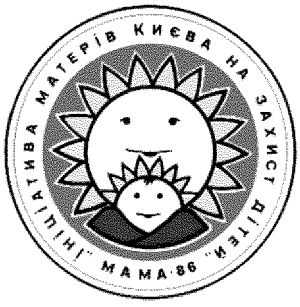
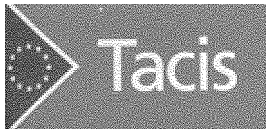
DRINKING WATER IN UKRAINE: COMMUNICATION AND EMPOWERMENT FOR LOCAL AND INTERNATIONAL ACTION





This case-study is a joint initiative between MAMA-86 and UNED-UK.
It has been completed as the result of a multi-sectoral seminar on drinking water issues from 4-7th April 1998 in Kyiv, Ukraine.
(For a full list of participants see annex 1).

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This report is only a start in the process of gathering support and information to facilitate the improvement of drinking water quality in Ukraine. It represents the views of our seminar participants, and is open to further comments and consultations from representatives of any major group or stakeholding sector. We welcome your feedback, views and information for inclusion in a second edition which will be prepared in time for the London WHO Conference on Health and Environment in June 1999.

Please, bear this in mind as you read the case-study, and send your comments in English, Russian or Ukrainian to:

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CONTENT

EXECUTIVE SUMMARY

This case-study reports on the efforts of a grassroots women's initiative in different regions of Ukraine to kick start a process of open and multi-sectoral debate on drinking water quality issues. The Ukrainian organisation MAMA-86 has undertaken independent research and analysis into drinking water quality and public perceptions and uses of household water.

MAMA-86 have initiated discussions and networks between water experts and major stakeholder groups from Ukraine and has teamed up with a UK NGO the United Nations Environment and Development Committee UK (UNED-UK) to bring UK water experts to Ukraine to participate in the discussions at the seminar in Kyiv in April 1998.

NGOs and experts: face-to-face

These discussions represent the first opportunity for different stakeholders to meet and share information, and give their perspectives in an integrated, multi-sectoral debate on water quality issues in Ukraine. The seminar takes into account the international and national processes currently underway to reach new standards of protection for fresh water resources.

Experts from different fields shared their expertise, and the participants, who represent a wide range of stakeholder groups, used this data together with their own experiences, and priorities to come up with the perspectives and recommendations listed in the report.

This report is part of an ongoing process aimed at publicising the issues and views from different sectors. Any editions and feedback will be incorporated in a second edition which will be published prior to the London WHO conference on health and environment in June 1999.

The principle recommendations of the participants included:

- the need to involve all major groups, in planning, implementing and monitoring changes;
- action to inform the public and major sectors in the principles of sustainable development, water safety, and public health issues;
- the need for new legislation, frameworks and standards for water supply, sanitation and monitoring in Ukraine;
- introduction of integrated river basin approach to cycle of water supply and sanitation;
- better monitoring systems for water quality and disease, which are accessible to the public;
- public health body co-ordination of water quality monitoring and supply;
- investment in pipelines and purification systems;
- policies to use pricing instruments as tools to increase investment in water supply, and discourage pollution;
- need for international co-operation and networking but also to develop solutions and technology locally, and to encourage "native brains" to be involved.

INTRODUCTION

This case study deals with the activities of MAMA-86, a community based women's NGO in Ukraine, which has initiated a national project on fresh water quality, bringing together community activists from different parts of the country with representatives of other stakeholder groups and government to facilitate an integrated approach to discussions on drinking water issues. UNED-UK, a UK NGO which promotes the participation of a range of stakeholders in UN activities, has assisted in bringing an international perspective to the Ukrainian project.

The MAMA-86 drinking water project was initiated after consultations with women community leaders from around the country. At a meeting of Ukrainian women's NGOs in April 1997 which discussed the Beijing Platform for Action, the participants considered Health, Environment and Economics, the most pressing issues for Ukrainian women. At a later consultation in July 1997, drinking water quality was identified as a key issue for action. From this network four organisations from different regions of Ukraine, including Kyiv, emerged as co-ordinators of a national campaign on drinking water.

The campaign has been funded by the Dutch agency NOVIB, with international support funded by the Know How Fund and co-funded by Charity Know How . The campaign aims to:

- research the drinking water quality in these regions;
- raise public awareness about the issues, and provide information about water safety;
- bring together experts and representatives from different groups to establish a clearer picture of the situation in Ukraine, and to stimulate co-operation and debate between different sectors;
- exchange already existing good practice from Ukraine and overseas in methods of water purification & supply;
- lobby and build public pressure for a change in water policy ;
- use international events such as WHO and CSD to highlight the Ukrainian situation and to promote participation and consultation.

THE INTERNATIONAL PERSPECTIVE

The international activities of the CSD and WHO currently offer opportunities for lobbying and participation on drinking water issues at a local, national and international levels. MAMA-86 are collaborating with UNED-UK, their long-term UK partner organisation, to ensure that Ukrainian NGOs have the information they need to use these opportunities. UNED-UK is currently acting as co-ordinator of NGO input to the WHO Health and Environment process. As a result of this collaboration a skillshare for major groups representatives and a water experts' seminar were organised in Kyiv in April 1998. Six UK representatives contributed to discussions with their Ukrainian counterparts on issues of public health and disease control, pollution reduction, water resource management and supply, legislative structures and local participation and implementation.

DEFINING THE PROBLEM: DRINKING WATER QUALITY IN UKRAINE - THE CURRENT SITUATION

The following information was gathered at a preliminary meeting of Ukrainian water experts in December 1997 organised by MAMA-86.

Overview:

The present day situation with the drinking water supply in Ukraine could be characterised by the intensive pollution of the surface and groundwater resources. Under the current conditions of industrial stagnation and economic degradation the amount of pollution should have decreased. However, the deteriorating efficiency of the wastewater purification plants that are still operating destroys the potentially environmentally "positive effect" of the crisis almost completely.

The condition of the sewerage system, the state of the water pipelines system and agricultural drainage contribute to the general state of the drinking water supply as well as industrial and pesticide pollutants. Up to 30% of water is lost in the pipelines due to leakage, and there is evidence that water quality is reduced while it is in the pipelines. Pesticide pollution is prevalent due to leakage from unofficial pesticide dumps, and salination and mineralisation of ground water in areas of agricultural irrigation pose a major threat the health of communities. Equipment and monitoring systems are inadequate, and the information available to the public is minimal and confused. Many health problems are considered to be associated with poor water quality, and in some regions water shortage is also a problem.

According to data provided by WHO more than 1 billion of the Earth's inhabitants do not obtain enough drinking water of adequate quality. To supply everyone with such water it is necessary to prevent the further pollution of rivers and other natural reservoirs, and to save water resources which are carelessly consumed in some regions. It is a gigantic and complex program which requires tremendous investments, but still

should be launched at the nation-wide and local levels. We especially need it on the environmentally threatened territory of Ukraine.

The capital Kyiv is in a better situation than most other areas of Ukraine. With a territory of 603,8 thousand sq km, Ukraine is the second largest country in Europe, with 30% of the population living in rural areas. There is a huge gap in the level of infrastructure, standard of living and security between the capital and other cities, and again between cities and villages, centre and province. These disparities reflect the urgent need for a Local Agenda 21 approach to be implemented as the main principle of a Sustainable Development Programme. This is true not only in Ukraine and not only for the drinking water problem, but everywhere in the post-Soviet countries, where there has been no bottom-up approach over the last 70 years.

Information on specific regions where MAMA-86 have initiated the drinking water project:

Tatarbunary:

The town of Tatarbunary, in Odessa region of Southern Ukraine is located in the Budzhatska Steppe area, which has suffered from water shortage for centuries.

Salination: Under the Soviet regime the Black Sea Bay of Sassyk was partly desalinated and converted into a fresh water lake. The main purpose of the desalination was to provide a fresh water reservoir for irrigation. The use of water from Sassyk for irrigation caused soil salination, and salination in natural drinking water sources, as well as loss of recreational facilities at the lake. As a result of the irrigation, algal bloom has become a problem on the lake in early spring and late summer making it unsafe for the residents of the region.

The only sources of drinking water in the region are artesian drillholes and wells. This underground source exceeds the Ukrainian standard of mineralisation, and nitrate levels are very high. There is no centralised piped water supply in the area, and drinking water is transported in tanks rather than through pipes in most cases, though some flats have water piped in from small reservoirs that have been filled from artesian wells. This supply is not always chlorinated.

Prevalent health problems in the region: Diseases among children and pregnant women are particularly high, including metabolic diseases, nephritis, polyarthritis, scoliosis, and pregnancy related illnesses.

Odessa:

In the city of Odessa there is also water shortage: tap water is switched off twice a day for a period of several hours.

Pipelines: The condition of pipelines is poor. 28 - 30% of water per person a day is lost through pipe leakage. Independent experts claim that the quality of water as it comes out of the taps is much worse than the quality of water as it leaves the purifi-

cation plant. Evidence suggests that purity is much reduced during transportation in the pipes. Drinking water analysis from one district of the city found an excess of residual active chlorine, demonstrating hyper-chlorination of the supply.

Prevalent health problems in the area: endocrine and urinary system disorders, blood diseases and oncological diseases. Also intestinal (dysentery, viral hepatitis etc) and measles, whooping cough, meningitis and diphtheria.

The results of a poll taken among the general public in one district showed that only 4.8% of respondents considered their health to be good, while 51.7% described their health as bad or very bad. People complain of frequent headaches, eye pains, nervousness, coughing, nose bleeding, pains in the abdomen, nausea, vomiting, heart pains and palpitation.

There are a number of other sources of contamination located in this district, such as a sewage works and a facility for cleaning out railways containers which permanently influence air quality.

Artemivsk:

The town of Artemivsk is located in a heavily polluted industrial and mining area. The tap water is highly contaminated and has a dark colour.

