	
Population	Inhabitants	1 932 917
GDP	USD	36 billion (2002 est.)
GDP per capita	USD	18 000 (2002)
Inflation rate	%	7,4
Unemployment rate	%	11

1 EURO -= 230.5 Tolar (SIT) (2002)

Slovenia, with its historical ties to Western Europe, enjoys a GDP per capita substantially higher than that of the other transitioning economies of Central Europe. Privatization of the economy proceeded at an accelerated pace in 2002, and steps were taken to bring down the budget deficit from 2.9% of GDP in 2002 to 1.2% in 2003. Despite the economic slowdown in Europe in 2001-02, Slovenia maintained 3% growth. Internal structural reforms to improve the business environment, encouragement of direct foreign investment, and measures to curb inflation are needed to prepare the way for EU membership. GDP was generated in 2001 by sectors as follows: agriculture 3%, industry 36%, and services 61%.

Water related legislation

Slovenia has three fundamental legislative tools that outline the objectives and strategies for future environmental regulation and water management. They are the Environmental Protection Act (1994) National Water Resource Strategy and National Environmental Action Program (1999). The Action Program prioritizes water, waste and nature management and makes realistic strategies for all three areas. The strategies are divided into short-term and long-term where the former are going to be met prior to accession and the latter prior to 2008. The Environmental Protection Act primarily focuses on pollution stemming from point sources. Only a few changes in the Act were necessary to meet the EU requirements. In 2001 different amendments began the transposition of the IPPC Directive. 15 installations have transitions period to meet IPPC requirements until 2011 and the rest will be in line with the Directive in 2007. Also for the UWWD transitional arrangements were made.

In 2000-2001 vulnerable areas were identified and all of Slovenia was classified as a vulnerable area under the Nitrate Directive. In July 2002 the Water Act was approved that transposes all EU Directives and considers the management of the whole water system. Also the discharges in the Dangerous Substance Directive were aligned in 2002.

EU Directive	**Compliance**
Water Framework	Transposed
Dangerous Substances	Transposed
Integrated Pollution Prevention and Control	Transposed with transition period until 2011 (for fifteen existing installations)
Seveso	Transposed
EIA	Transposed
EMAS	Implementation in progress. The process is expected to be finished by the end of 2003

Institutions

The overall responsible authority is the Ministry of Environment and Spatial Planning. The Ministry has been simplified and streamlined in order to improve the implementation of the directives. In 2001 the environmental administration was further improved when the Environmental Agency was established. The Agency was established by amalgamating three former institutes namely: the Nature Protection Authority, the Hydro-meteorological Institute and the Administration for Geophysics.

Slovenia has increased the number of staff dealing with EU environmental issues by 50 % over the last five years. Furthermore, employees in the Environmental Agency have received special training in order to make environmental impact assessments.

Permitting

The following types of permit are required:

- Location Permits (for construction) are issued directly by Ministry of Environment and Spatial Planning but relating to spatial planning rather than environment. They must be consistent with the structure plan and comply with EIA requirements (including public consultation) in accordance with the EIA Directive.
- Operating Permits are issued separately for air, water and waste by the Environmental Agency. Permit requirements will be consistent with the environmental *acquis*, providing relevant implementing legislation is in force in Slovenia.

The process of obtaining a permit is as follows. When an investor wishes to obtain a permit he usually first checks the physical plan for possible construction locations, then he issues a request for the draft location and draft building documentation. When all the necessary documentation has been received, he starts the procedure of negotiating with the permitting authority. This is usually conducted by an authorized company, which is preparing the location and building permit documentation. This company invites all authorities responsible for location and building permits to issue their consent statements or guidelines. Permits are negotiated in the sense that a polluter may be give time to come into compliance, but the absolute standards are not negotiated. Permits are generally handled on a case-by-case basis, although a consistent approach is adopted for a particular type of facility (power plants, landfill sites etc).

The present permitting system is fragmented and media-specific. The system experiences some coordination problems, but it seems like Slovenia will solve the problems by making one integrated permit issued by a single permit authority. In that case the responsibility will be under the Ministry of Environment and Spatial Planning.

Monitoring

The Hydro-meteorological Institute formerly did the monitoring of surface water quality but after the establishment of the Environmental Agency the responsibility has transferred to the Agency. There are more than 100 sampling stations along the main rivers and the monitoring is done from two to six times a year. The methodologies and needs of the system are harmonized with the requirements from the European Environmental Agency.

The Ministry of Environment issues authorizations for laboratories to conduct monitoring on request of companies. This list is publicly available. Site monitoring of permitted facilities is carried out by approved contractors, certified by the National Standardization Office and approved by Ministry to standards set by the monitoring regulation. Local Monitoring may also be carried out by or on behalf of local authorities.

Inspection

Enforcement is the main role of the Environmental Inspectorate. Local authorities also have a limited inspection role. Inspections are based primarily on Inspectorate regional offices. There are recognized ‘experts’ in some sectors, who are called in when the local inspectors identify issues that are beyond their competence/experience. Inspectors cover all media. The primary method of enforcement is site visits.

Inspections may be carried out on a routine basis (without advance notice) or in response to complaints submitted by the public through a dedicated telephone hot-line. Where the inspection reveals an infringement of permit requirements, the inspector generally issues a compliance notice requiring the operator to take specified action within a defined period. Failure to comply with the requirements of the notice within the period makes the operator liable to legal action. This may be primarily administrative in nature (specified financial penalty, but no criminal record) or, for more serious offences, result in criminal proceedings that can result in fines, imprisonment or withdrawal of the operating license (i.e. closure). Prosecution is dealt with through a dedicated office for legal issues within Inspectorate; although individual inspectors can deal with more routine cases (particularly administrative infringements) themselves using standard pro-forma letters.

Industrial pollution

The main industry branches are ferrous metallurgy and rolling mill products, aluminum reduction and rolled products, lead and zinc smelting, electronics (including military electronics), trucks, electric power equipment, wood products, textiles, chemicals, machine tools

The main pollution problems include the Sava River polluted with domestic and industrial waste; pollution of coastal waters with heavy metals and toxic chemicals; forest damage near Koper from air pollution (originating in metallurgical and chemical plants) and resulting acid rain

3.3.11 Ukraine

General background

Ukraine achieved independence in 1991 with the dissolution of the USSR, however, true freedom remains elusive as many of the former Soviet elite remain entrenched, stalling efforts at economic reform, privatization, and civil liberties. The territory covers 603 700 $km^{2.}$ It is administratively divided into 24 counties, 1 autonomous republic and 2 municipalities with county status.

Indicator	Unit	
Population	Inhabitants	48,396,470
GDP	USD	205 billion (2001)
GDP per capita	USD	4200
Inflation rate	%	12
Unemployment rate	%	3.6

1 EURO = 4.88 Ukrainian hryivna (UAH), 2002

After Russia, the Ukrainian republic was far and away the most important economic component of the former Soviet Union, producing about four times the output of the next-ranking republic. Its fertile black soil generated more than one quarter of Soviet agricultural output, and its farms provided substantial quantities of meat, milk, grain, and vegetables to other republics. Likewise, its diversified heavy industry supplied the unique equipment (for example, large diameter pipes) and raw materials to industrial and mining sites (vertical drilling apparatus) in other regions of the former USSR. Ukraine depends on imports of energy, especially natural gas, to meet some 85% of its annual energy requirements. Shortly after independence in late 1991, the Ukrainian Government liberalized most prices and erected a legal framework for privatization, but widespread resistance to reform within the government and the legislature soon stalled reform efforts and led to some backtracking. Output by 1999 had fallen to less than 40% the 1991 level. Loose monetary policies pushed inflation to hyperinflationary levels in late 1993. Ukraine's dependence on Russia for energy supplies and the lack of significant structural reform has made the Ukrainian economy vulnerable to external shocks. GDP in 2000 showed strong export-based growth of 6% - the first growth since independence - and industrial production grew 12.9%. The economy continued to expand in 2001 as real GDP rose by 9% and industrial output grew by over 14%. Growth was supported by strong domestic demand and growing consumer and investor confidence.

Water resources are not equally distributed throughout the Ukraine. Over 60% of the population is connected to municipal wastewater treatment plants but a majority of the villages discharge their

wastewater without treatment. The major problem is that in rural areas most of municipal waters are discharged untreated.

Water related legislation

The legislative framework for water management contains the Law on Environmental Protection and the Water Code of Ukraine. The Law on Environmental Protection from 1991 lays down the basic principles of nature protection and in particular, the principles that users must pay for the discharge of pollutants into water. The Water Code from 1995 provides the basic framework for water legislation. The basic provisions include the management of legal relations to ensure water protection, rational use of water for the population and industry, restoration of water resources and protection of waters from pollution and illegal disposal.

The laws do not correspond with the water regulation within EU. There is no specific legislation dealing with the integrated prevention and pollution control.

EU Directive	**Compliance**
Water Framework Directive	not transposed
Dangerous Substances Directive	not transposed
Integrated Prevention and Pollution Control Directive	not transposed
Seveso Directive	not transposed
EIA Directive	not transposed
EMAS	not transposed

Institutions

Water management is shared by a number of state institutions among which the Ministry of Environmental Protection and Nuclear Safety carries out complex management of water resource protection and

- develops new legislation and regulations,
- conducts state environmental impact assessment,
- issues permits for special water use,
- conducts state monitoring of water resources and,
- enforces the various water regulations.

There are water authorities at the local level, however, the mechanism on the supervision and management are not clear.

Permitting

According to the Water Code, water use and discharge requires a permit. The permits for water resources of national significance are granted by the Ministry of Environmental Protection and Nuclear Safety, while abstraction from and discharges into local water resources are permitted by local authorities. The permit determines the volume of raw water that can be taken and used and also the amount of pollutants that can be discharged (concentration as well as load). Ambient standards are used to set effluent limits. The permit also defines the rate of the two fees (abstraction and pollutions charges) that the user has to pay. The licensing procedure provides for cooperation with the Committee on Water Resources, the Committee on Geology or the Ministry of Health Protection. The permit may be granted for a short (up to 3 years) or a long-term period (3 to 25 years).

Monitoring

The situation was confusing without a clear delineation of the responsibilities between the various entities. In 1998, Resolution 391/1998 was adopted to improve the coordination of monitoring activities. Overall coordination of monitoring is under the Ministry of Environmental Protection and Nuclear Safety.

The following authorities are involved in water monitoring and control:

- Ministry of Environmental Protection and Nuclear Safety
- Ministry of Agriculture and Food Production
- Committee on Water Resources
- Committee for Hydrometeorology

The Committee on Water Resources maintains more than 200 monitoring stations for surface water.

Inspection

The State Ecological Inspectorate reviews compliance. If regulations or permit provisions are violated, it is authorized to temporarily close down the polluting activity and to impose a penalty or sue the polluter. However, the complexity of the permits and the lack of staff hinder enforcement of permit provisions.

Industrial pollution

The main industry branches are coal mining, electric power production, ferrous and nonferrous metals, machinery and transport equipment, chemicals, food processing (especially sugar)

The main pollution problems include inadequate supplies of potable water; air and water pollution; deforestation; radiation contamination in the northeast from the 1986 accident at the Chernobyl' Nuclear Power Plant

3.4 Water Legislation and Institutional Summary

The first part of this section contains a summary and discussion of the relevant water legislation and compared to the major EU water related legislation. In the second part an overview of the institutional situation is provided. This followed by a discussion of steps to be taken in addressing the legislative gaps.

3.4.1 Water legislation summary

Country/ Directive	Water Framework	Dangerous Substances	Integrated Prevention and Pollution Control	Seveso	Environmental Impact Assessment	Environmental Management and Audit Schemes
Bosnia & Herzegovina	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive
Bulgaria	Partially implemented using as future framework for national legislation	Transposed and substantially implemented in National Legislation	Partially implemented using as future framework for national legislation	Partially implemented using as future framework for national legislation	Fully implemented in National Legislation	Partially implemented using as future framework for national legislation
Croatia *	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive
Czech Republic	Transposed and substantially implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation
Hungary	Transposed and substantially implemented in National Legislation	Fully implemented in National Legislation	Transposed and substantially implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation
Moldova	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive
Romania	Partially implemented using as future framework for national legislation	Partially implemented using as future framework for national legislation	Partially implemented using as future framework for national legislation	Partially implemented using as future framework for national legislation	Transposed and substantially implemented in National Legislation	Partially implemented using as future framework for national legislation
Serbia - Montenegro	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive
Slovakia	Transposed and substantially implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation
Slovenia	Transposed and substantially implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation	Fully implemented in National Legislation
Ukraine	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive	Not implemented and changes not planned to transpose the EU directive

3.4.2 Institutional summary

The following table summarizes the institutional arrangements for the countries for comparative purposes.

