TACIS Project: EuropeAid/116448/C/sv/multy

BLACK SEA INVESTMENT FACILITY

THALES EC – SOGREAH – PÖYRY

Mykolaivvodokanal

"Mykolaiv Water Supply and Wastewater Services Development Project"

EIB

Environmental Justification and Rationale

Draft Final Report

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABREVIATIONS

BSIF	Black Sea Investment Facility
BOD_5	Biochemical Oxygen Demand (5 days)
BOD_{20}	Total Biochemical Oxygen Demand (20 days)
COD	Chemical Oxygen Demand
CS	Construction Supervisor
CSEMP	Construction Site Environmental Management Plan
MMWS Project	Mykolaiv Municipal Water Services Project
EA	Environmental Audit
EIB	European Investment Bank
EBRD	European Bank for Reconstruction and Development
Ecology Department	State Department of Ecology and Natural Resources in Mykolaiv Oblast, under the Ministry of Ecology and Natural Resources
EFI	Environmental Field Inspectors (under the Construction Engineer)
EIA	Environment Impact Assessment
EMD	Environmental Management Division
EMP	Environmental Management Plan
FS	Feasibility Study
GDK	*Russian acronym for Maximum Allowed Concentrations*
GDS	*Russian acronym for Maximum Allowed Discharges*
GOST	*Russian acronym for* National Standard
MAC	Maximum Admissible/Allowable Concentration
MAD (R)	Maximum Allowable Discharges (or Releases)
STIP	Short Term Investment Programme
PIU	Project Implementation Unit
Project (the)	Mykolaiv Municipal Water Services Project
SanPiN	*acronym for* Sanitary Rules and Norms
SLF	Salubrity Limiting Factor *(defined in SanPiN)*
ToR	Terms of Reference
USSR	Union of Socialist Soviet Republics
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

Executive Summary

The City of Mykolaiv has requested the DABLAS Task Force of the European Commission to assist in the preparation of the Mykolaiv Municipal Water Services Project (the Project), which will constitute a first step of a short-term capital investment programme (STIP) aiming at improving the efficiency of treatment works, reducing operation and maintenance costs, water losses and discharges of untreated sewage into the Black Sea basin. The Project will be implemented by the municipal water company "Mykolaivvodocanal".

The "Executive Summary" presents the key features of the Environmental Justification and Rational Report.

Introduction

The City of Mykolaiv is the administrative centre of the Mykolaiv region (Oblast), and with a population of 508,400 residents is the 9th largest city in Ukraine. The City is an important business, political and cultural centre in the south of Ukraine, located on the banks of the River Pivdennyj Buh that flows to the Black Sea. City of Mykolaiv has unique natural environment. The system of water bodies and territories with planted trees and shrubs is natural-ecological framework of the city. The ecological problems of Mykolaiv are typical for many cities of Ukraine: contamination of surface water bodies, atmospheric air, underground waters, quality of drinking-water, noise contamination, waste management, biodiversity protection within territory of the city. Due to the absence in the town of enterprises of metallurgical, chemical and coal industry, Mykolaiv does not behave to the list of regions with high contamination of atmosphere. The water bodies of Mykolaiv are Ingoul River, the Southern Bug River and Dnipro-Bug Estuary are under the anthropogenic influence. The main problem in respect of anthropogenic impact is municipal discharges that produce 97,53% of all discharges into the water bodies of the region.

Mykolaiv region is one of leading regions of Ukraine for bio-production potential of the soil fund. Unfortunately, the land resources of the Mykolaiv region face the problem of soil degradation and underflooding. The basic factors of ground degradation in the region are following:

- violation of ecologically possible correlation of plough-land area, natural forages lands, forest planting, that negatively influences firmness of agro-landscape;
- intensive agricultural use of soils, that results in the decrease of ground fertility through their thickness, losses of soil-grainy structure permeability to water and aeration ability.

Within the limits of the city there are 17 objects nature reserves with the total area of 1184 hectares (4,5% of the city territory):

Water Utility

Mykolaiv Vodokanal (the "Utility") is the public utility enterprise, wholly owned by the City, responsible for the provision of water supply and sewerage services to the City of Mykolaiv. Due to the pollution of local ground water resources, raw water for the City is abstracted from the Dnipro River and pumped over 70 km to Mykolaiv where it is treated to meet national water supply norms and is distributed to consumers. Wastewater is collected, partially treated (due to collapsing infrastructure) and presently discharged into the River Pivdennyj Buh in non-compliance with national wastewater discharge norms.

The current status of water utility characterized by the following:

Water Supply System

The water treatment plant while of fundamentally sound process design is well beyond its design life. The walls of tanks and chambers are leaking extensively, and in places appear to be close to structural collapse. Due to the relatively good raw water quality supplied from the Dnipro River the plant can achieve water quality standards without extensive dependence upon the coagulation and sedimentations processes. A key process limitation is the absence of a functioning pre-chlorination contact tank for the 40,000 m³/d process train that was built in 1958.

Mykolaiv's water distribution network, providing service to 83% of Mykolaiv's households as well as to industry and institutions, consists of approximately 1022 km of pipe and is operated on 3 pressure zones to conserve energy. Like the water treatment plant the water distribution network is old and much of which is past its design life. The network experiences, on average, 8 significant breaks per day.

A key component in the potable water distribution system is the main pumping station in the centre of Mykolaiv. This pumping station, which supplies water to the whole centre of Mykolaiv, only has one variable speed pump to assist maintain operational stability for pressure and flow management. There is no spare nor stand-by capacity that could provide the same function in the event that this pump failed or needed to be taken out of service for routine maintenance.

Wastewater Collection and Treatment

Mykolaiv's sewerage network, with approximately 535 km of sewers, collects wastewater from 63% of households as well as from industry and institutions, and transports the wastewater to one centralized wastewater treatment plant with the assistance of 26 primary wastewater pumping stations.

The sewers are in areas, collapsed or partially collapsing. The pumping stations are old, unreliable, very energy inefficient, and very labor intensive to operate (260 operators alone to operate these pumping stations).

The wastewater treatment plant (WWTP), again of fundamentally sound process design is well beyond its design life and despite the best efforts of its operators it is failing to meet wastewater effluent discharge standards, resulting in non-compliance penalties (730 000 UAH in 2005).

The current capacity of the WWTP is 104 thousand m³/d, but the actual level of waste water inflow is 108 thousand m³/d. In spite of fundamentally good process design of WWTP is collapsing due to the lack of essential investment, and in its present condition cannot perform to comply with the national wastewater discharge norms.

The existing water supply and wastewater assets of the City are in general ageing and in priority areas require urgent refurbishment or replacement. The Utility intends to identify priority investment needs summarized in a proposed Short Term Investment Programme (STIP) (described in details in Annex 1) and has requested assistance to prepare this priority water and sewerage infrastructure project for financing.

This task is under implementation by TACIS Black Sea Investment Facility Project (BSIF) represented by a consortium of three companies THALES, SOGREAH and POYRY (former GKW Consult, Germany) lead by POYRY with a local support from Mykolaivvodokanal, Mykolaiv City Administration and Ministry of Environmental Protection of Ukraine.

The scope of presented study is an environmental justification on the proposed project that will form a background for EIA study and Environmental Management Action Plan (EMP). The main issues considered in the study are the following:

- Present status of the environment (including social-economic and aesthetic environment)
- Influence of water utility's operations on the environment
- Elaboration of preliminary measures on improvement of water utility's compliance with environmental standards (EU and domestic)

The main objectives corresponded with the scope of the study are reflected in the following components:

1. Analysis of the present status of all components of the environment at the project site (including social-economic and aesthetic environment).
2. Analysis of the present performance of the water utility in respect of influence on environment
3. Elaboration of the preliminary measures on improvement of operations of the water utility to get compliance with EU and local environmental standards.
4. Comparison of the environmental quality standards (EU and Ukrainian) applicable to the project.
5. Identification of the main institutions and their roles in respect of environmental management in the project context.
6. Identification of the main laws and regulations in respect of the project implementation.

Description of the Project

The priority components of the proposed investment are preliminary summarized in the STIP:

a. Reconstruction and expanding of waste-water treatment plant's facilities (7 million Euro)
b. Reconstruction and upgrading of water-treatment plant's facilities (6.4 million Euro)
c. Rehabilitation of sewerage network (3.6 million Euro)

The proposed components of the STIP have been considered by the Consultant in light of analysis of environmental performance of the water utility. This analysis contents the following findings:

1. Protection of water resources:

- Emergency state of the water-supply and sewage mains (drainage of the sewage water and drinking water into the ground)
- Unsatisfactory condition of the equipment of the sewage pumping stations (potential threat to the local environment)

- Regular unauthorized discharges from sewage pumping stations into the Southern Bug River
- Not satisfactory treatment of the waste water (pollution of the Southern Bug River's ecosystem)
- Not registered volume of discharges from WWTP into the Southern Bug River
- Unsatisfactory status of the deep discharge collector (pollution of the surface layer of the Southern Bug River)

2. Protection of atmosphere:

- Unsatisfactory status of the Chlorine storage and dosing equipment of WTP
- Absence of plan of measures in respect of the decline of emission of harmful substances

3. Protection of land resources:

- Unauthorized sludge deposition close to WWTP (pollution of the soil)
- Unauthorized deposition of the garbage from the grids (pollution of the soil)

4. Energy saving:

- Excessive consumption of electricity by pumping stations and air-tanks' blowers

5. Laboratory control:

- Limited capacity of laboratories of WTP and WWTP (unsatisfactory control of the performance of water utility).

All these findings form an environmental background for the necessity of the measures introduced in STIP.

As was mentioned above, the compliance with Ukrainian standards and convergence towards EU standards is one of the objectives of the study, a detailed and commented comparison of the following standards is proposed in the study: surface water, drinking water and wastewater treatment. As for the reuse of sludge in agriculture, no Ukrainian standard exists and so EU standard is simply described without comparison.

Ukrainian and EU standards on surface water, drinking water and wastewater treatment have similar approaches, based on the definition of a set of physical, chemical and microbiological requirements to be met. Ukrainian standards for surface water and drinking water include both GOSTs and SanPiNs. GOSTs water monitoring requirements are systematically less comprehensive than EU requirements. Conversely, several SanPiNs requirements are unusually strict (number of parameters to be monitored, maximum allowed concentrations…) and their applicability is highly questionable. The enforcement of the drinking water SanPiN is presently suspended. The newly adopted law of Ukraine "Drinking Water in Ukraine" (April 3rd 2005), specifies that State Standards should be developed for drinking water.

As for wastewater treatment, both EU and Ukraine standards define minimum requirements for a limited set of parameters, and give local authorities the responsibility for defining additional requirements at the local level. Ukraine requirements are stricter than EU requirements for BOD5, COD and suspended solids but more permissive for nutrients releases (nitrogen and phosphorus compounds): EU standard explicitly aims at preventing eutrophication.

Approach and Methodology

The environmental assessment in this project employed an interactive approach in which potential environmental issues will be examined in successive levels of detail and specificity at each step in the process.

The environmental impact assessment will be undertaken for the project. The important recommendations of the EIA study will form the part of the Environmental Management Plan (EMP). It will help the Mykolaivvodokanal and City Administration to incorporate the measures to mitigate adverse impacts during operational phase of the project. It will also help to carry out careful supervision during operational phase of the project.

At the present time the study team visited entire project area and still to collect information on various aspects of the project. The data collected from various sources and from studies conducted in the past will be utilized for EIA analysis. Supplementary information was collected from local and state governmental agencies as well as previous reports prepared for this water supply and sewerage project.

1 INTRODUCTION

1.1 Background of the Project

The City of Mykolaiv (the "City") is the administrative centre of the Mykolaiv region (Oblast), and with a population of 508,400 residents is the 9th largest city in Ukraine. The City is an important business, political and cultural centre in the south of Ukraine, located on the banks of the River Pivdennyj Buh that flows to the Black Sea. Mykolaiv Vodokanal (the "Utility") is the public utility enterprise, wholly owned by the City, responsible for the provision of water supply and sewerage services to the City of Mykolaiv. Due to the pollution of local ground water resources, raw water for the City is abstracted from the Dnipro River and pumped over 70 km to Mykolaiv where it is treated to meet national water supply norms and is distributed to consumers. Wastewater is collected, partially treated (due to collapsing infrastructure) and presently discharged into the River Pivdennyj Buh in non-compliance with national wastewater discharge norms.

1.2 Engineering Consultants

The technical consultants for this project is TACIS BSIF Project represented by a consortium of three companies THALES, SOGREAH and POYRY (former GKW Consult, Germany) lead by POYRY with a local support from Mykolaivvodokanal, Mykolaiv City Administration and Ministry of Environmental Protection of Ukraine.

1.3 Project Concept and Needs

The existing water supply and wastewater assets of the City are in general ageing and in priority areas require urgent refurbishment or replacement. The Utility intends to identify priority investment needs summarized in a proposed Short Term Investment Programme (STIP) also described in Annex 1 and has requested assistance to prepare this priority water and sewerage infrastructure project for financing. A first issue to be resolved is the justification of the proposed STIP in line with Bank criteria, relating to demand-side considerations, environmental issues and appropriate standards, and the tariff and project approvals environment. The Utility's present institutional structure is summarized in Annex 2 and its financial position and capacity shown in Annex 3.

1.4 Scope of the Study

Conducting of environmental justification on the proposed project that will form a background for EIA study and Environmental Management Action Plan (EMP). The main issues to be looked up within the study are the following:

- Present status of the environment (including social-economic and aesthetic environment)
- Influence of water utility's operations on the environment
- Elaboration of preliminary measures on improvement of water utility's compliance with environmental standards (EU and domestic)

1.5 Objectives of the Present Report

The overall objective of this study is an environmental analysis of the situation in city of Mykolaiv in respect of operations of the water utility "Mykolaivvodokanal". Also, the study provides environmental rational for STIP.

Taking into consideration main components of the scope of study mentioned above, the main objectives of the study could be formulated as following:

- Analysis of the present status of all components of the environment at the project site (including social-economic and aesthetic environment).
- Analysis of the present performance of the water utility in respect of influence on environment
- Elaboration of the preliminary measures on improvement of operations of the water utility to get compliance with EU and local environmental standards.
- Comparison of the environmental quality standards (EU and Ukrainian) applicable to the project.
- Identification of the main institutions and their roles in respect of environmental management in the project context.
- Identification of the main laws and regulations in respect of the project implementation.

1.6 Environmental Impact Assessment Process Adopted

The EIA preparation led to identification of potential environmental impacts and their feasible remedial measures (including avoidance, mitigation and enhancements), which will be incorporated into environmental management plan.

1.7 Proposed Structure of the Final EIA Report

The report will be structured as follows:

Executive Summary – brief description of all chapters

Chapter 1: Introduction – general information on the Project.

Chapter 2: Project Description - In this chapter, the project area and the existing water treatment, distribution system and sewerage system will be discussed from an environmental perspective.

Chapter 3: This chapter discusses the **Policy, Legal and Administrative Framework** within which the project is set. The major stakeholder departments of the State and Central Governments with their specific roles are described. This chapter also covers the clearance requirements at various levels and their current status.

Chapter 4: **Comparison of Environmental Quality Standards** – This chapter provides information on analysis of existing environmental quality standards of EU and Ukraine.

Chapter 5 details out the **Approach and Methodology** adopted for the Environmental Impact Assessment. Descriptions are provided for environmental monitoring methodology, modelling methods and environmental designs.

Chapter 6 reviews the **Existing Environment**. This section includes the description of the baseline conditions. The meteorology of the area, physical and natural environment, cultural properties along the project area and quality of life add up to give a comprehensive picture of the existing environment along the project site and its area of influence.

Chapter 7 on the **Assessment of Impacts** determines the extent of the impacts of the project activity on the existing environment. The focus of section is on the adverse impacts. The beneficial impacts on the environment due to the project have been detailed in subsequent chapter under the enhancement measures. The impacts have been detailed in the same sequence as the existing environmental scenario described in Chapter 5 for ease of understanding.

Chapter 8 entitled **Mitigation, Avoidance and Enhancement Measures** forms the basis of the generation of coherent, comprehensive and concise Environmental Management Plans for the project area. In addition to the avoidance and mitigation measures for the physical and natural environmental components, this chapter discusses various environmental enhancements suggested for the project, including the enhancement of common property resources.

Chapter 9 reviews the existing **Implementation Arrangements** and suggests further institutional strengthening for ease of implementation of the environmental component of the project. It goes on to describe the set-up required, a reporting system and training needs to ensure that the environmental expertise required for the effective implementation of EA provisions is internalised.

Chapter 10 gives Environmental Management Plan for implementation during operation phase of the project.

2 DESCRIPTION OF THE PROJECT

The Terms of Reference (ToR) in connection with the results of the site visit are providing a clear and understandable view of the actual situation and the required tasks.

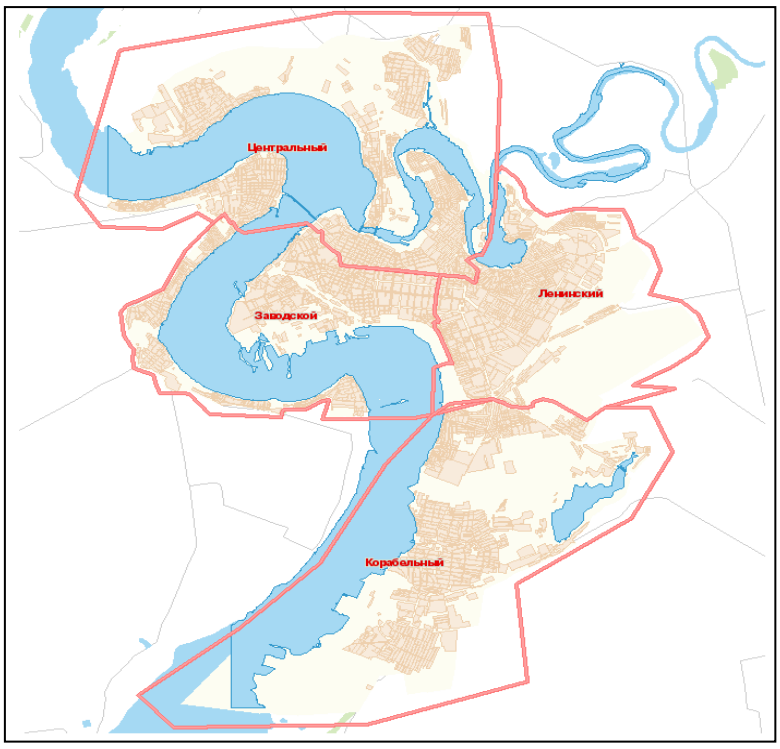
The ToR is indicating very clearly that the required scope of services is focusing on the following:

- A full justification for the proposed STIP based on demand and affordability criteria
- An environmental assessment summarizing the rationale for the proposed actions and investments, and an EIA for the STIP investments in compliance with both Ukrainian and EC requirements
- A STIP Procurement Plan (to comply with both Ukrainian and EU public procurement rules in order to facilitate downstream financing from both domestic and international sources)
- Engineering packages for each of the STIP investment components for procurement
- Options Study for the longer term optimization of the City's primary sewerage network

2.1 Location

The Project is located within the boundaries of the City of Mykolaiv that consists of four districts: Central District (79,5 sq. km), Leninsky District (32,7 sq. km), Zavodsky District (52,7 sq. km) and Korabelny District (87,9 sq. km).

Figure 1: Location of the Project Area



2.2 Water Supply System

2.2.1 Existing Water Supply System Infrastructure

Due to the pollution of local groundwater resources in and around the Mykolaiv area, raw water is pumped over 70 km from the Dnipro River to the City where it is treated prior to distribution. The data on the actual quality of raw water taken from Dnipro River and the Lake (storage reservoir) for the Mykolaiv water supply system are presented in the Table 1.

Table 1: Raw water: actual compared with standard requirements

Parameter	Dnipro River	Lake	EU Directive 75/440/EEC	GOST 2761-84	SanPiN 4630-88
	average	average	G & M MAC*	MAC	MAC
Alkalinity, mole/l	2.49	2.55			
Color, degree	28	17	G: 50 M: 200	200	
Dry residue, mg/l	384	1113.0		1000	1000
Odor 20°C, points	0.000	0.000	G: dilution: 20x	4	1
Odor 60°C, points	0.000	5.0			
pH	8.4	8.76	G: 5.5 to 9.0	6.5 to 8.5	6.5 to 8.5
Suspended solids, mg/l	1.04	9.5			
Total hardness, mole/m³	3.9	8.4		7	
Turbidity, mg/l				10 000	
Water temperature, °C	10.0	11.0	G: 22 M: 25		
BOD5, mg O/l	3.0	3.2	G: < 7	< 7 (BOD20)	< 7 (BOD20)
COD, mg O/l			G: <30		15
Dissolved O2, mg/l	9.0	10.7	G: > 30% saturation		> 4
Permanganate oxidation, mg O/l 8,68 1				20	
Ammonia NH4, mg/l	0.28	0.11	G: 2 M: 4		2
Anionic surfactants, mg/l			G: 0,5		
Arsenic As, mg/l	0.0	0.00	G: 0.05 M: 0,1		0.05
Beryllium Be, mg/l			to be defined		0.2
Cadmium Cd, mg/l			G: 0.001 M: 0.005		0.001
Calcium Ca, mg/l					
Chloride Cl, mg/l	38.0	277	G: 200	350	350

Chloroform CHCl3, mg/l					
Chromium Cr, mg/l	0.0	0.0	M: 0.05		
Cobalt Co, mg/l	0.0	0.0	to be defined		0.1
Copper Cu, mg/l	0.0370	0.0460	to be defined		1
Fluorides F, mg/l	0.35	0.480	G: 0.7 to 17		
Free CO2, mole/l					
Iron Fe, mg/l	0.18	0.360	G:1	5.0	**0.3**
Lead Pb, mg/l		0.0090	0.0050	M: 0.05	0.03
Magnesium Mg, mg/l					
Manganese Mn, mg/l			0.030	G:1	**0,1**
Mercury Hg, mg/l				G: 0.0005 M: 0.001	0.0005
Molybdenum Mo, mg/l			0.00		
Nickel Ni, mg/l	0.00	0.000	to be defined		0.1
Nitrates NO3 , mg/l	2.65	0.80	M: 50		45
Nitrites NO2, mg/l	0.030	0.0250			3.3
Oil products, mg/l			G: 0.5 M: 1		
Phenols, mg/l			G: 0.01 M: 0.1		
Phosphate PO4 , mg/l	0.39	0.0580	G: 0.7		3.5
Residual Al, mg/l	0.0	0.00			
Selenium Se, mg/l			M: 0,01		0,01
Sulphate SO4, mg/l	104	292	G: 150 M: 250	500	500
Sulphides, mg/l					
Strontium Sr, mg/l					
Tetrachlorocarbon CCl4, mg/l					
Zinc Zn, mg/l	0.0650	0.0950	G: 1 M: 5		
Biomass, mg/l					
Coliphages, PFU/l	118	220			**100**
Lactose-positive coliforms, /l 81			Total coliforms: G: 500000	50 000	**10000**
Microbe number / l	3.0	19.0			

Phytoplankton, cells/cm³	177000	2565000		**100000**	
Zooplankton, /501					

*** Guideline and Mandatory MAC**

Mykolaiv's main water treatment plant components consist of:

- An off-line raw water storage reservoir for flow balancing raw water demand,
- Conventional water treatment process trains of 40000 m3/day, 60000 m3/day and 100000 m3/day built in 1958, 1968 and 1978 respectively. Each process train utilizes conventional coagulation and sedimentation unit processes followed by rapid sand filtration.
- Chlorination storage and dosing equipment for both the pre-chlorination (for the prevention of bio-fouling of the filters) and for post treatment chlorination to achieve regulatory chlorine residual levels for distribution.
- Treated water reservoirs (5).
- A main treated water pumping station for distribution

In brief, the water treatment plant while of fundamentally sound process design is well beyond its design life. The walls of tanks and chambers are leaking extensively, and in places appear to be close to structural collapse. Due to the relatively good raw water quality supplied from the Dnipro River the plant can achieve water quality standards without extensive dependence upon the coagulation and sedimentations processes. However in high demand periods, and when raw water is used from the raw water off-line storage reservoir (of inferior raw water quality) the plant cannot meet demand. A key process limitation is the absence of a functioning pre-chlorination contact tank for the 40,000 m³/d process train that was built in 1958.