The water supply comes from artesian drillholes and the Severskiy Donets-Donbass Channel. Research indicates that the groundwater in the layers closest to the surface is heavily polluted. Relatively clean groundwater can be found only in the non-industrialised areas. In the industrial centre of the region, groundwater is polluted with: mercury, nitrates, zinc, fluorine and arsenic, all well above safety levels. A high level of mineralisation is also found.

Prevalent health problems in the region include: gastro-intestinal diseases, respiratory diseases, blood exchange disorders, and oncological diseases. Non-infectious diseases caused by heavy metals, halogens, pesticides and nitrates are prevalent.

Kyiv:

Kyiv has high levels of air and water pollution, including the post-Chernobyl effect on surface water and soil. Water pipelines are in bad repair and are not regularly maintained.

Hyper-chlorination is acute, especially during times of natural flooding. Artesian drillholes can be accessed directly from pumps in the street, and these are highly popular, as they are generally regarded as a safer source than tap water.

Prevalent health problems in the area connected to drinking water include: hepatitis, oncological illness, metabolic disorders, endocrine disfunction, allergies and all sorts of skin diseases including dermatosis and eczema.

STRATEGIES FOR CHANGE

STRATEGIES FOR CHANGE 1: INFORMATION AND TRANSPARENCY

Achieving cleaner water requires a range of interventions at government, industry, community, consumer and individual level. This requires transparency of information from government and industry, not just on the nature and extent of water pollution, but also on investment programmes to reduce pollution and who pays and who benefits from such interventions.

There is no tradition in Ukraine of disclosing information or co-operating with the non-governmental sectors or consumers, and it is difficult for the public to obtain clear information from official sources about water quality. The public needs information about their water quality including what practical steps they can take to improve it, and to protect themselves and their families from health risks associated with inadequate water.

Basic data about who uses most water, who pollutes most water, with what, when and for how long is needed to inform on the introduction of a toxics use reduction strategy to water pollution.

MAMA-86 independent water research:

In the face of this confusion and lack of information, MAMA-86 decided to undertake their own independent tests on tap water quality, and have them analysed and verified by Kyiv's L. Medved Institute of Eco-Hygiene and Toxicology, a certified laboratory.

Microbiological, sanitary-chemical, and organoleptic studies of drinking water samples from the cities of Kyiv and Odessa, and the towns of Tatarbunary and Artemivsk were carried out at the above laboratory. Sampling, storage and transportation of water samples were done according to the national requirements on drinking water and methods of sanitary-bacteriological analysis of Ukraine (GOST 18963-73). The full test results are listed in annex 4.

The points of greatest concern from the analysis are as follows:

The analysis of the organoleptic characteristics of all samples shows that they all meet the national requirements (GOST 2874-82), though there was some insignificant deviation.

An extremely high level of mineralization ie inorganic compounds was detected in drinking water samples from Tatarbunary, in the Odessa region. Dry residue in three out of five samples 1.5 times exceeds the Ukrainian maximum allowable level (MAL) and in one sample it is 7 times higher.

Heavy metals content in many samples does not meet the national require-

ments: the presence of iron in one sample from Artemivsk is 2.5 times the MAL. In one sample from Tatarbunary the iron content exceeds the standard by 1.5. The concentration of iron in several samples from Kyiv and Odessa is also relatively increased. Experts submit that this is caused by the deteriorating state of the water pipeline system.

Microbiological analysis revealed that one sample of drinking water from Kyiv does not meet the sanitary requirements on drinking water quality. The microbe level is double the MAL.

Nearly all samples from the above cities and towns contain organochlorine compounds. In samples from Odessa the pesticide content is excessive. The concentration of hexachlorcyclohexanes (HCCH) exceeds the MAL by 2.5 times and in one sample is 20 times the MAL. In two samples from Tatarbunary the content of hexachlorcyclohexanes is also enlarged. In one sample from Kyiv the amount of HCCH fluctuates closely to the MAL.

DDT and its metabolites are detected in excessive concentrations in two samples from Odessa, and in one from Kyiv it is very close to the limit. One sample from Odessa showed contamination with DDT proper. In other samples obsolete pollution with DDT metabolites was found. In the sample from the small river Fontanka in Odessa the herbicide simazin was detected. This is one of the stable herbicides applied in irrigation for farming.

MAMA-86 sociological study:

As no data was available as to how the public perceive their water supply, MAMA-86 decided to undertake some research into public attitudes and habits regarding drinking water. The questionnaire was drawn up by independent experts

Water project coordinator of MAMA-86 is reporting on Sociological Survey

and the results were processed by the Institute of Sociology of the National Academy of Science of Ukraine.

The survey was carried out by local women's and environmental NGOs, who are partners of MAMA-86. They collected 1678 completed surveys from members of the public in eleven cities and towns of Ukraine (Kyiv, Odessa, Dnipropetrovsk, Dniprodzerzhinsk, Kharkiv, Poltava, Lviv, Ternopil, Sevastopol, Artemivsk, Tatarbunary). A higher representation of women was deliberately ensured (76.9% versus 22.6% men) because women deal more closely with water in household activities, eg cooking, laundry, feeding children etc. Only 15.7% of respondents were involved in water issues through their work in some way, and the other 84.3%, were answering purely as household water consumers.

48.7% of respondents consider their annual family budget as inadequate, and 40.7% as extremely inadequate.

54% of the 86.7% who use water from centralised supply systems reported that the supply is interrupted either regularly or from time to time without warning.

35.5 % of the respondents do not bother to boil their drinking water, with this percentage as high as 65.7% in some regions. 7.9% treat their water with a filter, and 6.8% drink bottled water.

23.4% report some extraneous odour from their water, and this figure is as high as 46.5% in some regions.

Rusty sediments proved a problem in all areas, with 52.9% reporting sediment in water which has settled. 72.5% notice sediments in water after boiling. This is partially caused by rust in iron pipes, and is generally a sign of low quality drinking water. 34.1% experience rusty stains appearing on linen during presoaking for laundry.

Respondents were asked to assess their state of health. 10.3% assessed their health as "good", 58.3% as "satisfactory", 21.2% as "bad", and 2.3% as "very bad". Therefore almost a quarter of the respondents suffer from bad health.

When asked about the specific ailments they suffer from, 48.8% reported skin related problems and 88.1% reported increased skin problems after washing dishes. Only 18.2% of the respondents were aged 51 or older, yet the range and incidence of illness reported is extremely high. 49.6% answered that they suffer from depression.

64% of respondents perceive drinking water quality as a major environmental problem, and 50.6% of them believe that state funding is required to improve the situation. 43.3% believe the problem must be managed by local government and businesses initiatives. 21.3% believe they must rely on their own devices to improve water quality, and 15.6% consider that a large scale public awareness raising drive is necessary. 6.9% believe the current supply is adequate.

Information as a platform for action:

These two research documents represent the first attempt by local independent organisations to collect their own data on water quality. Within the first week of publication, they have received enormous public interest, and twenty four press and media features have helped to spread the information, raise awareness and stimulate public debate. Together with the results of the seminar, the research is being presented to local governments and water utilities around Ukraine by the NGOs who helped to collect the data. The data has successfully drawn public attention to the issues, and has set the scene for a more open and informed debate between the different sectors, the government and the public.

STRATEGIES FOR CHANGE 2: CO-OPERATION

Co-operation with experts:

The co-operation of experts is vital in obtaining information about the state of water supplies and quality, so that the debate can include those who are responsible for water quality. It is currently difficult to achieve any open dialogue with water authorities.

MAMA-86 therefore invited representatives from water supply and regulation authorities from around the country to a seminar to hear the results of their independent research. The MAMA-86 research formed the basis for discussion, and many officials who have never previously co-operated with NGOs attended and made their own data available for inspection.

It is not often in former Soviet Union countries that the city officials are reporting to the auditorium marginalized

These included Senior Medical Officers and Microbiologists from the Ukrainian Ministry of Health, the Deputy Chief Engineer of Odessa's Water Utility, representatives from Sanitary-Epidemiology Stations, which are water quality regulators, and scientists from water purification plants. Other official participants included: the Head of the Department of Water Resources at the City Environmental Management, and the Deputy Chief of the External Relationship Management at the Ministry for Environmental and Nuclear Safety. He described the negotiations for the draft WHO Protocol on fresh water, in which Ukraine is playing a key role.

Deputy Chief of European Ministries for Environmental Protection's negotiations on the draft WHO Protocol on fresh water is speaking of the leading role of Ukraine to initiate the water protocol negotiations

Other stakeholders with an interest in water quality were also represented, including business and industry, academics and researchers, journalists, NGOs and women's groups. These included scientists from the Research Institute of Eco-Hygiene and Toxicology, manufacturers of water filters, environmental campaigners, and the community based NGOs from around the country who are water consumers as well, and who have worked with MAMA-86 on collecting the data.

Networking the major stakeholders:

It was the first time for many NGOs present that they had access to the authorities, and the first attempt from the authorities to share their knowledge and opinions with members of the public. The networking has already proved fruitful:

- A system for providing clean drinking water organised by private bussiness in the streets of Odessa has been taken up by other local authorities who would not have known about it if they had not attended the MAMA-86 seminar.

- NGOs and business people from Kyiv also had their first opportunity to make contact with their local government representatives.

- Local activists from the Tatarbunary region who have been campaigning for years against a destructive irrigation system, met the engineers responsible for the system for the first time. Some conflict resolution methods were required to make this encounter positive for both sides, but in the end, it was agreed that the meeting was fruitful!

- Government officials responsible for the NEHAP and the WHO Water Protocol both agreed to NGO demands by committing to a public consultation on these documents.

Multi-sectoral meetings such as this were considered as highly constructive by the majority of the participants.

International networking and action:

There is clearly a need to share experience and learn from examples in other countries. Six UK experts on different aspects of fresh water attended the seminar to share their expertise. They outlined some strategies to improve drinking water quality, and to mobilise community participation in activities to improve health and environment.

Participation in the CSD and the WHO processes should provide opportunities for lobbying national and local government. Information about these events and how to participate was provided at the seminar, and the seminar report will be disseminated as a lobbying and awareness raising tool. A presentation of the project and the case-study is planned at the UN during the 6th session of the CSD in 1998, with a follow-up at the WHO Conference in London in 1999.