Country institutions	National level responsible for water related issues	County/local levels responsible (cooperating) for water related issues	Permitting authority	Inspection authority	Monitoring agency for industrial polluters
Bosnia and Herzegovina	Ministry does not exist at federal level, issues coordinated by Commission for Water FB&H: Federal Ministry of Agriculture, Water Management and Forestry Federal Ministry of Physical Planning and Environment RS: Directorate for Water Ministry of Agriculture, Forestry and Water Management	F B&H: cantons RS: municipalities	F B&H: Ministry of Agriculture, Water Management and Forestry, cantons RS: Ministry of Agriculture, Forestry and Water Management	F B&H: Federal Inspectorate RS: The Ministry of Urbanism, Housing-Communal Services, Civil Engineering and Ecology	F B&H: Self-monitoring Cantons RS: Self-monitoring Water Institute Bijeljina
Bulgaria	Ministry of Environment and Waters Executive Agency of the Environment	Regional offices Municipalities Water Basin Directorate	Water Basin Directorates	Regional inspectorates	Self-monitoring Bulgarian Environmental Agency Regional inspectorates
Croatia	State Water Directorate, Croatian Waters (Hrvatske Vode)	Economic county offices Environmental county offices	State Water Directorate Croatian Waters Economical county offices	State Water Management Inspection County Water Management Inspectorate	Croatian Waters (Hrvatske Vode)
Czech Republic	Ministry of Environment, Ministry of Agriculture	District offices Regional offices River basin administration Municipalities	District offices Regional offices	Regional inspectorates	Self-monitoring Hydrometeorological Institute Water Research Institute
Hungary	Ministry of Environment and Water Management	Water directorates at districts Regional environmental inspectorates Municipalities	Regional environmental inspectorates	Regional environmental inspectorates	Self-monitoring Regional environmental inspectorates VITUKI

Country institutions	**National level responsible for water related issues**	**County/local levels responsible (cooperating) for water related issues**	**Permitting authority**	**Inspection authority**	**Monitoring agency for industrial polluters**
Moldova	Ministry of Ecology, Construction and Territorial Development (MECT)	Regional water inspectorates and municipalities	MECT and Sanitary-Epidemiological Services (Ministry of Health)	Ecological Inspectorates	
Romania	Ministry of Waters and Environmental Protection	Basin Committees Municipalities	Environmental Protection Inspectorates	Environmental Protection Inspectorates	Self-monitoring Apele Romane
Serbia-Montenegro	Serbia The Ministry of Agriculture, Forestry and Water Resource Management Montenegro Ministry of Environmental Protection and Physical Planning	Municipalities	Ser: Ministry of Protection of Natural Resources and Environment Water Resource Management Inspectorate Municipalities Mon: Ministry of Environmental Protection and Physical Planning	Municipalities Mon: Ministry of Environmental Protection and Physical Planning	Self-monitoring Hydrometeorological Institute
Slovakia	Ministry of Environment	District offices Regional Offices River Basin Enterprises municipalities	District offices Regional offices	Regional Inspectorates	Self-monitoring River Basin Enterprises Water Research Institute Hydromet. Institute
Slovenia	Ministry of Environment and Spatial Planning	municipalities	Ministry of Environment and Spatial Planning Environmental Agency	Environmental inspectorate	Environmental Agency
Ukraine	Ministry of Environmental Protection and Nuclear Safety	Counties municipalities	Ministry of Environmental Protection and Nuclear Safety Committee on Water Resources	State Ecological Inspectorate	Self- monitoring Committee on Water Resources

Of the 11 countries 9 have an institution responsible for water management at the national level. In one country the national agency is purely a coordinating mechanism. In four countries the responsibilities are shared by than more that one organization. The remaining two countries have a more decentralized structure. In 10 of the 11 countries municipalities play a role in the process. Four have specialized river basin organizations and these along with regional district or county offices are key organizations. Those countries with existing river basin authorities may find that an advantage in implementing the Water Framework Directive. Three of the countries have a centralized permitting process with the others having a decentralized capability. Each of the countries has an inspection structure in place. Monitoring systems vary but there is a substantial reliance on self monitoring. The ICPDR should facilitate seminars and staff exchanges among the countries focusing on institutional organizational issues. In addition, the ICPDR should provide technical assistance and where necessary financial support new positions on a limited basis to influence positive institutional change.

As can be seen from the summary chart above and including Germany and Austria, the legislative situation groups the ICPDR countries into three groups; those which have implemented the EU legislation; those which have partially done so and those which have not implemented the EU legislation virtually at all. The first group includes Austria, Czech Republic, Germany, Hungary, Slovakia and Slovenia. Bulgaria, and Romania which are in the second group are at different stages in harmonizing their legislation with Croatia being the most recent to initiate the process. During the preparation for entrance to the EU substantial funding is available through the EU pre-accession funds. New EU Member States have Structural and Cohesion Funds available to them. Based upon the period of adjustment of the Czech Republic, Hungary, Slovakia and Slovenia the funds available will facilitate the process of improvements in industrial pollution legislation and enforcement in a timely manner.

3.5 BAT Implementation

BAT may be implemented as a legislative requirement or by more informal means. This section is divided into two parts. Sections 3.5.1 to 3.5.6 address the implementation of BAT at the level of the national government. Section 3.5.7 is targeted to the level of the individual industrial installation.

3.5.1 Implementation of BAT at the National Level.

It could be argued that the easiest way for the remaining countries to implement BAT would simply to adopt national IPPC legislation. Before adopting new environmental legislation several factors need to be considered including:

- Priority
- Impact
- Administration
- Inspection and Enforcement
- Cost to Government
- Cost to Industry
- Implementing Cost Effective Approaches
- Information and awareness activities
- Strategic negotiation
- Incremental approach

Each is discussed in the following sections.

3.5.2 Priority

The nations not involved in the EU process are developing and revising their legislation generally. This means that new environmental legislation must compete with legislation from other fields in the economic and social spheres. There are scarce resources for monitoring and enforcement after the legislation is passed. Therefore, Ministries of Environment with limited access to the legislative process have to decide which legislation has priority. IPPC legislation has only relatively recently been introduced in the EU countries. It is what might be referred to as a second level legislation in that it assumes those media specific standards and other basics measures are in place. Countries are more likely to place basic legislation before introducing IPPC making IPPC legislation a lower priority.

3.5.3 Impact

National Governments also have to look at potential impact of new legislation and prioritize those with the largest potential impact. IPPC is limited impact legislation in that it only applies to those industries using the proscribed technology. Therefore, each country needs to look at the number of installations which would be required to implement BAT under national IPPC legislation and further to estimate the reduction in pollution. In economies in transition it is also necessary to determine the life expectancy of the operation. The shorter the life expectancy of the operation the less likely BAT will be introduced. From a water management point of view while the introduction of BAT may improve the discharges to water it is not aimed only at water management. Taking into account both that only selected industrial facilities will be included and the reduction of water pollution is not the specific objective of the legislation it may only have a marginal affect on water management in individual countries.

3.5.4 Administration

IPPC legislation needs a significant administrative structure to be effective. This includes a permitting capability and a BAT Center as well as a dedicated monitoring and inspection capability. The permitting process is lengthy and detailed. The need for the introduction of new organizational units and additional staff and equipment are prerequisites for the implementation of IPPC legislation. The process must be supported by extensive training programs.

3.5.5 Inspection and Enforcement

The introduction of IPPC legislation requires a dedicated inspection and enforcement capability. Because of the complexity of the process inspectors will have to be trained. The focus is on technology therefore technology experts will also have to be included in the process.

3.5.6 Cost to Government

The cost to government including new organization units, permitting staff hired and trained, a technology pool of experts identified and a capable enforcement function established may in some cases be equal or higher that the total budget for existing national government environmental expenditures.

3.5.7 Cost to Industry

The most cost effective time to apply BAT is when the installation is initially being constructed. Since many of the installations in the transitional economies are quite old the technology is also outdated. It is likely that the legal requirement to introduce BAT would cause installations to close due to economic reasons.

3.5.8 BAT Application at individual industrial installations

Full implementation of BAT at the national level can be a time consuming and expensive process. An alternative is to encourage the voluntary introduction of BAT at individual industrial installations. The UNIDO TEST project has developed a detailed methodology and provided examples of the benefits of applying environmental sustainable technologies to individual industrial installations in the Danube River Basin. The approach is based upon a number of tools including an initial review, an environmental management system, cleaner production assessment, environmental sound technology assessment and a sustainable enterprise strategy. The approach is fully integrated addressing management and employee involvement and both technological and non technological improvements. The framework of sustainable economic and environmental performance eliminates the jobs versus the environment debate by showing the positive interrelation between productivity and pollution reduction. By providing an approach which is both economic and environmentally advantageous it is an approach which can be supported by industry and those advocating pollution reductions.

This section provides a discussion of the benefits to these installations from the voluntary implementation of BAT. It also examines data from 5 case studies to examine the initial steps necessary to implement BAT based in these specific industrial installations. The main objective of the case studies is to provide examples of how existing installations can implement BAT. There were 11 installations considered as possible case studies. The greatest potential for pollution prevention and reduction occurs in those installations which will continue to operate. In industrial installations using older, out of date, highly polluting technologies there is little potential for the implementation of BAT for technical and economic reasons. The focus for the five case studies presented in Appendix 4 is on those installations which are similar to others which may implement BAT.

Case studies are useful in a number of ways. Case studies may stimulate other installations to recognize the benefits and better understand the process of applying BAT. In the DRB this could cause more rapid introduction of BAT in installations so that pollution reduction and production efficiencies benefits will be gained sooner. Case studies are also useful to national governments in removing any policy or legal barriers which may exist and therefore promote further application at BAT. Also, case studies may be used to project the total potential impact of the introduction of BAT application on a sector, country, or region. The selection of the case studies focused on outdated techniques in the most polluting industrial sectors in the DRB. Selecting case studies within these sectors means that the case studies clearly incorporate the specific characteristics of the DRB and the objectives of this project.

Reasons for Voluntary Implementation of BAT

For industrial institutions to implement BAT on a voluntary basis there must be a business justification, that is, the installation must benefit economically.
Experience shows that there are a number of potential incentives for an industrial enterprise to implement BAT. The implementation of BAT can reduce pollution fees and fines. In addition to the reduced pollution load, production efficiencies are also likely to be achieved, and profitability enhanced. BAT also makes the enterprise more attractive to investors and may open new markets. New industrial technical development generally provides both production improvement and pollution reduction. Often, the additional revenue from the introduction of new technological developments may not only cover the investment costs but also increase profits over time.

The implementation of BAT makes the installation more attractive to potential investors. Investors in the DRB are moving away from investing in existing installations, preferring instead to develop completely new "green field" installations. Greenfield development has advantages in that the investor controls the facility and the technology design and does not have the risk attached to updating older buildings and technology . Also there is no risk of finding pollution loads on the site which would require costly clean up . This means that the availability of investment funds for existing industrial installations has decreased and therefore the competition for these funds has increased among existing installations. Industrial installations which have adopted BAT are in a better position to attract investment funding because it shows that they are modernizing. In BAT installations in the DRB there is more production and pollution reduction information available. The introduction of BAT may also provide access to additional markets. Many existing installations in the DRB were built at a time when production output was the key requirement and environmental pollution was not a significant consideration. With the introduction of BAT new markets may become available, for example where the purchaser requires certification that the product has been produced according to the highest environmental standards. BAT signifies that the installation has been upgraded and therefore is attractive to customers which require a continuous flow of consistent, high quality, production.

Case Study Analysis

The main objective of development of case studies is to demonstrate this potential in terms of change of pollution volumes and toxicities as well as to estimate scale of costs incurred by BAT implementation. Industrial installations in the DRB can be grouped into three categories; new installations, existing viable installations and existing non viable installations. While both viable and non viable installations may be using outdated polluting technologies the viable ones are those which have a sustainable future if upgrading occurs. The non viable category includes those which are both economically and environmentally inefficient and therefore will not be able to survive. At these installations full pollution reduction will be achieved by plant closure. Since ultimately the changes occur at the level of the individual installations case studies provide an analysis at the primary level of change. The emphasis is placed on those which are starting the process since these are most relevant to others who wish to start the process.

Out of 11 originally assessed companies, 5 case studies were developed with focus on priority sectors but also some other water extensive sectors were included (electro technical and food-processing). The experience from the initial stages of Zaharni Zavodi AD, a TEST project, has been included as one of the case studies to show the broader information which becomes available when installation enters into a full process of upgrading.

The analysis is based upon the following five installations producing fertilizer, batteries, polyethylene and polystyrene and pulp and paper and a vertically integrated food production facility. The case studies were provided by the Slovak Cleaner Production Center in cooperation with other DRB Clearer Production Centers. In Appendix 4 basic descriptive information and a summary chart are provided containing available information on emissions and discharges, company reference data, and certification information for each of the installations.