Other significant points of note on the site of the water treatment plant are:

- The chlorine storage, handling and dosing facilities are visibly dangerous and are not in compliance with national or EC regulations for the storage and handling of Cl2, and poses a significant risk to operator safety.
- The treated water pumping station consists of 8 pump-sets of which only 3 are operational posing a threat to operational security of water supply. In addition the pump-sets are very inefficient and are high electrical power consumers.
- Backwash water and sludge from the plant are not being treated properly prior to discharge and as a result the Utility is incurring fines related to these discharges.

Mykolaiv's water distribution network, providing service to 83% of Mykolaiv's households as well as to industry and institutions, consists of approximately 1022 km of pipe and is operated on 3 pressure zones to conserve energy. Like the water treatment plant the water distribution network is old and much of which is past its design life. The network experiences, on average, 8 significant breaks per day. The Utility keeps track of those areas of the network that are exceptionally weak and in need of priority replacement.

A key component in the potable water distribution system is the main pumping station in the centre of Mykolaiv. This pumping station, which supplies water to the whole centre of Mykolaiv, only has one variable speed pump to assist maintain operational stability for

pressure and flow management. There is no spare nor stand-by capacity that could provide the same function in the event that this pump failed or needed to be taken out of service for routine maintenance.

The Annex 5 provides the laboratory analysis in respect of current performance of the WTP and status of Dnipro river raw water and storage reservoir (lake).

2.2.2 Proposed Preliminary Measures

As mentioned in Note 1 above all of the items listed in the STIP for this component are priority works in the view of the Vodokanal. At the present time the Consultant is conducting justification and adjustment of the STIP (at the present, only the data from pre-feasibility study document are available).

The construction of the new pre-chlorination contact tank will increase the operational capacity of the water treatment plant.

Both water distribution pumping stations referred have to be upgraded urgently in order to provide operational security or service and to reduce operating costs.

The refurbishment of the chlorination storage, handling and dosing facilities is required both for operational safety and for legal compliance.

The priority replacement of collapsing water mains is essential to reduce water losses and prevent the secondary contamination water supplies.

Note Also: The proposed investment in on-site laboratory testing equipment both for the WWTP and for water supply do make sense. The testing is required both for operational management needs as well as for regulatory compliance needs.

2.3 Wastewater Collection and Treatment

2.3.1 Existing Wastewater System

Mykolaiv's sewerage network, with approximately 535 km of sewers, collects wastewater from 63% of households as well as from industry and institutions, and transports the wastewater to one centralized wastewater treatment plant with the assistance of 26 primary wastewater pumping stations.

The sewers are in areas, collapsed or partially collapsing (see Annex 4.2 for list of priority areas for sewer replacement).

The pumping stations are old, unreliable, very energy inefficient, and very labor intensive to operate (260 operators alone to operate these pumping stations).

The wastewater treatment plant (WWTP), again of fundamentally sound process design is well beyond its design life and despite the best efforts of its operators it is failing to meet wastewater effluent discharge standards, resulting in non-compliance penalties (730 000 UAH in 2005).

The current capacity of the WWTP is 104 thousand m³/d, but the actual level of waste water inflow is 108 thousand m³/d. The treatment processes consist of inlet screens (6mm – 2 of 5 operational), grit removal chambers, a pre-aeration contact tank, primary sedimentation tanks, main aeration tanks, secondary sedimentation tanks, chlorine disinfection facilities, mechanical sludge dewatering (one new belt press not in operation due to the supply and cost of polymer), and on-site sludge drying beds. Due to the collapse of the sludge dewatering facilities the plant is re-circulating primary sludge in the primary sedimentation tanks, and completely re-circulating secondary sludge in the aeration tanks resulting in ineffective primary treatment and ineffective secondary treatment. The air diffusers in the aeration tanks have been upgraded recently and appear to have increased the efficiency of O2 transfer and reduced the energy demand from the blowers (3 of 8 blowers are operational). The result is a WWTP of fundamentally good process design (despite very poor original materials specification and construction workmanship), that is collapsing due to the lack of essential investment, and in its present condition cannot perform to comply with the national wastewater discharge norms.

The analysis of laboratory data in respect of current performance of WWTP is presented in the Annex 6.

2.3.2 Proposed Preliminary Measures Infrastructure

The priority investments listed in STIP (with the exception of the new equipment for the existing on-site laboratory) are the minimum investment that would be required in order to upgrade the WWTP to achieve compliance with the national discharge norms. Also, at the present stage of the Consultant's work it is possible to include in this report only the data from the pre-feasibility study document.

The process calculations prepared by the WWTP engineers confirm the need for the additional secondary clarifiers and aeration tank capacity. (Note – construction began for one additional clarifier but stopped because of lack of finance.)

The construction of the sludge thickeners and the additional on-site sludge drying beds aims to solve a current fundamental problem with the dewatering and disposal of sludge. It is a solid low tech solution of proven reliability with future low operational cost and there is sufficient land availability on the existing site to implement it.

The proposed remedial works to the screens and grit removal plant is essential, as is the upgrade to the disinfection facilities.

2.3.3 Proposed Preliminary Measures for the replacement of collapsed sewers and reduction of associated operating costs

As mentioned above the cost of operating the 26 main sewage network pumping stations is high due to the labor intensity (260 operators) and the electrical inefficiency of the pump equipment. The installation of a SCADA system to automate the operations of these pumping stations will be very cost effective if the Utility can shed most of these jobs after its installation as planned. The payback period for this investment calculated on labor savings alone will be less than 3 years.

The priority replacement of collapsed or collapsing sewers should be carried out as soon as possible for the prevention of sewage flooding, localized pollution and the associated threat to public health. The Utility has already prepared some engineering packages for the procurement of the replacement of some sewers and the Consultant conducts the work on their justification.

2.4 Population and Customer Connections Projections

According to the current trends on the base of official statistical data provided by the Local Department of Statistics in Mykolaiv Oblast (reflected in the Table 2) it is possible to make the theoretical projection on the population of the City of Mykolaiv for the nearest 10 years (see the Table 3).

Table 2: Dynamics of the Population of the City of Mykolaiv 2000-2006 ('000 persons)

	2000	2001	2002	2003	2004	2005	2006
Mykolaiv City	520,0	516,4	513,9	511,5	509,7	509,0	508,4
Zavodsky District	135,1	133,4	132,3	131,7	131,0	130,3	129,8
Korabelny District	86,0	85,1	83,4	82,8	82,3	82,3	81,8
Leninsky District	146,7	146,2	144,1	143,5	143,1	142,8	143,2
Central District	152,2	151,7	154,1	153,5	153,3	153,6	153,6

Table 3: Population Projection of the City of Mykolaiv for 2007-2016 ('000 Persons)

2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
506,5	504,6	502,7	500,8	498,9	497	495,1	493,2	491,3	489,4

According to the UN data (Press-Release of Executive Director of the UN Fund of Population, Kyiv, July 8, 2005) at the present moment there is no evidence of changing of current demographical situation in Ukraine and it the tendency of population decrease will remain in the future.

2.5 Water Demand Projections

At the present time the water demand projection for the population could be estimated only on the base preliminary data received from vodokanal and local department of statistic. The water demand for other users (industry, commercial, institutions) should be further analyzed (the respective data are in the process of collection). The brief analysis of these data provides opportunity to make following conclusions on the factors that make influence on the estimation of water use:

- Stable negative trend of population growth (mentioned above)
- Stabilization of the water demand per capita with the tendency of decrease of water consumption due to the installation of water-meters inside of apartments.

According to the data provided by the Billing Department of Mykolaivvodokanal the average consumption of the water in City of Mykolaiv at present is 163 l/day per capita (4,89m³/month per capita).

Table 3: Average water consumption in apartment buildings with water-meters inside of building

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005
(m^3/month per capita)	10.8	11.6	10.1	11.0	9.1	7.8	6.6	5.8	4.9

At the year 2002 population of the city of Mykolaiv has started to install personal water-meters inside of apartments. This factor produced an effect of feasible decrease of water demand (data presented in Table 5).

Table 4: Average water consumption in apartment buildings with water-meters inside of apartment

Year	2002	2003	2004	2005
(m^3/month per capita)	4.01	2.92	3.08	3.21

Table 5: Average water consumption in private houses with water-meters (winter time)

Year	2001	2002	2003	2004	2005
(m^3/month per capita)	5.15	5.44	4.75	4.67	4.89

The average consumption of the water in private houses during the **summer time** is in average two times more than in other seasons (analysis was made on the base of data on 15 private houses with different sizes of gardens).

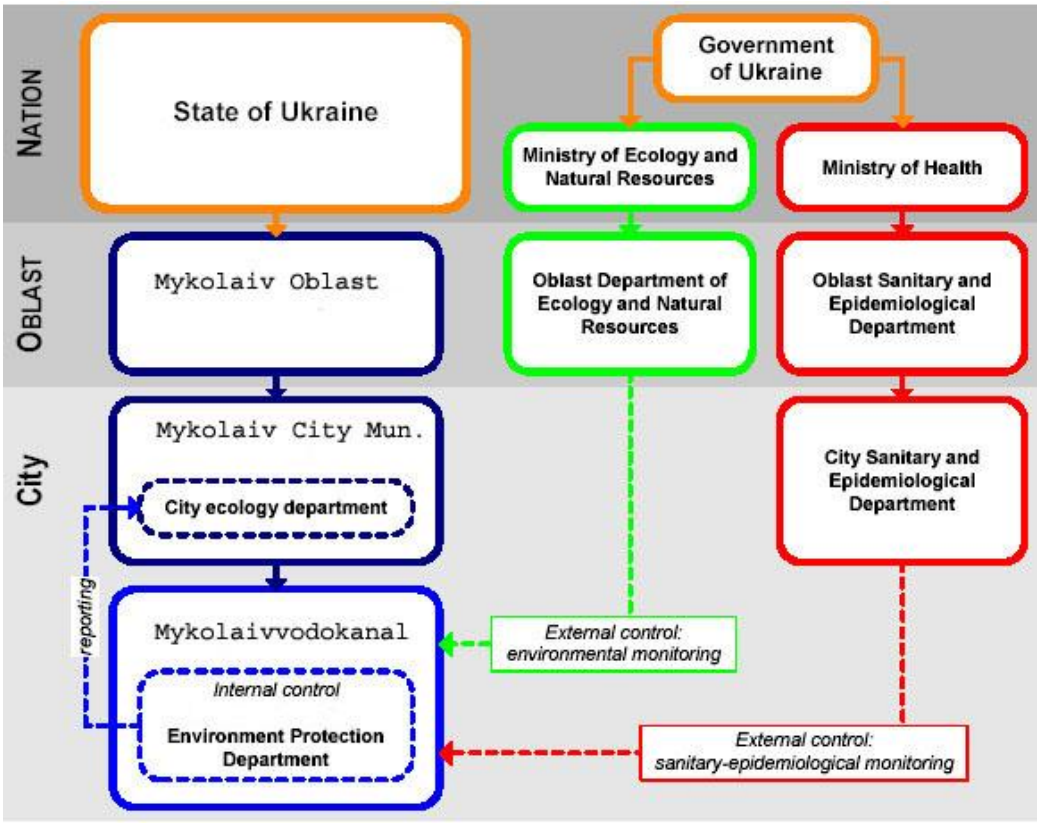
On the base of this preliminary data it is possible to make an assumption that at the present moment we observe a situation of stabilization of water demand from the population in the city of Mykolaiv. A more deep analysis of water demand in this sector as well as in other sectors will be further conducted.

3 POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

3.1 Environmental Institutions and Roles

The following Figure 2 shows the different institutional bodies presently involved in the environmental management and monitoring of Mykolaivvodocanal:

Figure 2: Institutional Bodies Involved in Environmental Management and Monitoring



3.2 Applicable Laws and Regulations

During the last decade, the Parliament of Ukraine reconsidered most of the legal acts inherited from the former Soviet Ukraine, and approved a large number of new laws and regulations to complete the national environmental legislative system. Further developments of the environmental legislation are nevertheless still needed, in order to improve the current laws and regulations (first of all to converge towards EU legislative system) and develop and strengthen the enforcement mechanisms.

The following list concerns major laws and regulations applicable to the environmental management of the Project.

National Laws:

- The Law on Environmental Protection (1991)
- The Law on Drinking Water of Ukraine (April 2005).
- The Law on Environmental Network (2004) *(harmonized with EU legislation)*
- The Water Code (1995)
- The Land Code of Ukraine (2001)
- The Law on guaranteeing the sanitary-epidemiological health of population (1994)
- The Law on Ecological Expertise (1995)
- The Law on Local Self-Governance in Ukraine (1997)
- The Law on Environmental Audit (2004) *(harmonized with EU legislation)*
- The Law on Waste (1998)
- The National Environmental Health Action Plan (NEHAP) (2000)
- The State Program for the Development of Water Industry
- The National Regulations:
- Regulation on state water cadastre (Ministry of Environmental Protection 08.04.1996 N° 413)
- Regulation on the legal regime of sanitary protection of water bodies (Ministry of Environmental Protection, Ministry of Health - 18.12.1998 N° 2024)
- Regulations of industrial sewage acceptance into communal and departmental urban sewage systems of Ukraine (Ministry of Economics, Ministry of Ecology and Natural Resources, Ministry of Finance, Ministry of Health - 19.02.2002 N° 37)
- Regulation on the approval of procedures for the determination of the size and borders of water protection zones and regime of economic activities within these zones (Ministry of Environmental Protection - 08.05.1996 N° 486)
- Regulation on approval of the rules for the protection of surface waters against pollution by return waters (Ministry of Environmental Protection - 25.03.1999 N° 465)
- Regulation on the procedure of development and approval of normative maximum allowable discharge of polluting substances and list of substances to be regulated during discharge (Ministry of Environmental Protection - 11.09.1996 N° 1100)
- Regulation on the approval of the rules for the determination of normative fees for pollution of the natural environment and collection of these fees (Ministry of Environmental Protection - 01.03.1999, N° 347.)
- International Treaties approved through National Law:
- The Law on the State Program of Protection and Rehabilitation of the Environment of the Black and Azov Seas (2001)
- The Law on the State Program of the Development of Water Industry (2002)
- The Law on Fish, other Alive Water Resources and Food Products thereof (2003)
- The Law on Drinking Water and Drinking Water Supply (2003)
- Law on the Approval of the State Program of Reforms and Development of Housing and Communal Sector
- The Law on the Ratification of the Convention on the Protection of the Black Sea against Pollution (Bucharest, 1992) (adopted in 1994)

- The Law on the Ratification of the Convention on Biodiversity (Rio, 1992) (adopted in 1994)
- The Law on Accession to the Convention on the Conservation of European Wildlife and Natural Habitats (Bern, 1979) (adopted in 1996)
- The Law on the Accession to the Convention on Transboundary Watercourses and International Lakes (Helsinki, 1992) (adopted in 1999)
- The Law on the Ratification of the Convention on Access to Information, Public Participation in Decision Making and Access to Justice in Environmental Matters (Aarhus, 1998) (adopted in 1999)
- The Law on the Ratification of the Protocol on Water and Health (London, 1999) to the Convention on Transboundary Watercourses and International Lakes (adopted in 2003).

Technical regulations for the EMP consist of environmental quality standards, basic health standards, public safety standards, standards for controlling toxic and radioactive substances, and pollutant emission standards. Except for the pollutants emission standards, regional authorities are not allowed to adopt their own prescriptions in any of the other four categories having to follow the national regulations.

3.3 Applicable EIB Safeguards

The following EIB safeguards apply to the Project:

- EU's Sixth Environment Action Programme
- EIB's Corporate Operational Plan (COP) 2005-2007.
- EIB's Environmental Statement 2004.

The water supply and sewerage system rehabilitation works proposed for the city of Mykolaiv, although providing services for a population equivalent of over 0,5 million, are mostly limited to rehabilitation of the existing works.

4 COMPARISON OF ENVIRONMENTAL QUALITY STANDARDS

4.1 Surface Water intended for Water Supply

4.1.1 Ukrainian Standards on Raw Water Quality

The Ukrainian standard for water supply sources is based on the former USSR state standards:

- **GOST 2761-84** "Centralized Potable and Utility Water Supply Sources – Sanitary and Technical Requirements, and Rules of Selection" approved by the Resolution #4013 of the State Standard of the USSR of 27 November 1984.

GOST 2761-84 covers the sources for potable, utility and industrial water supply (both surface and underground water sources are considered). It establishes the sanitary and technical requirements to water sources, and the rules of their selection with regard to human health. In 1988, a new regulation was introduced:

- **SanPiN 4630-88:** "Sanitary Regulations and Codes for the Protection of Surface Water from Pollution". Ministry of Health of the USSR, Moscow, 1988

SanPiN 4630-88 aims at preventing and eliminating the pollution of surface waters used for the recreational, domestic or drinking purposes. In particular, SanPiN 4630-88 defines Maximum Admissible Concentration (MAC), Approximate Admissible Level (AAL) and Salubrity Limiting Factor (SLF) for over 1300 parameters. MAC from SanPiN 4630-88 corresponds to the "Mandatory MAC" of EU regulation. AAL corresponds to the "Guideline MAC" of EU regulation. The Salubrity Limiting Factor explains the reason why an element is subject to limitation: organoleptic, toxic, epidemiological...

4.1.2 EU Standards on Raw Water Quality

Two European directives refer to surface water intended for water supply and directly apply to the Project:

- **Council Directive 75/440/EEC** of 16 June 1975 *concerning the quality required of surface water intended for the abstraction of drinking water in the Member States;*
- **Council Directive 79/869/EEC** of 9 October 1979 *concerning the methods of measurement and frequencies of sampling and analysis of surface water intended for the abstraction of drinking water in the Member States;*

4.1.3 Comparison of Raw Water Quality standards

Raw water sources: EU Directives and SanPiN 4630-88 specifically refer to surface water sources, while GOST 2761-84 refers to surface *and* underground sources. Only surface water sources are addressed in the report, since Dnipro river is the only permanent source of raw water used by Mykolaivvodocanal (recently, Mykolaivvodokanal stopped to use water from the storage lake).

General approach: Based on chemical and physical characteristics, both Directive 75/440/EEC and GOST 2761-84 define 3 categories of surface water and describe

corresponding standard methods of treatment for transforming surface water into drinking water. SanPiN 4630-88 only describes minimum requirements for surface waters aimed at drinking water supply and recreation.

Differences and discrepancies between GOST 2761-84 and SanPiN 4630-88: GOST 2761-84 is aimed at being used at the design stage of water supply systems, while SanPiN 4630-88 refers to raw water quality for existing water supply systems.

One problem is that SanPiN 4630-88 defines surface water quality requirements stricter than those of GOST 2761-84, regardless to the possibility adapting treatment technologies to the quality of raw water. Surface water bodies from which water can be abstracted for water supply should according to SanPiN 4630-88 have characteristics which can only be met by the 1st class of surface waters defined in GOST 2761-84. As a result, any water supply system built in accordance with GOST 2761-84 to abstract water from a 2nd or 3rd class water body will not meet the requirements of SanPiN 4630-88. The normative framework of Ukraine being under improvement, such discrepancies are likely to be corrected in future.

Raw water classification: Raw water classes are defined on the basis of limiting values or concentrations for specified physical, chemical and biological parameters. Appendix 3 presents a detailed and comparative list of these parameters. The number of parameters to be monitored for the raw water classification is:

- 15 parameters in GOST 2761-84
- 15 basis parameters in SanPiN 4630-88 (+ 1345 other parameters for which MACs are defined)
- 46 parameters in the Directive 75/440/EEC

Except for hardness, all 15 basis-parameters of GOST 2761-84 and SanPiN 4630-88 have a direct or indirect equivalent in Directive 75/440/EEC.

Standard raw water treatment methods: The following table compares the raw water treatment methods recommended by GOST 2761-84 and Directive 75/440/EEC for the different raw water classes. According to both standards, the sole application of these recommendations is considered as sufficient, provided that the resulting water complies with the drinking water standards (for information, raw water abstracted by Mykolaivvodocanal enters the 3rd class).

Table 6: Standard methods of treatment for transforming surface water into drinking water

Raw Water Class		Treatment method	
Ukraine	**EU**	**Ukraine - GOST 2761-84**	**EU Directive - 75/440/EEC**
1	**A1**	Treatment is limited to decontamination and filtration with or without coagulation	Simple physical treatment and disinfection, e.g. rapid filtration and disinfection
2	**A2**	The treatment process includes coagulation, gravity sedimentation, filtration, decontamination, and, if phytoplankton is present, micro-filtration	Normal physical treatment, chemical treatment and disinfection, e.g. pre-chlorination, coagulation, flocculation, decantation, filtration, disinfection (final chlorination).

3	**A3**	The proper water quality is achieved using the methods applied to Class 2, and additional clarification, oxidation and sorption, deeper decontamination etc.	Intensive physical and chemical treatment, extended treatment and disinfection e.g. chlorination to breakpoint, coagulation, flocculation, decantation, filtration, adsorption (activated carbon), disinfection (ozone, final chlorination).

Limiting values and concentrations: Appendix 1 provides a comparative table of the limiting values and concentrations considered by Ukrainian and EU standards. Generally, Ukrainian and EU standards use limiting concentrations of the same order of magnitude, except for pesticides for which Directive 75/440/EEC specifies requirements much stricter than SanPiN 4630-88. SanPiN 4630-88 is systematically less permissive than GOST 2761-84.

Occasional and limited exceed of MACs are allowed by Directive 75/440/EEC for some parameters.