STRATEGIES FOR CHANGE 3: PARTICIPATION

How we can use UN initiatives to mobilise locally for joint action on health and environment? It is clear from the MAMA-86 research that large numbers of people believe that action must be taken at community level to achieve improvements in human health and environmental quality. How can we use international agreements to bring these two areas of action together? Chris Church, Health Advisor to UNED-UK, made the following suggestions:

If we are to work to develop joint action plans for health and environment issues, then it is important to see how these issues are linked at an international level. There is a number of key agreements. These include:

- Agenda 21 - Agreed at the 1992 UN Earth Summit in Rio. Chapter 6 of Agenda 21 deals with Health issues; the Agenda 21 document has been endorsed by over 175

governments;

- Health for All - the World Health Organisation programmes that seek to promote public health strategies;
- The European Environmental Health Action Plan 1994, which calls on every nation to develop a National Environmental Health Action Plan (NEHAP). These are linked to the WHO's Charter on Environment and Health.

There are some key similarities in what these documents say. The Health for all European programme states in target 18 that: "By the year 2000 all Member states should have developed and implemented policies on the environment and health that ensure ecologically sustainable development, effective prevention and control of environmental health risks and equitable access to healthy environments"

Chapter 6 of Agenda 21 states in the introduction that: "Action under Agenda 21 must address the primary health needs of the world's population, since they are integral to the achievements of the goals of sustainable development and primary health care."

This is mirrored in the WHO 'Ottawa Charter for health promotion' which states that: "The fundamental conditions and resources for health are peace, shelter, education, food, income, a stable ecosystem, sustainable resources, social justice and equity. Improvements in public health require a secure foundation in these basic prerequisites".

These issues will be explored further at the next European Ministerial Conference, which takes place in London in June 1999. This will review work done across Europe on 'NEHAPs', and seek to move the agenda on from making plans to implementation. The 1999 Conference will cover a range of issues, including:

- Transport, environment & health
- Public and NGOs involvement
- Water-related diseases
- Industry and workplace issues
- The health of children
- Multi-national activity
- NEHAP implementation

How can we use these international agreements on a local level?

The documents and ideas that emerge from this event will provide a basis for action by all sectors of society. In all these documents there are some important common principles. They can be summarised in this way:

- Development must be equitable if it is to be truly sustainable
- An interdisciplinary & holistic approach is necessary
- Action at a local level is essential by all sectors
- Promoting public participation is key to this process

Some ideas for effective action on a local level might include:

'Stakeholder analysis' for both health and environment:
Workers in the health sector and in the environment sector often see the same issues from different perspectives. It is important that such people co-operate from the start to identify all types of people who will be affected by local health and environment action planning.

Mutual understanding:
Such programmes involve people from different sectors and with different expertise. It is important to provide meetings and discussions where all important issues can be addressed so that all the players understand each other's concerns.

Agreement on 'good practice':
It is often valuable to learn from existing 'good practice', or examples of what has worked in another locality. People may be more motivated by an inspiring example than being told to do something because it is a legal duty. But if we are to describe projects as examples of 'good practice' then we need to get agreement on what that means.

Action on both policies and projects:
If we are to change the current situation then we need practical projects that show how our ideas work in practice. We also need change at a policy level (both government and local government) that will lead and support action in all sectors.

It is important to be aware of the international agreements that your government has signed, such as those mentioned above, so that you can remind your government that they have made commitments for action, and that you want to know what they are doing to fulfil these commitments.

STAKEHOLDERS' PERSPECTIVES:

After discussion of these ideas seminar participants made the following recommendations on the potential use of international initiatives in Ukraine:

We can make use of Agenda 21, the CSD and WHO processes in our work:

- to prove awareness and co-operation between major stakeholders;
- as a real opportunity to participate in international events associated with the implementation of Agenda 21;
- possibilities to co-operate with foreign partners in implementation of Agenda 21;
- increasing the role of NGOs and major stakeholders;
- an opportunity to pressurise our national and local government;
- an opportunity to influence governments of other countries, and international organisations;
- an opportunity to find new funding and resources;
- exchange information and experience internationally;
- obtain new information and educational materials;

- learn about others' criteria for priority setting, and value systems;
- learn new methods of information dissemination;
- gain the support of the international community for our initiatives, multiplication of efforts.

One of the working groups uniting NGOs, experts and business people

What are the obstacles to our participation in these events?

- institutional and legislative obstacles;
- financial obstacles;
- lack of interaction and the alienation of government and NGO sectors;
- lack of trained and experienced personnel;
- low awareness of government (including Ministry for Environmental Protection) and of stakeholders on the concepts of sustainable development;
- the need to unify environmental and health standards;
- lack of mechanisms and infrastructure for monitoring and enforcement of standards.

Who do we need to work with to make use of these UN agreements?

- All members of the "third sector" ie NGOs, individuals, interest groups, academics, domestic producers, mass-media, local authorities;
- elected officials at different levels;
- potential donors;
- economic actors;
- general population;
- direct contacts with scientists.

Many NGOs are now active in the fields of health and environment in Ukraine, but as we see from the list of obstacles above, their capacity for action is often hampered by lack of support from the government. The following initiatives are now being made to improve NGO communication with government.

A Consultative body of NGOs for the Ukrainian government:

As a result of the March 1998 elections in Ukraine, nineteen Members of the Green Party have been elected. This brings new hope to the third sector, as many of the newly elected come from the environment movement, and are acutely aware of the need for greater communication and access to policy-makers. As the Greens will still be a small group in parliament, their influence will be greater if they are supported by public pressure and NGOs' demands which are heard by policy-makers. According to Sergei Kurykin, a new Green Party Member of Parliament, they aim to establish a formal process for consultation which will ensure that NGOs are heard by decision-makers.

Ukraine's National Environmental Health Action Plan (NEHAP)

In March 1998 the Ukrainian Ministry of Health and the Ministry for Environmental Protection and Nuclear Safety published a plan for writing the Ukrainian NEHAP. MAMA-86 submitted the chapter on public participation, which has been accepted as part of the official plan.

Key points from the Public Participation Chapter of the NEHAP:

Legislation currently exists in Ukraine to ensure public access to information concerning the condition of the environment and public health. These laws include the Constitution, environmental protection, health protection, nuclear power legislation etc. However, in practice state systems still lack transparency, as no mechanisms have been developed to promote public awareness, and there is no legislation giving the public the right to participate in decision-making, or to be involved in planning initiatives.

Public concern was highlighted in an opinion survey carried out by the Foundation for Democratic Initiatives in February 1996. 76.6% of respondents felt the country needed "more environmental security", the same percentage agreed that the country needed more "chiefs who are able to rule the country", and 81.3% were concerned by the lack of "stability in the state and in society".

The public's confidence in the government's ability to tackle these problems will only increase if the government develops some mechanisms for interaction with those NGOs who are able to provide a dialogue between state structures and the major sectors of society. Government support of NGOs and respect for their pluralism and independence would ensure the effectiveness of government's own initiatives, as well as independent and joint initiatives to improve environmental and human health.

The following actions are proposed to promote public participation on these issues:

- negotiate a mechanism for collaboration between NGOs and government;
- improve legal mechanisms to provide for community participation in decision-making on health and environment issues;

- establish a process for NGO participation in the implementation of the NEHAP;
- ensure specifically the involvement of women and women's NGOs in the discussion on and implementation of the NEHAP;
- create educational and training programmes to teach and promote interaction between local administration, NGOs and representatives of local self-governance organisations;
- create a "Bonus for Environmental Citizen's" Foundation, in co-operation with regional Councils, to promote and encourage good practice in NGOs and independent citizens' initiatives.

The plan for preparing the NEHAP is promising, but the question of how it will be financed is unclear. In order to be effective, sufficient resources will have to be committed to its preparation and implementation.

STRATEGIES FOR IMPROVING DRINKING WATER QUALITY

STRATEGIES FOR IMPROVING DRINKING WATER QUALITY 1: PUBLIC HEALTH ISSUES

Galina Kortchak, Md, Head of Microbiology Laboratory at the Ukrainian Ministry of Health Hygiene Centre, describes the communicable disease prevention systems in Ukraine as they relate to drinking water supply in Ukraine:

Ukraine has a fairly wide network of laboratories, which are involved in monitoring the quality of water resources, drinking water and waste water. Monitoring is done by the Sanitary-Epidemiology Service of the Health Ministry, and also at the level of local municipal administration.

In the year 2000 new sanitary regulations will be introduced for decentralised water quality control. These measures have been made necessary by the degradation of water quality, caused largely by insufficiently treated waste waters. Around half of the waste water discharged into natural water resources is insufficiently treated or non-treated at all.

Up to 16.8% of samples tested from the centralised water supply in several Ukrainian regions do not meet the acceptable standard (See Fig.1 in annex 2). In 1996 dangerous levels of bacteriological contamination was found in tap water in four regions of Ukraine (See Fig. 6, annex 2). This is a public health risk which threatens epidemics. In Sevastopol, 1996 all the water samples had index of more than 20 pathogens, causing a significant rise in hepatitis A.

Leaving the microbiological indices aside, about 10% of tests taken annually do not meet the organoleptic requirements, with mineralization and chemical contents exceeding the maximal allowable level.

Rural consumers, who amount to 30% of the total population of Ukraine, are even worse off. Almost every third sample from rural well water fails to meet standards, and every 8th sample of water from piped supply systems reveals bacteriological pollution.

It is universally acknowledged that water is one of the important carriers of communicable diseases. The following figures are for the period 1992 - 1996:

- 29 outbreaks of water borne acute intestinal communicable diseases were registered (Tab. 8, annex 2). The total number of sick people reached 7400;
- dysentery morbidity increased in the vast majority of regions due to low quality water. Contamination of piped water occurred as a result of emergency discharges into the water supply and sewerage systems;
- the cholera pathogen was found in six regions;
- Hepatitis morbidity accounted for 255.5 cases of illness per 100,000 people.