Information Availability

Review of the initial information suggests that there is a wide variation in the amount information available. Generally, the technical process information is at a minimum level and there is little or no economic data included. Many private companies prefer to release as little information as possible for a number of reasons. Historically, virtually no information was made available to anyone so that industrial installations have no experience with sharing information even when it will benefit the installation. The installation management may feel the outsiders are trying to "steal the company secrets" to use for themselves. Ironically, this is often encountered with respect to the technology used

in production which is outdated and not useful to others. Also, once the information is made public it is open to interpretation and may be used for purposes which are inappropriate, for example, using minimum financial data to project profit figures by the newspapers or tax authorities. Public information may give competitors ideas on how they can be more competitive with the installation, for example, by installing more cost effective technology. The installation may fear that it could become a target for an unwelcome ownership bid without consultation with the company if a potential investor can acquire sufficient information from public sources without contacting the company. There is also the added factor that many of the companies are formerly government owned and may not be familiar what company information is generally available in market based economies. Cost saving is a key consideration as an incentive for an installation to voluntarily apply BAT. However, without sufficient information in the initial stage, it is not possible to predict an estimate of potential savings or even whether or not cost savings can be achieved. Many installations are changing their accounting systems to meet new national or international standards of accounting. The estimation of cost savings may be more difficult when the installation has changed accounting systems. With different accounting systems meaningful comparisons become difficult or even impossible.

Certification

Four of the five case study installations have one or more ISO certificates. Certification indicates that the installation has already met a set of international standards. This has a number of implications for BAT. By meeting the requirements of ISO 9000 or 14000 the installation is in fact meeting some of the BAT requirements. This is particularly true for ISO 1400 which explicitly requires the identification of environmental impacts. By going though the certification process the enterprise has been reviewed against specific criteria and has made any necessary changes. This means that these companies will be more prepared for the review and changes required to implement BAT. These installations recognize that changing and upgrading is necessary in an increasingly global market place.

Lessons Learned

The analysis above identifies a number of observations which will be useful to industrial installations in the DRB which are considering adopting BAT on a voluntary basis:

- BAT is a very new concept for most installations in the DRB. Senior managers are not familiar with the concept. Environmental managers may have some information about BAT but usually do not have enough information to understand what the benefits would be to their installation.

- Companies will voluntarily introduce BAT when there is a financial incentive for them. For companies which are economically viable there is a stream of benefits in the short and longer term which can provide the necessary financial incentive.

- General public data is insufficient to identify potential benefits. Potential benefits may be identified from comparing the experience of other similar installations or from an initial screening process based upon installation specific installation

- Support materials and other assistance are becoming more readily available for voluntary BAT implementation. The substantial body of information related to implementing the EU IPPC Directive is public information and can be used by the installation. Also, the UNIDO TEST Project in the DRB has fully developed a complete process for implementing BAT as part of a larger framework for industrial productivity improvement and pollution reduction.. There are

increasing numbers of experienced consultants available to assist individual installations in the voluntary implementation of BAT.

- BAT can be implemented in phases. Installations which have gone through an ISO certification process are more likely to be prepared to implement the process of introducing BAT.

Therefore, it can be concluded that, in the absence of a specific legal requirement industrial installations in the DRB have the opportunity to implement BAT on a voluntary basis. There are additional benefits for those installations which are in countries which will have legal requirement in the future. In these cases the voluntary introduction of BAT allows the installation to implement BAT in a time frame which fits the circumstances of the installation rather than a timetable which is legally binding for all installations.

3.5.8 Applying BAT at the DRB level

Consistency in industrial prevention and reduction programs across the DRB is important for the overall improvement of the Danube River water quality. In developing the ICPDR's role in the future it is necessary to put it in the context of the mandate of the ICPDR, and current contribution of the EMIS EG and existing BAT implementation components which from other sources are already in place.

BAT is applied at the level of the individual installation. The ICPDR is focused on the river basin generally with the cooperation of the Danube countries. Therefore, one of the options is for the ICPDR to encourage all of the Danube countries to adopt and implement IPPC legislation. The majority of the countries have a mandatory obligation to the EU to do so and need no further encouragement or involvement of the ICPDR. In fact, the implementation of IPPC legislation is so complicated and time consuming the involvement of an additional party in the process would be counter productive. The remaining countries could be encouraged to adopt legislation requiring the application of BAT. However, given the legislative priorities and the stage of transition of these countries it would likely be a difficult and lengthy process to get BAT implemented through the development and enforcement of national legislation in countries not involved in the EU accession process.

BAT is a concept that may be implemented without the need for a specific legal framework. When BAT is implemented it often results in cost savings in the operation of the industrial installation so there may be an economic incentive. There are also country based Cleaner Production Centers capable of providing cost effective support for the implementation of BAT. The UNIDO TEST project substantially improved the number of such centers and their capabilities with respect to the implementation of BAT at the level of the individual installation.

As part of this project a BAT workshop was held in Bratislava in December 2004 to discuss the issue with selected stakeholders. In the presentations and discussions the contribution of the ICPDR through the development of BAT industrial sector guidelines by the EMIS EG was recognized. The participants also identified other BAT initiatives such as the BAT facility established in Seville by the EU and the BAT activities of the Cleaner Production Centers. The Seville facility produces information on industrial technologies BREFS, some of which are over 1000 pages. These need to be adapted to national conditions as a legal requirement under the IPPC Directive. In summary the number of information and support programs for the implementation of BAT in the DRB is growing rapidly. The application of BAT occurs at the level of the individual installation with specific conditions mandated by national governments. The workshop participants looked at a number of options for the ICPDR in the implementation of BAT in the DRB. The consensus suggested that the ICPDR should have an awareness and information dissemination role.

3.6 Recommendations and Next Steps

With the expansion of the EU within the Danube River Basin three categories of countries emerge; member states, accession countries, and those not yet part of the current EU expansion process.

Countries that are Member States or will become Member States in 2004 have a common legislative framework dictated by the EU Directives. While the negotiation for membership was conducted on an individual country basis there is a similar pattern across all new Member States in terms of institutional structure, legislation and enforcement including the implementation of BAT, which is a legal requirement under the EU IPPC Directive. There are also three countries which are in the process of meeting the requirements of EU membership and therefore they are working within the same framework of the EU legislation but are not yet as far advanced . Effectively this means that the majority of the Danube countries (9 out of 13) have a consistent approach to environmental management including the management of their water resources, most importantly the Danube River.

The ICPDR has been very successful in developing data bases, conducting special studies, identifying hot spots and sensitive areas and raising awareness. These activities have facilitated improvements in water management practices in the Danube River Basin. With the majority of the countries now within or working toward the same legislative framework new strategies emerge. It is now possible to develop a more broadly based policy approach. The advantage of a policy approach is that it affects change over a large number of similar situations without having to work on a case by case basis. This makes it both more efficient and also cost effective.

3.6.1 ICPDR and EU Legislation Development

The EU legislation will dictate the approach taken to industrial pollution reduction and prevention in the majority of the DRB countries. The EU is already involved in the ICPDR so input from the EU perspective is considered in ICPDR decisions. The DRB would benefit from more input from the ICPDR in the legislative development process to ensure that DRB issues are fully taken into consideration in future EU legislation.

Recommendation

The ICPDR should establish a mechanism to support the six ICPDR national governments which are also EU Member States to advocate future EU policy and decisions which are directed toward the reduction and prevention of the industrial water pollution in the DRB. This mechanism also could be used to support other ICPDR policy initiatives.

3.6.2 Capacity building support programs

However, only EU Member States and those preparing for membership will be affected by this approach therefore a second approach is needed.

- For each of the ICPDR member countries, not involved in EU accession, it is recommended that a targeted three year support program for industrial pollution reduction policy and capacity building be developed. The components should include legislation drafting, institutional development, technical assistance and training among others. The program would be developed in cooperation with the individual national government and tailored to the needs of each country. These activities should be complementary similar activities by other international organizations which are either underway or planned for these countries.

The initial step would be to do a needs analysis in each country. Based upon the analysis a country specific work plan would be developed in cooperation with national officials. A key factor in developing the country work plans would be sustainability. Sustainability is dependent upon a number of factors; however, the key factor is the priority and commitment of the host government. This can best be assured by detailed discussions and agreement during the needs analysis phase and a flexible

approach to implementation. As part of the country needs analysis other donor initiatives will be reviewed. This review can identify not only gaps but also extension possibilities. These are situations where a previous project can be extended by the ICPDR to obtain additional benefits to the country in a very cost efficient way because it builds upon the prior resource allocation.

Several types of support might be provided including the following:

- short term research and analysis of a specific issue (3-6 months). This type of project might be for example an inventory of approaches of other countries in addressing a specific issue

- medium term analysis and institution building aimed at a small number of issues in a single institution. (6-12 months). For example, assisting in developing a revised organization structure to more efficiently analyze policy options or deliver an industrial pollution initiative.

In addition, it would be useful to establish a central information center which the countries could contact to receive either specific information or sources of information as appropriate. The center includes those involved in the country specific support program and other experts as needed.

This approach would reflect the current situation in the Danube Basin by ensuring that EU Directives address the priority issues. At the same time it would allow the non EU countries to strengthen their individual approaches to industrial pollution control.

3.6.3 BAT

The concluding discussions of the BAT workshop combined with the analysis conducted by the project team identified a rapidly growing number of sources for BAT in the DRB. BAT is not a water management tool per se but addresses other media as well. Those other media are not within the mandate of the ICPDR.

Recommendation

The role of the ICPDR should be to provide information links to the appropriate sources of BAT information specifically included BAT experts which have worked with the EMIS EG. This should be done by creating a BAT information link on the ICPDR website. The EMIS EG should review the current sources of BAT and select the most appropriate BAT information sources. The links to these sources and the EMIS EG BAT experts should be placed on the ICPDR website. The sources should be reviewed and upgraded annually. In this way the ICPDR supports the pollution reduction potential of BAT by providing a basin wide service in support of BAT implementation without duplicating the activities of other organizations.

The first step is to identify information sources and individual experts on BAT in the DRB. A link should then be created on the ICPDR website.

3.7 Appendices

Appendix 1: Comparison of EMIS Inventory Parameters and Other Data Sources

APPENDIX 1.
COMPARISON OF EMIS INVENTORY PARAMETERS AND OTHER DATA SOURCES

The following chart compares the current EMIS categories and threshold limits with the EU IPPC categories and threshold limits.

The EMIS industrial inventory deals with selected industries that are grouped into 11 sectors following a classification system developed for the EMIS inventory. The main related EU Directive, the IPPC directive uses an internationally recognized coding system which has very similar coding.

Current ICPDR Industrial Sectors		**IPPC Source Categories**	
1	Food industry	1	Energy industries
2	Chemical industry	2	Production and processing of metals
3	Pulp&paper industry	3	Mineral industry
4	Fertilizer industry	4	Chemical industry and chemical installations
5	Mining	5	Waste management
6	Iron and steel industry	6	Other Annex I activities
7	Metal surface industry		
8	Textile industry		
9	Leather industry		
10	Agriculture		
11	Other relevant industry		

The EMIS industrial inventory includes those polluters that produce 2 tons of COD per day and 1 ton of BOD per day. The data for IPPC installations will be kept according to the EPER Decision that prescribes the threshold values of pollutants of pollutants.

Current ICPDR polluters threshold value	**Kg/day**	**EPER list of threshold values**	**Kg/year**
COD	2 000	Total N (as N)	50 000
BOD	1 000	Total P (as P)	5 000
		As and compounds (as As total)	5
		Cd and compounds (as Cd total)	5
		Cr and compounds (as Cr total)	50
		Cu and compounds (as Cu total)	50
		Hg and compounds (as Hg total)	1
		Ni and compounds (as Ni total)	20
		Pb and compounds (as Pb total)	20
		Zn and compounds (as Zn total)	100
		Dichloroethane –1,2 (DCE)	10
		Dichloromethane (DCM)	10
		Chloro-alkanes (C10-13)	1
		Hexachlorobenzene (HCB)	1
		Hexachlorobutadiene (HCBD)	1
		Hexachlorocyclohexane (HCH)	1
		Halogenated organic compounds (as AOX)	1 000
		Benzene, toluene, ethylbenzene, xylenes (as BTEX)	200
		Brominated diphenylether	1
		Organotin – compounds (as total Sn)	50
		Polycyclic aromatic hydrocarbons	5
		Phenols (as total C)	20
		Total organic carbon (as total c or COD/3	50 000
		Chlorides (as total Cl)	2 000
		Cyanides (as total CN)	50
		Fluorides (as total F)	2 000