GOST 2761-84 specifies, for all harmful substances of Danger Class 1 and 2 having the same Salubrity Limiting Factor and being detected in raw water: "the sum of the ratios between the actual concentrations and the MACs shall not exceed 1". Mathematically said:

Figure 3: Salubrity Limiting Factor

$$\frac{C_1}{MAC_1}+\frac{C_2}{MAC_2}+\frac{C_3}{MAC_3}+\ldots+\frac{C_n}{MAC_n}\leq 1$$

Practically, this rule is not applied and probably not applicable, because:

Danger Classes 1 and 2 of SanPiN 4630-88 comprise 350 parameters belonging to the SLF "sanitary toxicity". The application of the formula to these other 350 parameters would lead to extremely conservative and constricting requirements in terms of water quality and water monitoring.

Laboratories have insufficient means (lack of equipments and standard testing methods) to monitor all of the parameters included in Danger Classes 1 and 2 of SanPiN 4630-88.

This rule forbids abstraction for water supply purposes of any water not conforming to the above-mentioned inequation, regardless to the possibility to reduce harmful substances concentrations to acceptable levels through appropriate treatment.

4.1.4 Consequence of non-compliance:

In almost all cases, the non-compliance of raw water with standard requirements is a situation of which drinking water producers are victims: the quality of raw water is, de facto, a consequence of activities located upstream from water supply intakes. SanPiN 4630-88 and EU Directive 75/440/EEC propose rather different approaches to such non-compliances.

SanPiN 4630-88: Article 1.6 of SanPiN 4630-88 specifies that "the appropriateness of surface water for domestic and public purposes is defined by its compliance with the requirements and standards". Explicitly, Article 1.6 means that raw water which does

not comply with SanPiN requirements should not be used for drinking water supply. This implies that drinking water producers, when facing a pollution of the resource surface water, should either use an alternative resource or stop producing drinking water. Remedial solutions such as temporary intensified treatment are not considered by SanPiN 4630-88. The role of the State is limited to the supervision of the appropriateness of surface water for drinking water supply through controls performed by the State Sanitary Inspectors under the Ministry of Health.

EU Directive 75/440/EEC: EU Member State fully bear the responsibility for the monitoring and protection of drinking water resources: *"Member States shall take all necessary measures to ensure that surface water conforms to the [characteristics of surface water intended for the abstraction of drinking water]".*

EU Directive 75/440/EEC does not explicitly forbid the abstraction of non-complying surface water for drinking water supply. The non-compliance of surface water is not prohibitive for drinking water supply, as long as the drinking water finally produced complies with standard requirements. As a consequence of surface water pollutions, some EU Member States were already sued by drinking water producers for not having properly protected the water resources.

4.2 Drinking Water

4.2.1 Ukrainian Standards on Drinking Water Quality

The Ukrainian standard for drinking water is based on the following documents:

GOST 2874-82 *"Potable water: Hygienic requirements and quality control* developed by the Ministry of Health of the USSR (Authors: K.I. Akulov, V.T. Mzayev, A.A. Korolyov, T.G. Shlepnina) and approved for use by the Resolution #3989 of the Committee for Standards of 18.10.1982.

SanPiN 383-96: "Drinking water. Hygienic requirements to quality of centrally supplied water for domestic use". Ministry of Public Health of Ukraine, Kyiv, 1996

SanPiN 4630-88: "Sanitary Regulations and Codes for the Protection of Surface Water from Pollution". Ministry of Health of the USSR, Moscow, 1988

NRS - **76/87:** "Norm on Radiation Safety". Ministry of Health of the USSR, Moscow, 1988

These documents connect as explained hereafter:

GOST 2874-82 and SanPiN 383-96 cover the water supplied by centralised systems for utility, potable and, eventually, technical consumption. These standards also establish the hygienic requirements and norms of drinking water quality control procedures.

GOST 2874-82 implicitly refers to SanPiN 4630-88 (concerning MACs) and explicitly refers to the Norm on Radiation Safety "NRS - 76/87".

By year 2005, GOST 2874-82 was planned to be gradually replaced by SanPiN 383-96. However, Mykolaivvodocanal (like other vodokanals) was officially informed on April 4th, 2005 that the implementation of SanPiN 383-96 was suspended, because *1)* for numerous reasons, the practical application of SanPiN 383-96 appeared to be extremely difficult, and *2)* the newly adopted law of Ukraine "Drinking Water in Ukraine" (April 3rd 2005), specifies that State Standards should be developed for drinking water.

In fact, it is difficult to say when exactly SanPiN 383-96 enter in force (this fact has been checked with local sanitary-epidemiology department). Therefore, in the following, SanPiN 383-96 is mentioned for information only, but not referred to as a standard to be complied with. Presently, only GOST 2874-82 is to be applied. But even in these conditions some parameters from SanPIN 383-96 are already in use by laboratory of Mykolaivvodokanal.

4.2.2 EU Standard on Drinking Water Quality

In the European Union, the reference regulatory document for drinking water is the following directive:

- **Council Directive 98/83/EC** of 3 November 1998 on the quality of water intended for human consumption (OJ L 330, 5.12.1998, p. 32).

Directive 98/83/EC is intended to protect human health by laying down healthiness and purity requirements which must be met by drinking water.

Type of Drinking Water: GOST 2874-82 does not cover the water supplied from local sources without distributing systems. Directive 98/83/EC does not apply to natural mineral or medicinal waters.

General requirements: GOST 2874-82 specifies that potable water shall be epidemiologically safe and chemically harmless, and have favorable organoleptic properties.

Directive 98/83/EC specifies that EU Member States shall ensure that drinking water *i)* does not contain any concentration of micro-organisms, parasites or any other substance which constitutes a potential human health risk; and *ii)* meets the minimum requirements laid down by the Directive (radioactivity, microbiological and chemical parameters).

Parameters to be monitored: Ukrainian and EU standards define a set of physical, chemical and microbiological requirements that should be met by drinking water. A comparative table of Ukrainian and EU requirements is presented in Appendix 4. The number of parameters to be monitored for drinking water to meet the minimum requirements is:

25 parameters in GOST 2874-82 (4 have no equivalent in Directive 98/83/EC)

49 parameters in Directive 98/83/EC (23 have no equivalent in GOST 2874-82)

GOST 2874-82 was prepared 18 years before Directive 98/83/EC: this is the main reason why this standard appears as less comprehensive and excludes several parameters which were introduced in European standards over the last decades: heavy metals, micro-pollutants, pesticides, carcinogenic and toxic derivatives of hydrocarbons. However, at the request of their controlling body (usually, the sanitary-epidemiological service), drinking water producers can be asked to monitor additional parameters than those included in GOST 2874-82.

Maximum allowed concentrations: the order of magnitude of maximum allowed concentrations (MAC) defined in both EU and Ukrainian standards are comparable. The largest ratio between EU and Ukrainian MAC is 5, for Arsenic and Nickel (refer to Appendix 2).

Parameters not included in the standard minimum requirements: The EU standard simply specifies that "where parameters are not set out, limit values must be laid down by the Member States if necessary to protect health".

For compounds not included in the standard minimum requirements, GOST 2874-82 refers to the formula already presented in p. 4.1.3, but its application is now generalized to all substances detected in water and for which a MAC was established. As mentioned before, this formula is practically not applicable.

4.3 Wastewater Treatment

Wastewater treatment standards define minimum quality requirements to be satisfied by effluents released by WWTPs to the environment, regardless to the type of treatment which is used to reach this quality objective.

4.3.1 Ukrainian Standards on Wastewater Treatment

Several documents regulate the release of treated wastewater in surface water bodies:

Decree of 11 September 1996, N° 1100-96 from The Cabinet of Ministers of Ukraine "on procedure of working out and approving the standards for Maximum Allowable Releases of pollutants and index of pollutants, whose discharge is standardized"

Decree of 25 March 1999, N° 465-99 from The Cabinet of Ministers of Ukraine "on approval of Rules concerning surface waters protection from contamination caused by water discharge"

SanPiN 4630-88: "Sanitary Regulations and Codes for the Protection of Surface Water from Pollution". Ministry of Health of the USSR, Moscow, 1988

These documents connect to each other as described hereafter:

Decree N°1100-96 introduces the notion of Maximum Allowable Releases (MAR) and defines 4 lists:

List A (А): 17 elements whose return discharge is to be standardized in any case.

List B (Б): 132 elements whose discharge should be definitely stopped at a date fixed by the Ministry of Ecological Resources.

List V (В): 155 elements whose discharge should on term be reduced.

List G (Г): any of the 1345 elements listed in SanPiN 4630-88, which are not included in lists Б and В.

Elements from lists Б, В and Г should be included in List A if they are proved to negatively impact the local environment.

Decree N° 465-99 provides practical information for the implementation of Decree N°1100-96. Among others, it specifies the values of MAC for the outflow from WWTP for BOD5 (15 mg/l), COD (80 mg/l) and suspended substances (15 mg/l).

SanPiN 4630-88 is used as a reference document for the definition of MAD by the authorized service, i.e. the Ecology Department (State Department of Ecology and Natural Resources in Mykolaiv Oblast, please see Appendix 3).

4.3.2 EU Standard on Wastewater Treatment

For wastewater treatment, the reference regulatory document is the following European directive:

• **Council Directive 91/271/EEC** of 21 May 1991 concerning urban waste-water treatment (Official Journal L 135, 30/05/1991 P. 40 - 52), amended by Commission Directive 98/15/EC of 27 February 1998.

Directive 91/271/EEC concerns the collection, treatment and discharge of urban wastewater and the treatment and discharge of wastewater from certain industrial sectors.

Directive 91/271/EEC is a document which aims at harmonising European practices and defining time objectives for improved wastewater treatment in the EU. The directive defines minimum quality requirements (see Table 8 below) and gives to Member States the responsibility, through their local administrations, to define additional requirements at the local level in order to comply with all other relevant directives. For example, releases from a WWTP located upstream from a drinking water intake should by no way lead to such increase in surface water pollutants concentration that surface water abstracted downstream would no more conform to raw water requirements.

4.3.3 Comparision of Wastewater Treatment Standards

Categorization of receiving water bodies: SanPiN 4630-88 defines two classes of receiving water bodies: those intended to drinking water supply, and those intended to recreational activities. Dnipro river intake belongs to the "drinking water supply" class. The Southern Bug River is considered as "recreational activities" class in the areas where WWTPs release their effluents.

Directive 91/271/EEC also defines two types of receiving water bodies: "sensitive areas" and "less sensitive areas". The two main sensitiveness criteria are eutrophication risk and water abstraction (for drinking water supply). The Directive defines minimum requirement to be fulfilled by wastewater treatment plants, depending on the sensitiveness of the receiving water body. According to Directive 91/271/EEC, Dnipro is to be classified as a "sensitive area" since it is used for surface water abstraction and is also subject to eutrophication.

Maximum Allowable Concentrations (MAC): Both EU and Ukraine standards define minimum requirements for a limited set of parameters, and give local authorities the responsibility for defining additional requirements at the local level. Table 8 presents the effluent quality requirements of EU and Ukrainian standards. Note that:

- Occasional and limited deviations are allowed by EU standards.
- Ukrainian requirements on BOD, COD and Suspended Solids are stricter than European requirements.

Since N- and P-compounds are in most cases the limiting factors of the algal development, Nitrogen and Phosphorus monitoring is compulsory according to the EU standard for a water body like Dnipro River, which is exposed to eutrophication. Nitrate and phosphate which are the main N- and P- nutrients are included in List A of the Ukrainian regulations, but the definition of the corresponding requirements is left under the responsibility of local control bodies. Totally, more than 80 Phosphate compounds and 90 Nitrogen compounds are included in lists А, Б, В and Г: they should theoretically be monitored, but standard testing methods and relevant equipments are lacking in Dnipropetrovsk Oblast (and Ukraine) for most of these parameters.

Table 7: Wastewater treatment: EU directive requirements that would apply to Mykolaiv

	Ukraine		**European Union** Directive 91/271/EEC	
	Decree N° 465-99	Decree N° 1100-96 (List A)	At least one of these conditions is to be satisfied:	
	Maximum outflow concentration	Maximum Allowed Discharges (MAD)	Maximum outflow concentration	Minimum reduction in relation to the load of the WWTP influent
BOD_5 at 20 °C	15 mgO_2/l	MADs to be defined by the controlling body (Ecology Department)	25 mgO_2/l	70 to 90 %
COD	80 mgO_2/l		125 mgO_2/l	75 %
Suspended solids	15 mg/l		35 mg/l	90 %
Total Nitrogen[13]	-	-	10 mg N/l	70 to 80 %
Total Phosphorus	-	-	1 mg P/l	80 %
Nitrates, Nitrites, Urea nitrogen, Phosphates	-	MADs to be defined by the controlling bodies (Ecology Department or City Sanitary-Epidemiological Service)	included in Total Nitrogen and Total Phosphorus*	
Dissolved oxygen, Mineralisation, Sulphates, Chlorides, Petroleum products, Permanganate oxidability, Water toxicity level (through biotesting), Germs, Water radioactivity (total radioactivity), pH, Temperature			Additional requirements shall be defined where required to ensure that the receiving waters satisfy other relevant Directives.	
Other parameters		cf. lists Б, В and Г of Decree N° 1100-96		

*Total nitrogen means the sum of total Kjeldahl nitrogen (organic and ammoniacal nitrogen), nitrate-nitrogen and nitrite-nitrogen

4.4 Sludge

4.4.1 Practical aspects of sludge reuse in agriculture

Sewage sludge has valuable agronomic properties in agriculture. But the reuse of sludge in agriculture can only be reliable and sustainable if the agronomic properties of dry sludge correspond to the agricultural needs (especially with regard to the nitrogen, phosphorus, calcium and heavy metals contents).

Apart from appropriate nutrient contents, sludge reuse should also be performed without impairing the quality of the soil and of surface and ground water: the chemical and microbiological properties of sludge should therefore be comprehensively studied and later properly monitored when reuse in agriculture is envisaged.

Sewage sludge sometimes requires post-processing (additives) to be transformed into proper fertilizer before being reused in agriculture. Post-processing can either be performed by the sludge producer, or by farmers when spreading the sludge.

4.4.2 Ukrainian Standards on sludge reuse in agriculture

There is no standard in Ukraine related to the reuse of sludge in agriculture.

The only document that was issued over the last years at the national level about the use of sewage sludge as fertilizers is:

- **Technical Terms "TT 204 76-93"** "Sludge fertilizers"

These Technical Terms define the conditions under which the reuse of sludge as fertilizers can be allowed. It is to be noticed that this document was issued with a validity limited to 31/09/1995, which was not extended.

4.4.3 EU Standard on sludge reuse in agriculture

The reference regulatory document is the following European directives:

- Council Directive 86/278/EEC of 12/06/1986 on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture (Official Journal L 181, 04/07/1986, pages 6 - 12).

Sewage sludge may be used in agriculture, provided that the Member State concerned regulates its use. The Directive lays down limit values for concentrations of heavy metals in the soil, in sludge and for the maximum annual quantities of heavy metals which may be introduced into the soil.

Sludge should usually be treated before being used in agriculture, but the Member States may authorize the use of untreated sludge if it is injected or worked into the soil.

For sanitary reasons, the use of sludge is prohibited:

- on grassland or forage crops if the grassland is to be grazed or the forage crops to be harvested before a period of not less than three weeks;
- soil in which fruit and vegetable crops are growing, with the exception of fruit trees;
- soil intended for the cultivation of fruit and vegetable crops which are normally in direct contact with the soil and normally eaten raw, for a period of ten months preceding the harvest of the crops and during the harvest itself.

The following table indicates the requirements that should be met by soils and sludge with regards to heavy metals:

Table 8: Sludge reuse in agriculture: limiting values for heavy metals as per European standards

Parameters	Maximum allowed concentration in soil before or as a result of the use of sludge. (mg/kg of dry matter with a pH of 6 to 7)	Maximum allowed concentration in sludge for reuse in agriculture (mg/kg of dry matter)	Maximum amounts of heavy metals which may be added annually to agricultural land, based on a 10 year average (kg/ha/yr)
Cadmium	1 to 3	20 to 40	0.15
Copper	50 to 140	1000 to 1 750	12
Nickel	30 to 75	300 to 400	3
Lead	50 to 300	750 to 1 200	15
Zinc	150 to 300	2500 to 4000	30
Mercury	1 to 1.5	16 to 25	0.1
Chromium	to be defined by EU		

4.5 Other relevant EU Directives

The following EU directives do not directly apply to the Project, but provide reference for related environmental issues:

- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy
- Decision 2455/2001/EC of the European Parliament and of the Council of 20 November 2001 establishing the list of priority substances in the field of water policy and amending Directive 2000/60/EC
- Council Directive 76/464/EEC of 4 May 1976 on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community;
- Council Directive 78/659/EEC of 18 July 1978 on the quality of fresh waters needing protection or improvement in order to support fish life;
- Council Directive 79/923/EEC of 30 October 1979 on the quality required of shellfish waters;
- Council Directive 80/68/EEC of 17 December 1979 on the protection of groundwater against pollution caused by certain dangerous substances;
- Council Directive 91/692/EEC of 23 December 1991 standardizing and rationalizing reports on the implementation of certain Directives relating to the environment;
- Council Decision 77/795/EEC of 12 December 1977 establishing a common procedure for the exchange of information on the quality of surface fresh water in the Community.
- Council Directive 76/160/EEC of 8 December 1975 concerning the quality of bathing water.

5 PRESENT ENVIRONMENTAL PERFORMANCE

5.1 Protection of Water Resources

Inguletsky Water Treatment Plant (WTP)

The structure of the subsection and treatment technology has not been changed for a long period. Quantity of water which is abstracted to the WTP from Dnipro-Mykolaiv water intake mains and Inguletsk irrigation system (IIS) remains without essential changes for the last three years.

According to data of register (form POD-12), intake of water to WTP (from water intake mains and irrigation system) makes (2005):

- 80997,3 thousand m³, including from water intake mains -61999,2 thousand m³
- from irrigation system - 18998,1 thousand m³.
- Water treated at WTP - 80997,3 thousand m³
- drinking water supplied to Mykolaiv 64852,7thousand m³.

The samples of water discharged to Bug estuary from WTP do not exceed MAC. Permission on special water utilization as a discharge into Bug estuary of 22.12.2004 № UKR 2114A/NIK was issued for 3 years. The maximum-possible discharge of contaminants into the water body with reverse waters is developed and ratified by the State Administration on 1.08.2002, the term of its validity has been prolonged to 1.08.2008.

In accordance with data of statistics on form 2-TP (vodgosp) for a period of 2005 WTP discharged to the Bug estuary 2065,1 thousand m³.

Reconstruction works at WTP, planned in 1986, are not conducted for lack of financing. Treated water is supplied to the city by the second stage booster pumping station, along three collectors: d1200mm and 1400mm - 2 collectors. Chlorination of water supplied to Mykolaiv, is done twice: at WTP and further - at the third and fourth stage booster pumping stations.

Zhovtneve storage reservoir is filled with 22,317 million m³ having project capacity of - 30,2 mln m³. The losses of water from a storage reservoir is 6227,3 thousand m³ (per annum) — 32,7%. Losses of water in the storage reservoir are defined by "Operating Rules of Zhovtneve Storage Reservoir", which were developed by the UKRVODPROJECT institute in 1996 and make 52,6 thousand m³ per year.

The water level in a storage reservoir is controlled every day. Records of outlet water are registered through the capacity of pumping equipment. There is a register "Water balance of Zhovtneve Storage Reservoir". The quantity of outlet water depends on water supply in Dnepr- Mykolaiv water main and makes on average 24 thousand m³ daily.

Sanitary outlets from Zhovtneve storage reservoir is done accordingly with "Operating Rules of Storage Reservoirs", from April untill September, in a quantity of 9 m³/day.

The territory of the Zhovtneve storage reservoir and all buildings are under the police protection and the 100-meter sanitary area is bounded by signs with the distance of 500m between them.

In accordance with the resolution №3/9 of Mykolaiv City Council of 10.07.02, the area of 555 hectares for maintenance of Verhnoinguletsk treatment plant building (storage reservoir) is registered as land reserve (Korabelny district).

Technical water intake from the Ingul river - is not in operation for lack of necessity in technical water at enterprises of the city.

Pumping stations of water supply system and network – total length of water supply network which is in assets, is 1023,4 km, 59,6 km of them are in the emergency state. During the last year 2409 emergency leaks in the water supply system were registered. In addition, on balance of Mykolaivvodokanal there are 446 street hydrants.

At the present time on the balance of Mykolaivvodokanal there are 28 pumping stations, 23 of them are operational. The rest are out of operation because of lack of technological necessity. Registration of water which comes to the 3-stage booster pumping station is automatized and data come to the computer in central control room of the enterprise. The technical condition of equipment and buildings of the pumping stations is satisfactory. The capacity of the chlorination chamber, which is situated at the 3-stage booster pumping station, is 5 tons of liquid chlorine. It is equipped with the alarm system of notification and degassing. Emergency emission of chlorine has not been registered for the last few years.

Ground water intake – in the districts of Varvarovka, Matviivka and village of Nadbuzke.

Permission on special water consumption №УКР 2096 A/NIK of 30.09.2004 at Varvarivka (3 artesian wells) and Nadbuzky (8 artesian wells) water intake was issued for three years.

At the present time the permission on special water consumption at Matviivka water intake (2artesian wells) issued by State Administration (№UKR 1802 of 30.08.2001) for 3 years, was prolonged up to 30.08.2007. Water intake was changed over from drinkable to technical through worsening of water quality.

Technical condition of water intake is satisfactory.

Sewage network

Total length of sewage networks which are on balance of CCE "Mykolaivvodokanal" is 537,01 km. 77,2 km of network are in emergency state. In the last few years the cases of failures of free-flow and pressure collectors through destruction of pipelines as a result of gas corrosion were registered. In 2004 the contractor „Energoremont" company did repair work on pressure collector from main pumping station to wastewater treatment plant for 916,4 thousand UAH.

In 2004, 6002 blockages were registered and in 2005 - 4869 blockages respectively.

There are 24 operational sewage pumping stations (SPS). Depreciation of greater part of the equipment is 100%. The technical condition of the sewage pumping stations in general is unsatisfactory. SPS-5, which is situated in the river of Ingul, operates on verge of its technical feasibilities as one pressure collector is in operation that in case of emergency situation can result in contamination of the Ingul River.

The sewage pumping stations, which had in 2004-2005 unauthorized discharges of untreated water into water bodies: SPS-2 -1830 thousand m³, 1365 thousand m³ accordingly. The regular discharges of untreated water from SPS-2 continue at the present time.

The outlet collector (in part of deep-water outlet) is in the emergency state. In 2002 the outlet collector was inspected and repaired in the part of breakage (at the coastline). At the present time the underwater part of deep-water outlet collector is partly on the surface and leaking. During last years no repair works on underwater part of outlet collector were done. The sanitary state of off-shore line is extremely unsatisfactory, sludge has specific smell.