This data, alongside the low quality water in Ukraine's natural sources, proves

the interdependence of drinking water quality and inadequate water treatment techniques. As for hepatitis A virus contaminated water disseminates it widely and easily and it is one of the leading communicable diseases after flu and respiratory diseases.

Considering the level of contamination of water sources the following preventive measures are strongly advised:

- nationwide action to construct, and update existing, purification plants implementing modern effective techniques;
- prevention of the additional drinking water contamination in water supply systems and drillholes through planned replacement of old defective water pipes with new ones of anti-corrosion material;
- development and implementation of new national sanitary standards and regulations on drinking water quality and hygiene requirements for the centralised drinking water supply;
- new approaches to wastewater discharge into natural resources;
- a national programme to prevent hepatitis A expansion. This should include awareness raising work in all educational institutions and at grassroots level, as well as improved production processes and housing conditions etc.;
- monitoring of anthropogenic micro-organisms circulation in water resources;
- modern, well-equipped laboratories at the institutions responsible for research and monitoring, and new methods and techniques of research;
- conformity of national regulations to the world standards.

The UK experience:

Epidemiology plays a strong role in prevention of communicable diseases in the UK, in order to establish how an infection is being spread. Information and evidence is required to prove the source of infection so that interventions can be effective and targeted. Good and widely acknowledged evidence can also be a powerful tool in bringing water quality and public health issues to the top of government's priority list for action. This information and evidence is actively collected, and the UK has a Communicable Diseases Surveillance Unit to co-ordinate this activity.

Also, a reliable and publicly accessible mechanism for registration of illness and deaths is essential in water surveillance, as in other areas of public health, as this makes it possible to measure the impact of any intervention designed to improve water quality. Without reliable statistics for incidence of illness before an intervention starts, it is impossible to measure whether the intervention has been effective in bringing about improvement.

Health and water borne diseases in the UK. Dr. Ros Stanwell-Smith from the UK Public Health Laboratory Communicable Diseases Surveillance Centre (CDSC) describes the system of water surveillance in the UK.

Proving that disease is water related is difficult because water is a moving target. It changes constantly and it is difficult to prove that contamination was caused by this route, as communicable diseases have many other causes, eg food, person to person etc. To prove the source of infection, it is necessary to collect evidence from individuals who have been affected. Their memories of when, where and how much

water they consumed is not always reliable.

Also, linking disease to water can be a highly political and sensitive subject. Under current UK legislation it is a criminal offence for a water utility to supply contaminated water, and so proving that outbreaks are water-related is a sensitive issue requiring research and evidence.

Water borne disease surveillance in England and Wales:

Water-borne disease surveillance is a multi-disciplined approach, with separate organisations responsible for chemical and microbiological surveillance. Outbreaks and serious contamination of water must be reported to the Drinking Water Inspectorate, which monitors water quality, but reporting to the Communicable Disease Surveillance Centre is voluntary. Cases of infection are picked up by family doctors and gathered by a consultant in each area, from where they are sent to the CDSC. The reports are collected and sent back out nationally. Any infection that is statistically above average will be evident in the reports. Infections are voluntarily reported from around the country on reporting forms distributed by CDSC. All aggregate information about disease incidence and outbreak is available to the public.

Studying outbreaks:

Good information and epidemiological study is considered vital in reducing risks of outbreaks. Therefore when an outbreak of suspected water-borne disease occurs, the CDSC studies the case to assess the evidence. Criteria have been developed to assess the strength of evidence as either strong, probable or possible. For the period 1992-1995, 11 of 26 outbreaks were assessed as strongly associated with water. This means that the same pathogen was found in the affected humans and in the water.

The most thorough means of examining an outbreak is through a cohort study, which involves the entire population affected by the outbreak. It involves seeking active contact with the people affected, such as interviews in their homes, questionnaires etc.

Communication between the CDSC and water utilities at an early stage helps if an increased number of infections are being found in an area, and co-operation can be fruitful in preventing further cases.

THE STAKEHOLDERS' PERSPECTIVES:

- new legislation is needed, and also new frameworks and mechanisms to make the new law work;
- the public education on water quality issues and purification techniques;
- better, more reliable health monitoring and eco-genetic monitoring;
- better systems for microbiological monitoring;
- introduce new technologies in water treatment process: alternative methods (ozonation, biological materials, polymers etc.);
- improve water supply systems to prevent additional pollution.

Groups who should be involved in implementing these strategies:

- experts and professionals;
- NGOs;
- business people;
- local administrations;
- mass media;
- parliament.

Where will resources be found to implement new strategies?

- new technologies developed in Ukraine will be cheaper than imported;
- modernisation and water saving technologies will save resources if long-term strategy of investments is undertaken;
- Western investments;
- careful use of natural resources;
- changes in tax policy esp. for those involved in recycling wastes and water producers;
- attract and involve "native brains" in finding and implementing solutions.

STRATEGIES FOR IMPROVING DRINKING WATER QUALITY 2: REDUCE POLLUTION

Tamara M. Zinchenko, Deputy Head of the Laboratory at the Research Institute of Eco-Hygiene and Toxicology in Kyiv, commented on other sources of water pollution in Ukraine.

The objective of modern hygiene is to prevent the impact of all chemical toxics, biologically active compounds, fertilisers, pollutants, etc. However the current water supply system in Ukraine cannot guarantee adequate drinking water.

Degraded water purification systems:

The municipal purification utilities are deteriorating and do not meet the requirements of modern decontamination procedures. The existing water treatment plants cannot cope with the level of water pollution because they were designed to deal with water from cleaner sources. Now in Ukraine only about 20% of water resources are considered clean. The other 80% of water sources are of low quality, and are considered third grade. Therefore the current systems do not have the capacity to purify drinking water sufficiently.

Water purification procedures have not changed for a century. The same "quick" and "slow" filters are used involving sand, coagulant and chlorine. However, 100 years ago industries did not discharge the amount of chemical wastes into natural water resources which they do now. These chemicals pass through sand in purifying devices and react to chlorine. This leads to the formation of carcinogenic and mutagenic organochlorine compounds in the water pipes causing innumerable serious ailments among people.

Pipeline problems:

In Ukraine most water pipes have been made from asbesto-cement for the last thirty years. Therefore their maintenance and their impact on human health and environment is a priority.

To solve this urgent problem the following action must be taken:

- research the hygiene criteria of asbestos fibres impact on health;
- development and maintenance of other alternative materials to reinforce water pipes;
- development of industrialized drinking water treatment technologies;
- introduction of asbestos-containment methods.

It is clear that new purification methods are needed, but measures which do not rely on "end of pipe" technologies could help reduce waste discharges into water resources, and therefore protect water from exposure to toxics from before treatment, right down to transport through the pipes to the tap.

Prof Andrew Watterson, of the Centre for Occupational and Environmental Health, De Montfort University, UK, suggests Cleaner Production and Toxics Use Reduction as an approach to water pollution in Ukraine.

What is cleaner production?

This is a broad term that encompasses the concepts of waste minimization, waste avoidance, pollution prevention. It is, as its definition suggests, "the continuous use of industrial processes and products and services to prevent pollution and reduce wastes at their source" (UNEP, Cleaner Production, 1995).

An example of cleaner production:

Pesticide reduction in agriculture has been effectively introduced in a number of countries. This is a policy based on the recognition that toxic chemicals are used in the sector and that, with integrated pest management and biological controls, toxics reduction is an economic, practical, safer and achievable alternative (WWF 1992; OECD. FAO 1995; WWF 1995).

What is toxics use reduction?

Toxics reduction is a policy and practice to reduce or remove known or suspect toxic substances rather than engaging in complicated risk assessments and then risk reduction programmes which may leave toxic substances in the workplace or the environment. Effective toxics reduction techniques involve:

- recycling;
- effective operations and maintenance;
- production redesign or modification;
- production modernisation;
- substitution;
- product reformulation (Rossi, 1991).

An example of Toxics Use Reduction:

In the USA, the Amalgamated Clothing and Textiles Workers' Trades Union have used research studies to press for the use of soap and water as a better occupational and environmental health system for cleaning than using dry cleaning methods involving perchloroethylene. Additionally, "wet cleaning has higher labour costs but lower equipment and supply costs and should create jobs". (Labour Forum, 1995).

strategies for toxics use reduction would include:

- reduce water usage and use "grey water";
- reduce water pollution;
- reduce water leakage;
- recycle water.

Policies would include pricing controls which take into account cost benefit analyses and risk benefit analyses. In deciding whether or not to chlorinate water, it is necessary to establish information about who is exposed to what risks from chlorinated organic compounds in order to make a judgement.

Water filters in the home and tap water:

Individuals' action to improve tap water with filters can be helpful, but action to improve water before it reaches the tap is more helpful. Filters may remove certain chemicals from water supplies, but different kinds of filter are needed for different chemicals. Granular activated charcoal removes many volatile organic chemicals but such filters require regular changing as they have a limited capacity and lifespan. When filter capacity is exceeded, a large quantity of contaminants may enter the household water supply from the tap.

Bottled water is not enough:

Drinking water is not the only way of absorbing water pollutants in the household. Pollutants can also be absorbed through the skin when bathing, washing or showering. Inhalation is also a possible route of entry, as processes such as washing dishes, showering or flushing toilets can "air strip" chemicals from water. Inhalation can contribute a dose of pollutant equal to or more than doses produced by drinking water. Whereas ingested chemicals go through the liver, chemicals absorbed through the skin or inhaled enter the systemic circulation at once. Hence the use of bottled water for drinking may not deal with the problems of skin absorbtion or inhalation.

Below are some possible alternative strategies for reducing pollution in water. Will they work?

- reduce water pollution by reducing production:
a downturn in production may still produce pollutants, as it may lead to a reduction in investment in water pollution controls;
this is currently a problem in Ukraine;

- reduce water pollution by reducing demand eg through better industrial, agri-

cultural and commercial use of existing water supplies:

this strategy has been used in electricity supplies: the choice has been made either to build more power stations or to engage in energy conservation and remove the need to build power stations!