Water

	EU WFD priority substances	Danube priority substances	TNMN	JDS	Emission inventories
Alachlor	µg/l	µg/l		n.d.	
Anthracene	µg/l	µg/l			
Atrazine	µg/l	µg/l	µg/l	µg/l	
Benzene	µg/l	µg/l		µg/l	
Brominated diphenylethers	µg/l	µg/l			
Cadmium and its compounds	µg/l	µg/l	µg/l	µg/l	t/a
C_{10-13}-chloroalkanes	µg/l	µg/l			
Chlorfenvinphos	µg/l	µg/l		n.d.	
Chlorpyrifos	µg/l	µg/l		n.d.	
1,2-Dichloroethane	µg/l	µg/l		µg/l	
Dichloromethane	µg/l	µg/l		n.d.	
Di(2-ethylhexyl)phthalate (DEHP)	µg/l	µg/l			
Diuron	µg/l	µg/l		n.d.	
Endosulfan	µg/l	µg/l		n.d.	
(alpha-endosulfan)	µg/l	µg/l		n.d.	
Fluoranthene	µg/l	µg/l			
Hexachlorobenzene	µg/l	µg/l		n.d.	
Hexachlorobutadiene	µg/l	µg/l			
Hexachlorocyclohexane	µg/l	µg/l			
(gamma-isomer, Lindane)	µg/l	µg/l	µg/l	n.d.	
Isoproturon	µg/l	µg/l		n.d.	
Lead and its compounds	µg/l	µg/l	µg/l	µg/l	t/a
Mercury and its compounds	µg/l	µg/l	µg/l	n.d.	t/a
Naphthalene	µg/l	µg/l		n.d.	
Nickel and its compounds	µg/l	µg/l	µg/l	µg/l	t/a
Nonylphenols	µg/l	µg/l			
(4-(para)-nonylphenol)	µg/l	µg/l			
Octylphenols	µg/l	µg/l			
(para-tert-octylphenol)	µg/l	µg/l			
Pentachlorobenzene	µg/l	µg/l			
Pentachlorophenol	µg/l	µg/l			
Polyaromatic hydrocarbons	µg/l	µg/l			
(Benzo(a)pyrene)	µg/l	µg/l			
(Benzo(b)fluoranthene)	µg/l	µg/l			
(Benzo(g,h,i)perylene)	µg/l	µg/l			
(Benzo(k)fluoranthene)	µg/l	µg/l			
(Indeno(1,2,3-cd)pyrene)	µg/l	µg/l			
Simazine	µg/l	µg/l		n.d.	
Tributyltin compounds	µg/l	µg/l			
(Tributyltin-cation)	µg/l	µg/l			
Trichlorobenzenes	µg/l	µg/l		µg/l	
(1,2,4-Trichlorobenzene)	µg/l	µg/l		µg/l	
Trichloromethane (Chloroform)	µg/l	µg/l	µg/l	µg/l	
Trifluralin	µg/l	µg/l		n.d.	
Chemical Oxygen Demand (COD)		mg/l	mg/l		t/a
Ammoniacal Nitrogen (NH_4-N)		mg/l	mg/l	mg/l	t/a
Organic Nitrogen			mg/l	mg/l	
Total Nitrogen (tot N)		mg/l			t/a
Total Phosphorus (tot P)		mg/l	mg/l	mg/l	t/a
Arsenic and its compounds		µg/l	µg/l	µg/l	t/a

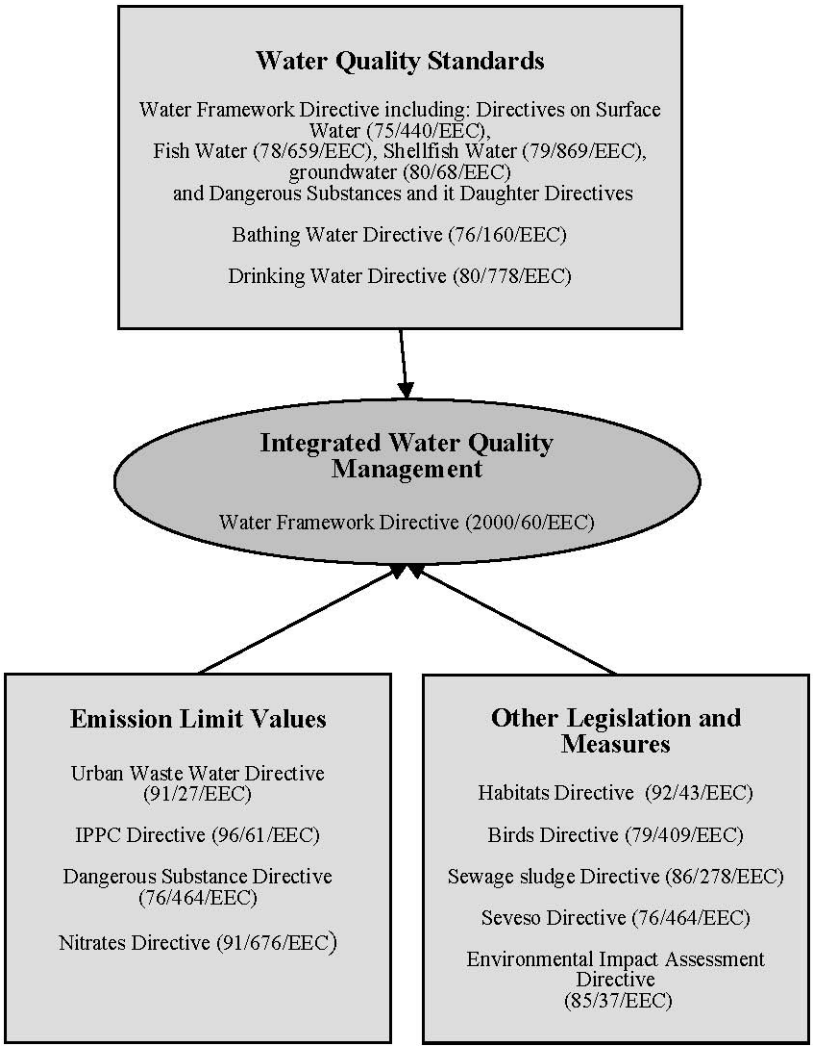
	EU WFD priority substances	**Danube priority substances**	**TNMN**	**JDS**	**Emission inventories**
Copper and its compounds		µg/l	µg/l	µg/l	t/a
Zinc and its compounds		µg/l	µg/l	µg/l	t/a
Chromium and its compounds		µg/l	µg/l	µg/l	t/a
p,p'DDT			µg/l		
Carbon tetrachloride			µg/l	µg/l	
Trichloroethylene			µg/l	µg/l	
Tetrachloroethylene			µg/l	µg/l	
Iron			mg/l		t/a
Manganese			mg/l		t/a
Magnesium			mg/l		t/a
Aluminium			µg/l	µg/l	t/a
Sulphates			mg/l		t/a
Phenols			mg/l		t/a
Fluorides					t/a
Petroleum Hydrocarbons			mg/l		t/a
Chlorides			mg/l		t/a
Detergents			mg/l		t/a
Sulfide					t/a
Formaldehyde					t/a
Methanol					t/a
AOX			µg/l		t/a
Nonpolar extractables					t/a
Dissolved inorganic substances					t/a
Chlorinated hydrocarbons					t/a
Suspended solids			mg/l	mg/l	t/a
Nitrate (NO_3-N)			mg/l	mg/l	t/a
Nitrite (NO_2-N)			mg/l	mg/l	t/a
Ortho-phosphate (PO_4-P)			mg/l	mg/l	t/a
Active chlorine					t/a
Dissolved silicate				mg/l	t/a

Suspended solids and sediments

	EU WFD priority substances	Danube priority substances	TNMN	JDS	Emission inventories
Anthracene	µg/kg	µg/kg		mg/kg	
Atrazine	µg/kg	µg/kg			
Brominated diphenylethers	mg/kg	mg/kg		n.d.	
Cadmium and its compounds	mg/kg	mg/kg	mg/kg	mg/kg	t/a
C_{10-13}-chloroalkanes	µg/kg	µg/kg		n.a.	
Chlorpyrifos	µg/kg	µg/kg			
Di(2-ethylhexyl)phthalate (DEHP)	mg/kg	mg/kg		mg/kg	
Endosulfan	µg/kg	µg/kg			
(alpha-endosulfan)	µg/kg	µg/kg			
Fluoranthene	µg/kg	µg/kg		mg/kg	
Hexachlorobenzene	µg/kg	µg/kg		mg/kg	
Hexachlorobutadiene	µg/kg	µg/kg		mg/kg	
Lindane (gamma HCH)	µg/kg	µg/kg	mg/kg	mg/kg	
Lead and its compounds	mg/kg	mg/kg	mg/kg	mg/kg	t/a
Mercury and its compounds	mg/kg	mg/kg	mg/kg	mg/kg	t/a
Naphthalene	µg/kg	µg/kg		mg/kg	
Nickel and its compounds	mg/kg	mg/kg	mg/kg	mg/kg	t/a
Nonylphenols	µg/kg	µg/kg		mg/kg	
(4-(para)-nonylphenol)	µg/kg	µg/kg		mg/kg	
Octylphenols	µg/kg	µg/kg		mg/kg	
(para-tert-octylphenol)	µg/kg	µg/kg		mg/kg	
Pentachlorobenzene	µg/kg	µg/kg		mg/kg	
Pentachlorophenol	µg/kg	µg/kg		n.d.	
Polyaromatic hydrocarbons	µg/kg	µg/kg	mg/kg	mg/kg	
(Benzo(a)pyrene)	µg/kg	µg/kg	mg/kg	mg/kg	
(Benzo(b)fluoranthene)	µg/kg	µg/kg	mg/kg	mg/kg	
(Benzo(g,h,i)perylene)	µg/kg	µg/kg	mg/kg	mg/kg	
(Benzo(k)fluoranthene)	µg/kg	µg/kg	mg/kg	mg/kg	
(Indeno(1,2,3-cd)pyrene)	µg/kg	µg/kg	mg/kg	mg/kg	
Simazine	µg/kg	µg/kg			
Tributyltin compounds	µg/kg	µg/kg		mg/kg	
(Tributyltin-cation)	µg/kg	µg/kg		mg/kg	
Trichlorobenzenes	µg/kg	µg/kg			
(1,2,4-Trichlorobenzene)	µg/kg	µg/kg			
Trichloromethane (Chloroform)	µg/kg	µg/kg			
Trifluralin	µg/kg	µg/kg			
Organic Nitrogen			mg/kg	Mg/kg	
Total Nitrogen (tot N)		mg/kg			t/a
Total Phosphorus (tot P)		mg/kg	mg/kg	Mg/kg	t/a
Arsenic and its compounds		mg/kg	mg/kg	Mg/kg	t/a
Copper and its compounds		mg/kg	mg/kg	Mg/kg	t/a
Zinc and its compounds		mg/kg	mg/kg	Mg/kg	t/a
Chromium and its compounds		mg/kg	mg/kg	mg/kg	t/a
p,p'DDT			mg/kg	Mg/kg	
PCB			mg/kg	Mg/kg	
Petroleum Hydrocarbons			mg/kg	Mg/kg	t/a

Source: (Rodeco Consulting, Draft Report, August 2003)

Appendix 2: EU Water Legislation



Appendix 3: Report from the BAT Workshop

UNDP/GEF Danube Regional Project

Strengthening the Implementation Capacities for Nutrient Reduction and Transboundary Cooperation in the Danube River Basin

Report from the BAT Workshop

Bratislava, on December 4th-5th, 2003

Project Component 1.5:
Industrial reform and the development of policies and legislation towards the reduction of nutrients and dangerous substances

December 6, 2003

Prepared by:
Ramboll
Authors Stanislav Kosina, Danka Jassikova-Thalmeinerova, Tom Owen

1. INTRODUCTION

The workshop is an activity of the industrial pollution reduction policy analysis component 1.5 of the UNDP-GEF Terms of Reference. One approach to the reduction of industrial pollution is to have installations apply Best Available Techniques (BAT). BAT has been introduced into the Danube River Basin. It is a legal requirement in all EU and accession countries for industrial installations which fall under the IPPC Directive. It has also been a requirement for World Bank project support in Bulgaria. UNIDO has also sponsored the TEST programme on a voluntary basis for a selected number of industrial installations in the basin.
Levels of awareness and knowledge of the BAT concept are very different among countries in the region as well as among different ministries and stakeholder groups within individual countries.
This workshop in addition to country representatives will bring together experts working with BAT in the region including the UNIDO TEST Project and Cleaner Production Centres.

1.1 Objectives:

The workshop is designed to facilitate cooperation in the region to achieve full utilisation of the potential of BAT to improve industrial water pollution in the DRB.

Specifically the objectives are to:

provide the basis for a common understanding of BAT potential in the Danube River Basin particularly as it relates to the implementation to the Water Framework and IPPC Directives

exchange information and experience from different countries in the region, and

share experience from recent regional or local industrial case studies.

identify the potential contribution of BAT in the management of water resources in the Danube River Basin

2. SUMMARY OF TOPICS DISCUSSED

The two major EU Directives relating to the reduction of industrial pollution in the DRB are the Water Framework Directive and the Integrated Pollution Prevention and Control Directive. The WFD is the primary tool for water management and the IPPC is directed at the control of large industrial installations. On the first day these two directives were presented in the morning following the introductory remarks. The EMIS EG of the ICPDR has had several activities relating to industrial pollution reduction ranging from being responsible for the Emission Inventory which identifies industrial installations which are pollution sources through to developing sectoral guidelines for the application of BAT. Following the lunch break the presentations moved toward a more methodology and installation specific focus with the presentation of the UNIDO-TEST methodology and case studies being presented. This was followed by a presentation with respect to the pulp and paper sector. This provided not only an overview of the sector issues but also an insight into how the private sector views the implementation of IPPC. The final presentation focused on the practical considerations through the discussion of the application of BAT to a pulp and paper installation. The presentation included both environmental and financial considerations. At the end of the day it could be seen that at least some of the participants found the information somewhat confusing. Whether it was because of the complexity or volume of information or some other factor was unclear.