Galitsinovo Wastewater Treatment Plant (WWTP) is overloaded, actual sewage intake is up to 200 thousand m³ /day while the design capacity is 118 thousand m³ of complete biological treatment. It is impossible to treat wastewater up to standards, thus sewages which go through WWTP, are discharged into the Bug estuary as not enough treated. Permission on special water consumption as a discharge into the Bug estuary of 22.12.2004 № UKR 2114A/NIK was issued for 3 years. Allowed volume of discharge from WWTP is 180 thousand m³/day, actual discharge in accordance to statistics on form 2-TP (vodgosp) is 108 thousand m³/day. Registration of wastewater which comes to WWTP is outdated (by means of measuring ruler in horizontal sand traps); volume of discharged water in the Bug estuary after treatment is not registered at all, which is a violation of requirements of Water Law of Ukraine, article 44.

The maximum-possible discharge of contaminants into water bodies with treated waste waters was developed and ratified by State Administration on 1.08.2002, the term of its validity has been prolonged up to 1.08.2008.

Construction works at another secondary sedimentation tank have not been in progress since 2003. Aeration tanks, which were reconstructed earlier and are not in operation long time, come to be useless.

Repairs of buildings and equipment are done according to the schedule. For last years 13140 tons of sludge accumulated at WWTP which is stored partly on the territory of the plant and nearby.

The problem of sludge storage has not been solved at the plant yet. Garbage from grits is manually removed and stored without permission at the territory of WWTP. In 2004 for dehydration of raw sediment DOUBLE BELT PRESS 88 was installed (40 m³/day capacity).

Actual volume of dehydrated sludge is 20 tons/day. For production needs WWTP uses water from underground sources. There are 3 artesian wells, wells №2 and 3 are in operation (by turns) round the clock. There are no water-meters Primary account is

journalized on form POD-12. Artesian wells are in satisfactory state. Permission on special water consumption №UKR2114A/NIK of 22.12.2004 is valid till 2007.

5.2 Protection of atmosphere

The inventory of sources of air pollution according to № 21.5 is executed by the method of direct instrumental intentions and computation method for CCE "Mykolaivvodokanal" by a firm "TEPS and C" in 2001p as by agreement № 30-4/ 01 from 07.05.01.

According to the data of inventory, there are 196 sources of air pollution are registered on Mykolaivvodokanal, from them 136 - are organized, 60 - are unorganized. Dust-cleaning options on all production grounds of CCE are absent. Permission on the emission of harmful substances (HS) in atmospheric air from stationary sources after №480124 (21.5) from 14.11.02. to IV quarter 2005 is continued due to the absence of ratified procedure "Instruction about the common requirements to processing of documents at which volumes of the troop landing, for the receipt of permission..." but elucidations of Ministry of Environmental Protection of Ukraine from 28.02.03. №1774/18-8.

Statistical accounting on Form 2-TP (air) for 2004 and 2005 completed by computation method according to the inventory data. Sources of emission of air pollution substances in an atmosphere CCE "Mykolaivvodokanal" are located on 28 places. According to the data provided by enterprise, the actual emission is 113,34 ton.

Special consideration should be given to the Chlorine storage within the WTP facilities that is on unsatisfactory condition and doesn't correspond to the requirements for storage of harmful substances (included in the STIP).

According to the data provided by Oblast Department of Environment Protection, the exceeding of the normative emissions on an enterprise are not observed. In the last and current year the plans of measures on the decline of the emission of harmful substances into atmosphere were not planned.

Computation of fee for contamination of atmospheric air for year 2005 carried out on the actual volumes of the emission resulted in statistic reporting 2-TP (air) in amount of 29060,41UAH. Computation is carried out according to the norms of fee and Instruction of computation of fee for contamination of natural environment.

An enterprise has a status of 2nd category on the degree of influence on contamination of atmospheric air according to sanitary classification - to the 4th class. In obedience to SN 245-71 there is a sanitarian-protection area (SPA) for industrial areas № 1,2,3,4 - 50 m, for industrial areas № 23-25-100 m, for industrial areas № 5 - 22 - 20 m. Sizes of SPA are self-possessed for all production grounds.

Within the limits of SPA measures on planting of greenery of territory are conducted. In air 35 contaminating matters are thrown out, the 7 of them have the effect of the accumulation of harmful influencing, and 2 of them have the effect of potentiality.

Transport workshop

On a balance sheet 66 cars are registered: 55 - carburator, 6 - diesel, 5 -gas. On an enterprise there are absent control points. The check-in procedure for exhaust gases of cars is conducted by enterprise LTD. "Vaco" (according to agreement). Check-in procedure is conducted periodically once per three months. Toxic certificates are in a presence.

Power production

Power production is presented by following components: a gas boiler room on a ground WTP, equipped by 6 caldrons "Minsk-1"; a boiler room on a ground WTP - on a coal and gas on the base of enterprise. On the WWTP (s. Galitsinovo) there are two boilers, presented by two water-heating caldrons "Bogdan, - 50 that" by two modules of heating MN 100.

Ventilation

The technical state of the ventilation systems in general is satisfactory, except for the ventilation system in the rake separation of WWTP.

5.3 Protection of land resources

The general area of occupied lands in 2005 was 765,5 thousand m2 and decreased due to withdrawal of lands in general area 2408 m2 on the basis of decision of the Mykolaiv City Council from 20.05.05 №33/34.

Solid Waste Management

The enterprise has developed and agreed with Environmental Department the limits and permission on waste deposition in a natural environment on 2005, №1-203 from 8.07.05. Not all types of waste, that appear: hard wastes from the bars of separation facilities on WWTP, literary garbage, waste of wood, build waste - were included in the project of limits on placing of waste in NPS for 2005, that is violation of requirements of item 17,32,33 of Law of Ukraine „About waste".

Other types of waste, except for sludge and sand that appear, are passed to subsequent utilization in accordance with concluded treaties.

Sludge and sand, which appears during the cleaning of sewage flows on WWTP, should be deposited in accordance with the project of limits, and to be saved on its sand and sludge landfields. Actually during last years sludge that appears on WWTP, partly deposited on the territory of WWTP. Its main volume is deposited without respective permission near the wall and adjoining to WWTP territory (lands of the Galitsinivscoi village council), that causes violation of item 17, 32, 33 of Law of Ukraine „About waste". Sludge is defined as 2nd class of danger. Its deposition on a land surface causes its contamination as a result penetration due to influence of atmospheric precipitates in the superficial layer of soil, and also interfusion between the sludge and the superficial layer of soil on the average on 10-12sm.

The question of deposition of the sludge on WWTP and WTP as wastes of 2 class of toxic to the present tense by an enterprise is not decided.

Garbage from the bars of sand-traps installation of WWTP is removed manually and deposited also without permission outside of territory of WWTP.

5.4 Laboratory control

The control on the waste water discharges of Mykolaivvodokanal is executed by own chemical-bacteriological laboratory. A laboratory attested - certificate from 20.01.05 № 1 valid until 20.01.08.

The control of the state of waters is conducted in accordance with approved by Environmental Department the schedule of sampling flow and superficial waters. A laboratory is provided not at the proper level with crockery, equipment, control of one of basic indexes – BOD5 - is conducted not in a thermostat and not in the special glasses.

It is found, that data of laboratory are constantly understated on separate indexes: BOD, COD, ammonium and iron.

The state control is carried out by Environmental Department in Mykolaiv oblast according to the program of supervisions not less than 1 time per a quarter. As a result of analyses and in obedience to the statistical accounting the 2-TP (vodgosp) enterprise constantly carries out the discharges of the not enough cleared flows in the Bug estuary.

5.5 Energy Saving

The main issue of energy saving is operation of the pumping stations of the water supply and sewage network, as well as pumps of blowers of air-tanks of WWTP. The majority of the pumps those are in operation at the present time are old no-variable speed pumps with high consumption of electricity. The other aspect is their capacity that is exceeds the necessary reasonable level. Additionally, the level of automatization of the pumps is so low, that causes additional consumption of electricity (these data will be presented in technical report of the Consultant).

Also, the constructional mistakes in some components of the water utility infrastructure produce additional consumption of electricity because of unappropriate functioning of hydraulic model.

5.6 Recommendations on Improvement of Environmental Performance

#	Component/Problem Issue	Recommendation
1	**Protection of Water Resources**	
1.1	Emergency state of the water-supply and sewage mains	• Replacement of priority segments of water-supply and sewage mains • Utilization (where possible) alternative gravity sewage collectors (instead of pressure collectors)
1.2	Unsatisfactory condition of the equipment of the sewage pumping stations	• Installation of the automatization equipment • Installation of variable-speed pumps • Installation of the SCADA system • Installation of meters
1.3	Regular unauthorized discharges from sewage pumping stations	• Construction of back-up collectors • Installation of new variable-speed pumps • Installation of SCADA system and automatization equipment
1.4	Not satisfactory treatment of the waste water	• Construction of additional secondary clarifiers • Finishing of reconstruction of the additional air-tanks (including interconnecting pipes and electro-mechanical equipment) • Reconstruction of grids chamber and sand-trappers
1.5	Not registered volume of	Installation of meters of discharged treated water

	discharghes from WWTP into the Southern Bug River	
1.6	Unsatisfactory status of the deep discharge collector	Finishing of the reconstruction of the under-water part of the collector
2	**Protection of Atmosphere**	
2.1	Absence of dust-cleaning options	Installation of the necessary dust-cleaning equipment
2.2	Absence of plan of measures in respect of the decline of emission of harmful substances	Development of appropriate plan of measures as a part of EMP
2.3	Unsatisfactory status of the Chlorine storage and dosing equipment of WTP	• Reconstruction of Chlorine storage facilities of WTP • Installation of new Chlorine dosing equipment
3	**Protection of Land Resources**	
3.1	Unauthorized sludge deposition	• Construction of additional sludge drying beds close to the WWTP • Construction of sludge-thickeners to reduce of volume of sludge (including pumps, mains and automatization equipment)
3.2	Unauthorized deposition of the garbage from the grids	• Deposition of the garbage on the city landfill • Development of alternative option of processing of garbage (for example, garbage incinerator)
4	**Energy Saving**	
4.1	Excessive consumption of electricity by pumping stations and air-tanks' blowers	• Installation of new variable-speed pumps (where necessary) with capacity that corresponds to the technological needs and conditions for each particular case • Installation of automatization equipment
5	**Laboratory Control**	
5.1	Limited capacity of laboratories of WTP and WWTP	• Re-equip laboratories with new equipment that will allow to make tests on all required parameters (according to EU and Ukrainian regulations) • Install new data-base system (including computers/servers) for appropriate management of laboratory data • Include in the list of tests all necessary parameters required by EU and Ukrainian regulations

6 APPROACH & METHODOLOGY

6.1 Introduction

The environmental assessment in this project employed an interactive approach in which potential environmental issues will be examined in successive levels of detail and specificity at each step in the process. This chapter presents the methodology that will be utilized for the EIA preparation for the project "Mykolaiv water supply and wastewater services development project" for the mainstreaming of the environmental considerations in this project.

6.2 Environmental Impact Assessment

The environmental impact assessment will be undertaken for the project. The important recommendations of the EIA study will form the part of the Environmental Management Plan (EMP). It will help the Mykolaivvodokanal and City Administration to incorporate the measures to mitigate adverse impacts during operational phase of the project. It will also help to carry out careful supervision during operational phase of the project.

6.3 Scoping

The scope of the assessment for EIA study includes the following main issues:

- Present status of the local environment and influence of the water utility on its components
- Potential influence of the project on the local environment during its implementation phase and measures that will reduce/eliminate negative impact.
- Potential influence of the water utility on the environment after the implementation of STIP and mitigation measures

6.4 Survey and Data Collection

At the present time the study team visited entire project area and still to collect information on various aspects of the project. Maps of the project area are in the process of preparation and will provide valuable information regarding project area and water utility's infrastructure.

The data collected from various sources and from studies conducted in the past will be utilized for EIA analysis. Supplementary information was collected from local and state governmental agencies as well as reports prepared for this water supply and sewerage project.

6.5 Documentation and Baseline Conditions

The documentation of the baseline conditions was completed for the entire project area. Data was collected with respect to the current status of the environment and utility's impact on that environment in respect of air quality, noise levels, surface and ground water quality, land use pattern, ground cover, drainage, settlements, other utility services, cultural properties, archaeological monuments/ historical places.

6.6 Assessment of Potential Impacts

Potential and significant impacts will be identified on the basis of analytical review of baseline data; review of land use and other environmental factors; analytical review of the socio-economic conditions within the project area; and impact on beneficiaries and other utility services present in the project area. The final assessment of the potential impact could be done only after the finalization of the STIP.

6.7 Identified Mitigation and Enhancement Management Plan

Positive and suitable actions will be determined, not only to avoid adverse impacts, but also to capitalize on opportunities and to correct environmental degradation or improve existing environmental conditions.

6.8 Finalizing the Environmental Assessment

The baseline environmental setting, the potential impacts and the possible mitigation measures will be supplemented based on the survey, and data collected from different sources.

6.9 Impact Assessment and Monitoring

Detailed monitoring system and methodology for individual environmental component i.e., air, water, noise etc. will be given in Environmental Management Plan.

6.10 Environmental Management Plan (EMP)

The EMP must contain all the information that may be required for the successful implementation of the mitigation and/or enhancement measures envisaged as part of the assessment. The summary impacts for operation phase will be given in EMP. Mitigation and enhancement measures will be specified along with a clear demarcation of responsibilities of the various institutions responsible. A monitoring plan will be established to ensure ease of follow-up activities.

7 DESCRIPTION OF THE EXISTING ENVIRONMENT

7.1 Baseline Environmental Status

The existing environmental set-up of the City of Mykolaiv's area has been studied and described in subsequent sections.

City of Mykolaiv has unique natural environment. The system of water bodies and territories with planted trees and shrubs is natural-ecological framework of the city. The ecological problems of Mykolaiv are typical for many cities of Ukraine: contamination of surface water bodies, atmospheric air, underground waters, quality of drinking-water, noise contamination, waste management, biodiversity protection within territory of the city.

7.2 Physical Resources

7.2.1 Meteorological/Climatic Conditions

Geographical position: the City of Mykolaiv is located on the South of Ukraine in the pool of lower flow of Southern Bug River and on a south is washed waters of the Black sea.

Climate: moderately continental. A summer is sultry, with frequent hot winds; middle temperature in July +27°C, in January, –4,5°C. The winter is almost without a snow, it is comparative warm. The maximum of precipitations falls out in summer, mainly as thundershowers. A sea in a bathing season (June–August) is warmed up at a shore to +24°C.

7.2.2 Air Quality

Due to the absence in the town of enterprises of metallurgical, chemical and coal industry, Mykolaiv does not behave to the list of regions with high contamination of atmosphere.

Maximal concentrations of specific harmful elements in Mykolaiv, where the supervisions are conducted, are the following: NO2 1,5 GDK/day, formaldehyde – 7,3 GDK/day., benzaperen – 3 GDK/day.

Atmospheric pollution in the city by a dust, sulphur-dioxide, oxide of nitrogen, oxide of carbon and fluorine hydrogen is muddy insignificantly: average monthly concentrations did not achieve the GDK/day. The concentration of heavy metals (cadmium, iron, manganese, copper, nickel, lead, chrome and zinc) in the atmosphere of city is also insignificant.

For the last a few years is observed a tendency of the insignificant decline of contamination of atmosphere of the city by the harmful matters.

Table 9: Dynamics of the atmospheric pollution (thousand tones/year)

	Total	Stable Sources	Moving Sources
(+/-)2002 comparing to 2001	-9.2	+0.33	-9.53
2003	40.4	6.26	34.14
2004	31.2	6.59	24.61

The condition of atmospheric air pollution of Mykolaiv in May 2006 was characterized by the following data:

1. Content of dust was not exceeded by MAC and made for a month on a city 0.07 mg/cub.m. The greatest concentration of dust was observed in the district of Chigrina - pr. Zhovtnevij, where it made on the average 0.14 mg/cub.m at an average daily MAC, even 0.15 mg/cub.m.

2. Mounthly average concentration of dioxide of sulphur did not change comparatively with an April and made 0.002 mg/cub.m at GDC average daily, even 0.05 /mg/cub. m.

3. Content of the oxide of carbon in May was not exceeded by MAC both on maximal, and on average daily concentrations. Most maintenance of it was observed in Industrial Area and in the district of the bus station which made 2 mg/cub.m (0.4 MAC).

4. Dioxide of nitrogen on equaled average monthly concentrations 0.04 mg/cub.m

(1 MAC). The exception made the district of Observatornaya st., where concentration of dioxide of nitrogen made 0.02 mg/cub.m (0.5 MAC). Maximal concentration 0.12 mg/cub.m (1.4 MAC) was observed in the district of 12 Line street – 7 Povzdovjnaya on May, 5 at 7 o'clock of morning at weak north-eastern wind..

5. Middle concentration of oxide of nitrogen on a city remained at the level of 0.01 mg/cub.m (0.2 MAC).

6. On maintenance of fluoride hydrogen of exceeding MAC was not observed and middle concentration of it for a month made 0.002 mg/cub.m (0.4 MAC).

7. Average monthly concentration of formaldehyde in May considerably grew and made on a city 0.011-0.014 mg/cub.m at an average daily MAC, even a 0.003 mg/cub.m.MAC exceeding of maximal-valid for one occasion was evened 1.1-1.3 MAC on to all points of supervisions.

A radiation background in May equaled natural and made over city Mykolaiv 0.010-0.016, on the Micolaiv's region 0.009-0.016 mR/h.

7.2.3 Noise Environment

Noise which disturbs the habitants of city is generated mainly by transport. For the last 5 years the situation with a noise became a little bit better.

7.2.4 Solid Waste Management

In the field of waste management the most important ecological problem is the current situation with the city's landfill of solid waste that is situated close to the village of V.Koreniha (the area of landfill is 31,55 hectares). The actual volume of filling is 30 mln. m^3 of solid waste. According to the data of municipal enterprise "Mykolaivcomuntrans" in 2003 the total volume of solid waste of the city of Mykolaiv was about 727 thousand m^3; in 2004p. – 658 thousand m^3 respectively.

Annually on territory of are observed about 70 unauthorized dumps because only about 16% of private households have agreements with municipal waste collection service.

7.2.5 Water Environment:

Surface Water

Mykolaiv oblast', that occupies an area of 24,6 thousand sq. km with the population of about 1,3 million persons, located in the southern part of Ukraine, borders on Odessa, Kirovogradsk, Dnepropetrovsk and Kherson oblast's, is placed in the basins of the South Bug (59,5%), the Dnepr (23,5%) and Prichornomor'y rivers (17%).

According to characteristic environmental features the Oblast' is located within the limits of two natural areas of forest-steppe (Krivoozerskiy and western part of Pervomaysk district) and steppe (the rest of the territory). In the hydrological relation the Oblast belongs to the Black Sea artesian basin and partially in the northern part - to the Ukrainian crystalline array.

In the Oblast there are 110 large, middle and small rivers of the total length of 34380 km. including the South Bug (257 km within the limits of Oblast), its tributaries, - middle rivers: Kodima (59 km), Sinyuha (24 km), Black Tashlik (41 km), Chichicleya (86 km), Ingul (179 km), and also middle rivers of the Dnepr basin Ingulets (96 km) with a tributary of Pull (195 km).

In the Oblast 45 storage reservoir and 933 ponds are built with the total area of 15,8 thousand hectares and volume of 418,2 mln.m^3, among them with volume of more than 10 million m^3: Tashlitsk storage reservoir (86 mln.m ^{3}), Sofia (36 mln.m ^{3}), Octyabrsk (31 mln.m ^{3}), Oleksandrivsk (16,7 mln.m ^{3}), Shcherbanivsk (15,7 mln.m ^{3}), Stepovsk (13,88 mln.m ^{3}), Caterinivsk (10,8mln.m ^{3}). The Total volume of storage reservoirs is 314,33 mln.m^3 including useful - 225,15 mln.m ^{3}.

Storage reservoirs and ponds are used for needs of power engineering, drinking water-supply, irrigation, pisciculture, food industry and household needs of population. On the territory of the Oblast' Bug, Dnipro-Bug, Tiligulsk, Berezansk and Adgigolsk estuaries are located.

The Oblast has 18 lakes, their total area is 11,6 km^2. The area of water bodies makes 150,5 thousand hectares (6,1%) of its territory. At present the resources of surface - waters (mainly rivers) and underground waters have the practical value for water economy of the Oblast. The local water resources are very limited, thus water supply is provided mainly by water intake from other regions.

By drinking indexes of water resources (on a unit of area and on an inhabitant) the Oblast occupies one of the last places among the oblasts of Ukraine. Within limits of the Oblast drinking indexes also differ considerably. Description of supply of the local flow of Oblast population is given in Table 11.

Table 10: Water resources of Mykolaiv Oblast

Water resources, km/year				Supply of river flow, thousand m 3 /year on an inhabitant			
average annual		with little water year		average annual		with little water year	
local	total	local	total	local	total	local	total
0.57	4.00	0.33	2.78	0.44	3.09	0.26	2.15

The water bodies of Mykolaiv are Ingoul River, the Southern Bug River and Dnipro-Bug Estuary are under the anthropogenic influence. The main problem in respect of antropogenic impact is municipal discharges that produce 97,53% of all discharges into the water bodies of the region. The measures implemented under the State Programme of Protection and Rehabilitation of the Environment of the Black Sea and Sea of Azov provided and opportunity to reduce this pressure for 2,6 mln. m^3 per annum.

Table 11: Municipal discharges into the water bodies (mln m^3/annum)

Y2001	Y2002	Y2003	Y2004	Y2005

46.0	40.5	36.6	31.1	28.5

The average concentrations of contaminating elements in 2005 did not exceed the legitimate values of national standards. The decline of level of contamination of surface waters is observed, phenols, nitrite, nitrogen ammonium.

Quality of drinking-water in the city water-supply network is controlled according to 30 parameters (Annex 5). Due to the stop of water-intake from Ingulets River and use of coagoulyant «Polvac» at the treatment installations the number of tests which do not respond to standards diminished.

Table 12: Percentage of tests of drinking-water, which are not corresponded to requirements of the national standards

Year	Bacteriological indexes (%)	Chemical indexes (%)
2001	5.6	4.2
2002	4.9	1.1
2003	3.9	1.6
2004	2.6	0.8

In May, 2006 monitoring of the state of surface-water of region was conducted in following monitoring points of waters bodies:

Southern Bug River

Village Rakovo, Village Novogrugorivka (17.05.) - higher and below of sewage with MSK of Town Voznesensk, enterprise of SE "BOS" of Joint-stock company of "Vozko" (18.05) are concentrations of contaminents within the limits of permanent supervisions: exceeding maximum allowded concentrations (MAC) for the reservoirs of the fishing-domestic consumption setting on iron – 2- 4 MAC, to the phosphates is 1,2 MAC, BOD5 is 1,6 MAC.

New Odessa (18.05) is concentration of contaminents within the limits of permanent supervisions: exceeding of MAC on iron general – 4MAC, ammonium of saline – 1,2MAC;

Village Saletnya (30.05) – higher and below upcast with MSK vtt.Olshanskij, ME "Olshanskij water canal": concentrations of contaminents within the limits of permanent supervisions is are exceeding of MAC on: to iron – 2-4 MAC, to the phosphates is 1,2 MAC, BOD5 is 1,6 MAC.