- reduce water pollution by making production more effective:
this links production to quality, efficiency and output;

- reduce water pollution by changing production processes:
for example, substitute chemical agriculture for organic, and reduce solvent use in manufacturing. However, some substitution may reduce certain forms of environmental pollution and increase other forms;

- interventions on water pollution at different levels:
at a primary level: agriculture and industry, and also at a secondary level: for domestic and household use;

- assess impacts through environmental audits, studying "ecological footprints" and "environmental rucksacks", to look at the full impact of each product:
eg the US Environmental Protection Agency working group argued that dry cleaning used less water than wet cleaning in textile treatment, but omitted to look at the water used in producing the chemicals for dry cleaning.

STAKEHOLDERS' PERSPECTIVES:

The first issues to tackle to reduce pollution are:

- sources of pollution which are affecting water sources, especially surface water;
- treatment technologies;
- decayed pipeline infrastructure;
- testing technologies and water quality control;
- out-of-date regulations for control;
- lack of specialised sanitary-epidemiological service;
- water shortages.

Strategies to tackle these issues:

- reduce or eliminate sources of toxics and pollution;
- improve pollution removal technologies so that a further stage of treatment is not necessary;
- replace and improve pipeline infrastructure;
- provide efficient filters for individual households;
- ensure state funding for "hot spots";
- search for alternative sources of water supply;
- build capacity and technical abilities of water treatment facilities.

Another working group governmental officials including

Who should be involved in implementing and planning these strategies?

all stakeholders including specifically:

- state services;
- local authorities;
- NGOs;
- academics and professionals;
- business;
- consumers;
- funders/ investors;
- mass-media.

STRATEGIES FOR IMPROVING DRINKING WATER QUALITY 3: INSTITUTIONAL FRAMEWORKS FOR PROVIDING WATER SUPPLY, REGULATION AND QUALITY CONTROL

Ukrainian regulations on the quality of drinking and household water date back to the time of the USSR and are out-of-date. They contain 29 parameters of quality, compared to 70 in Russia and 50 in the USA. In reality, only 10 of them are monitored by the State Sanitary-Epidemiology Service.

A new Ukrainian Code on Water is being developed and will be adopted by 2000. The Code is currently at a preliminary stage, and its contents are not yet clear. It will be developed under the newly elected parliament, but the individuals responsible for its development are not yet decided, as elections have just taken place.

However, the newly elected representatives for the Green Party will now prove a useful force for lobbying to ensure strong and effective legislation. The new Code and the advent of the Green Party into government presents an excellent opportunity for networking and lobbying to improve the current water legislation in the next parliamentary term.

In the UK, a privatised water and sanitation system has been in existence since 1989. **Howard Price, of the Chartered Institute of Environmental Health,** outlines the current institutional and legislative framework, and indicates some measures that are needed to improve the framework.

In 1989 the ten public water authorities responsible for regions based around river basin catchments were privatised. The private suppliers manage the water supply, sewerage, water resources, fisheries, land drainage, conservation, recreation and navigation in an integrated river basin management system . Government regulators were established to monitor drinking water quality, sewage treatment and environmental standards, and pricing and economic issues. Therefore the operation of the industry is separated from its three regulators, which are in public sector.

These changes were preceded by the EC Directive on the quality of drinking water adopted in 1980. From 1990 UK water companies have been obliged to comply with the numeric standards at least as high as those stipulated in the EC Directive.

Water pricing with a privatised supplier:

Water prices in England and Wales have risen 44% in real terms since privatisation. Many poor people have been cut off from their water supplies when they have not been able to pay bills, which are usually related to the size of their home rather than metered water consumption. The increase in prices is partly because the privatised suppliers had to invest large amounts in improving the supply and sanitation systems to meet the European standards, and these costs are being passed on to current water consumers.

Strategies to improve UK legislation:

Government action is needed to close gaps in the current framework in legislation, and to improve regulation and monitoring, and to ensure that the consumers are more involved in regulation. To achieve this it is necessary to find a way to integrate social, environmental, and economic parameters, which are currently represented by three different regulators, and to develop suitable indicators which measure their integration. There must be locally developed indicators, which are relevant to specific communities, but which are also relevant at a national level. The participation of consumers needs to be introduced to regulation in a more proactive role.

Water conservation strategies must also be approached in an integrated way, which focuses on reducing need by investing in water efficiency, not simply by deterring demand through high prices.

WATER SUPPLY AND SANITATION

Deputy Chief Engineer of the Joint Stock Enterprise Odessa-Vodokanal, the Odessa water utility, made the following comments on Odessa's water supply.

For water utilities, the only criteria of clean water is that it corresponds to State Standards. The Sanitary-Epidemiology establishments define the means of water purification and how it meets the requirements of State Standard. The new code and standards being brought in will require new policies and practice for water purification.

Water treatment in Ukraine does not meet the current requirements. There is no water treatment plant in Ukraine which has the capacity to purify water in full. Methods such as absorbtion by coal filters and ozonation are not available in most areas of Ukraine. It is not possible to remove heavy metals if they are found in high concentrations.

There is a problem of water quality in transportation. 50% of the pipe system in the country is deteriorated. There are parts of the system in Odessa which have not been replaced since 1873 i.e. since its foundation. If during the coming 10 years no capital investments are made in repairing the water networks, the water supply to some city districts and even towns will simply stop.

Increased pollution of water resources affects the pressure in the network. Pressure cannot be maintained due to under-capacity at the water treatment plants and electricity failures. This causes interruptions in water supply. As drinking water pipes are often leaking, and are laid next to wastewater channels, interruption of supply causes seepage from wastewater into clean water pipes, causing additional contamination.

The Sanitary-Epidemiology station insists on the chlorination of municipal waste water. But to my mind it's a crime. Chlorination of waste water brings up a tremendous amount of organochlorine compounds of carcinogenic origin. Purification through ozone treatment is used for hospital waste, but this is viable only for smaller quantities of waste, not for full scale municipal waste purification.

There is no optimistic perspective, on the contrary, the prognosis is very upsetting. Sooner or later the economic crisis will be over and agricultural production will be intensified leading to greater pesticide pollution of natural water resources. We need to prepare for this.

Severn Trent Plc is a UK water and sanitation company. **Jim Oatridge, Director of Corporate and Environmental Controls of Severn Trent,** outlines some strategies for improving supply and sanitation utilities, based on his experience in the UK.

In Severn Trent's experience, the following steps are helpful in planning improvements:

- establish the facts about each source of drinking water, and obtain real data on the performance of drinking water quality and sewage treatment discharges;
- prioritise the problems, and focus on improvements that give maximum quality of benefits in the shortest time at the least cost;
- years of neglect cannot be put right overnight, and prioritisation is necessary.

The key aspects we have considered in making improvements are:

- uprating currently existing plants, and try to operate them more efficiently;
- repairing or replacing pipelines;
- improving management and cost control;
- finding ways of cost recovery, eg metering consumption of water;
- improving information to consumers, and ensuring public access to all information about water quality and performance;
- training staff;
- improve customer awareness re toxics reduction, conservation and water safety issues.

In improving drinking water quality the following steps may be useful:

- take measures to protect the water sources;
- maintain the present facilities as best you can and try to operate the current plant more efficiently;
- ensure good disinfection of water, in the process and at output from works;
- beware of pipeline contamination: improving treatment is of little value when pipes transporting water are poor.

In improving sewage treatment, the following steps are useful:

- reduce industrial discharges to sewer if possible by: charging fees for effluents from industry according to volume and strength, and by encouraging recycling and reuse on industrial premises;
- maintain the treatment plant as best you can and try to operate it more efficiently;
- introduce awareness raising programmes to encourage users to reduce substances poured into drains eg oil;
- reduce the strength of discharge into rivers as this will help protect drinking water resources downstream.

Possibilities for international partnership exist, and a programme to improve water and sanitation in the Ukrainian town of Zaporizhia is being planned. The programme will be a partnership between local utilities and an overseas water utility. Financing for such arrangements include some investment from the European Bank for Reconstruction and Development (EBRD), but also require financial commitment from Ukraine. The Investment programme for Zaporizhia is costed at $48 million USD, with an EBRD loan of $30 million USD. It has the following objectives:

- reduce pollution;
- reduce wastage of water through leakage reduction and managing demand;
- improve quality and reliability;
- enhance Vodokanal's financial and operational performance;
- introduce private sector rationale (individual domestic meters will be introduced).

STAKEHOLDERS' PERSPECTIVES:

- The key is the so called "integrated river basin principle" of water treatment, i.e. to define who is responsible for the whole cycle in the basin of a certain river and bring all activities under one institution.
- In case of a transnational water artery eg. the Dnieper, special multilateral treaties should be signed between States.
- Public Health Ministry should play a leading role in water supply and sanitation control.

To improve the drinking water quality it is also necessary:

1. to implement water conservation technologies;
2. to locate the source pollutants;
3. to monitor and control waste discharge;
4. to monitor and decrease water losses in the whole system;
5. to constantly monitor the state of water in its natural sources;
6. to inform people on the issues of water consumption;
7. to distinguish between notions "drinking water" and "household water";
8. to study international experience technology and introduce new technologies;
9. to improve water supply network and purification plants;
10. to provide economic incentives for every stage of distribution;
11. to introduce licenses and tenders for water activities.

Director of MAMA-86 comments on the objectives of the working group

Resources:

- introduce economic tools and pricing structures such as:
  - fees for water use;
  - and fees for pollution;
- define property issues for water management;
- privatise ownership of water treatments facilities, and take this partly out of state control;
- investments in the infrastructure and improved technologies.

Possible partners in planning and implementation:

- all sectors of the society, including water consumers;
- international organisations;
- investing institutions.