The second day was devoted to country presentations. The presentations were very good focusing on the issues raised in the material sent to participants prior to the seminar. Because they were focused on real situations in the countries the participation was much higher. In addition, there were informal discussions among countries on questions of mutual interest for example on the method of transboundary communication. The wrap up discussions summarized the role of the ICPDR role in reducing industrial pollution, namely to assist in the development of priorities, track progress and how best to influence the use of BAT in the DRB. Specifically with respect to BAT, the role of other bodies such as EU and UNIDO was discussed along with the growing number of Cleaner Technology Centers. While it was agreed to wait until the final report of The Industrial Pollution Project (1.5) there was noticeable support for a website link to the main sources of BAT information.

3. SUMMARY OF PRESENTATIONS

Speaker:	Ivan Zavadsky
Presentation:	Danube Regional Project: Strengthening the Implementation Capacities for Nutrient Reduction and Transboundary Cooperation
Summary:	Overview of UNDP-GEF Project which is the overall framework for the workshop.
Speaker:	Tom Owen
Presentation:	UNDP Regional Project: Industrial reform and the development of policies and legislation towards the reduction of nutrients and dangerous substances
Summary:	Outline of the activities of section 1.5 of the ToR of the UNDP-GEF. The workshop is part of 1.5 with the objective of facilitate cooperation in the region to achieve full utilisation of the potential of BAT to improve industrial water pollution in the DRB.
Speaker:	Ursula Schmedtje
Presentation:	UNDP Regional Project: Industrial reform and the development of policies and legislation towards the reduction of nutrients and dangerous substances
Summary:	A detailed description of the philosophy behind the WFD and the implementation issues including the ICPDR role in providing the Roof Report.
Speaker:	Margareta Stubenrauch
Presentation:	Council Directive 96/61/EC of 24 September 1996 concerning Integrated Pollution Prevention and Control (IPPC)
Summary:	An overview of the history, philosophy and implications for implementing the IPPC Directive.
Speaker:	Philip Weller
Presentation:	The ICPDR Framework on emission control
Summary:	An overview of the organizations and activities within the ICPDR which form the framework for pollution reduction in the DRB
Speaker:	Ursula Schmedtje
Presentation:	UNDP Regional Project: Industrial reform and the development of policies and legislation towards the reduction of nutrients and dangerous substances
Summary:	A detailed description of the philosophy behind the WFD and the implementation issues including the ICPDR role in providing the Roof Report.
Speaker:	Mihaela Popovici
Presentation:	Role of the EMIS EG in reducing industrial pollution
Summary:	A detailed history of the involvement of the EMIS EG in relation to industrial pollution control including the introduction of selected sector guidelines
Speaker:	Roberta de Palma
Presentation:	UNIDO-TEST Project: An Integrated Approach for Introducing BAT
Summary:	The UNIDO Test Project has developed methodology for the analysis of the application of BAT in individual installations. The methodology has been used to develop case studies in the DRB. The presentation included the UNIDO-TEST results.
Speaker:	Philip Weller
Presentation:	Future Role of ICPDR in addressing Industrial Pollution
Summary:	ICPDR assist governments to identify priorities in reducing industrial pollution track the progress in reducing emissions. The question is how best to identify the influence of the introduction of BAT on pollution prevention. The role of the ICPDR in future will have to be developed recognizing the roles and responsibilities of other

organizations for example the EU and UNIDO. Also a suggestion was made that perhaps a webpage link to other BAT information sites might be a good idea. The ICPDR will make a decision following review of the report for component 1.5 of the UNDP-GEF ToR which will make specific recommendations

Speaker: Josef Zboril (Czech Republic)
Presentation: IPPC in the Czech (Pulp and Paper) Industry, Romanian Experience
Summary: A detailed discussion of BAT in the Pulp and Paper Industrial sector based upon the experience in Romania and the Czech Republic. Provided insight into industry issues and expectations with respect to legal introduction of BAT through IPPC

Speaker: Viera Feckova (Slovakia)
Presentation: Company Case Studies
Summary: Presentation of the approach to BAT in operating countries with illustrations of the types of issues addressed at the company level, and the financial impact of the application of BAT. BAT implementation often leads to very quick payback periods which can be finance by the cost saving of that activity. However there is also the need to include more costly BAT changes in the company's long term investment plan.

4. SUMMARY OF COUNTRY SITUATIONS

Speaker: Juliana Chidu (Romania)
Presentation: Administrative responsibilities for transposition and implementation of IPPC Directive in ROMANIA
Summary: IPPC transposed. Inventory of IPPC ready (~2500 installations). Transition period – 2007-2014 is expected but not yet approved

Speaker: Teodor Lucian Constantinescu (Romania)
Presentation: WFD Implementation in Romania
Summary: New Water Act (ready in 2004) will transpose WFD. It is still not clear an integrated permit will be issued

Speaker: Maria Boyadjiiska (Bulgaria)
Presentation: Implementation of Best Available Techniques (BAT) within the overall EU Water Framework Directive (WFD) and the specific requirements of the EU IPPC Directive
Summary: Permits are done by sites! 255 site applications have already been received. Methodologies for applications, permits, inspection and BAT are ready. The discussion between Bulgaria and Romania took place with respect to communication of transboundary impacts.

Speaker: Hristina Stevanovic (Serbia and Montenegro)
Presentation: IPPC and WFD in Serbia and Montenegro.
Summary: New Act on Environment is being prepared 840 IPPC Installations identified. Permits will be delayed until 2010. Currently permitting is split among different authorities

Speaker: Mladen Borso (Croatia)
Presentation: Implementation WFD and IPPC in Croatia
Summary: IPPC not yet considered. Link between MoE and MW not good Commitment to harmonization declared but not yet implemented. Some research on BAT done.

Speaker: Szilvia Gondar and Gyorgy Botond (Hungary)
Presentation: IPPC in Hungary
Summary: IPPC Act adopted. Around ~1000 IPPC installation identified. 23 permits issued .

Speaker: Jan Marsak (Czech Republic)
Presentation: Implementation of IPPC in the CR.
Summary: IPPC and WFD implemented. Permitting in Progress ~30 permits issued

Speaker: Stanislav Kosina (Slovakia)
Presentation: Implementation WFD and IPPC in Slovakia.
Summary: IPPC and WFD laws are in place. Permitting in Progress. Around 540 IPPC installations identified, among them there are 33 new ones.

5. RECOMMENDATIONS OF THE WORKSHOP

The IPPC Role to meet objectives of the DRB needs to be further refined
The benefits of BAT implementation to improve water quality in DRB needs to be further assessed
The role of water managers in BAT implementation with respect to WFD needs to be better defined
The ICPDR should review and refine its strategies to reduce industrial pollution (via BAT, Cleaner production)
The Workshop has been a good start with knowledgeable presentations and excellent country and raised issues where addition is required.
The role of ICPDR with respect to BAT needs to be refined, however given the information presented at the Workshop the most common suggestion was that the ICPDR set up a link on the web page that would refer to sites that provide and update the most relevant information.

List of participants:

Name	Institution	Country
Philip Weller	ICPDR	Austria
Ivan Zavadsky	UNDP-GEF	Austria
Ursula Scmedtje	ICPDR	Austria
Michaela Popovici	ICPDR	Austria
Margareta Stubenrauch	Fed.MoAFEandWM	Austria
Roberta de Palma	UNIDO	Austria
Georgi Ivanov	MoEW BG/Water	Bulgaria
Maria Boyadjiiska	MoEW BG/IPPC	Bulgaria
Mladen Borso	MoEW CR	Croatia
Marijan Host	CPC Croatia	Croatia
Tomas Zelinka	MoEW Czech/Water	Czech Republic
Jan Marsak	MoEW/Czech/IPPC	Czech republic
Josef Zboril	Private Consultant,Czech Association of Industries and Transportation	Czech republic
Pia Jorgenssen	Ramboll	Denmark
Gyuyla Zilahy	CPC Hungary	Hungary
Gyorgy Botond	MoEW HU/Water	Hungary
Szilvia Gondar	MoEW HU/IPPC	Hungary
Juliana Chidu	MoAFWE Ro Water	Romania
Teodor Lucian Constantinescu	Romanian Waters	Romania
Dragan Povrenovic	University Belgrade	Serbia
Hristina Stevanovic	MoE Serbia	Serbia
Tanja Popovicki	MoE Serbia	Serbia
Stanislav Kosina	Ramboll	Slovakia
Tom Owen	Ramboll	Slovakia
Danka Thalmeinerova	Ramboll	Slovakia
Zdena Kelnarova	MoE SK Water	Slovakia
Viera Feckova	CPC Slovakia	Slovakia

Workshop Agenda

4 Dec. 2003 (Thursday)

Session	Time	Topics	Speaker	Session Chair
Session I - Introduction	**8.00**	Coffee and registration		Ivan Zavadsky
	9.00	Welcome to participants	Ms.Eleonora Bartkova	
	9.10	The GEF Danube Project	Ivan Zavadsky UNDP/GEF Project Manager	
	9.25	Objectives, expected results. Introduction of participants	Tom Owen/Industrial Reform Project Manager	
Session II EU Legislation	**9.45**	Water Framework Directive	Ursula Schmedtje ICPDR Secretariat	Tom Owen
	10.15	Discussion		
	10.25	IPPC Directive	Margareta Stubenrauch/Unit for EU Affairs, Min. Agr., Forestry&Water Mgmt and Env.	
	10.45	Discussion		
	11.05	***Coffee Break***		
Session III Role of ICPDR	**11.30**	The ICPDR Framework on emission control	Phil Weller/ ICPDR Executive Secretary	Ivan Zavadsky
	11.45	Role of the EMIS EG in reducing industrial pollution	Mihaela Popovici	
		Discussion		
	12.30	***Lunch***		
Session IV Country Case Studies	**13.45**	UNIDO TEST PROJECT	Ms.Roberta De Palma/UNIDO Test Project Director	Tom Owen
	14.15	Discussion		
	14.30	BAT in the pulp and paper sector	Mr.Josef Zboril Consultant, Czech Republic	
	15.00	Discussion		
	15.15	***Coffee Break***		
	15.45 17.45	Company Case studies	Ms.Viera Feckova/Director CPC Slovakia	
	18.30	Dinner		

5 Dec. 2003 (Friday)

Time	Session	Topics	Speaker	Session Chair
9.00-10.30	Session V - Country experience	Country presentations	Country representatives	Ivan Zavadsky
10.45		***Coffee break***		
11.00-12.30	Session VI Conclusions	Future Role of ICPDR in Addressing Industrial Pollution	Philip Weller	Tom Owen
12.30		Conclusions	Mr. Ivan Zavadsky, Mr. Tom Owen	
13.00		***Lunch***		

Invitation to participants letter

To: **ICPDR - Heads of Delegation**

From: **Ivan Zavadsky**
Project Manager

Subject: **BAT workshop in Bratislava**
December 4th and 5th 2003

Vienna, 30/9/2003

Dear colleagues,

The Danube Regional Project is organizing a workshop on the implementation of Best Available Techniques (BAT) within the overall EU Water Framework Directive (WFD) and the specific requirements of the EU IPPC Directive.

The workshop will begin with a presentation and discussion of the EU Water Framework Directive (WFD) and the IPPC Directive. There will also be presentations on the methodology to analyze individual industrial installations, a sectoral appraoch to BAT implementation and several case studies from DRB countries.. The current and possible future role of the ICPDR in industrial reform will also be discussed.
With regard to the preparation of this workshop, I would like to ask you to nominate two participants. One person should be a person responsible for water management, particularly industrial pollution control programs who is prepared to comment upon the real potential impact of implementing IPPC on industrial water pollution in that country. The other person should be a person responsible or involved in the application of BAT generally in your country. It may be that this person may come from the water field but in other cases may be in another field and may be in another ministry.

I will appreciate to receive the nomination of the experts from your country by 12 November 2003.

Thank you for your attention and cooperation

Yours sincerely,

Ivan Zavadsky
Project Manager

(Signed)

Questions to participants

There will be an opportunity for each country to make a presentation on the existing and planned activities. We are looking for two types of information. The first group of questions is directed toward understanding the context for the implementation of BAT. The second will help participants understand the potential impact of BAT on the reduction of water pollution in the industrial sector.