Rodniki, higher of Mykolaev (17.05) are concentrations of contaminents within the limits of permanent supervisions is exceeding of MAC on: to iron is 2,2MAC , to the phosphates is 1,7 MAC, BOD5 is 1,2 MAC, copper is 2,7 MAC, a manganese is 1,8 MAC.

Mertvovid River

Town Voznesensk (18.05) are concentrations of contaminents within the limits of permanent supervisions is exceeding of MAC on: to iron is 7,2 MAC, zinc is 2,2 MAC, manganese is 10 MAC, to the ammonium salt is 1,3 MAC.

Ingul River

City of Mykolaiv, higher and lower of "Factory of 61 Communard" (17.05) is the concentration of contaminents makes on: BOD5 is 1,2-2,0 MAC, to the chlorides of to 3 MAC, iron to 6 MAC.

Southern Bug River estuary

City of Mykolaiv, Varvarovskij bridge (17.05) are concentrations of contaminents within the limits of permanent supervisions is exceeding of MAC on: to iron 1,8 MAC, zinc is 5,5 MAC, BOD5 is 1,3 MAC, copper is 2,2 MAC.

City of .Mykolaiv, river port (18.05) are concentrations of contaminents within the limits of permanent supervisions is exceeding of MAC on: to iron is 6,4 MAC, zinc is 7,5 MAC, BOD5 is 1,4 MAC, copper is 3,6 MAC, oil product – 2 MAC, nitrites – 2 MAC.

Dnieper-Bug estuary

Town of Ochakov, in limits of a city, aquatorium of marine port (05.05) are the fixed exceedings of MAC on BOD5 (1,5 MAC), oil products (2,0 MAC), iron (3,3 MAC).

In estuarine waters of Southern Bug and Ingul in May there was exceeding of MAC in 1.2-1.5 times on maintenance of nitrites, phenols, synthetic-superficial active matters. Most contamination of aquatorium of City of Mykolaiv was marked on maintenance of oil products: from 14 analysed tests, 10 had exceeding of MAC. Maximal concentrations of oil products were fixed on May, 5 in the district of Varvarovskij bridge (9 MAC) and in a portside marine (7 MAC).

On other certain ingredients of exceedings of MAC are not observed.

The contents of dissolved oxygen in a superficial layer was 10.20-13.68 mg/l (93-131 % satiation), in to a benthic –5.27-10.77 (54-121 % satiation).Compound of oxygen below to MAC (5.27 mg/l) was observed on Mays, 23 in the benthic layer of mouth of Ingul.

Ground Water Resources

The prognosis operating resources (supplies) of underground waters of basic aquiferous horizons within bounds of the Mykolaiv Oblast are defined by the Ukrainian supply territorial commission (in 1978) and specified by protocol of working commission VGO "Krymmorgeologiya" (1983p.) in a quantity of 441,6 thousand m³/day with mineralization to 3 gr/dm 3, including 349,87 thousand m 3/day with mineralization to 1.5 gr/dm 3.

By 01.01.2004 the operating supplies of underground waters with mineralization to 1,5 gr/dm 3 in a quantity of 86,31 thousand m³/day are found and approved, which makes 19,8% from prognoses. The supplies of underground waters are located on the territory unevenly, modules of prognosis operating supplies of basic aquiferous horizons with mineralization to 1,5 gr/dm 3 makes 1,8-37,4 m³/day for 1km2.

The territories with the module of more than 10m³/day for 1 km2 are located in 9 districts, from 5 to 10 in 5 districts and to 5 in 5 districts. Oblast water supply from underground waters makes 30%. In accordance with data of state accounting by

01.01.2005 the underground waters are exploited through 2918 single well, 367 mining wells, 15 group water intakes with a total water intake of 186,376 thousand m 3/day.

7.3 Land Environment

7.3.1 Status of the Land Environment

The soil fund of the Mykolaiv region compounds 2458,55 thousand hectares, 2010,77 thousand ha (or a 81,8 percent)of them occupy agricultural lands.

The area of forest is 120,48 thousand ha, including field-protecting forest belt – 34,69 thousand ha. Under built-up soil lands there occupied 97,04 thousand ha (3,9%), by bogs – 21,01 thousand ha (0,85%). Territory of dry land makes 2331,22 thousand ha or 94,8 percent of the general area of region. Covered by water -127,33 thousand ha (5,2%).

Mykolaiv region is one of leading regions of Ukraine for bio-production potential of the soil fund. The soil cover in the northern part of the region is represented mainly by deep black soil, farther southward – by ordinary and southern black soils, and in a seashore line – dark-chestnut grounds on forest breeds. Among these zonal grounds on considerably smaller areas of black soil were formed on dense clays, eluvium of dense carbonates and not carbonates breeds, sands, and also meadow- black-earths, meadows-type and other soil.

Deep black soil on forest breeds has a distribution in Krivoozersky, Vradiivskij and Pervomajskij districts. This is one of the most fertile lands of the region. Ordinary black earths with little- and medium humus content in forest is mostly widespread in the region and occupies almost third of its territory. Southern black earths are poorer in humus than ordinary black soil. They are in a greater degree influenced by the process of the wind erosion, than ordinary black soils. Dark-chestnut residual – low- salinity soils on forest breeds are widespread on southern regions. Characteristic features of these soils are the expressed signs of physical alkalinity, spraying and, as a result, weak waterstability of structure, low general and non-capillary porosity.

Soil degradation

The basic factors of ground degradation in the region are following:

- violation of ecologically possible correlation of plough-land area, natural forages lands, forest planting, that negatively influences firmness of agri-landscape;

- intensive agricultural use of soils, that results in the decrease of ground fertility through their thickness, losses of soil-grainy structure permeability to water and aeration ability.

Agricultural mastering of the regional territory in comparision with the soil funds of world leading countries is extremely high.

Due to the erosive processes the area of ravines makes 7,018 thousand ha, and the area of the degraded and little productive grounds is 295,5 thousand ha, that is 12,04% from the general area of region. That is why all soils should be protected from negative processes, contamination and worsening of the ecological condition. Contamination of region grounds by persistent ecologically dangerous pesticides (by chlorine-organic

preparations), by herbicides of groups 2-4 Д- and s-triasin has a clearly seen tendency to the decrease. During the last 5 years the percent of muddiness of the soil by the above mentioned pesticides did not go above 0,1-0,2%.

As a result of the ecological agro-chemistry passport system the number of mercury, cobalt and zinc in the region soil, does not go above maximally possible levels (2,1 mg/kg for a mercury, 5,0 mg/kg for a cobalt and 23 mg/kg for zinc). On the contrary, there is the deficit of zinc in the soil of the region. Zinc is a microelement and becomes toxic only in large concentrations. On majority of the regional territory content of propulsion cadmium is within the limits of natural background, or does not exceed maximum possible level – 0,7 mg/kg.

The most widespread in domain boundary is soil pollution by a lead. On the majority of region s territory content in soil of propulsion copper is low (to 1,5 mg/kg). Grounds, where excess of maximum possible level of copper (3,0 mg/kg)is overseen, are used by stubbed gardens and vineyards.

In the conditions of the Mykolaiv region by application of Beurdeux liquid (10 kg/ha CuSO4) 20-25-years-old exploitation of vineyards brings to 2-3 multiple excess of maximum possible level in grounds. The general level of region soil contamination can be estimated as little- and medium polluted.

Flat landform of the local region, located in the basin of inferior streaming of rivers S.Bug, Ingul, and Inguletz, slow down the surface runoff, presence of the reserved non-flow territories, human activity with intervention in redistribution of natural flow for land irrigation, the unsatisfactory technical state of drain networks, irrigation systems and systems of water disposal lead to underflooding of region settlements row by soil waters, by lift of their level placed on 1,5-2,0 m from existing and output on separate areas on the Earth s surface. On the basis of monitoring researches it was defined, that in 2004 problem of underflooding is actual for City of Mykolaiv, Arbusiinskij, Berezanskij, Berezniguvatovskij, Jovtnevij, Mykolaivskij, Novobuzskij, Vradiivskij, Kazankivskij, Krivoozerskij and Snigurivskij 's districts.

7.3.2 Biodiversity Protection

The quantity of the green planting in Mykolaiv makes 17.1 m² on one inhabitant. The following breeds of trees prevail: white acacia, maple of yasenelistiy, mulberry, Bille poplar, Norway maple, walnut, green ash and green ash, sycamore, oak, chestnut, a linden-tree. In the last few years 100 thousand of nursery transplants of trees and bushes are planted in the town.

Biodiversity of the South Bug, Ingul and Dnipro-Bugskiy estuary counts 70 representatives of ichthyofauna. In the fields and forests within the limits of city territory there is a European hare. On steppe areas there are a lot of insects; among typical amphibious and reptiles are green frog small lizard, racer, grass-snake, among birds are lark, grey partridge, quail. Wetlands are inhabited by a numerous and various birds' population.

Within the limits of the city there are 17 objects nature reserves with the total area of 1184 hectares (4,5% of the city territory):

- Mykolaiv city state zoo;
- oaks, spring-water source the «Turkish fountain»;

- parks: "Victory", «Pioner», «Lenin komsomol», "68 mareens", "Petrovsky", "Leski", «Naval boulevard», public gardens: «Memory» and «Sivashsky»;
- natural boundary «Oaks», nature reserv the «Zhovtnevy storage lake» and «Balabanivka».

7.4 Socio-Economic Environment

Machine building and metalworking occupy the leading place with the sectors such as shipbuilding and power engineering. Mykolaiv industrial enterprises provide up to 60% of the Ukraine's shipbuilding production, over 90% of the state gas turbine production, and 80% of the alumina which is the semi-product for aluminum production.

Shipbuilding - the leading industrial sector – is represented in Mykolaiv by three large shipyards: State Joint Stock Holding Company "Chernomorsky Shipbuilding Yard", State Enterprise "Shipyard named after 61 Communards", and "Damen Shipyards "Okean" Joint Stock Company. These enterprises mainly produce tankers, bulk and container carriers, refrigerator ships, trawlers, floating hotels and military ships of different types. However, the industry of Mykolaiv is not only capable of building the highly science-intensive ships, but also modern gas-turbine installations, radio-electronic equipment of the highest precision.

A number of shipbuilding - related enterprises such as «Era», «Crystal» and «Equator» Joint Stock Companies specialize in shipboard equipment and assembly of onboard power systems. Besides that, a number of electric-technical and electronic industry enterprises with highly qualified personnel are located in the city.

State Enterprise "Scientific Research Complex for Gas Turbine Construction «Zarya-Mashproekt» produces universal purpose gas turbine engines for propelling ships, transporting natural gas, and generating electricity. Its products meet the world standards and are an item of export.

Light industry is represented by the textile enterprises that produce cloth for man, women and children ("Evis", "Yuzhanka"), knitted garments and haberdashery ("Angela" JSC), leather raw material, shoes and various leather goods ("Nikkozh" JSC, "Niko" JSC). "Alye Parusa" JSC holds an important place in producing various perfumes - cosmetics products.

Well-developed food industry keeps its good positions. Meat industry is based on processing agricultural raw products, and is represented by Mykolaiv meat plant, poultry plant, and numerous sausage-producing shops. The leading milk processing enterprise producing all range of diary products is "Laktalis - Ukraine" Close JSC. There are also "Mykolaiv confectionery factory" JSC, "Sandora" Ltd (produces various cans and juices), "Nectar" JSC (beverages, confectionery goods, mayonnaise), numerous bakeries and bread plants, "Mykolaiv liquors plant" State Enterprise and famous "Yantar" Brewery JSC whose products got all-Ukrainian recognition, working in the city.

The transport infrastructure is well developed in the city, it includes sea and river ports, railway junction, two airports and highways. The current city authorities and the Mayor of Mykolaiv Vladimir Chayka does all possible to maximally use the city's industrial, scientific and intellectual potential for increasing the well being of Mykolaiv residents.

Today serious and systematic work is done for supporting the functioning of the Special economic zone (SEZ) "Mykolaiv". SEZ "Mykolaiv" was created with the purpose of engaging investments into priority branches of production to preserve existing and create new places of employment, introduce modern production technology, promote foreign economic relations and entrepreneurial activity development, increase efficiency of the ship-building enterprises facilities and their export potential, increase high-quality goods and services deliveries, create modern industrial, transport and market infrastructures.

The special legal regime for economic activity is established on the territory of SEZ "Mykolaiv". It is determined by the Law of Ukraine "On Special economic zone "Mykolaiv" in accordance with the Law of Ukraine "On general principles of special (free) economic zones creation and functioning".

The main data on socio-economic development of the City of Mykolaiv are summarized in the Annex 4.

7.5 Cultural/Aesthetical Environment

Promotion and further development of science, education, culture, publishing activity and health care has great significance for the life and sustainable development of the city and its community.

Mykolaiv is the acknowledged center of higher education and science. About 2500 highly qualified specialists graduate from ten institutes and universities annually, and about half of them have qualifications that are unique for the country. Among the city's universities we should mention: Ukrainian State Marine Technical University named after Admiral Makarov (trains specialists in all shipbuilding professions, the degrees are recognized in USA, Germany etc.), Mykolaiv State Pedagogical University, Mykolaiv State Agrarian Academy, Mykolaiv State Humanitarian University named after Petro Mohyla, Southern Slavic Institute, Mykolaiv branch of Kiev National University for Culture and Arts, Mykolaiv educational center of Odessa National Law Academy, Mykolaiv educational-scientific center of Odessa National University named after I. Mechnikov, Mykolaiv branch of International University for Human Development "Ukraine", Mykolaiv branch of European University for Finance, Informational Systems, Management and Business, Mykolaiv branch of the Moscow International Natalia Nesterova University.

Seven colleges and technical schools, and four higher training schools are functioning in the Mykolaiv, among them the Polytechnic, Construction, Music, and Medical Training Schools.

Educational system and the network of educational institutions in Mykolaiv are being developed on the basis of the complex program "Education" adopted by the City Council in 1999.

There are 82 pre-school facilities functioning in Mykolaiv. 73 thousand of young students study in 80 secondary educational establishments. Within recent years the secondary education system has been reformed with the intention to provide appropriate studying conditions for the gifted children. With this purpose a pedagogical and two humanitarian gymnasiums, informational-mathematics, physics-mathematical and two economic lyceums were created. With the consideration of students' and their parents' interests,

9977 students in 2002 study under more advanced programs in the specialized classes with extensive learning of physics, mathematics, economics, law, foreign languages or computer science.

The existing system of secondary education allows students to be taught in their native language. Thus in the city there are 22 schools with teaching in Russian, 33 – in Russian and Ukrainian, 13 – in Russian. Other national languages are taught as selective courses in several schools.

More than one third of the Mykolaiv city population are young people. That is why the City Council has adopted the complex program "Youth" which is currently being implemented.

The council on the issues of youth policy – "Youth Municipality" – has been created. It consists of the representatives from 29 youth organizations. The "Youth Mayor" has been elected in the course of All-Ukrainian Action "Student Republic".

Involving young people in the public service has become a priority direction of the municipality human resources policy (currently the municipality and district administrations employ 77 men aged under 29, 19 of them are studying in the Public Administration graduate programs).

Mykolaiv has accumulated rich spiritual and cultural potential. There are 58 cultural facilities functioning in the city. Among them: 10 schools for aesthetic education, two Palaces of Culture, 10 Houses of Culture that host various professional and amateur singing, dancing and other ensembles, clubs, parks, wonderful play-town "Fairy tail" for children's leisure, Municipal performance studio, Municipal cultural centre, Municipal Chamber Orchestra, the Zoo, theatres, cinemas, the network of 35 libraries and others.

The financing of cultural sphere from the city budget has increased over the recent years.

The oldest in Mykolaiv Russian Drama Theatre, the Theatre for Ukrainian Drama and Musical Comedy as well as the Regional Philharmonics are very popular among the spectators.

The most famous and favourite place of interest is the MYKOLAIV ZOO – one of the oldest and most developed in Ukraine. At the beginning of September 2001 the celebrations devoted to the Mykolaiv Zoo 100th anniversary took place, which was a great event for the residents and guests of our city. The issuing of the anniversary 2 Hryvna coin "Mykolaiv Zoo Centenary" and opening of the monument to the Zoo founder N. Leontovich brought joy and honour to the city residents. It is very honorable and prestigious that in 1993 Mykolaiv Zoo became the first one in Ukraine to be accepted the European Association of Zoo and Aquaria (EAZA), it takes part in many international programs on endangered species conservation in captivity. A Zoo collection contains more than 350 species of animals, more than 2500 specimen, many of which are included in the International Red Book.

In November 2002 Mykolaiv Zoo was awarded with the Crystal Cornucopia according to the results of the IX International Academic Rating of Popularity and Quality Golden Fortune.

Mykolaiv is famous for its sports traditions. The development of sports and physical training in Mykolaiv are highly determined by constant organizational work and active support on the side of the city authorities.

The municipal program "Physical training is the health of the nation" is being carried out; the program of the children and youth sport development is being drafted.

There are 25 sports schools in 36 kinds of sports where 9200 children and youth people are trained. Professional sportsmen are trained in the Higher School for Physical Training and Sports and School for Higher Sports Skills.

Five stadiums, 118 gyms, four swimming pools, and 21 tennis courts are available for people in the city. The created sports infrastructure as well as highly qualified coaches enables to train the sportsmen who greatly succeed in the international competitions.

Mykolaiv is the centre for sailing sports. The legendary "Ikar" yacht continues its distant marine voyages. The International Black Sea Rally "KAYRA" became a real holiday for the people.

ANNEXES

Annex 1. The Short Term Investment Programme (STIP)

Item	Item Description	Cost Estimate €
1	**WWTP**	
1.1	Construction of 2 secondary clarifiers (dia. 40 meters each) complete with ancillary electromechanical plant and interconnecting pipe work	**3.0 million**
1.2	Completion of aeration tank extension together with ancillary electromechanical plant and interconnecting pipe work (blower upgrades)	**0.8 million**
1.3	Construction of 3 sludge thickeners and sludge pumping equipment together with ancillary electromechanical plant and interconnecting pipe work	**1.5 million**
1.4	Construction of 3 onsite sludge drying beds (same as existing)	**0.6 million**
1.5	Miscellaneous remedial works to existing 6mm screens and grit removal equipment	**0.4 million**
1.6	Refurbish disinfection building and upgrade disinfection plant	**0.5 million**
1.7	Reequip WWTP onsite laboratory and computerize record management	**0.2 million**
	SUB-TOTAL 1	***7.0 million***
2	**Sewerage Network**	
2.1	Installation of instrumentation and controls (SCADA) to automate the operations of the existing 26 sewerage network pumping stations	**1.2 million**
2.2	Priority replacement of collapsed and collapsing sewers (see Annex 2)	**2.4 million**
	SUB-TOTAL 2	***3.6 million***
3	**WTP**	
3.1	Construct a new pre-chlorination contact tank for water treatment plant	**0.6 million**
3.2	Refurbishment / reconstruction of main treated water pumping station from water treatment plant complete with replacement of pumps and pump controls	**2.0 million**

3.3	Refurbishment of main water pumping station in Mykolaiv center complete with replacement of pumps and installation of pump controls	**1.5 million**
3.4	Refurbish chlorine storage and dosing facilities for legal compliance and operational needs	**0.5 million**
3.5	Priority replacement of collapsing water mains (see Annex)	**1.5 million**
3.6	Reequip WTP onsite laboratory and computerize record management	**0.3 million**
	SUB-TOTAL 3	***6.4 million***
	TOTAL (1+2+3)	***17.0 million***

ANNEX 2. Legal / Institutional Summary Review Notes

Note 1: Legal status, ownership and control of Mykolaivvodokanal

Mykolaivvodokanal is a public enterprise owned by, and subject to the control of, the City of Mykolaiv. The City exercises its rights and responsibilities to control Mykolaivvodokanal and the provision of water and sewerage services within is administrative boundaries granted to it under the Law on Local Self Governance of Ukraine.

The geographical zone of operational responsibilities of Mykolaivvodokanal matches the territorial administrative boundaries of the City of Mykolaiv.

Mykolaivvodokanal conducts its operations in accordance with its Statutes as approved by the City Parliament (#28/12, 28/02/2001) and is registered under the national register of enterprises license # 31448144 (register # 14583, 09/04/2001).

Clause P.1.2 of the Statute confirms that the City of Mykolaiv, as the representative body of the local community, is the owner of the Mykolaivvodokanal enterprise, and that all water and wastewater infrastructure assets are the property of the local community. In accordance with Statute clauses P.3.1 and 3.2, the assets are entrusted, with full authority for operational exploitation, to Mykolaivvodokanal. Mykolaivvodokanal uses these assets according to its operational needs and in agreement with the City Property Fund. All assets are accounted for in the Balance Sheet (Form 1) of Mykolaivvodokanal's financial statements (see Annex 3) and each year Mykolaivvodokanal reviews and updates the inventory of assets (re. the Inventory Commission – see Note 2 below).

In addition to its statutes, governance of Mykolaivvodokanal is affected through a direct contract between the City and the General Manager of Mykolaivvodokanal negotiated and agreed for a term of 5 years.

Note 2: Legal requirements on the calculation and accounting of the depreciation / amortization of water and wastewater infrastructure assets in Ukraine

The calculation and accounting of the amortization of Mykolaiv's water infrastructure assets is calculated and reported in accordance with Ukraine's national legislation related to:

i. Accounting and Financial Reporting - calculated in accordance with the Law of Ukraine (16/07/1999 # 996) "On accounting and financial reporting in Ukraine", and further to Law #996 the adopted rules (standards) on accounting.

ii. Taxation - calculated in accordance with the Law of Ukraine "On taxation of the revenues of enterprises".

These 2 legal requirements result in differing annual valuations for the amortization of Mykolaiv's water infrastructure assets wherein:

i. The value calculated in accordance with the Law "On accounting and financial reporting in Ukraine" (in accordance with Ukrainian Accounting Standard #7 "Main Assets", Articles 22-30, approved by the Ministry of Finances of Ukraine on April 27, 2000, Decree # 92, and assessed by an ad hoc Inventory Commission annually) is included in Financial Statement Form 1 (Balance Sheet) item code 32 (see Annex 3). The authority of the Permanent Inventory Commission are defined in Instruction #69

"Instruction on inventory of main assets, non-material assets, commodities, cash assets and documents", approved by the Order of the Ministry of Finance, 11/09/1994.

ii. The value calculated in accordance with the Law "on taxation of the revenues of enterprises" (#283/97-VR, 22/05/1997) is included in Financial Statement Form 2 (P/L statement) item code 260 (see Annex 3).

Note 3: Legal / procedural requirements for the setting / amending of water and wastewater tariffs

According to the sub-p.2 of P. "a" of Article 28 of the Law "On Local Self Governance of Ukraine", the city council has the authority to define and approve the level of tariffs for local government services, of which water and wastewater is defined as a local government service.

The City must approve tariffs in accordance with the methodology defined in the Order of the (former) State Committee of Municipal Economy #139, 27/06/2001 that is registered in the Ministry of Justice on 23/08/2001, registration #748/5939.

According to the Article 31 of the Law of Ukraine "On municipal services", should the City approve of tariffs/charges for municipal services that are below cost recovery levels for the service providing enterprise, the City Council should compensate the service provider for any shortfall. In practice this legal requirement is not enforced in Mykolaiv.