Annex 1

DRINKING WATER SEMINAR
LIST OF PARTICIPANTS
Kyiv, April 1998

NGOs

1. Natalya Kumysh, “Geya”, Children and Youth Environmental Organization, Sevastopol
2. Alexander Belov, International Environmental Treaties Work Group, Program to Promote Sustainable Development in Ukraine, Kyiv
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5. Sergey Ussenko, “Bakhmat”, Artemivsk
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8. Yulia Karamanits, Youth Environment League of the by-Dnieper area, Dnipropetrovsk
9. Viktor Khazan, “Zeleny Svit”, Dnipropetrovsk
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11. Vladimir Tyhiy, Environmental Education and Information Centre (EEIC), Kyiv
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14. Vladymir Ussatenko, Senior Consultant of the Ukrainian Parliament (Verhovna Rada) on the Chernobyl accident issues, Kyiv
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20. Lyubov Ogyr, Candidate of Medicine, Ass.professor at the Hygiene and Ecology Department, State Medical Academy, Dnipropetrovsk

21. Galyna Traversse, Doctor of Medicine, Professor, Head of Pediatrics Department,Ukrainian Medical Stomatology Academy, Poltava
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23. Lyubov Kharina, sanitary physician, Regional Sanitary-Epidemiology Station, Odessa
24. Svetlana Ussenko, sanitary physician, Town Sanitary-Epidemiology Station, Artemivsk
25. Ivan Solonenko, Doctor of Medicine, Professor, Head of the Health Management Department, Ukrainian Academy of State Management by the President of Ukraine, Kyiv
26. Nadiya Solonenko, Health Management Department, Ukrainian Academy of State Management by the President of Ukraine, Kyiv
27. Anatoliy Ukrainchuk, senior expert of the Ukrainian Research South Project Water Management Institute, Odessa
28. Vladimir Dmitrenko, expert of the Ukrainian Research South Project Water Management Institute, Odessa

GOVERNMENT REPRESENTATIVES

29. Viktor Karamushka, Deputy Chief of the External Relationships Management, Ministry for Environment and Nuclear Safety, Deputy Chief of European Ministries for Environmental Protection's negotiations on the draft WHO Protocol on fresh water, Kyiv
30. Tatyana Vassilyeva, Head of the Water Resources Department, City Environment Safety Management, Kyiv
31. Yelena Nazarchuk, Head of the Wastes Department, City Environment Safety Management, Kyiv
32. Larissa Koloss, senior expert of the Women Issues Management, Ministry for Family and Youth Affairs, Kyiv
33. Fyodor Kartophil, Deputy Chief Engineer of the State Water Supply company "Odessa-Vodokanal", Odessa

PARLIAMENT

34. Sergey Kurykin, Member of Ukrainian Parliament (Verhovna Rada), Green Party, Kyiv

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35. Yuriy Zagorodnyuk, Deputy Director of the Board of the Ukrainian Ecology Corporation, Kyiv
36. Valeriy Voytsehovsky, Ukrainian Ecology Corporation, Kyiv
37. Vladimir Podafa, Director of the Educational and Producing Company "AYNY", Dnipropetrovsk

38. Vladimir Bud, Ukrainian biomonitoring joint stock company "ATEK", Kyiv
39. Viktor Antonchenko, Ph.D., Director of the Scientific-Productive Centre "Ordana", Kyiv

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40. Chris Church, UNED-UK, London
41. Clare Flenley, UNED-UK, London
42. Mari Mozhaysky, Coordinator of Raising Public Awareness on Environmental Issues program TACIS, Kyiv
43. Olga Ivanitskaya, Assistant Coordinator of Raising Public Awareness on Environmental Issues program TACIS, Kyiv
44. Julia Harms, UNDP, Kyiv
45. Svetlana Vassylchenko, Information Centre Manager, British Council, Kyiv

EXPERTS FROM GREAT BRITAIN

46. Dr. Ros Stanwell-Smith, Consultant Epidemiologist, Communicable Diseases Surveillance Centre, Public Health Laboratory Service, London
47. Dr. Andrew Watterson, Professor of Occupational and Environmental Health, De Montfort University, Leicester
48. Robert Hearn, International Environment and Development Institute, London
49. Howard Price, Housing and Environment Policy, Chartered Institute of Environmental Health, London
50. Jim Oatridge, Director of Environmental and Corporate Controls, Severn Trent Water, Birmingham

MASS-MEDIA

51. Irina Chyornaya, newspaper "Segodnya" ("Today"), Kyiv
52. Alexander Belenkiy, newspaper "Den" ("Day"), Kyiv
53. Irina Kopchenkova, newspaper "Informatsionnaya Kultura" ("Information Culture"), Kyiv
54. Svetlana Chutova, Ukrainian Radio, program "Rodyna" ("Family"), Kyiv
55. Oksana Krassina, newspaper "Petrovna", Kyiv
56. Lyubov Fyodorova, newspaper "Kievskiye Vedomosty" ("Kiev News"), Kyiv

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59. Yelena Zubko, Ecotelephone project coordinator
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61. Nina Kashovarova, project coordinator
62. Lyudmila Vakulenko, accountant
63. Shynkarenko Yuliya, volunteer
64. Stepanyuk Lessya, volunteer

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S.V. Kozlov, Ukrainian Information Service
O.O. Mozgovaya, “Galytsky Kontrakty” (newspaper)
Yu.I. Giller, “Radio Continent”
Pavlina Semivolos, “Zerkalo Nedely” (newspaper)
Viktoriya Volontyrets, “ Prosto Radio”
Tatyana Larina, DINAU (State Information Agency of Ukraine)
Valentina Levitskaya, “InterNovosty” (“International News”)
Yelena Martynenko, UNIAN (“Ukrainian Information News Agency”)
Andrey Mykhaylyk, “Zelena Studiya” (“Green Studio”)
Anastassiya Obraztsova, “Vikna” program, STB television channel
Konstantin Kaverznev, television program “Misto” (“City”)
Alina Astakhova, Televison&Radio Broadcasting Company “Kyiv”
Viola Burda, BBC
Alexander Sinitsa, UNIAN (“Ukrainian Information News Agency”)
Yuliya Logvinyuk, State Television Company, INTER channel
Konstantin Lavrov, State Television Company, INTER channel
Sergey Zveryok, State Television Company, INTER channel
Marina Koltsova, “Moskovskiy Komsomolets v Ukraine”

Annex 2

Figure 1

Specific proportion of samples from centralized water supply sources in several Ukrainian oblasts that don't correspond to standards in 1995-1996.

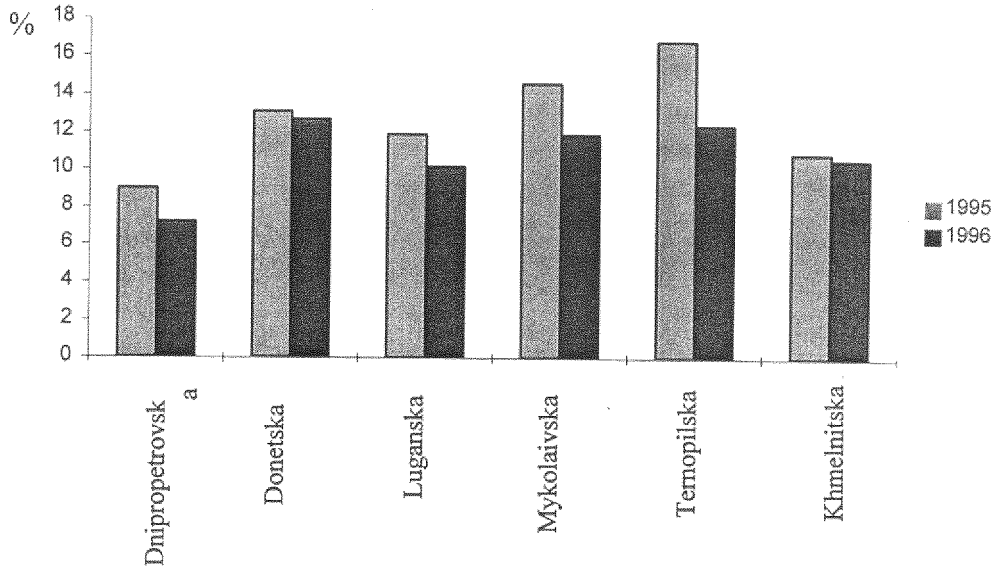

Figure 2

A number of samples and specific proportion of drinking water analyses from decentralized water supply that don't correspond to sanitary standard's requirements on the microbiological indices in Ukraine in 1992- 1996

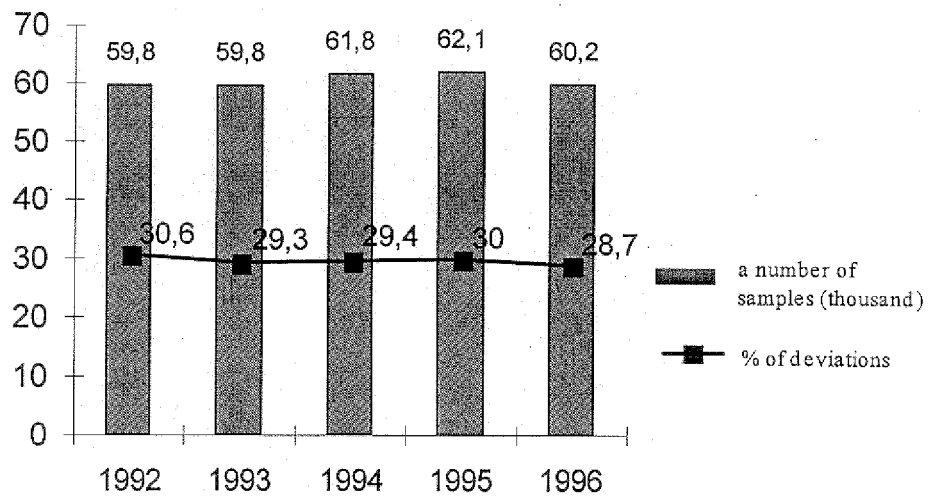

Figure 7
Hepatitis A morbidity in Ukraine in 1992-96

Annex 3

MAMA-86 Women's Environmental NGO.
"DRINKING WATER": Results of the Sociological Study

Questionnaire design:
T. V. Strikalenko, Candidate of Medicine.