As a starting point for the context presentation:

1) What is the countries relationship the EU i.e. New Member, Accession partner etc? If your country is not part of the formal process it would be interesting to know how EU legislation affects your national legislation i.e. we are implementing some of the principles, acts, or EU legislation is not considered
2) How much of the EU environmental legislation has been transpose into your national legislation
3) Who are the responsible authorities for the implementation of the WFD and IPPC?
4) At what stage of development are the enforcement and monitoring systems?
5) What are the major issues with respect to the implementation of BAT at this time?
6) What is industry's reaction to the implementation of BAT through the IPPC legislation?

For the water impact discussion it would be interesting to know:

1) How many installations which discharge to water will be covered by the BAT requirement in IPPC? Can you give us an idea what is the relevant importance of IPPC installations for example, a rough percentage of total installations with water pollution discharges or the rough percentage of the total water pollution which will be accounted for by IPPC installations.

2) Please try to estimate what will be the water pollution reduction impacts of BAT implementation in your country, compared to the situation without BAT. Please identify the specific components of BAT that are most important in contributing to the pollution reduction.

Information for participants

Venue:
Congress Centre UVS (Ustav vzdelavania a sluzieb)
Bardosova 33
Bratislava
Tel:
++421- 02- 54772060, 54772123

How to get to the Hotel:
When we have more detailed information on arrival times we will make common arrangements for those arriving at the same time.

From Vienna airport to Bratislava bus station
There is a regular bus connection from Vienna Schwechat Airport to the Bratislava Bus Station. The bus stop for Bratislava is right in front of the Vienna airport. The name of Bratislava station is Mlynske Nivy. The bus leaves from Vienna to Bratislava every hour. The ticket can be purchased form the driver. The price is cca 10 EURO. Extra 1 –2 EURO is paid for luggage and the payments must be made in Euro.

The detailed schedule of departures from Vienna airport is: 10:40, 11:40, 12:55, 13:25, 14:25, 15:25, 17:25, 18:25, 18:55, 20:40, and 22:25

From Bratislava bus station Mlynske Nivy to the Hotel UVS
There is a trolleybus No. 206 that departs directly from the bus station Mlynske Nivy to Bardosova Street (the ninth stop). The trolleybus departs every 15 minutes. You will need a 30 minute ticket that can be purchased at a kiosk. The price is 16 SK. The hotel is located at Bardosova Street 33. The name of locality is Kramare.
You can take a taxi; the price is approx. 400 SK (10 EURO). The taxi will not be reimbursed.

By Car
From the west and south when you pass customs take the road to Brno. You will come to a set of traffic lights. Go straight through the traffic lights on Stromova St. up the hill and past the hospital. Then you will come to traffic lights at the corner of Na Revine St. Turn left and it will take you to Hotel UVS. From the Czech Republic proceed directly into Bratislava and turn left on Stomova street (the third traffic light) and follow the directions above.
A Bratislava map can be found on http://mapy.zoznam.sk.

By Train
Take a taxi from the main railway station.

Visas:
Those who need assistance with a visa for Austria and Slovakia should please let us know as soon as possible. We will send you a nominal invitation and inform the Embassy in your country about your participation at the meeting.

The letter to CPC's, letter to invitees, Copies of the presentations are still missing and should be put in the annexes.

Appendix 4: BAT Case studies

Company Info

Name: ELHIM ISKRA JSC

Branch: Electrochemical industry

Address: 4400 Pazardzhik
9 Iskra Str.
BULGARIA

Date of establishment: 25 December 1960

Production: The company ELHIM ISKRA JSC is the biggest Bulgarian producer of starting and traction batteries of different types:

Starter batteries:

- for motorcycles (6V/7Ah, 6V/14Ah, 12V/4Ah)
- standard (from 12V/44Ah to 12V/210Ah)
- max Energy (from 12V/44Ah to 12V/85Ah)
- maintenance free (from 12V/44Ah to 12V/100Ah)

Traction batteries:

- pasted
- panzer
- with enhanced resource
- according to the wish of the client

The company has its distributors in the bigger cities of Bulgaria, and the total number of the sites where its products are sold comes to 65.

Number employees: app. 500

Turnover:

Telephone: +359 34 444 548

Fax: +359 34 443 438

E-mail: elhimiskra@mbox.digsys.bg

Brief history

1960	In November 1960 the first ebonite boxes and lids were produced. The production of first starter storage battery "Iskra" 12V/82Ah and motorcycle battery type 12V/14Ah was started.
25.12.60	The inauguration of the battery factory in Pazardzhik city
1962	The production of the first 5 types of traction batteries was started
1964	The first reconstruction and modernisation began. The technological process was improved.
1968	The first reconstruction ended. As a result the battery factory in Pazardzhik city became the largest one on the Balkans.
1981	The most modern technologies and equipment for the production of traction panzer batteries and starter batteries in plastic boxes with reduced maintenance were introduced into the factory.
Beginning of the 90's	The end of the reconstruction. It gave the ability to "ELHIM-ISKRA" JSC to produce even at the moment products comparable to the products of the world leaders in this branch. At the same time the production is done with up-to-date equipment, modern technologies and by highly qualified specialists and excellent workers.
2000	The battery factory was certified for the first time according to ISO. The factory received also for the first time a certificate of conformity according to the Ukrainian certification system UkrSEPRO..
After 2000	Despite the conditions of keen competition in the branch, "Elhim-Iskra" JSC continues to offer fair prices and products with high quality. The factory realizes successfully its new types of starter batteries – "maintenance free" (Ca) and "Max Energy" (ME), and at the same time continues its work for the creation of new products.

Production Process and Facilities

The factory is equipped with up-to date machinery and whole production process is under control. The central factory's laboratory monitors all incoming raw materials and components for battery production as well as of the production processes and thus ensuring needed quality of the final products. Several are the important sections: incoming control of the raw materials, fast monitoring of wide range of purity of water lead and other components

Production process begins in the grid casting department where the grids for the starter and traction batteries are produced. Low antimony alloys are used in the casting area and they prolong the life of the batteries and make the production competitive on the local and international markets.

The next unit is paste mixing department, which consists of three areas: the mill, pasting and acid mixing. The production of the lead powder is carried out on the installation from USA. The high purity of the Bulgarian lead 99.99% is a prerequisite for production of good quality batteries.

In the acid mixing area mixing, storage and dispensing of acid is carried out. By means of pumps the acid is fed to paste mixing area and formation department.

In the paste mixing area mixing of lead powder with purified water, electrolyte and other additives is done. The process is automated and accomplished with count-current mixers. The mixture is than pot into the feeders and after fed to machine, which press the mixed paste onto the batteries' grids.

Formation process is done by means of reversing current charging units, which are controlled by local computerised system. Complete control is performed by computer data system for following the operation of the current charges and formation groups.

Formed starter and industrial plates are dried in electric and steam tunnels as well as in glide drying ovens. After drying double plates are parted and ready for pre-assembling.

The containers for the automotive batteries and the traction cells are manufactured in the plastics department. There are different sizes depending of the battery capacities.

In the assembly department whole range of automotive and traction batteries are made. The area is equipped with up to date machines like TBS-UK, DAGA-Italy and HADI-Germany.

The production cycle finished with the stand for dry charge test of the batteries in accordance with DIN, BDS, IEC and GOST standards.

For laid acid wastewater treatment the purification plant was designed and putted into operation in the factory. The plant is designed mainly for reducing the content of the heavy metals in the wastewater and most of them lead. The capacity of the plant is 300 m3/h and the laid content in purified water is less than 0,1 mg/dm3. The operation of plant is continuous and there is a laboratory for monitoring and observation of the wastewater parameters.

There is at present an open area depot for temporary storage of the waste laid pastes achieved after the mechanical filtration of the waste steams resulted from the factory operation. When the waste laid paste is approximately dried due to the atmospheric conditions it is transported to the nearby laid processing factory.

Certificates

1. **ISO 9001:2000 Design and manufacturing of lead acid batteries**

Company: ELHIM ISKRA JSC
Sector: Electrochemical Industry
Country: BULGARIA

		DATA FOR YEAR						BAT emission level
		2000	**2001**	**2002**				
Emissions to air	**CO_2 emissions** (tons of CO_2 equivalent)[2]	2 050,0	1 560,0	1 260,0				
	Sulphur dioxides / SO_x(tons)							
	Nitrogen oxides / NO_x (tons)	3,40	2,59	2,09				
	Volatile Organic Compounds / VOC (tons)							
	Amonia (tons)							
	Fluorides as fluorine (tons)							
	PM (mass particle) (tons)							
	Hydrogen sulfide (tons)							
Discharges to water	**Aquatic Release of Phosphorous Compounds** (tons of P)							
	Aquatic Release of Nitrogen Compounds (tons of N)							
	Ammonia NH4-N (tons)							
	Nitrate nitrogen NO3-N (tons)							
	Heavy Metals into water - after purification (kg for each metal) [4]	The quantities presented are based on the measured content in mg/dm^3 of each methal in the purified waste water and are less than:						
	- As	8,0	7,3	7,0				
	- Cu	1,6	1,5	1,4				
	- Cr							
	- Cd	1,6	1,5	1,4				
	- Pb	16,1	11,0	10,5				
	- Hg							
	- Ni	1,6	1,5	1,4				
	- Zn							
	Total heavy metals (kg)							
	AOX (kg)							
	BOD (tons)							
	TSS (total sulhur) (kg)							
	Total amount of water consumed (per year) m^3							
	Total amount of water discharged (per year) m^3	401 555,0	365 000,0	349 600,0				

		DATA FOR YEAR						BAT emission level
		2000	**2001**	**2002**				
Waste	**Hazardous Waste for Disposal** (tons)	1 022,0	794,0	370,0				
	waste paste with high content of laid (tons)	662,0	304,0	200,0				
	waste paste with low content of laid (tons)	360,0	490,0	170,0				
	Non-hazardous Waste for Disposal (tons)							
	cooper (tons)	4,5	-	1,5				
	paper and card board (tons)	5,5	11,0	9,0				
	pieces of iron and steel (tons)	141,0	52,0	78,0				
	aluminum scrap (tons)	271,0	705,0	762,0				
Reference data	**Number of employees**	app. 500	app. 500	app. 500				
	Tons of production (tons)							
	Production of certain chemical, fertilizer, specify in (tons)							
	Turnover (millions of €)							
EMS	ISO 14 001 (preparation/ certified)			NOT YET				

Date(year) of plant establishment – launching production: 25 12 1960

Email: elhimiskra@mbox.digsys.bg

Name: Executive Manager

Telephone: +359 34 444 548

Telefax: +359 34 443 438

PETROKEMIJA d.d., Kutina

COMPANY BACKGROUND

Petrokemija, d.d. Fertiliser Company was founded in 1965, although one of its businesses, carbon black production, dates from as far back as 1926. The headquarters of the company are in Kutina, Aleja Vukovar 4. The company manufactures fertilisers, clay-based products and carbon black as well as various other products within secondary productions.

Petrokemija, d.d. delivers high-quality products that meet customer requirements. One of the proofs of

our commitment and also potential for competitiveness in the world market is the ISO 9001/94 Quality

System Certificate awarded for fertilisers and carbon black production.

TECHNOLOGY:

Production of Nitrogen and Phosphate fertiliser.

1. COMPANY IFORMATION:

No. of employees	2 800
Capacity of the factory	1,2 mill tons/year
Annual turnover:	264,5 mill USD

2. PRODUCTS:

Different formulations of fertilisers:

UREA

KAN

NPK

3. CERTIFICATE:

ISO 9001 & ISO 14001

Company: **PETROKEMIJA d.d., Kutina**
Sector: **Chemical**
Country: **Croatia**

		Data	WB	BAT emission level
		2002		draft
Emissions to air			kg/NPK	
	Nitrogen oxides / NO_x (tons)		**0,2**	0,03kg/ t P2O5
	Amonia (tons) NH3 as Nitrogen		**0,3**	<150mg/Nm3
	Fluorides as fluorine (tons)		**0,02**	0,3kg/ t P2O5
	PM (mass particle) (tons)		**0,3**	50 mg/Nm3
	Amonia NH4-N (tons)		**0,01**	
Discharges to water	**Amonia NH4-N (tons)**	**98,2**	**0,012**	
	Total heavy metals (kg)			
	Nitrate nitrogen(NO3-N) (tons)	**72,2**	**0,03**	
	Fluoride (tons)	**18**	**0,05**	
	P2O5 (tons)	**122,2**	**0,06**	
	Total amount of water consumed (per year) m3	**11 429 364**		
	Total amount of water discharged (per year) m3	**4 078 863**		
Waste	**Hazardous Waste for Disposal** (tons)			
	Non-hazardous Waste for Disposal (tons)			
Reference data	**Number of employees**	**2 800**		
	Tons of production (tons)	**1 002 465**		
	Production of certain chemical, fertiliser…..specify in (tons)			
	Turnover	**264,5 mill USD**		

EMS	**ISO 14 001 (preparation/ certified)**			

black as well as various other products within secondary productions

Production of Nitrogen and Phosphate fertiliser.