Other relevant legislation:

Decree of the Cabinet of Ministers of Ukraine December 25, 1996 (#1548), defining the responsibilities of local administrations on the regulation of tariffs.

Decree of the Cabinet of Ministers of Ukraine March 11, 2002 (#173) amendments to the previous decree and amendments to the decree of cabinets of ministers 135 Feb 22, 1995 on State regulation of prices and tariffs on products, works and services of monopolies, and

Decree of Oblast Administration #289/R May23, 2002 on additional responsibilities of Oblast administrations on regulation of prices and tariffs.

Note 4: Legal / regulatory requirements setting quality, pressure and access to service norms for water supply

Water quality: The quality of drinking water in Ukraine is regulated by State Standard 2874-82 (SanPin). If the water quality parameters of drinking water distributed are not within this standard, the utilization of such water is possible only after approval by the Ministry of Health of Ukraine, and in accordance with the Decree of the Cabinet of Ministers of Ukraine #630, 21/06/2005 the user tariffs / charges for this water should be discounted by 20% during the period of non-compliance.

In addition, according to the Decree of the Cabinet of Ministers of Ukraine #1282, 28/09/2001, where water supplied is not in compliance with the State Standard referred to above, 10% of the cost associated with this water should be funded by the local budget.

Technical norms for pressure: Technical norms regulating water pressure delivery requirements are specified in Ukrainian Technical Standards 2.04.01-85:

- p. 6.7. Hydrostatic pressure in the water-supply network on the lowest point of location of a respective measuring device should exceed 60m.
- p. 7.3. Free water pressure upon devices should be within 2-8 m
- p. 12.1. During permanent or periodical loss of water pressure in the water-supply network, the relevant additional pumps should be installed.

In accordance with these rules, Mykolaivvodokanalcurrently provides sufficient water pressure to distribution water up to the 5th level of buildings.

Access to Service Obligations: Article 2 of Law of Ukraine "On municipal services" defines the principle of equal opportunities for everybody to get appropriate high-quality municipal services.

P.2 of the Rules "Utilization of the municipal systems of water-supply and sewerage services in the cities and towns of Ukraine" regulates the order of connection to public water-supply networks. All costs associated with the design of water-supply networks in principle should be covered by the consumer.

Note 5: Legal requirements setting technical norms for wastewater discharge and sludge disposal (plus non-compliance penalties)

Relevant laws controlling discharges to the water bodies:

- Law of Ukraine "About Environment Protection (#1264/12),"
- Decree of the Cabinet of Ministers of Ukraine #303, 01/03/1999 "About approval of the norms on payments" (amended 21/07/2005)
- Orders of the Ministry of Environmental protection of Ukraine #37, 18/05/1995 and #93, 28/04/1999.

Under this legislation penalties are applied to any entity including public water utilities, discharging pollutants to water bodies outside the technical norms specified. The level and methodology for the calculation of penalties is specified in law. In the case of Mykolaivvodokanalit is paying penalties for discharging its wastewater effluent to receiving waters in non-compliance with the national norms. The penalties are enforced and Mykolaivvodokanalpaid in excess of 700,000 UAH in penalties in 2005.

Relevant laws controlling the disposal of wastes (including sewage sludge):

Mykolaiv Vodokanal, as a water utility, generates both water treatment sludge and sewage sludge, the handling and disposal of which are controlled under law. The relevant laws that apply are:

- Law of Ukraine "On Waste"
- Decree of the Cabinet of Ministers of Ukraine #1218, 03/09/1998 "About approval of the order for design, approval and review of the limits on production and disposal of waste"

- Permission #1-50, 27/10/2005 of the State department of Environment Protection in Mykolaiv Oblast "On the disposal of the waste of Mykolaivvodokanalin 2006"

The utility currently needs to invest, as a priority in its sludge treatment and disposal facilities at its wastewater treatment plant and must comply with this legislation.

Note 6: EIA Requirements

In accordance with the Law of Ukraine 2.2-1-2003 "Contents of materials on assessment of impact on environment (EIA) upon the design and construction of enterprises, buildings and installations", all reconstruction and modernization investment projects are subject to the satisfactory completion of an EIA. In the case of MykolaivVodokanal, an EIA must be conducted within the consultancy work for project preparation to meet the national EIA requirements.

Note 7: Law on the safe handling and storage of hazardous chemicals (in particular Cl2)

Cl2 is a very hazardous chemical and Mykolaivvodokanalneeds to invest to comply with the national legislation on the safe handling, storage and utilization of Chlorine. The national legislation to which it must comply is:

- "Rules of safety of production, storage, transportation and utilization of the Chlorine" approved by the order of the State Committee of Ukraine on Labor Safety, #105, 29/10/1993.

Note 8: Labor laws that regulate the hiring and firing of staff

Mykolaivvodokanalpresently has operational and administrative departments that are overstaffed and needs to rationalize or reorganize their workforce in order to improve efficiency. The relevant legislation regulating the hiring and termination of employees is:

- Law of Ukraine "Labor Code of Ukraine" and its annexes.

The law essentially requires a minimum of 2 months notice plus 1 month's severance pay prior to termination of employment.

Pension contributions are made directly to the state and Mykolaivvodokanaldoes not carry with it long term pension obligations.

Note 9: The Regulation of engineering design / management (consultancy) costs

As is typical in former Soviet Union countries the costs for design and engineering supervision services are regulated. In Ukraine they are regulated by the Decree of the Cabinet of Ministers of Ukraine #2328, 20/12/1999. These laws, which limit the monies allocated for project preparation and construction supervision, have in general had an adverse impact on the quality of construction that results.

Note 10: Other items of note

Decree of the Cabinet of the Ministers of Ukraine, 29/07/2005, #664 "On measures on conducting of payments on pay-off of the state debts on the citizens deposits in the offices of the former Savings Bank of USSR (SBER) through the pay-off procedure for municipal services".

The above mentioned decree is expected to allow to assist citizens reduce the level of outstanding debts owned to Mykolaivvodokanalas well as to other municipal service providers.

Annex 3. Financial Aspects of Mykolaivvodokanal

In order to ensure the financial viability of the proposed investment programme, both increased self-generated contributions, derived from tariff increases, and an as far as possible advantageous financial package will be important The Financial Statements for Mykolaivvodokanalare available. Total revenue in 2005 was some 31 M UAH (4.8 M EUR) from water supply and some 14 M UAH (2.2 M EUR) from wastewater services, while operating and maintenance costs were some 45 M UAH (7 M EUR), showing that further tariff increases would be required to finance depreciation. The Vodokanal is also paying significant dues for transgressing wastewater emission limits, which would be eliminated by the planned investments in treatment.

Tariff levels for water and wastewater are some 1.15 UAH/m³ (0.18 EUR/m³) for households and 3.7 UAH/m³ (0.57 EUR/m³) for industry, and a 30% increase for industry was implemented in 2006. The company is attempting to improve its collection of arrears. Regarding past (rather modest) investments, these have been largely financed from local and state contributions.

The loan affordability (financial position of the Mykolaivvodokanal) will be analyzed in details by the Consultant together with the specialists of the company taking into consideration the loan's conditions provided by the EIB. Also, it is necessary to make justification for financial prognosis on Mykolaivvodokanal provided within pre-feasibility study document. Additionally, the recent changes in the state tariff policy should be taking into account during this justification (The Decree of the Cabinet of Ministers of Ukraine #959, July 12, 2006 "The Procedure on forming of the tariffs for centralized water-supply and water take-off").

Table 13: Balance Sheet of Mykolaivvodokanal (2001-2005)

BALANCE SHEET
(Thousand UAH)
Form #1

Item Name, 000	Code	2001	2002	2003	2004	2004	2005	2005
ASSETS		UAH	UAH	UAH	UAH	EUR	UAH	EUR
I. Non-current assets								
Intangible assets:								
Remain value (Book value)	10	4.8	3.7	4.9	6.9	1.1	28.6	4.8
Primary value	11	5.4	5.4	10.3	10.3	1.7	37.5	6.2
Depreciation	12	-0.6	-1.7	-5.4	-3.4	-0.6	-8.9	-1.5
Work in progress	20	191.8	393.4	2,022.8	494.6	82.2	1,468.9	244.0
Tangible assets:						0.0		0.0
Remain value (Book value)	30	208,519.0	199,837.4	194,721.4	205,097.6	34,069.4	183,847.3	30,539.4
Primary value	31	308,981.7	315,178.5	334,108.9	333,684.4	55,429.3	334,338.9	55,538.0
Depreciation	32	-100,462.7	-115,341.1	-139,387.5	-128,586.8	-21,359.9	-150,491.6	-24,998.6
Non-current financial assets:						0.0		0.0
Equity investments	40					0.0		0.0
Other financial investments	45					0.0		0.0
Long-term Receivables	50			31.0	15.0	2.5	57.6	9.6
Prolonged taxation assets	60					0.0		0.0
Goodwill	65					0.0		0.0
Other non-current assets	70					0.0		0.0
Total on Section:	80	208,710.8	200,234.5	196,780.1	205,614.7	34,155.3	185,402.4	30,797.7
II. Current assets						0.0		0.0
Inventories:						0.0		0.0
Operational Inventories	100	1,710.2	2,150.9	1,953.0	2,374.7	394.5	2,273.9	377.7
Animals	110					0.0		0.0
Unfinished production	120					0.0		0.0

Granted assets	130					0.0		0.0
Commodities	140	11.6	10.5	5.4	5.8	1.0		0.0
Receivables for commodities, work, services	150					0.0	1,695.0	281.6
Net value:	160	17,236.4	20,317.4	34,205.1	38,876.8	6,457.9	25,773.0	4,281.2
Primary value	161	17,236.4	20,317.4	35,837.7	38,876.8	6,457.9	25,813.1	4,287.9
Reserve of doubtful debts	162			-1,632.6		0.0	-40.1	-6.7
Debit debts on payments:						0.0		0.0
To budget	170	147.6	168.0	102.6	147.5	24.5	58.4	9.7
On issued advances	180					0.0		0.0
On charged revenues	190					0.0		0.0
On internal payments	200					0.0		0.0
Other current receivables	210	2,153.8	3,077.5	1,496.6	2,280.7	378.9	1,140.9	189.5
Current financial investments	220					0.0		0.0
Cash values and their equivalents:						0.0		0.0
In national currency	230	1,144.9	671.9	98.4	460.0	76.4		0.0
In foreign currency	240					0.0		0.0
Other current assets	250	677.9	1,742.2	815.9	1,343.9	223.2	76.4	12.7
Total on Section:	260	23,182.0	28,238.4	40,572.0	47,784.4	7,937.6	31,017.6	5,152.4
III. Spending on future periods	270	6.3	6.3	11.7	5.5	0.9	14.2	2.4
Balance:	280	231,904.3	228,479.2	237,363.8	253,404.0	42,093.7	216,434.2	35,952.5
CAPITAL AND LIABILITIES						0.0		0.0
I. Own Capital						0.0		0.0
Statute capital	300	80,072.4	80,072.4	79,948.9	80,072.4	13,301.1	226,466.1	37,619.0
Shareholder capital	310					0.0		0.0
Additional deposited capital	320					0.0		0.0
Other additional capital	330	152,663.0	151,467.0	155,385.3	162,185.9	26,941.2	12,744.3	2,117.0
Reserves	340					0.0		0.0
Loss carried forward	350	-3,326.1	-5,700.9	-9,745.3	-883.1	-146.7	-33,142.6	-5,505.4
Total on Section:	380	229,310.2	225,838.5	225,588.9	241,375.2	40,095.5	206,067.8	34,230.5
II. Providing with next spending and payments								

Payments to staff	400							
Other secured payments	410							
	415							
	416							
Target finance	420							
Total on Section:	430							
III. Long-term Liabilities								
Long-term loans	440							
Other long-term liabilities	450							
Prolonged taxation obligations	460							
Other long-term obligations	470							
Total on Section:	480							
IV. Current Liabilities								
Short-term loans	500						388.3	64.5
Current portion of long-term debt	510			880.0				0.0
Promissory notes	520							0.0
Account payables	530	1,377.5	1,496.6	1,187.6	1,291.5	214.5	738.8	122.7
On received advances	540					0.0		0.0
Payables To budget	550	937.4	775.5	2,128.1	907.0	150.7	1,065.7	177.0
Non-budget Payables	560					0.0	18.8	3.1
On insurance	570	65.1	32.1	208.3		0.0	271.5	45.1
Liabilities towards employees	580	206.0	327.5	522.5	1.6	0.3	611.5	101.6
Wit participants	590					0.0		0.0
On internal payments	600					0.0		0.0
Other current liabilities	610	8.1	9.0	5,847.0	8,799.2	1,461.7	4,267.9	709.0
Total on Section:	620	2,594.1	2,640.7	10,773.5	10,999.3	1,827.1	7,362.5	1,223.0
V. Future periods' revenues	630			1,001.4	1,029.5	171.0	3,003.9	499.0
Balance:	640	231,904.3	228,479.0	237,363.8	253,404.0	42,093.7	216,434.2	35,952.5

Table 14: Report on Financial Results of Mykolaivvodokanal (2001-2005)

Report on Financial Results
(Thousand UAH)
Form #2
I. Financial results

Item name	Code	2001	2002	2003	2004	2005
		UAH	UAH	UAH	UAH	UAH
Operating Revenues	10	30,027.2	50,484.5	60,731.8	55,537.0	54,294.1
VAT	15	-5,004.5	-8,414.1	-10,122.0	-9,256.2	-9,049.0
Excise duty	20					
	25					
Other deductions	30		-0.9	95.7	49.1	
Net revenues	35	25,022.7	42,069.5	50,514.1	46,231.7	45,245.1
Operating costs	40	-28,283.3	-46,672.9	-49,042.7	-51,436.0	-54,463.1
Gross						
Income	50			1,471.4		
Loss	55	-3,260.6	-4,603.4		-5,204.3	-9,218.0
Other operating revenues	60	1,562.3	923.7	-828.5	1,033.4	1,891.5
Administrative costs	70	-1,625.4	-4,155.3	-4,076.0	-4,661.0	-1,744.2
Marketing costs	80			-600.5	-1,082.3	-1,769.2
Other operating costs	90	-655.3	-1,306.3	-1,210.2	-6,527.8	-6,680.1
Financial results from operating activities						
Income	100					
Loss	105	-3,979.0	-9,141.3	-5,243.8	-16,442.0	-1,750.0
Income from equity investments	110					
Other financial income	120			3,000.0	300.0	0.9
Other incomes	130	656.0	6,792.0	6,612.2	7,796.8	513.1
Financial costs	140					-117.9
Equity investments	150					
Other financial costs	160	-3.7	-25.7	-3.3	-499.9	-219.9
Financial results from operations before taxation:						
Income	170			6,021.5		
Loss	175	-3,326.7	-2,375.0		-8,862.2	-17,343.8
Financial results from operations:	**180**			1,203.7		
Income	190			4,817.8		
Loss	195				-8,865.2	
Extraordinary:						
Revenues	200					
Costs	205					
Taxes on extraordinary revenues	210					
Net:						
Income	220			4,817.8		
Loss	225	-3,326.7	-2,375.0		-8,865.2	-17,343.8
II. Structure of Operating Costs:						
Material costs	230	18,619.0	27,264.9	27,384.8	28,948.3	27,793.7
Payments on salary	240	4,162.0	7,494.5	9,361.7	10,750.2	11,809.9

Social payments (Pension funds and heath insurance)	250	**1,542.0**	**2,847.9**	**3,623.0**	**4,168.0**	**4,702.3**
Depreciation and Amortisation	260	**5,626.0**	**13,220.9**	**13,350.3**	**13,313.0**	**13,670.6**
Other operating costs	270	**614.0**	**1,306.3**	**1,210.2**	**6,527.0**	**6,680.1**
Total:	280	**30,563.0**	**52,134.5**	**54,930.0**	**63,706.5**	**64,656.6**
III. Calculation of indicators of shares' profitability						
Average number of shares during the year	300					
Increase/Decease of number of average shares during the year	310					
Net income (loss) per share	320					
Corrected net income (loss) per share	330					
Dividends per share	340					
Prime costs without depreciation		**-22,657.3**	**-33,452.0**	**-35,692.4**	**-38,123.0**	**-40,792.5**

ANNEX 4. Socio-Economical Data City of Mykolaiv

Table 15: Mykolaiv City Budget (Euro)

Item	2004 (actual)	2005 (actual)	2006 (planned)
	47843468.28	59799694.5	69573907
Budget Expenditures	50865430.78	60865047.5	69493356
Balance	**-3021962,5**	**-1065353**	**-80551**

Population: 509,000 people (01/01/2005)

Table 16: Dynamic of population (2005)

	August-January				
	Total		2005. in % to 2004 p.	For 1000 people*	
	2005	2004		2005	2004
Number of new-born	2703	2779	97.3	8.0	8.2
Mortality	5060	5056	100.1	14.9	14.9
Including children up to 1 year old	15	22	68.1	5.3 2	8.22
Natural decline of population	-2357	-2277	103.5	-7.0	-6.7
Number of marriage	2174	1753	124.0	6.4	5.2
Number of divorcement	1541	1431	107.7	4.6	4.2

Industrial production growth for 2005: 13.2%

Table 17: Industrial production (2005)

	Volume of realized industrial products for January-November 2005	
	'000 UAH	% of total realized products
Industry	**4135350.5**	**100.0**
Raw-materials extraction industry	6688.0	0.2
Extraction of non-energy raw-materials	6688.0	0.2
Processing industry	3612155.4	87.3
including		

Food processing	698473.8	16.9
Closes	26275.5	0.6
Publishing and paper production	11052.8	0.3
Chemical	12984.9	0.3
Production of non-ferrous mineral products	45176.5	1.1
Metallurgy and metal-processing	1295797.7	31.3
Machinery	1468078.0	35.5
Power production (electricity and heating)	516507.1	12.5

Export January-September 2005: 660,5 million USD (150% growth to compare with 2004)
Import January-September 2005: 312,8 million USD (160% growth)
Balance: +347,7 million USD

Average salary 2005: 900,25 UAH per month (around 150 Euro/month)

Unemployment rate 2005: 3390 people (1% of labor force)

Table 18: Dynamic of households' payments for Heating (2005)

Month	Payment
January	74.16 %
February	84.99 %
March	108.4 %
April	118.1 %
May	124 %
June	116 %
July	90.9 %
August	93.3 %
September	101.6 %
October	167 %
November	87 %

December	101.3 %
Debt on 01.01.05	33774 thousand UAH
Debt on 01.01.06	32308.5 thousand UAH.

Table 19: Gas payments (2005)

	Consumer	
	Households	Industry
January	68 %	40 %
February	72 %	89 %
March	88 %	97 %
April	145 %	107 %
May	206 %	323 %
June	206 %	2632 %
July	207 %	3431 %
August	166 %	3726 %
September	162 %	6183 %
October	105 %	962 %
November	55 %	73 %
December	95 %	99 %
Debt on 01.01.05	4463000 UAH.	12563000 UAH.
Debt on 01.01.06	3809000 UAH.	12034000UAH

Table 20: Electricity payments (2005)

	Consumer	
	Households	Municipal house-keeping organizations
January	64.69 %	5.48 %
February	92 %	45.43 %
March	76.32 %	55.67 %
April	121 %	12.33 %
May	88.97 %	63.54 %
June	104.5 %	21.86 %
July	104.7 %	14.97 %
August	98.4 %	23.38 %
September	102.13 %	47.97 %
October	108.9 %	82.28 %
November	107.76 %	21.64 %
December	107.6 %	181.15 %
Debt on 01.01.05	14056 thous. UAH.	25072 thous.UAH
Debt on 01.01.06	15525.1 thous. UAH.	27005.1 thous. UAH.

Table 21: Water-supply and water take-off services payments (2005)

	Households
Debt on 01.01.05	21629 thousand UAH.
January	95.3 %
February	103 %
March	102.5 %
April	99.8 %

May	103.6 %
June	102.8 %
July	106 %
August	98.7 %
September	103 %
October	227.8 %
November	196.8 %
December	142.9 %
Debt on 01.01.06	16021.2 thousand UAH.

Table 22: Payments for building keeping services (2005)

	Households
January	97.3 %
February	103 %
March	110 %
April	111.1 %
May	95.8 %
June	108.3 %
July	112.8 %
August	59.4 %
September	68 %
October	86.9 %
November	96.1 %
December	104.8 %
Debt on 01.01.05	11878 thousand UAH.
Debt on на 01.01.06	14158.1 thousand UAH.

Prices for 2005: price index is 110,3% (to compare with 2004)

Total Direct foreign investments up to end of 2005: 67,5 million USD

Table 23: Financial results of business activities before taxation (January-August 2005) '000 UAH

	Financial Result	Enterprises those received profit	Enterprises those received loss
Mykolaiv City	425492	564905	139413

Debit debts: 4039,6 million UAH

Credit debts: 5167,7 million UAH

Table 24: Financial results of business activities of enterprises and organizations of City of Mykolaiv for January-August 2005

Parameters		Total since the beginning of the year
Financial results of business activities before taxation	Million UAH.	425.5
By sectors:		
Industry	Million UAH..	200.8
Agriculture	Million UAH.	-1.122
Transport	Million UAH..	84.1
Construction	Million UAH.	-8.378
Others	Million UAH.	150.13

Table 25: Dynamic of reforming of municipal property and budget revenue

	2002	2003	2004	2005 (9 months)	2006 (planned)
Number of privatized objects	61	84	93	61	85
Revenue from privatization (Thousand UAH)	3095.2	3493.5	7139.0	4173.9	3200.0

Table 26: Development of the entrepreneurship

	2004	**2005**	**2006 (planned)**

Number of small enterprises (SE)	7300	8000	9000
Number of SE to 10 thousand of population	137	156	165
Number of employees of SE	84000	92300	10500
Number of private entrepreneurs	27750	33300	39000
Share of SE in GDP of the City's production sector (%)	20	22	25
Budget revenue from SE (%)	30	33	35

Table 27: City budget revenue from rent of municipal property

	2002	2003	2004	2005 (preliminary data)	2006 (planned)
Thousand UAH	1709	1780	2238	4000	4000

Table 28: City budget revenue from rent of land resources (in million UAH)

1999	10.6
2000	15.37
2001	20.28
2002	25.4
2003	26.127
2004	20.806
10 months of 2005	19.061

Table 29: Population health

	9 months of 2004	9 months of 2005
Number of birth per 1000 people	6.18	5.84
Mortality per 1000 people	9.36	9.40
Natural increase of population	— 3.18	— 3.56
New-born mortality per 1000 people	4.6	4.0
Illness per 1000 people	451.9	458.5
Distribution of illness per 1000 people	1293.4	1352.00

Social sector budget expenditures

Number of people that have social preferences: 105,6 thousand (including 60,7 thousand of labor veterans, 30,5 – 2nd WW veterans).