Analysis of the sociological data:
by O.O. Kisselyova, Candidate of Philosophy.

Expert assessment:
by Prof. Sova R.Yu., Doctor of Medicine.

Within the project framework, we have carried out independent sociological survey in order to identify views of Ukrainian population on quality of drinking water and its health impact. The sample population reached 1678 persons. The study was carried out in 11 cities of Ukraine: Kyiv, Kharkiv, Dnipropetrovsk, Ternopil, Tatarbunary (Odessa oblast), Odessa, Artemivsk (Donetsk oblast), Poltava, Dniprodzerzhinsk, Lviv, Sevastopol. The study results have been processed in the Institute of Sociology of the National Acad. Sci. of Ukraine (the CA data processing department).

Shares of completed questionnaires within the overall array of respondents reached: Kyiv (20.1%); Sevastopol (16.8%); Lviv (11.9%); Poltava (9.4%); Dnipropetrovsk (7.8%); Odessa (7%); Tatarbunary (6.6%); Kharkiv (6%); Ternopil (6%); Dniprodzerzinsk (4.2%); Artemivsk (4.2%).

We deliberately ensured higher representation of women in the sample population (76.9% vs. 22.6% of men), accounting for the fact that they consider the water quality problems more closely, because they spend more time for household activities, cooking, laundry, etc.

The age profile of the respondents shows the following distribution:

the age group under 22	19.7%,
the age group from 23 to 35	28.6%,
the age group from 36 to 50	33.6%,
the age group of 51 and older	18.2%.

The majority of respondents live in their settlements for more than 21 years (61%). However, we observed also rather high level of migration: 67.7% of the respondents specified that their parents were born in other settlements, a half of the respondents themselves (50%) were born in other settlements (not in the ones they live now).

In respect to social status, the respondents show the following distribution: 52.8% of white collars, 12.6% of workers, 16.8% of students, 10% of pensioners, 3% of housewives.

Rather high share of the respondents assessed their labour conditions as safe (76%). Only 4.4% of them assessed their workplace conditions as hazardous.

Professionally, the majority of respondents were not connected with drinking water quality problems, i.e. they responded to the questionnaire as mere household water consumers (84.3%). Only 15.7% of respondents were professionally connected with the problem to greater or lesser extent.

48.5% of respondents assessed their work as relatively hard (20% as hard, 3.5% as very hard, 5.9% as easy).

72.5% of respondents assessed their housing conditions as good or satisfactory (16% as bad, 3.6% as very bad).

These questions were introduced into the questionnaire in order to identify interdependence between job conditions, housing conditions and population's morbidity. Considering the data collected, we can conclude that the major share of respondents live in satisfactory housing, have white collar jobs, works in relatively safe environments and assess their jobs as moderately hard. Correspondingly, one might assume that, according to assessments of the major share of respondents these factors do not affect negatively their health. Provided these conditions we might expect that the majority of respondents are rather healthy. The data below contradict to such an assumption.

It is worth to note, that 48.7% of respondents assess their annual family budgets as inadequate, 40.7% of them assess their annual family budgets as extremely inadequate (i.e. totally 89.4%). Only 7.2% of respondents assess their annual family budgets as satisfactory.

If we focus directly on problems of water consumption and population's assessment of water quality, we are to note that 86.7% of respondents use water from water supply networks. Other respondents use water from wells (7%); minor natural water sources (3.7%); deep artificial wells (7.2%); 2.3% of respondents use water from water carts.

Naturally these data show different distribution in different cities:

Kyiv: water supply networks - 80.2%; wells - 7.1%; minor water sources - 5%; deep waterwells - 20.7%; water from mobile tanks - 1.8%; bottled water - 2.4%

Kharkiv: water supply networks - 92.1%; wells - 5.9%; minor natural water sources - 7.9%; deep waterwells - 4%; water from mobile tanks - 0; bottled water - 0.

Dnipropetrovsk: water supply networks - 94.5%; wells - 4.7%; minor water sources - 1.6%; deep waterwells - 3.2%; mobile tanks - 0.8%; bottled water - 3.9%.

Ternopil: water supply mains - 70.7%; wells - 31.3%; minor water sources - 8.1%; deep waterwells - 3.1%; mobile water tanks - 0; bottled water - 2.1%.

Tatarbunary: water supply mains - 65.7%; wells - 11.7%; minor water sources - 0; deep water wells - 19.8%; mobile water supply - 18%; bottled water - 1%.

Odessa: water mains - 88.1%; wells - 3.4%; minor water sources - 2.5%; deep waterwells - 2.5%; mobile water supply - 8.5%; bottled water - 1.7%.

Artemivsk: water mains - 98.6%; wells - 0; minor water sources - 1.4%; deep waterwells - 0; mobile water supply - 0; bottled water -1.4%.

Poltava: water supply nets - 88%; wells - 10.8%; minor water sources - 1.3%; deep waterwells - 7%; mobile water supply - 0; bottled water - 1.9%.

Dniprodzerzhinsk: water supply nets - 95.8%; wells - 5.6%; minor water sources - 0; deep waterwells - 1.4%; mobile water supply - 0; bottled water - 0.

Lviv: water supply nets - 96.4%; wells - 4.1%; minor water sources - 1.5%; deep water wells - 1%; mobile water supply - 0; bottled water - 1.5%.

Sevastopol: water supply nets - 92.5%; wells - 1.8%; minor water sources - 6.4%; deep water wells - 0.4%; mobile water supply - 0.4; bottled water - 1.8%.

More than a half (54%) of the respondents, who use water from water supply mains, noted that their water supply is irregular (i.e. water is absent at day/night).

In Kyiv temporary breaks in centralised water supply were specified by 22.3% of respondents (by 46.8% in Kharkiv; by 25.6% in Dnipropetrovsk; by 43.2% in Ternopil; by 77.5% in Tatarbunary; by 59.6% in Odessa; by 67,8% in Artemivsk; by 36.9% in Poltava; by 14.5% in Dniprodzerzhinsk; by 68.3% in Lviv; by 69.8% in Sevastopol).

The expert's comments:

The respondents' array is sufficient but very diverse. In further studies it is worthwhile to consider separately Kyiv city and cities with clearly poor drinking water quality (e.g. Tatarbunary). Another major division incorporates water from centralised water supply nets and other water sources. In general, drinking water is a common problem, so the questioning is necessary as a pilot study to identify major problems and their possible solutions.

Responding to the question "What kind of drinking water do you use?", almost a quarter of respondents (24.8%) answered that they drank it unboiled, 10.7% of them said that they drink any sort of water (both boiled and unboiled). Anyway, rather substantial share of respondents drink boiled water (61.7%); water after sedimentation (19.4%); water after treatment (7.9%); bottled water (6.8%).

Water consumption:

Kyiv: unboiled water - 16.6%; any sort of water - 13.9%; boiled water - 60.8%; water after sedimentation - 19%; water after treatment - 11.8%; bottled water - 8.1%.

Kharkiv: unboiled water - 14%; any water - 4%; boiled water - 88%; water after sedimentation - 35%; water after treatment - 5%; bottled water - 3%.

Dnipropetrovsk: unboiled water - 17.5%; any water - 13.5%; boiled water - 69%; water after sedimentation - 18.3%; water after treatment - 6.4%; bottled water - 11.9%.

Ternopil: unboiled water - 37.8%; any water - 12.2%; boiled water - 50%; water after sedimentation - 9.2%; water after treatment - 5.1%; bottled water - 5.1%.

Tatarbunary: unboiled water - 65.7%; any water - 14.8%; boiled water - 22.2%; water after sedimentation - 22.2%; water after treatment - 0; bottled water - 0.

Odessa: unboiled water - 18.6%; any water - 14.4%; boiled water - 62.7%; water after sedimentation - 13.6%; water after treatment - 17.8%; bottled water - 11%.

Artemivsk: unboiled water - 39.1%; any water - 8.7%; boiled water - 44.9%; water after sedimentation - 24.6%; water after treatment - 1.5%; bottled water - 1.5%.

Poltava: unboiled water - 46.1%; any water - 10.4%; boiled water - 46.8%; water after sedimentation - 10.4%; water after treatment - 2.6%; bottled water - 4.6%.

Dniprodzerzhinsk: unboiled water - 37.1%; any water - 7.1%; boiled water - 51.4%; water after sedimentation - 14.3%; water after treatment - 2.9%; bottled water - 4.3%.

Lviv: unboiled water - 25.5%; any water - 10.5%; boiled water - 69.5%; water after sedimentation - 17%; water after treatment - 6%; bottled water - 13%.

Sevastopol: unboiled water - 7.2%; any water - 6.8%; boiled water - 83.5%; water after sedimentation - 28.3%; water after treatment - 12.5%; bottled water - 5%.

The expert's comments:

In the case of water from centralised water supply mains, it might be consumed without boiling in the majority of cases. Boiling is just a means to kill microbes, but water quality decreases after boiling. Very little people can afford to buy bottled water. Besides, in the case of bottled water one has to know if it is good for him/her or not.

Assessing drinking water quality 28.7 % of respondents note, that it does not allay thirst.

Corresponding shares in different cities:

Kyiv - 25.1%; Kharkiv - 65.5%; Dnipropetrovsk - 22.9%; Ternopil - 27.2%; Tatarbunary - 29.4%; Odessa - 23.8%; Artemivsk - 33.3%; Poltava - 23.9%; Dniprodzerzhinsk- 32.8%; Lviv - 42.9%; Sevastopol - 42%.

The expert's comments:

The question is rather psychological and subjective. In case a person is not satisfied with water quality, a given jig of water does not allay thirst. Objectively this might be caused only be high salt content.

23.4% of respondents specified that their drinking water has some extraneous odour; other 16.9% of respondents noted that these odours appear periodically (odour of chlorine (13.7%), odour of iodine, rust, lime, bog, sewage, oil, diesel oil, chemicals (3.2%).