PRODUCTS: Different formulations of fertilisers:
UREA
KAN
NPK

DIOKI d.d. , Zagreb

1. COMPANY BACKGROUND

DIOKI d.d. was founded on 17 July 1995 as a merger of INA-OKI of Zagreb, DINA of Omišalj and INA-Naftaplin's Ethylene Production Unit of Zagreb. OKI - Organic Petrochemical Company was founded in 1959, and was the first producer of petrochemicals and plastics in the country. DINA was established as a joint-venture of INA and DowChemicals early in the 1980s. INA-Naftaplin's Ethylene Production Unit was founded in 1982. Until the end of 1996 the present DIOKI d.d. (at that time named Polimeri d.o.o.) had been a member of the INA-Group; then INA transferred it to the State Agency for Deposit Insurance and Bank Rehabilitation (DAB). In the process of voucher privatization, a 51% stake in the company was transferred to privatization and investment funds (PIF) on 16 December 1997. Since 20 November 1999, the company has been operating by the name of DIOKI d.d.

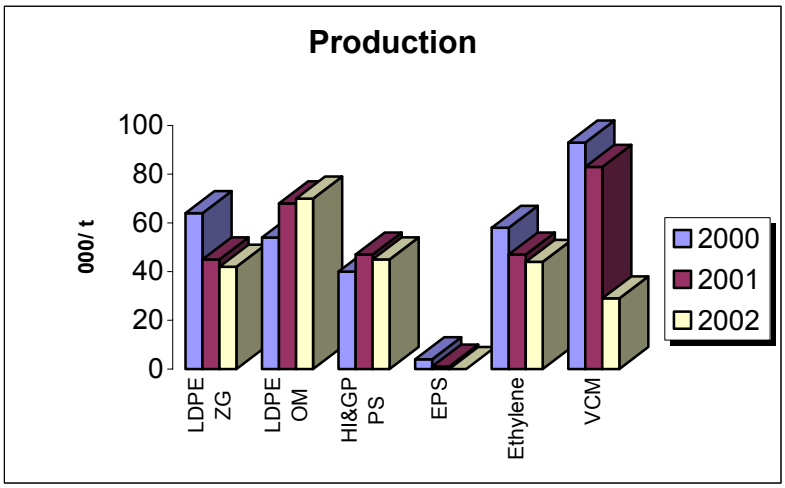
2. TECHNOLOGY:

Production of ethylene from ethane as raw material.
ATO HP polyethylene unit.

DOW HP polyethylene
DOW polystyrene unit

3. COMPANY INFORMATION:

{PRIVATE} **million US$**	**2000**	**2001**
Operating income – turnover	145	115
Production in tons	312.737	291.195
Number of employees	1.338	970



3. PRODUCTS:

- LOW DENSITY POLYETHYLENE
- POLYSTYRENE
- General Purpose Polystyrene (PS-GP)
- High Impact Polystyrene (PS-HI)
- Modified Polystyrene

4. CERTIFIED:

ISO 9001 and ISO 14001

Company: **DIOKI d.d. , Zagreb**
Sector: **Chemical industry**
Country: **Croatia**

		Data	WB	BAT emission level
		2002		draft
Emissions to air				
	Sulphur dioxides / SO_x(tons)		500mg/Nm3	
	Nitrogen oxides / NO_x (tons)		300mg/Nm3	
	Hydrogen chloride		10mg/Nm3	
	PM (mass particle) (tons)		20mg/Nm3	
Discharges to water	BOD (tons)		30mg/l	
	COD (tons)		150mg/l	
	Nitrogen (total)		10mg/l	
	Total heavy metals (kg)			
	- Cu		0,5mg/l	
	- Cr		0,1mg/l	
	- Cd		0,1mg/l	
	TSS (total sulhur) (kg)		50mg/l	
	Oil and grease		10mg/l	
	pH		from 6 to 9	
Waste	Hazardous Waste for Disposal (tons)			
	Non-hazardous Waste for Disposal (tons)			
Reference data	Number of employees	970		
	Tons of production (tons)			
	Energy			
	Water consumption			
	Turnover			

EMS	ISO 9001 and ISO 14001			

BELIŠĆE d.d. pulp and paper industry

1. COMPANY BACKGROUND

Belišće is the biggest pulp and paper factory of packaging paper in Croatia, and one of the biggest producers in South-East Europe. They produce all types of packaging paper needed for final production of cardboard.

2. COMPANY INFORMATION
Number of employees: 1 700

CAPACITY: 200 000 tons/year

ANNUAL TURNOVER: 93 430 000 mill $

1. TYPE OF PAPER	**GRAMM/M^2**
TESTLINER : BELLINER 1 (BL1)	140
TESTLINER : BELLINER 2 (BL2)	115, 120, 125, 130, 135, 140, 170, 175
TESTLINER : BELLINER 3 (BL3)	125, 135, 175
TESTLINER : BELLINER 4 (BL4)	135
RECIKL. FLUTING : BELWELL (BW)	100, 105, 110, 120, 127, 140, 150, 175
POLUKEM. FLUTING : SC FLUTING (SCF)	112, 120, 127, 140, 150, 175
ŠRENC (Š)	105, 110, 120

CERTIFIED: ISO 9002

Company: **BELIŠĆE d.d. pulp and paper industry**
Sector: **Pulp and paper industry**
Country: **Croatia**

		DATA FOR YEAR		WB	BAT emission level
		2002			BREF
				kg/t ADP	**kg/Adt**
Emissions to air					
	Sulphur dioxides / SO_x(tons)			**1**	**0,2 - 0,4**
	Nitrogen oxides / NO_x (tons)			**1,5 - 2**	**1,0 - 1,5**
	Dust				**0,2 - 0,5**
	TRS as S				**0,1- 0,2**
Discharges to water	**Aquatic Release of Phosphorous Compounds** (tons of P)			**0,02 - 0,05**	**0,01 - 0,03**
	Aquatic Release of Nitrogen Compounds (tons of N)			**0,15 - 0,4**	**0,1 - 0,2**
	AOX (kg)			**0,2 - 2**	**<0,25**
	COD (tons)			**15 - 35**	**23**
	BOD (tons)				**0,2 -1,5**
	TSS (total sulphur) (kg)				**0,3-1,5**
	Total amount of water consumed (per year) m3				
	Total amount of water discharged (per year) m3				
Waste	**Hazardous Waste for Disposal** (tons)				
	Non-hazardous Waste for Disposal (tons)				
Reference data	**Number of employees**	**1 700**			
	Tons of production (tons)				
	Production of certain chemical, fertiliser…..specify in (tons)				
	Turnover	**93 430 000 mill $**			
EMS	ISO 14 001 (preparation/ certified)				

Belišće is the biggest pulp and paper factory of packaging paper in Croatia, and one of the final production of cardboard

CAPACITY: 200 000 tons/year

TYPE OF PAPER

TESTLINER : BELLINER 1 (BL1)
TESTLINER : BELLINER 2 (BL2)
TESTLINER : BELLINER 3 (BL3)
TESTLINER : BELLINER 4 (BL4)
RECIKL. FLUTING : BELWELL (BW)
POLUKEM. FLUTING : SC FLUTING (SCF)
ŠRENC (Š)

Company Info:

Name: ZAHARNI ZAVODI AD

Branch: Food industry

Address: 5100 Gorna Oriahovitza
29 Kniaz Boris I Str.
BULGARIA

Production: The company ZAHARNI ZAVODI AD was established as a sugar processing factory. Later on different businesses have been added to achieve high levels of vertical integration. As a result today the company consists of number of production units, which have marketing and operational autonomy:

- Sugar Production Factory (SPF);
- Candy Production Factory (CPF);
- Alcohol Production Factory (APF)
- Printing & Packaging Materials Production Factory (PPMPF);
- Machinery Repair Factory (MRF);
- Thermal Power Plant (TPP).

Number employees: 1,360 (31.12.2001)
Turnover: 72,408 000 BGN (2001)

Executive Managers: Rumen Ivanov

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Brief history

Situated in the town of Gorna Oriahovitza nearby Yantra, river (flows into the Danube river) ZAHARNI ZAVODI AD is the biggest sugar and alcohol production company in Bulgaria. The enterprise was established in 1913 as a sugar-processing factory. Later on different businesses have been added to the company to achieve high levels of vertical integration.

Taking an advantage of possibility to use the sugar beet molasses generated during the sugar processing as an input material for production of pure alcohol in 1922 the Alcohol production factory (APF) was built. In 1959-60 Sugar production factory (SPF) was renovated, which lead to increase of the quantity and quality of the final product. At the same time the Thermal power plant (TPP) was erected and started to supply the different facilities with steam and electricity. In 1969-70 the machinery repair factory and factory for the packing materials have been putted into operation and together with the existing ones they formed the current structure of the company.

As a result today the company consists of the following strategic business units, which have marketing and operational autonomy:

- Sugar Production Factory (SPF);
- Candy Production Factory (CPF);
- Alcohol Production Factory (APF);
- Printing and Packaging Materials Production Factory (PPMPF);
- Machinery Repair Factory (MRF);
- Thermal Power Plant (TPP).

At present ZAHARNI ZAVODI AD is private enterprise, which has a workforce of 1360 workers and annual turnover of 72 408 000 BGN.

1. General description of enterprise and its processes

APF is producing pure and technical alcohol by using molasses from the sugar beet as raw material. There is a possibility also to use for these purposes either the molasses from sugar cane or product received by hydrolysis of the maize (this product named “Glucoferm 310” is produced in Bulgaria from Tzaramill factory situated in town of Razgrad). Currently for the production of alcohol a mixture from molasses and Glucoferm 310 is used.

In order to simplify the description of process is divided into five separate processes:

- Pretreatment of molasses for fermentation;
- Production of yeast, including yeast culture;
- Fermentation of molasses;
- Production of CO_2;
- Production of pure alcohol.

1.1 Pretreatment of molasses for fermentation

The main flow of molasses entering the Alcohol Production Factory is divided into two flows. The first one is diluted with water to 25-27% content of dry solid (D.S.) using either fresh water or water of Luther (from column 3 and 4) and then is passed to the fermentation tank. The second flow is diluted with water to 48-50% D.S. and is used for production of yeast.

1.2. Production of yeast

Solution of molasses with 48-50% D.S. (black line) is treated for 6 hours with mixture of chemicals, which is prepared in the mixing tank. These chemicals are:

- Sulfuric acid - to maintain pH;
- Urea (nitrogen food);
- Phosphoric acid (phosphorus food);
- Urotropine (disinfection agent);
- Antifoaming agent;

Later on the main solution of molasses is going to sterilization after dilution with water to 10-12% D.S. Sterilization is done with steam for one hour. The sterilized solution of molasses is passed (after cooling) to yeast culture machine where is mixed with yeast culture from laboratory and treated with air. From this process yeast culture is received which is passed to yeast culture generator where is mixed with solution of molasses (11-12% D.S.) for producing mature yeast (also with air treatment).

1.3. Fermentation

The process of fermentation is done in the fermentation tank periodically where the main molasses stream (containing 25-27% D.S.) and the mature yeast are put. This process is exothermic and lasts between 24-48 h. During this period of time the fermentation tank is cooled with water. After the fermentation of molasses is over, the main product is received called beer alcohol with 8-10% content of C_2H_5OH. The by-product received during the fermentation is carbon dioxide (CO_2).

1.4 Production of carbon dioxide – CO_2

As known CO_2 is a by-product generated during the fermentation of the molasses. Its production consists of two major steps: purification of the CO_2 (gas) and production of CO_2 (liquid). These steps include several consecutive procedures:

- Removal of the alcohol drops;
- Washing with the sodium carbonate;
- Washing with water;
- Compression (two stages);
- Filtration through activated carbon;
- Compression (third stage);
- Filtration through silica gel;
- Liquifation in freezing installation;
- Storage in bottles;

1.5. Production of pure alcohol

The production of pure alcohol consists of four steps using well-known technology of consecutive distillation and rectification with four columns. The processes in these columns can be briefed as follows:

***Column** 1* is used for distillation of beer alcohol: two products being received: crude alcohol (38-40% C_2H_5OH) and non-alcoholic liquid called slop.

Column 2 is used for the epuration of crude alcohol; two products being received: ester aldehyds fraction and pure alcohol (36-38% C_2H_5OH);

Column 3 is used for production of the final product – pure alcohol (96%) by rectification of pure alcohol (36-38% C_2H_5OH) from column 2. By-products here is so-called water of Luther, heavy alcohol fraction and fusel fraction;

Column 4 is used for rectification of the mixture from ester/aldehyds fraction (from column 2), fusel fraction and heavy alcohols fraction (from column 3) Main product here is technical alcohol and by-product – fusel oil and water of Luther.

Almost all waste streams from this factory is liquid. These waste streams can be divided into three principal flows:

- *Waste water flow* (wwf) - it is a water used either for cooling of heat exchangers (for instance for reflux) or for washing of the single apparatuses;
- *Slop water flow* – it is nonalcoholic residual water, received in column 1 and discharged in Yantra river;
- *Water of Luther* – it is non-alcoholic residual water received in column 3 and 4

Some small quantity of waste can also be mentioned as exhausted Na_2CO_3 solution, or exhausted activated carbon, or silica gel, but this waste do not interfere with the environment.