Subsidies to the families with low income: 3,6 million UAH

Subsidies to the families with children: 10,6 million UAH

Table 30: Budget expenditures on municipal economy sector

Budget Item	1999	2000	2001	2002	2003	2004	2005
Total expenditures (thousand UAH)	22353.7	22362.0	18631.3	27030.2	40378.18	48568.82	31052.39
Expenditures per capita (UAH)	43.805	44.211	36.618	52.845	79.079	95.364	61.139

Table 31: Main Economic and Social Indicators of the City of Mykolaiv

Item	Measure	2004	2005.	2006 (planned)	200 6 planned (in % to 2005)
1	2	3	4	5	6
Economy development					
Volume of realized industry products	Million UAH	3952.9	4264.1	4610.4	108.1
Volume of realized industry products per capita	UAH	7741.9	8391.0	9077.4	108.2
Volume of realized industry products comparing with previous year in %	%	116.4	107.9	108.1	X
Financial Indicators					
Revenue of city budget	Million UAH	216.9	263.6	289.5	109.8
Volume of the development budget in total budget	Million UAH	18.7	20.1	8.6	42.8
Share of the development budget in the total budget	%	8.6	7.2	3.0	X
Budget expenditures	Million UAH	325.5	365.2	416.8	114.1
Life Standards' indicators					
Salary fund of big and medium enterprises	Million UAH.	1125.1	1541.4	1673.5	108.6
Average salary per person/month	UAH	673.1	875.0	950.0	108.6
Including:					
Industry	UAH	810.0	920.0	1100.0	119.6
Salary debts	Thousand UAH	13199.4	3200	0.0	X
Share of employees that didn't received salary in time	%	3.3	1.5	-	X
Market indicators					
Retail sales volume	Million UAH.	1839.0	2500.0	3000.0	X
Dynamic of retail sales	%	127.2	120.0	110.0	X
Volume of services provided	Million UAH	1130.0	1300.0	1573.0	X
Dynamic of services	%	117.3	109.1	10.0	X
Population and employment					
Average population/month	Thousand	508.5	508.1	507.7	99.9

	people				
Unemployed people	Thousand people	3.5	3.5	3.5	100.0
Unemployment rate	%	1.0	1.0	1.0	X
Number of new working places	places	2167	6000	6000	100.0
Investments and Export/Import					
Investments per capita	UAH	2645.3	181.0	182.2	100.6
Volume of Direct Foreign Investments from the beginning of the year	Million USD	8.309	8.5	10.2	120.0
Direct foreign investments by sector	Million USD				
Industry:		39.26	38.34	38.034	100.0
Food processing		28.34	28.4	28.4	100.0
Machinery		9.33	8.455	5.45	100.0
Transport		13.84	13.86	13.86	100.0
Export	Mill. USD	585.67	425.06	907.77	125.2
Export to compare with previous year	%	123.1	123.8	125.2	X
Import	Mill USD	247.59	310.73	404.25	130.1
Import to compare with previous year	%	120.3	125.5	130.1	X
Investments into the municipal economy	Million UAH	18.69	35.87	39.67	110.6
From local budget	Million UAH.	15.88	32.58	27.5	84.4
From state budget	Million UAH.	2.80	3.29	12.17	in 3.7 t.m.
From other sources	Million UAH.	-	-	-	-
Payments of households for municipal services					
Total debts for municipal services	thousand UAH.	82528	84500	95190	112.6
Heating and hot water	thousand UAH.	42148	44300	49600	112.0
Apartment fee	thousand UAH	11703	10800	12000	111.1
Gas	thousand UAH	7047	6500	6190	95.2
Water supply and take-off	thousand UAH	21630	22900	27400	119.6
Credit debts for municipal services	thousand UAH	91092.7	93900	98600	105.0
Including outstanding debts	thousand UAH	22734.5	25000	26200	104.8

Debit debts for municipal services	thousand UAH.	89892	88100	96000	109.0
Including outstanding debts	thousand UAH	10092	10500	11500	109.0
Payments rate	%	96	97	86	X
Construction of the objects of social sector					
Total living space	Thousand m2	61061.0	54600.5	55212.3	101.1
Schools	places	-	-	462	-
Kindergarten	places	-	-	-	-
Hospitals	places	-	-	100	-
Water supply pipes	km	-	1.98	4.98	у 2.5 р.б.
Heating	km GKal/h	0.765 576	- -	0.42 -	- -
Gas mains	km	2.584	3.492	4.3	123.1
Streets financed from local budget	km	-	-	-	-
Number of telephones per 100 households	items	53.9	55.6	56.9	102.3
Development of small enterprises (SE)					
Number of SE	items	6000	6500	7000	107.7
Number of SE to compare with previous year	%	120.5	150.4	180.0	X
Share of SE in realized products	%	14.2	17.0	20.0	X
Share of SE those received profit	%	68.0	74.0	80.0	X
Share of SE those received loss	%	32.0	28.7	20.0	X
Financial results of SE before taxation	Million UAH	36.0	40.0	45.0	X
including:					
profit	Million UAH	72.0	75.0	78.0	X
loss	Million UAH	28.0	25.0	22.0	X
Oblast Budget revenue from SE	Million UAH.	55.0	60.0	65.0	108.3
Financial support of SE from local budget	Thousand UAH	190.0	-	100.0	-

ANNEX 5. Parameters of the Water Supply System of Mykolaiv

Table 32: Parameters of chemical-bacteriological, radiological and hydro biological analyses of Inguletz water supply system purifying structures during the period of 01.03.06 – 31.03.06

The frequency of sampling: monthly

Drinking Water GOST 2874-82

Parameter	**unit of measure**	March, 2006
B-activity	b/dm³	0.2000
PH		8.0500
A-activity	bk/dm³	0.0187
Aluminum	mg/dm³	0.0000
Ammonia	mg/dm³	0.1600
Iron, general	mg/dm³	0.1000
Water hardness	mol/m³	3.9000
Calcium hardness	mol/m³	2.4000
Magnesium hardness	mol/m³	1.5000
Water smell at T = 20 °C	units	1.0000
Water smell at T = 60 °C	units	1.0000
Index of bacteria of coli form group	units	3.0000
Cobalt	mg/dm³	0.0000
Manganese	mg/dm³	0.0000
Copper	mg/dm³	0.0620
Microbe number/contents		1.0000
Molybdenum	mg/dm³	0.0000
Total suspended solids	mg/dm³	0.4700
Arsenic	mg/dm³	0.0000
Nickel	mg/dm³	0.0000
Nitrates	mg/dm³	2.0500
Nitrites	mg/dm³	0.0100
Oxidability	mg/dm³	8.6000
Residual chlorine, medium	mg/dm³	0.6000
Polyphosphates (Fluorine phosphate) mg/dm³		0.3700
Lead	mg/dm³	0.0030
Sulfates	mg/dm³	83.0000
Dry residual	mg/dm³	307.0000
Temperature	°C	5.4000
Carbonic acid	mg/dm³	6.6000

Phytoplankton	mg/cm³	47000.0000
Fluorine	mg/dm³	0.2300
Chlorides	mg/dm³	57.0000
Chrome, general	mg/dm³	0.0000
Colour	degree	18.0000
Zinc	mg/dm³	0.0400
Alkalinity	mol/m³	2.3500

Table 33: Parameters of chemical-bacteriological, radiological and hydro-biological analyses of drinking water during the period of 01.04.06 – 30.04.06

The frequency of sampling: monthly

Pump Station IV, pressure side, GOST 2874-82

Parameter	**unit of measure**	April, 2006
PH		7.9400
Aluminum	mg/dm³	0.0000
Ammonia	mg/dm³	0.2600
Iron, general	mg/dm³	0.1200
Water hardness	mol/m³	4.1000
Calcium hardness	mol/m³	2.3000
Magnesium hardness	mol/m³	1.8000
Water smell at T = 20 °C	units	1.0000
Water smell at T = 60 °C	units	1.0000
Index of bacteria of coliform group	units	3.0000
Manganese	mg/dm³	0.0000
Copper	mg/dm³	0.0550
Microbic number/contents		1.0000
Molybdenum	mg/dm³	0.0000
Total suspended solids	mg/dm³	0.6000
Arsenic	mg/dm³	0.0000
Nitrates	mg/dm³	2.5000
Nitrites	mg/dm³	0.0120
Oxidability	mg/dm³	9.0000
The optimal contents of chlorine	mg/dm³	0.7500
Polyphosphates (Fluorine phosphate)	mg/dm³	0.2600
Lead	mg/dm³	0.0000
Sulfates	mg/dm³	90.0000
Dry residual	mg/dm³	389.0000

Fluorine	mg/dm³	0.2200
Chlorides	mg/dm³	43.0000
Chromaticity	degree	18.0000
Zinc	mg/dm³	0.0500
Alkalinity	mol/m³	2.3500

Table 34: Parameters of chemical-bacteriological, radiological and hydrobiological analyses of drinking water during the period of 01.04.06 – 30.04.06

The frequency of sampling: monthly

Pump Station III, pressure side, GOST 2874-82

Parameter	**unit of measure**	April, 2006
PH		7.9300
Aluminum	mg/dm³	0.0000
Ammonia	mg/dm³	0.2600
Iron, general	mg/dm³	0.1000
Water hardness	mol/m³	4.1000
Calcium hardness	mol/m³	2.3000
Magnesium hardness	mol/m³	1.8000
Water smell at T = 20 °C	units	1.0000
Water smell at T = 60 °C	units	1.0000
Index of bacteria of coli form group	units	3.0000
Manganese	mg/dm³	0.0000
Copper	mg/dm³	0.0600
Microbes number/contents		0.0000
Molybdenum	mg/dm³	0.0000
Total suspended solids	mg/dm³	0.3000
Arsenic	mg/dm³	0.0000
Nitrates	mg/dm³	2.5000
Nitrites	mg/dm³	0.0150
Oxidability	mg/dm³	9.0000
The optimal contents of chlorine	mg/dm³	0.8400
Polyphosphates (Fluorine phosphate)	mg/dm³	0.2500
Lead	mg/dm³	0.0000
Sulfates	mg/dm³	90.0000
Dry residual	mg/dm³	387.0000
Fluorine	mg/dm³	0.2200
Chlorides	mg/dm³	43.0000

Chromaticity	degree	18.0000
Zinc	mg/dm³	0.0480
Alkalinity	mol/m³	2.4000

Table 35: Parameters of chemical-bacteriological, radiological and hydrobiological analyses of Inguletz water supply system purifying structures during the period of 01.04.06 – 30.04.06

The frequency of sampling: monthly

River Intake - Raw Water (The Dniper River) N2 GOST 2761-84

Parameter	**unit of measure**	April, 2006
B-activity	b/dm³	0.2500
PH		8.4000
A-activity	bk/dm³	0.0180
Aluminum	mg/dm³	0.0000
Ammonia	mg/dm³	0.2800
BOD5	mg/dm³	3.0000
Iron, general	mg/dm³	0.1800
Water hardness	mol/m³	3.9000
Calcium hardness	mol/m³	2.6000
Magnesium hardness	mol/m³	1.3000
Water smell at T = 20 °C	units	0.0000
Water smell at T = 60 °C	units	0.0000
Index of lacto bacteria and coli form bacteria	kl/l	118.0000
Cobalt	mg/dm³	0.0000
Manganese	mg/dm³	0.0300
Copper	mg/dm³	0.0370
Microbes number/contents		3.0000
Molybdenum	mg/dm³	0.0000
Total suspended solids	mg/dm³	1.0400
Arsenic	mg/dm³	0.0000
Nickel	mg/dm³	0.0000
Nitrates	mg/dm³	2.6500
Nitrites	mg/dm³	0.0300
Oxidability	mg/dm³	11.2000
The optimal contents of aluminum sulfate powder	mg/dm³	30.0000
The optimal contents of chlorine	mg/dm³	4.0000

Polyphosphates (Fluorine phosphate)	mg/dm³	0.3900
Dissolved oxygen	mg/dm³	9.0000
Lead	mg/dm³	0.0050
Sulfates	mg/dm³	104.0000
Dry residual	mg/dm³	384.0000
Temperature	°C	10.0000
Carbonic acid	mg/dm³	5.2000
Phytoplankton	mg/dm³	177000.0000
Fluorine	mg/dm³	0.3500
Chlorides	mg/dm³	38.0000
Chrome, general	mg/dm³	0.0000
Chromaticity	degree	28.0000
Zinc	mg/dm³	0.0650
Alkalinity	mol/m³	2.4900

Table 36: Parameters of chemical-bacteriological, radiological and hydrobiological analyses of Inguletz water supply system purifying structures during the period of 01.04.06 – 30.04.06

The frequency of sampling: monthly

Water Storage - lake GOST 2761-84

Parameter	**unit of measure**	April, 2006
B-activity	b/dm³	0.3500
PH		8.7600
A-activity	bk/dm³	0.0490
Aluminum	mg/dm³	0.0000
Ammonia	mg/dm³	0.1100
BOD5	mg/dm³	3.2000
Iron, general	mg/dm³	0.3600
Water hardness	mol/m³	8.4000
Calcium hardness	mol/m³	3.6000
Magnesium hardness	mol/m³	4.8000
Water smell at T = 20 °C	points	0.0000
Water smell at T = 60 °C	points	5.0000
Index of LKP		220.000
Cobalt	mg/dm³	0.0000
Manganese	mg/dm³	0.1800
Copper	mg/dm³	0.0460
Microbic number/contents		19.0000
Molybdenum	mg/dm³	0.0000

Total suspended solids	mg/dm³	9.5000
Arsenic	mg/dm³	0.0000
Nickel	mg/dm³	0.0000
Nitrates	mg/dm³	0.8000
Nitrites	mg/dm³	0.0250
Oxidability	mg/dm³	11.0000
Polyphosphates (Fluorine phosphate)	mg/dm³	0.0580
Dissolved oxygen	mg/dm³	10.7000
Lead	mg/dm³	0.0090
Sulfates	mg/dm³	292.0000
Dry residual	mg/dm³	1113.0000
Temperature	°C	11.0000
Carbonic acid	mg/dm³	0.0000
Phytoplankton	mg/dm³	2565000.0000
Fluorine	mg/dm³	0.4800
Chlorides	mg/dm³	277.0000
Chrome, general	mg/dm³	0.0000
Chromaticity	degree	17.0000
Zinc	mg/dm³	0.0950
Alkalinity	mol/m³	2.5500

Annex 6. Physico-chemical and bacteriological analysis

Month	December 2005															
№	Parameters	Unit	Screens	Grit chambers	Sedimentation tanks				Activated sludge tanks				Secondary clarifiers			Outlet
					№1	№2	№3	№4	№1	№2	№1	№2	№1	№2	№3	
1	Temperature, air	°C														
2	Temperature, water	°C														
3	Transparency	cm														
4	Colour	visual														
5	Dry solids	mg/l	1,048		924	951	924	978					931	916	832	858
6	Suspended solids	mg/l	245		89	119	109	74					40	25	31	54
7	Ammonia nitrogen	mg/l	37.0		36.0	34.0	36.0	36.0	11.2	15.5	20.0	15.0	11.6	11.6	7.0	14.8
8	Nitrites	mg/l	0.4		0.7	0.1	0.1	0.1	2.8	3.5	1.0	1.3	2.2	1.9	2.4	0.8
9	Nitrates	mg/l	1.2		0.4	0.4	0.3	0.4	15.4	15.0	13.0	14.0	11.0	13.0	12.0	12.3
10	Dissolved oxygen	mg/l														
11	BOD5	mg/l	312		232	240	202	192	32	21	58	61	29	42	35	74
12	COD	mg/l	635													140
Month	February 2006															
№	Parameters	Unit	Screens	Grit chambers	Sedimentation tanks				Activated sludge tanks				Secondary clarifiers			Outlet
					№1	№2	№3	№4	№1	№2	№1	№2	№1	№2	№3	
1	Temperature, air	°C														
2	Temperature, water	°C														
3	Transparency	cm														
4	Colour	visual														
5	Dry solids	mg/l	1,029													946
6	Suspended solids	mg/l	194		156	81	93	126					61	42	40	43
7	Ammonia nitrogen	mg/l	38.0		36.0	34.0	36.0	35.0	16.0	16.0	25.0	24.5	11.0	20.0	11.0	16.5
8	Nitrites	mg/l	0.5		0.2	0.2	0.2	0.2	0.5	0.8	0.7	0.6	0.5	0.6	0.5	0.5

9	Nitrates	mg/l	0.4		0.2	0.1	0.2	0.2	11.0	9.0	8.0	6.0	12.0	3.5	16.0	7.1
10	Dissolved oxygen	mg/l														
11	BOD5	mg/l	249		205	179	174	183	26	15	35	18	18	19	28	64

Month	April 2006															
№	Parameters	Unit	Screens	Grit chambers	Sedimentation tanks				Activated sludge tanks				Secondary clarifiers			Outlet
					№1	№2	№3	№4	№1	№2	№1	№2	№1	№2	№3	
1	Temperature, air	°C														
2	Temperature, water	°C														
3	Transparency	cm														
4	Colour	visual														
5	Dry solids	mg/l	1,029													946
6	Suspended solids	mg/l	194		156	81	93	126					61	42	40	43
7	Ammonia nitrogen	mg/l	38.0		36.0	34.0	36.0	35.0	16.0	16.0	25.0	24.5	11.0	20.0	11.0	16.5
8	Nitrites	mg/l	0.5		0.2	0.2	0.2	0.2	0.5	0.8	0.7	0.6	0.5	0.6	0.5	0.5
9	Nitrates	mg/l	0.4		0.2	0.1	0.2	0.2	11.0	9.0	8.0	6.0	12.0	3.5	16.0	7.1
10	Dissolved oxygen	mg/l														
11	BOD5	mg/l	249		205	179	174	183	26	15	35	18	18	19	28	64

Month	May 2006															
№	Parameters	Unit	Screens	Grit chambers	Sedimentation tanks				Activated sludge tanks				Secondary clarifiers			Outlet
					№1	№2	№3	№4	№1	№2	№1	№2	№1	№2	№3	
1	Temperature, air	°C														
2	Temperature, water	°C														
3	Transparency	cm														
4	Colour	visual														
5	Dry solids	mg/l														
6	Suspended solids	mg/l	1,208													1,018

7	Ammonia nitrogen	mg/l	408.0													72.0
8	Nitrites	mg/l	31.0													9.6
9	Nitrates	mg/l	0.1													0.8
10	Dissolved oxygen	mg/l	1.0													4.0
11	BOD5	mg/l														
12	COD	mg/l	457													64
13	Clorides	mg/l	995													172
Month	June 2006															
№	Parameters	Unit	Screens	Grit chambers	Sedimentation tanks				Activated sludge tanks				Secondary clarifiers			Outlet
					№1	№2	№3	№4	№1	№2	№1	№2	№1	№2	№3	
1	Temperature, air	°C														
2	Temperature, water	°C														
3	Transparency	cm														
4	Colour	visual														
5	Dry solids	mg/l														
6	Suspended solids	mg/l	1,115													986
7	Ammonia nitrogen	mg/l	583.0		156.0	244.0	84.0	118.0					36.6		54.0	175.0
8	Nitrites	mg/l	39.0		39.0	35.0	38.0	38.0	3.4	8.4	14.3	13.6	3.6		10.0	13.6
9	Nitrates	mg/l	0.7		0.1	0.2	0.2	0.2	1.4	0.2	1.2	0.9	0.6		0.1	0.3
10	Dissolved oxygen	mg/l	2.2		0.7	0.7	0.4	0.7	1.8	1.6	1.4	1.0	2.2		1.3	0.5
11	BOD5	mg/l														
12	COD	mg/l	553		461	555	300	385	26	51	59	35	27		53	118
13	Clorides	mg/l	929													372

Month	July 2006															
№	Parameters	Unit	Screens	Grit chambers	Sedimentation tanks				Activated sludge tanks				Secondary clarifiers			Outlet
					№1	№2	№3	№4	№1	№2	№1	№2	№1	№2	№3	
1	Temperature, air	°C														

2	Temperature, water	°C														
3	Transparency	cm														
4	Colour	visual														
5	Dry solids	mg/l														
6	Suspended solids	mg/l														
7	Ammonia nitrogen	mg/l	36.0		33.0	34.0	35.0	35.0	0.5	11.3	0.0	0.0	1.5		0.0	20.5
8	Nitrites	mg/l	0.9		0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.7	0.2		1.4	0.3
9	Nitrates	mg/l	2.7		0.7	0.9	0.9	0.6	0.1	0.6	18.0	16.7	0.7		7.0	6.4
12	COD	mg/l	1,400													920

APPENDIXES

Appendix 1. Raw Water - Limiting concentrations and monitoring

Table 37: Minimum requirements in raw water intended for drinking water supply

Parameter	Notes	Unit	EU - Directive75/440/EEC						Ukraine - GOST 2761-84 *[SanPiN 4630.88]*		
Raw water class:			**A1 G**	**A1 I**	**A2 G**	**A2 I**	**A3 G**	**A3 I**	**1**	2	3
PH			**6.5** to **8.5**		**5.5** to **9**		**5.5** to **9**		6,5 to 8,5 *[6,5 to 8,5]*	6,5to 8,5 *[6,5 to 8,5]*	6,5 to 8,5 *[6,5 to 8,5]*
Colour		degrees							35	120	200
	(1)	mg/l Pt scale (after simple filtration)	**10**	20 **(O)**	**50**	**10 20 (O)**	**50**	100 **(O)**			
Turbidity		mg/l							20	1500	10000
Total suspended solids		mg/l SS	**25**								
Dry residue	**(4)**	mg/l							1000 *[1000]*		
Temperature	**(1)**	°C	22	**25 (O)**	22	**25 (O)**	22	**25 (O)**			
Total hardness	**(5)**	mole/m³							*7*		
Conductivity		us/cm at 20°C	**1** 000		**1** 000		**1** 000				
Odour		points at 20°C							*2 [1]*	3 *[1]*	4 *[1]*

		(dilution factor at 25°C)	**3**		**10**		20				
Nitrates	**(1) (2)**	mg/l NO_3	**25**	**50 (O)**		**50 (O)**		**50 (O)**			45
Fluorides	**(3)**	mg/l F	**0.7** to **1**	**1.5**	**0.7** to **1.7**		**0.7** to **1.7**				
Total extractable organic chlorine		mg/l Cl									
Iron (Fe)	**(2)**	mg/l	**0.1**	**0.3**	**1**	**2**	**1**		1 *[0.3]*	3 *[0.3]*	5 *[0.3]*
Manganese (Mn)	**(2)**	mg/l	**0.05**		**0.1**		**1**		0,1 *[0.1]*	1,0 *[0.1]*	2,0 *[0.1]*
Phytoplankton (filamentous or scarious)		mg/l							1	5	50
Phytoplankton (unicellular organisms)		CFU/l							1 000	10001000	10001000