2. Energy facilities

Heat and power are produced in the existing Thermal Power Plant (TPP), specially designed to cover the needs of production facilities of ZAHARNI ZAVODI AD. TPP was built in 1960 and its main equipment consists of:

- 2 steam boilers, producing superheated steam with capacity 2 x 75 t/h;
- 1 steam boiler, producing superheated steam with capacity 1 x 35 t/h;
- 1 steam boiler, producing saturated steam with capacity 1 x 12 t/h;
- 2 back pressure turbines with electrical capacity 6 MW each.

Electricity production covers the own needs of ZAHARNI ZAVODI AD as the rest of the production (when it is available) is sold to the Regional Electricity Distribution Company (REDC). Coal, type G from Ukraine is used as a main fuel and a heavy fuel oil with high sulfur content is used as additional fuel.

3. Sources of pollution and inefficiency

3.1. The principal source of environmental pollution from APF to Yantra river water is the distillery residue from distillation column called slop (or slop water flow). The slop is nonalcoholic dark brown liquid with temperature 100-103°C and with high content of organic matter. The main data for the slop obtained from sugar beet molasses is given in the table 1 as follows:

Table.1. Slop data

No	Slop from sugar beet molasses	unit	Values (approx)
1	Dry solid (D.S.)	%	6-8
2	pH		4.5 – 5.5
3	BOD_5 (as oxygen demand)	mgO_2/l	30 000
4	COD (as oxygen demand)	mgO_2/l	65 000
5	Soluble matters (dissolved solids),	mg/l	70 000
6	Non soluble matters (suspended solids)	mg/l	10 000

"The output" of this waste liquid product received by on-site measurement (January 2003) was 19 000 l/h. Samples from slop (slop water flow) during the trials were examined and COD of the slop for a single day obtained was 56000 mg/l (as oxygen demand). These data are reliable and confirm the decision of enterprise to look for a solution to eliminate this detrimental flow to Yantra river.

In order to demonstrate the characteristics of overall unit effluents to the Yantra river, an extraction from Analysis Report (for two days) is given on fig.1. As seen from fig. 1 due to the dilution of the slop (and the water of Luther) from the APF (see table 1) BOD_5 and COD of the final effluent discharge in Yantra river are decreased. Nevertheless this wastewater does not meet the regulations listing in Bulgarian State Standards. It means that industrial wastewater from APF could not be discharged at Yantra river due to its composition; the main source being the flow of slop from distillation/rectification system.

Extract

Ministry of Environment and Water
Republic of Bulgaria

Analysis Report
No240 / 17.04.2002 and No290 / 20.05.2002

Subject: Analysis of waste water from "Sugar Production Company", Gorna Oriahovitza (discharged point of Yantra river)

No	Physical/Chemical indicator	Unit	Protocol No 290	Protocol No 240	In accordance with Regulation No7/86	
					II cat.	III cat.
1	pH		7.54	6.28	6-8.5	6-9
2	Oxygen dissolved	mg/l	2.92	1.11	4	2
3	Saturated with Oxygen	%	33.3	12.1	40	20
4	Conductivity	□S/cm	no data	no data	1300	1600
5	BOD_5	mg/l	170	2060	15	25
6	COD	mg/l	558	4526	70	100
7	Soluble matters	mg/l	798	4586	1000	1500
8	Non soluble matters	mg/l	114	418	50	100
9	Hydrogen sulfide	mg/l	-	0.18	no	O.1
10	Sulfides	mg/l	-	2.48		

Fig.1

3.2. Slop water flow is a major source of waste high potential heat energy; its temperature being 103 °C. As can be seen from the detailed material and energy balances the loss of heat energy due to slop water flow is 1 950 000 kcal/h (data received by on-site measurement).

3.3. Water of Luther is another source of waste heat energy. The energy balances made shown that the loss of heat energy with water of Luther from both rectification and fusel columns is 769 690 + 63 013 = 832 703 kcal/h. With temperature 104 °C this water flow has a high thermal potential and in winter time is used for heating of molasses. It means that a problem for recuperation of this waste heat exists only in summer time.

3.4. Cooling water flows from heat exchangers in pure alcohol production section are significant sources of waste heat energy and wastewater.

The losses of high-potential waste heat energy from cooling water flows can be briefed as follow:

- epuration column – 113 528 kcal/h;
- rectification column – 1 710 436 kcal/h.

Total heat energy losses = 1 823 964 kcal/h

The losses of cooling water flows are:

- separator – 43 200 l/h;
- distillation column – 65 818 l/h;
- epuration column – 4 193, 8 l/h;
- rectification column – 46 228 l/h;
- fusel column – 21 225 l/h.

Total losses of cooling water – 180 664 l/h

3.5. According to on-site measurements done by CP team the following data can be given concerning specific input and output of incoming energy (steam), outgoing waste energy (hot water) and outgoing waste water (to 1000 l alcohol).

- outgoing waste cooling water (from all units) – 112 774 l/1000 l;
- incoming steam – 6 242 kg/1000 l;
- outgoing waste heat energy (with cooling water) – 1 138 554,3 kcal/1000 l;
- outgoing waste heat energy (with slop water) – 1 217 228,5 kcal/1000 l;
- outgoing waste heat energy (with water of Luther) – 519 789,6 kcal/1000 l.

As a conclusion, a detail analysis of material, energy and water cooling balances of alcohol production section of APF discloses the major sources of pollution: (1) (slop water flow, water of Luther, (2) the major losses of heat energy with waste liquid flows (slop water flow, water of Luther, cooling water flow etc.) and (3) the major losses of water with waste water flows (cooling water).

4. Proposals for reconstruction and modernisation (Environmentally Sound Technology option - EST)

Decision for reconstruction and modernisation of APF was done based on the detailed analysis of material energy and water flows as well as taking into account the existing sources of pollution and inefficiencies within the factory. The selected option was formulated as "*Change of raw material in conjunction with the change of technology*" and its implementation consists of following activities:

- Delivery of cereals (wheat or corn);
- Storage of cereals;
- Wet milling of cereals;
- Hydrolysis of starch to glucose (by enzymes);
- Reconstruction of yeast production unit from periodic to continuous one;
- Reconstruction of the fermentation unit from periodic to "continuous" one;
- Reconstruction of distillation/rectification section, including reconstruction of columns for distillation, purification and rectification with implementation of indirect steam for heating;
- Replacement of the fusel column with another column (for final purification) and appropriate change of the material flow pipelines;
- Building of the new installation for the treatment of the slop water flow, including centrifugation, multi-effect distillation (MED) and drying the solid residue to fodder;
- Reconstruction of whole steam pipelines following the principle that the steam from TPP is to be used as primary steam in (MED) and the steam from evaporation of slop water flow would be used to heat distillation/rectification columns;
- Reconstruction of water cooling system from once through to recirculation one.

If this EST option would be implemented in APF the major problems would be resolved namely:

- The impact of the slop water flow for Yantra river pollution would be decreased to zero;
- Total heat energy losses would be decreased as the enthalpy of the slop water and the water of Luther would be used in MED installation;
- Total discharge of cooling water would be decreased dramatically as in the future the discharge water from APF would be only the blow down water from the cooling recirculatiing system.

As seen from the above mentioned, the reconstruction of APF – Gorna Oriahovitza is a complicated and long-term process. The strategy of the factory owners is to divide this process into three consecutive stages, as follows:

1. During the first stage, the raw materials (e.g. molasses) do not change. This stage includes:
   - Reconstruction of the fermentation unit from periodic to continuous one. This provides possibility to operate with two raw materials – molasses or cereals. When molasses is used, the process would be really continuous. When cereals are used, the process would be, as mentioned above, "continuous" one.
   - Reconstruction of the yeast generation unit.
   - Reconstruction of DC/RC columns (internal).
   - Implementation of indirect heating of the columns, when necessary.
   - Installing a new column for final purification of ethanol (FPC).
   - Reconstruction of all pipe-lines for products, steam, and water flows.
   - Construction of recirculating cooling system (RCS).
2. The second stage includes all actions related to the change of the raw material from molasses to cereals. These actions are:
   - Construction of compartment for delivery, separation, and storage of cereals;
   - Construction of compartment for wet milling of cereals;
   - Installation of the all necessary equipment for enzymatic hydrolysis of starch to glucose, including heat exchangers, reactor vessels, pump, mixing devices, etc.
3. The third stage is installing of slop water treatment unit. This step would significantly reduce the environmental impact. This stage includes:
   - Centrifugation of the slop water from DC.
   - Evaporation of this water in MED units and receiving a concentrate with great content of dry solids.
   - Mixing of the concentrate with solid residue from centrifugation, drying the product received in the drying cylinder, and producing a fodder.
   - Storage and sale of fodder.

Estimated investment needed for reconstruction and modernisation of APF are estimated as follows:

First Stage	1,468,869	USD
Second Stage	969,493	USD
Third Stage	2,590,362	USD
Supplementary costs	992,457	USD
TOTAL COSTS (prices of 2003)	6,021,181	USD

Company: ZAHARNI ZAVODI AD - Alcohol Production Factory (APF)
Sector: Food Industry
Country: BULGARIA

		DATA FOR YEAR						BAT emission level
		2000	**2001**	**2002**				
Emissions to air	**CO_2 emissions** (tons of CO_2 equivalent)[2]	76 589,0	72 040,0	96 933,0				
	Sulphur dioxides / SO_x(tons)	1899,8	1776,8	2406,7				
	Nitrogen oxides / NO_x (tons)	336,7	310,9	427,4				
	Volatile Organic Compounds / VOC (tons)							
	Ammonia (tons)							
	Fluorides as fluorine (tons)							
	PM (mass particle) (tons)							
	Hydrogen sulfide (tons)							
Discharges to water	**Aquatic Release of Phosphorous Compounds** (tons of P)							
	Aquatic Release of Nitrogen Compounds (tons of N)							
	Ammonia NH4-N (tons)							
	Nitrate nitrogen NO3-N (tons)							
	Heavy Metals into water - after purification (kg for each metal) [4]	The quantities presented are based on the operation of coal fired boilers in TPP of ZAHARNI ZAVODI AD						
	- As							
	- Cu							
	- Cr							
	- Cd	0,08	0,07	0,10				
	- Pb	4,93	4,47	6,27				
	- Hg	1,39	1,26	1,72				
	- Ni							
	- Zn							
	Total heavy metals (kg)	6,40	5,80	8,09				
	AOX (kg)							
	BOD (tons)	2 519,0	3 733,0	2 963,0				
	COD - from Slop and water of Luther (tons)	5 057,0	7 491,0	5 846,0				
	TSS (total sulphur) (kg)							
	Total amount of water consumed (per year) m^3							
	Total amount of water discharged (per year) m^3	**948 139,0**	**1 404 560,0**	**1 114 781,0**				
	slop water m^3	83 986,0	124 427,0	98 756,0				
	water of Luther m^3	35 298,0	52 162,0	41 400,0				
	cooling water m^3	828 855,0	1 227 971,0	974 625,0				

		DATA FOR YEAR						BAT emission level
		2000	**2001**	**2002**				
Waste	**Hazardous Waste for Disposal** (tons)							
	Non-hazardous Waste for Disposal (tons)							
Reference data	**Number of employees**							
	Tons of production - alcohol (tons)	7 335,0	10 867,0	8 625,0				
	Production of certain chemical, fertilizer…..specify in (tons)							
	Turnover (millions of €) only of APF	4 473,0	6 959,0	4 535,0				
EMS	ISO 14 001 (preparation/ certified)							

Date(year) of plant establishment – launching production: 1913

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Appendix 5: Mechanism of data collection questionnaire summary

Annex 5: Monitoring of industrial polluters

Country	Self-monitoring of industrial polluters required			National/regional monitoring of industrial polluters required			Monitored data on industrial emissions collected and processed			Authorization of labs required		Monitored parameters harmonized with the EU DS Directive		Availability of monitored data			Name of responsible institution responsible for reporting to ICPDR
	Yes	no	Only specific polluters	Yes	no	Only specific polluters	centrally	regionally	no	yes	no	Yes	no	public	Upon request and prior approval	No-public	
R. Srpska (part of FBiH)	●				●				●	●			●		●		Not in place
BiH (part of FBiH)			●	●				●		●			●		●		Not in place, several institutions designated
Bulgaria																	
Croatia			●	●			●			●			●		●		State Water Directorate and Croatian Waters
Czech Republic	●			●			●			●		●			●		Water Research Institute
Hungary	● by 2005		●	●			●	●		●		●			●		Ministry of Environment and Water
Moldova																	
Romania			●	●			●	●		●		●		●			Romania Waters
Serbia - Montenegro																	
Slovakia	●			●			●			●			●		●		Ministry of Environment
Slovenia																	
Ukraine																	