Parameter	Notes	Unit	EU - Directive75/440/EEC						Ukraine - GOST 2761-84 *[SanPiN 4630.88]*		
Raw water class:			**A1** G	A1 I	A2 G	A2 I	A3 G	A3 I	**1**	*2*	**3**
Copper	**(1)**	mg/l Cu	0.02	0.05 (O)	0.05		1		*[1.0]*	*[1.0]*	*[1.0]*
Zinc		mg/l Zn	0.5	3	1	5	1	5			
Boron		mg/l B	1		1		1		*[0.5]*	*[0.5]*	*[0.5]*
Beryllium		ug/l Be							*[0.2]*	*[0.2]*	*[0.2]*
Cobalt		mg/l Co							*[0.1]*	*[0.1]*	*[0.1]*
Nickel		mg/l Ni							*[0.1]*	*[0.1]*	*[0.1]*
Vanadium		mg/l V							*[0.1]*	*[0.1]*	*[0.1]*
Arsenic		mg/l As	0.01	0.05		0.05	0.05	0.1	*[0.05]*	*[0.05]*	*[0.05]*
Cadmium		mg/l Cd	0.001	0.005	0.001	0.005	0.001	0.005	*[0.001]*	*[0.001]*	*[0.001]*
Total chromium		mg/l Cr		0.05		0.05		0.05			
Lead		mg/l Pb		0.05		0.05		0.05	*[0.03]*	*[0.03]*	*[0.03]*
Selenium		mg/l Se		0.01		0.01		0.01	*[0.01]*	*[0.01]*	*[0.01]*
Mercury		mg/l Hg	0.0005	0.001	0.0005	0.001	0.0005	0.001	*[0.0005]*	*[0.0005]*	*[0.0005]*
Barium		mg/l Ba		0.1		1		1	*[0.1]*	*[0.1]*	*[0.1]*
Cyanide		mg/l Cn		0.05		0.05		0.05			
Sulphates	**(1)**	mg/l SO_4	150	250	150	250 (O)	150	250 (O)	500 *[500]*		
Chlorides		mg/l Cl	200		200		200		350 *[350]*		
Surfactants (reacting with methyl blue)		mg/l (laurylsulphate)	0.2		0.2		0.5				
Phosphates	**(2)**	mg/l P_2O_5	0.4		0.7		0.7		*[3.5]*	*[3.5]*	*[3.5]*

Phenols (phenol index) paranitraniline 4 aminoantipyrine		mg/l C_6H_5OH		0.001	0.001	0.005	0.01	0.1			
Dissolved or emulsified hydrocarbons (after extraction by petroleum ether)		mg/l		0.05		0.2	0.5	1			
Parameter	**Notes**	**Unit**	**EU - Directive75/440/EEC**						**Ukraine - GOST 2761-84 *[SanPiN 4630.88]***		
Raw water class:			**A1** G	**A1 I**	A2 G	A2 I	A3 G	A3 I	**1**	***2***	**3**
Polycyclic aromatic hydrocarbons		mg/l		0.0002		0.0002		0.001			
Total pesticides (parathion, BHC, dieldrin)		mg/l		0.001		0.0025		0.005	*[numerous pesticides are listed in SanPin 4630.88. For BHC, the MAC is fixed to 0.05 mg/l, i.e. 10 times more than the MAC for all pesticides in the EU legislation]*		
Permanganate oxidability		mgO/l							*7*	15	20
Chemical oxygen demand (COD)	**(2)**	mg/l O_2					30		*[15.0]*	*[15.0]*	*[15.0]*
Dissolved oxygen saturation rate	**(2)**	$\%O_2$	> 70		> 50		> 30				
Dissolved oxygen		mg/l O_2							*[4.0]*	*[4.0]*	*[4.0]*
Biochemical oxygen demand (BOD_5) (at 20°C without nitrification)	**(2)**	mg/l O_2	< 3		< 5		< 7				
Total BOD		mgO_2/l							**3** *[3.0]*	5 *[3.0]*	*7 [3.0]*
Nitrogen by Kjeldahl method (except NO_3)		mg/l N	1		2		3				
Ammonia	**(1)**	mg/l NH_4	0.05		1	1.5	2	4 (O)	*[2.0]*	*[2.0]*	*[2.0]*

Substances extractable with chloroform		mg/l SEC	0.1		0.2		0.5				
Total organic carbon		mg/l C									
Total coliforms		number/100 ml	50		5 000		50 000				
Lactose-positive coliforms									100 *[1 000]*	1 000 *[1 000]*	5 000 *[1 000]*
coliphages		PFU/l							*[100]*	*[100]*	*[100]*
Faecal coliforms		number/100 ml	20		2000		20000				
Faecal streptococci		number/100 ml	20		1000		10000				
Parameter	**Notes**	**Unit**	**EU - Directive75/440/EEC**						**Ukraine - GOST 2761-84 *[SanPiN 4630.88]***		
Raw water class:			**A1** G	A1 I	A2 G	**A2 I**	**A3** G	**A3 I**	1	2	3
Salmonella			Not present in 5000 ml		Not present in 1000 ml						

Note (1): EU standard: Exceedence of mandatory concentrations because of exceptional meteorological or geographical conditions is allowed, but such exceedence may in no case disregard the requirements of public health protection;

Note (2): EU standard: in the case of surface-water in shallow lakes or virtually stagnant surface water, for parameters marked with an asterisk in the table in Annex II, this derogation being applicable only to lakes with a depth not exceeding 20 m, with an exchange of water slower than one year, and without a discharge of wastewater into the water body.

Note (3): EU standard: the values given are upper limits set in relation to the mean annual temperature (high and low).

Note (4): Ukrainian standard: up to 1500 mg/l, if approved by the sanitary-epidemiological services.

Note (5): Ukrainian standard: up to 10 mole/m³, if approved by the sanitary-epidemiological services..

Note (6): SanPiN defines Maximum Allowable Concentrations for 1345 chemical parameters. Only values referring to chemical parameters included in GOST or EU directive are listed in the table.

Application of the EU directive: The EU Directive divides each raw water class into two sub-classes, noted "G" and "I". "G" values are guidelines, while "I" values are mandatory. Surface water shall be assumed to conform to a class if it complies with the limiting values and concentrations in the case of 95 % of the samples for parameters conform to the T value, 90 % of the samples conform to the T and "G" value; and in the case of the 5 or 10 % of the samples which do not comply (a) the water should not deviate from the parametric values by more than 50 %, except for temperature, pH, dissolved oxygen and microbiological parameters; (b) there should be no resultant danger to public health; (c) consecutive water samples should not deviate from the relevant parametric values.

The EU Directive may be waived: (a) in the case of floods or other natural disasters; (b) in the case of exceptional meteorological or geographical conditions, for some parameters only (see Appendix 1); (c) if surface water undergoes natural enrichment in certain substances; (d) in the case of surface-water in shallow lakes or stagnant surface water, for some parameters only (see Appendix 1): this derogation is applicable only to lakes with a depth not exceeding 20 m, an exchange of water slower than one year, and without a discharge of wastewater into the water body). In no case may these exceptions disregard the requirements of public health protection.

Appendix 4. Drinking water: minimum requirements

Table 38: Minimum requirements on drinking water

Parameter	EU: 98/83/EC	Ukraine GOST 2874-82	Ukraine SanPiN 383-96	Unit	Note
Part A. Microbiological parameters					
Total number of micro-organisms	absence	100/dm³	100/dm³		A1
Escherichia coli (E. coli)	0/100ml	3/dm³	3/dm³		A2
Thermostable colibacilli (faecal coliforms index)			absence	CFU / 100 ml	A3
Pathogenic microorganisms			absence	CFU / l	A3
Coliphages	0/100ml		0 PFU / l		A3
Enterococci	0/100ml				
Pathogenic intestinal protozoan			absence	Cells, cysts/ 25 l	
Intestinal helminths			absence	Cells, eggs, larvae/25 l	
Part B. Chemical parameters					
Acrylamide (monomer)	0,10			ug/i	B1
Residual polyacrylamide		2		mg/l	
Antimony (Sb)	5,0			ug/i	
Arsenic (As)	10	50	10	M9/l	
Barium (Ba)			0,1	mg/l	
Benzene	1,0			Mg/i	
Benzo(a)pyrene	0,010		not detectable	Mg/i	
Beryllium (Be)		0.2		Mg/i	
Boron (B)	1,0			mg/l	
Bromate	10			Mg/i	B2
Cadmium (Cd)	5,0		not detectable	Mg/i	
Carbon tetrachloride CCl_4			2	Mg/i	
Chlorine (free)		0,3 to 0,5	0,3 to 0,5	mg/l	B12
Chlorine (fixed)		0,8 to 1,2	0,8 to 1,2	mg/l	B12
Chloroform			60	Mg/i	
Chlorophenols			3	Mg/i	
Chromium (Cr)	50			Mg/i	
Chromium VI (Cr)			not detectable		
Copper (Cu^{2+})	2,0	1,0	1,0	mg/l	B3
Cyanide	50		not detectable	Mg/i	
1,2-dichloroethane	3,0		not detectable	Mg/i	

1.1-dichloroethylene			not detectable		
Parameter	**EU: 98/83/EC**	**Ukraine GOST 2874-82**	**Ukraine SanPiN 383-96**	**Unit**	**Note**
Dibromochloromethane			10	ug/i	
Epichlorohydrin C_3H_5OCl	0,10			ug/i	B1
Fluorine (F)	1,5	1,2	1,5	mg/l	B11
Lead (Pb)	10	30	10	ug/i	B3 & B4
Mercury (Hg)	1,0		not detectable	M9/l	
Molybdenum (Mo)		0.25		Mg/i	
Nickel (Ni)	20		100	Mg/i	B3
Nitrate (NO_3^-)	50	45	45	mg/l	B5
Nitrite (NO_2^-)	0,50		not detectable	mg/l	B5
Ozone			0,1 to 0,3	mg/l	B13
Pesticides	0,10			Mg/i	B6 & B7
Pesticides — Total	0,50		0,10	Mg/i	B6 & B8
Polycyclic aromatic hydrocarbons (sum of concentrations)	0,10			Mg/i	B9
Selenium (Se)	10	10	10	Mg/i	
Strontium (Sr)		7,0		mg/l	
Thallium (Tl)			not detectable		
Tetrachloroethene and Trichloroethene (sum of concentrations)	10			Mg/i	
Trihalomethanes — Total (sum of concentrations)	100		100	Mg/i	B10
Vinyl chloride	0,50			Mg/i	B1
Zinc (Zn^{2+})		5,0		mg/l	
Part C. Indicator parameters					
Aluminium (Al)	200	500	200	Mg/i	
Ammonium (NH_4^+)	0,50			mg/l	
Chloride (Cl~)	250	350	250	mg/l	C1 & C5
Clostridium perfringens	0			number/100 ml	C2
Colour	Acceptable to consumers and no abnormal change	20 degrees	20 degrees		C8
Conductivity at 20 °C	2500			uS/cm	C1
Total hardness		7,0		mole/m^3	
Hydrogen ion concentration	6,5 to 9,5	6,0 to 9,0	6,5 to 8,5	pH units (note)	C1
Iron (Fe)	200	300	300	Mg/i	
Manganese (Mn)	50	100	100	Mg/i	
Mineral Oils			not detectable		

Odour	Acceptable to consumers and no abnormal change	2 points at 20°C and at 60°C	dilution factor below 2		C3
Oxidability (Permanganate)	5,0		4,0	mg/l O_2	C4
Parameter	**EU: 98/83/EC**	**Ukraine GOST 2874-82**	**Ukraine SanPiN 383-96**	**Unit**	**Note**
Sulphate (SO_4~)	250	500	250	mg/l	C1 & C5
Sodium	200			mg/l	
Surfactants			not detectable		
Taste	Acceptable to consumers and no abnormal change	2 points at 20°C	dilution factor below 2		C3
Colony count 22°C	No abnormal change				
Dry residue		1000	1000	mg/l	C12
Total organic carbon (TOC)	No abnormal change		3,0	mg/l	C6
Turbidity	Acceptable to consumers and no abnormal change	1,5 mg/l	0,5 nephelometric units		C7 & C8
Total volumetric activity of alpha emitters			0,1	Bq/l	
Total volumetric activity of beta emitters			1,0	Bq/l	
Radioactivity: Tritium	100			Bq/l	C10
Radioactivity: Total indicative dose	0,10			mSv/year	C9 & C10

Note A1: SanPiN: compliance required for 95% of water samples in water supply system being analysed during the year.

Note A2: SanPiN: or 98% samples of the water that come into water supply system and is analysed during the year; if on the stage of grown colonies identification BCG index exceeds the standard, additional research are conducted to check presence of faecal coliforms.

Note A3: SanPiN: if faecal coliforms are found in two successive water samples, analysis of the water looking for infectious diseases agents of bacteria or virus etiology (depending on the epidemical situation) should be started within 12 hours.

Note B1: EU standard: the parametric value refers to the residual monomer concentration in the water as calculated according to specifications of the maximum release from the corresponding polymer in contact with the water.

Note B2: EU standard: where possible, without compromising disinfection, Member States should strive for a lower value. The value must be met, at the latest, 10 calendar years after the entry into force of the Directive. The

parametric value for bromate from five years after the entry into force of this Directive until 10 years after its entry into force is 25 pg/l.

Note B3: EU standard: the value applies to a sample of water intended for human consumption obtained by an adequate sampling method at the tap and taken so as to be representative of a weekly average value ingested by consumers. Member States must take account of the occurrence of peak levels that may cause adverse effects on human health.

Note B4: EU standard: the value must be met, at the latest, 15 calendar years after the entry into force of this Directive. The parametric value for lead from five years after the entry into force of this Directive until 15 years after its entry into force is 25 Mg/l.

Note B5: EU standard: Member States must ensure that the condition that [nitrate]/50 + [nitrite]/3 < 1 (concentrations in mg/l) is complied with and that the value of 0,10 mg/l for nitrites is complied with water after treatment works.

Note B6: EU standard: 'Pesticides' means [organic insecticides, organic herbicides, organic fungicides, organic nematocides, organic acaricides, organic algicides, organic rodenticides organic slimicides, related products (inter alia, growth regulators)] and their relevant metabolites, degradation and reaction products. Only those pesticides which are likely to be present in a given supply need be monitored.

Note B7: EU standard: the parametric value applies to each individual pesticide. In the case of aldrin, dieldrin, heptachlor and heptachlor epoxide the parametric value is 0,030 pg/l.

Note B8: EU standard: 'Pesticides — "Total" means the sum of all individual pesticides detected and quantified in the monitoring procedure.

Note B9: EU standard: the specified compounds are: benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene, indeno(1,2,3-cd)pyrene.

Note B10: EU standard: where possible, without compromising disinfection, Member States should strive for a lower value. The specified compounds are: chloroform, bromoform, dibromochloromethane, bromodichloromethane. The value must be met, at the latest, 10 calendar years after the entry into force of this Directive. The parametric value for total THMs from five years after the entry into force of this Directive until 10 years after its entry into force is 150 pg/l.

Note B11: GOST 2874-82 distinguishes between 4 climatic regions (noted I to IV). Mykolaiv corresponds to the climatic region IV. The MAC for Fluorine is higher in regions I and II (1,5 mg/l) and lower in region IV (0,7 mg/l).

Note B12: SanPiN: if chlorine contacts with water more than 30 min.(free chlorine) or 60 min (fixed chlorine). In case there are both free and fixed chlorine in the water it is allowed to put under control one of them: residual free chlorine (when its concentration amounts more than 0.3 mg/dm^3) or residual fixed chlorine (when concentration of residual free chlorine is less than 0.3 mg/dm^3)

Note B13: SanPiN: if ozone contacts with water more than 4 min. Note C1: EU Standard: the water should not be aggressive.

Note C2: EU standard: this parameter need not be measured unless the water originates from or is influenced by surface water. In the event of non-compliance with this parametric value, the Member

State concerned must investigate the supply to ensure that there is no potential danger to human health arising from the presence of pathogenic micro-organisms, e.g. cryptosporidium.

Note C3: The Ukrainian standard is based on a discontinuous and subjective scale which has no equivalent in the EU standard. Note C4: EU standard: this parameter need not be measured if the parameter TOC is analysed.

Note C5: GOST: the sum of chlorides and sulphates, expressed as the fractions of the maximum permissible concentrations of each of them, shall not exceed 1.

SanPiN: the maximum values specified in GOST are acceptable under specific conditions.

Note C6: EU standard: this parameter need not be measured for supplies of less than 10 000 m^3 a day.

Note C7: EU standard: in the case of surface water treatment, EU Member States should strive for a parametric value not exceeding 1,0 NTU (nephelometric turbidity units) in the water exiting treatment works. SanPiN: 1,5 allowed in specific situation.

Note C8: Ukrainian standard: turbidity measurement with a photocolorimeter. If approved by the sanitary-epidemiological service, the maximum admissible colour is up to 35 degrees and the turbidity (during flood season) up to 2 mg/l.

Note C9: EU standard: excluding tritium, potassium -40, radon and radon decay products.

Note C10: EU standard: a Member State is not required to monitor drinking water for tritium or radioactivity to establish total indicative dose where it is satisfied that, on the basis of other monitoring carried out, the levels of tritium or the calculated total indicative dose are well below the parametric value. In that case, it shall communicate the grounds for its decision to the Commission, including the results of this other monitoring carried out.

Note C11: SanPiN: 500 pg/l is permissible when reagents used for water treatment includes aluminium.

Note C12: SanPiN: 1 500 allowed in specific situation.

Appendix 5. Wastewater: Maximum Allowed Discharges

Category of discharged water: domestic
Name of water body: Southern Bug estuary
Category of water body: High-priority fishing water body

Table 39: Maximum Allowed Discharges (MAD) from WWTP of Mykolaivvodocanal, as defined by the Ecology Department

№	Parameters	Actual concentration, mg/l	Actual discharge g/hour	Allowed concentration, mg/l	MAD,g/hour	Discharges,ton/year
1.	suspended solids	52	390000	15	112500	985.5
2.	mineralization	880	6600000	692	5190000	45464.4
3.	sulphates	135	1012500	146.9	1101750	9651.3
4.	chlorides	270	2025000	273	2047500	17936.1
5.	BOD5	50	375000	15	112500	985.5
6.	COD	102.7	770250	80	600000	5256
7.	Ammonia nitrogen	6.1	45750	10.3	77250	676.7
8.	nitrates	17	127500	12.24	91800	804.2
9.	nitrites	0.16	1200	0.07	525	4.6
10.	phosphates	2.3	17250	3.3	24750	216.8
11.	petroleum products	0.9	6750	0.8	6000	52.6
12.	POP	1.07	8025	0.7	5250	46
13.	iron	0.52	3900	0.34	2550	22.3
14.	copper	0.02	150	0.007	52.5	0.45
15.	zinc	0	0	0.007	52.5	0.45
16.	chrome3+	0.005	37.5	0.008	60	0.53
17.	chrome6+	0.007	52.5	0.008	60	0.53
18.	nickel	0	0	0	0	0

Approved characteristics of discharged water:

floating impurities-none
smell, taste - water must not add specific taste to fish
colour (transparency)- water must not have extrinsic colour
temperature of expansion- not more than 5˚C
pH reaction- 6,5-8,5
dissolved oxygen in winter time- not less 6mg/dm³
colifags<100/l
enterobacilli- 10000/l
germinative eggs of helminths- none

Category of discharged water: industrial
Name of water body: Southern Bug estuary
Category of water body: High priority fishing water body

Table 40: Maximum Allowed Discharges (MAD) from WWTP of Mykolaivvodocanal, as defined by the Ecology Department

№	Parameters	Actual concentration, mg/l	Actual discharge g/hour	Allowed concentration, mg/l	MAD, g/hour	Discharges, ton/year
1.	suspended solids	80	24000	26.95411	8086.2	70.836
2.	mineralization	840	252000	840	252000	2207.52
3.	sulphates	280	84000	128	38400	336.384
4.	chlorides	230	69000	230	69000	604.44
5.	BOD5	8	2400	6.87	2061	18.054
6.	COD			80	24000	210.24
7.	Ammonia nitrogen	0.14	42	0.14	42	0.368
8.	nitrogen of nitrates	2.5	650	2.5	750	6.57
9.	nitrogen of nitrites	0	0	0	0	0
11.	petroleum products	0.75	225	0.75	225	1.971
12.	iron	0.06	18	0.06	18	0.158

13.	copper	0.02	6	0.012616	3.7848	0.033
14.	zinc	0	0	0	0	0
15.	chrome3+	0	0	0	0	0
16.	chrome6+	0	0	0	0	0
17.	nickel	0	0	0	0	0

7. Approved characteristics of discharged water:

floating impurities-none
smell, taste - water must not add specific taste to fish
colour (transparency)- water must not have extrinsic colour
temperature of expansion- not more than 5˚C
pH reaction-6,5-8,5
dissolved oxygen in winter time- not less 6mg/dm³
colifags<100/l
enterobacilli-10000/l
germinative eggs of helminths-none

Table 41: Background Data for MAD Normes for Mykolaivvodokanal

№	Parameters	MAD for fishing water bodies, mg/l	Natural concentration, mg/l	Actual concentration, mg/l	Concentrations in 1998, mg/l	Allowed concentrations, mg/l	Background Document
1.	suspended solids	+0,25 to natural	22.2	52	41.7	15	PKMU№465 of 25.03.99
2.	mineralization	1000		880	692	692	
3.	sulphates	100	207.6	135	146	146.9	
4.	chlorides	300	1854	270	273	273	PKMU№465 of 25.03.99,
5.	BOD5	2.24	4.04	50	33	15	
6.	COD	15	13.3	102.7		80	PMKU №465 of 25.03.99
7.	Ammonia nitrogen	0.39	35.7	6.1	10.3	10.3	
8.	nitrates	40		17	1.6	12.24	

9.	nitrites	0.08		0.16	0.07	0.07	
10.	phosphates	0.17		2.3	3.3	3.3	
11.	petroleum products	0.05		0.9	0.8	0.8	
12.	POP	0.1		1.07	0.7	0.7	
13.	iron	0.1	0.24	0.52	0.34	0.34	
14.	copper	0.001	0.006	0.02	0.007	0.007	
15.	zinc	0.01	0.0116	0	0.007	0.007	
16.	chrome3+	0.005	0	0.005	0.008	0.008	
17.	chrome6+	0.002	0	0.007	0.008	0.008	
18.	nickel		0.0037	0	0	0	PMKU №465 of 25.03.99

Table 42: Limits of pollutants discharge into surface water bodies for Mykolaivvodokanal

№	water body receiving pollutants	Limit volume of water discharge, mln m³/year	pollutants, tons/year			
	Southern Bug Estuary	65.7	2005	2006	2007	pollutants
			1992	1992	1992	suspended solids
			9855	9855	9855	sulphates
			17936.1	17936.1	17936.1	chlorides
			985.5	985.5	985.5	BOD5
			45.333	45.333	45.333	ammonia nitrogen
			105.12	105.12	105.12	nitrates
			4.599	4.599	4.599	nitrites
			204.984	204.984	204.984	phosphates
			49.275	49.275	49.275	petroleum products
			45.99	45.99	45.99	POP
			7.03	7.03	7.03	iron
			0.4599	0.4599	0.4599	copper

			0.4599	0.4599	0.4599	zinc
			0.3942	0.3942	0.3942	chrome3+
			0.3942	0.3942	0.3942	chrome6+
			0	0	0	nickel