Figures for separate cities:
Kyiv: extraneous odour - 26.3%; periodical extraneous odour - 16.2%.
Kharkiv: extraneous odour - 46.5%; periodical extraneous odour - 4.7%.
Dnipropetrovsk: extraneous odour - 28.6%; periodical extraneous odour - 21%.
Ternopil: extraneous odour - 29.1%; periodical extraneous odour - 17.4%.
Tatarbunary: extraneous odour - 14.3%; periodical extraneous odour - 6.2%.
Odessa: extraneous odour - 33.7%; periodical extraneous odour - 16.8%.
Artemivsk: extraneous odour - 27.1%; periodical extraneous odour - 42.4%.
Poltava: extraneous odour - 21.4%; periodical extraneous odour - 25.7%.
Dniprodzerzhinsk: extraneous odour - 15%; periodical extraneous odour - 25%.
Lviv : extraneous odour - 24.2%; periodical extraneous odour - 23.6%.
Sevastopol: extraneous odour - 33%; periodical extraneous odour - 16.5%.

The expert's comments:

According to the State standards, drinking water might have some slight odour up to two grades. Such an odour might be identified only if one pays special attention to it. In case of some intense odour, a consumer is to consult with a local sanitary authority.

Other 15.3% of respondents noted, that these extraneous odours appeared after water storage for some time (they specified the same range of odours).

Distribution of responses in particular cities: Kiev - 18.5%; Kharkiv - 34.9%; Dnipropetrovsk - 23.4%; Ternopil - 27%; Tatarbunary - 14.5%; Odessa - 32.5%; Artemivsk - 25%; Poltava - 13.1%; Dniprodzerzhinsk - 33.3%; Lviv - 14.7%; Sevastopol - 35.1%.

The expert's comments:

Water odour really intensifies after storage, due to volatile compounds. These ones mainly incorporate chlorinated organics (as a result of hyperchlorination).

52.9% of respondents noted appearance of "rusty sediments" in water after settling. Corresponding figures for particular cities: Kyiv - 54%; Kharkiv - 85.3%; Dnipropetrovsk - 61.1%; Ternopil - 57.7%; Tatarbunary - 84.6%; Odessa - 55%; Artemivsk - 67.9%; Poltava - 42.1%; Dniprodzerzhinsk - 68.4%; Lviv - 81.7%; Sevastopol - 65.6%,

The expert's comments:

Rusty sediments might be due to high iron contents in water, which comes through rusted water pipes. It is advisable to discharge some initial volume of water from mains at morning and to let water stay for some time for sedimentation.

Specifying water taste, 68.5% of respondents noted that drinking water is tasteless (Kyiv - 86.8%; Kharkiv - 65.2%; Dnipropetrovsk - 78%; Ternopil - 81%; Tatarbunary - 42.9%; Odessa - 84%; Artemivsk - 73.7%; Poltava - 73%; Dniprodzerzhinsk - 88.7%; Lviv - 87.6%; Sevastopol - 84.7%); 6.3% of respondents noted sweet taste (Kyiv - 5.6%; Kharkiv - 10.1%; Dnipropetrovsk - 11%; Ternopil - 9.5%; Tatarbunary - 26.2%; Odessa - 3%; Artemivsk - 0; Poltava - 12.4%; Dniprodzerzhinsk - 4.8%; Lviv - 4%; Sevastopol - 3.9%); 5.1% of them noted salty taste (Kyiv - 3%; Kharkiv - 10.1%; Dnipropetrovsk - 2.8%; Ternopil - 2.4%; Tatarbunary - 27.4%; Odessa - 6%; Artemivsk - 21.1%; Poltava - 6.6%; Dniprodzerzhinsk - 1.6%; Lviv - 0.6%; Sevastopol - 5.1%); 2.21% of respondents noted some extraneous acidity of drinking water(Kyiv - 1%; Kharkiv - 7.3%%; Dnipropetrovsk - 2.8%; Ternopil - 2.4%; Tatarbunary - 1.2%; Odessa - 4%; Artemivsk -0; Poltava - 6.6%; Dniprodzerzhinsk - 3.2%; Lviv - 4%; Sevastopol - 0.4%); only 0.66% of respondents specified their drinking water as good (Kyiv - 1%; Kharkiv - 0; Dnipropetrovsk - 0; Ternopil - 2.4%; Tatarbunary - 1.2%; Odessa - 0; Artemivsk - 0; Poltava - 0.7%; Dniprodzerzhinsk - 0; Lviv - 0.6%; Sevastopol - 1.2%); other responses collected - 1.9%.

17.5% of respondents note that drinking water has some extraneous taste,
(Kyiv - 22.7%; Kharkiv - 40.3%; Dnipropetrovsk - 22.8%; Ternopil - 27.1%; Tatarbunary - 18%; Odessa - 22.5%; Artemivsk - 29.6%; Poltava - 17.7%; Dniprodzerzhinsk - 8%; Lviv - 19.3%; Sevastopol - 37.3%).

Other 13.2% of them noted periodic appearance of some extraneous taste (chlorine, iodine, rust, bog, chemicals, oil, soda) (Kyiv - 22.7%; Kharkiv - 40.3%; Dnipropetrovsk - 22.8%; Ternopil - 27.1%; Tatarbunary - 18%; Odessa - 22.5%; Artemivsk - 29.6%; Poltava - 17.7%; Dniprodzerzhinsk - 8%; Lviv - 19.3%; Sevastopol - 37.3%).

The expert's comments:

According to the State standard, water is to be tasteless, however, some slight extraneous taste is allowed (up to 2 grades). If you are not sure of the water taste, then warm it up to 40^{0}C and taste it again.

Answering the question if the water they use is clear 47.9% of respondents gave a positive answer; 16.0% of respondents responded negatively; other 20.6% of respondents noted that water became clear only after sedimentation (among them 7% said that water became clear after 1 - 3 hours of sedimentation; 2.1% said that water becomes clear after 12 hours of sedimentation; 3.3% said that water became clear after 24 hours of sedimentation).

Percentage by cities and towns:
Kyiv: clear - 61.6%; not clear - 17.9%; clear after sedimentation- 20.5%.

Kharkiv: clear - 35%; not clear - 27.5%; clear after sedimentation - 37.5%.
Dnipropetrovsk: clear - 56.9%; not clear - 22.6%; clear after sedimentation - 20.5%.
Ternopil: clear - 60.7%; not clear - 19.1%; clear after sedimentation - 20.2%.
Tatarbunary: clear - 40.9%; not clear - 17.1%; clear after sedimentation - 42%.
Odessa: clear - 57.6%; not clear - 8.1%; clear after sedimentation - 34.3%.
Artemivsk: clear - 61.5%; not clear - 21.2%; clear after sedimentation - 17.3%.
Poltava: clear - 83.2%; not clear- 8.8%; clear after sedimentation - 8%.
Dniprodzerzhinsk: clear - 69.1%; not clear - 10.9%; clear after sedimentation - 20%.
Lviv: clear - 56.3%; not clear - 17.6%; clear after sedimentation -26.1%.
Sevastopol: clear - 42.8%; not clear - 29.7%; clear after sedimentation - 27.5%.

The expert's comments:

Drinking water must be clear. Some sediments or opalescence are allowed (caused mainly by carbonates). In case of highly opaque water it is necessary to ifind out the reason.

Substantial share of respondents noted large amounts of sediments in water after boiling (totally 72.5%).

Percentage by cities and towns:
Kyiv - 79.1%; Kharkiv - 93.4%; Dnipropetrovsk - 69.6%; Ternopil - 90.9%; Tatarbunary - 89%; Odessa - 83.1%, Artemivsk - 95%; Poltava - 57.5%; Dniprodzerzhinsk - 82%; Lviv - 96.7% Sevastopol - 95.2%.

The expert's comments:

The amount of sediments after water boiling meets the requirements, but huge amounts of the sediments confirm low quality of drinking water. Sediments are associated with other parameters of water, these ones might be found in local sanitary authority.

Assessing water quality in respect to its use for household purposes, the respondents noted that at pre-soaking of linen in the water, rusty stains appear (11.9% of respondents said "yes"; 22.2% said "sometimes". Totally they correspond to more than one third of the overall array of the respondents).

	Yes	Sometimes
Kyiv	9.6%	22.8%
Kharkiv	20.6%	30%
Dnipropetrovsk	7.3%	18.4%
Ternopil	6.4%	27.7%
Tatarbunary	14%	23.3%
Odessa	8%	29%
Artemivsk	26.3%	12.3%
Poltava	4.8%	19%
Dniprodzerzhinsk	3%	24.6%
Lviv	28.1%	31.9%
Sevastopol	7.5%	28.6%

The expert's comments:

Rather substantial share of samples, we have analysed in the laboratory, show high iron contents, which are associated with rusty water supply mains. This water may produce rusty spots at pre-soaking.

38.8% of respondents noted high consumption of detergents (other 19.6% of respondents noted that it happened sometimes).

	Yes	Sometimes
Kyiv	38%	25.6%
Kharkiv	72.7%	12.5%
Dnipropetrovsk	30.3%	26.6%
Ternopil	39.8%	30.1%
Tatarbunary	38.2%	20.2%
Odessa	42%	30%
Artemivsk	61.1%	14.8%
Poltava	14.8%	17.6%
Dniprodzerzhinsk	45.5%	22.7%
Lviv	50%	25.8%
Sevastopol	60.2%	16%

The expert's comments:

Consumption of detergents depends on water hardness, but it is not worthwhile to solve the problems by increased detergents' dosage. It might be solved by allocating more time for pre-soaking or by switch to more efficient detergents.

One block of questions was formed by questions on health of population. In general 10.3% of respondents assess their health status as "good" (58.3% assessed it as "satisfactory, 21.2% assessed it as "bad", 2.3% assessed it as "very bad". This means, that almost a quarter of the respondents have bad and very bad health, more than a half of them have satisfactory one.

Percentage by cities and towns:

Kyiv: "good health" - 9.2%; "satisfactory" - 61.4%; "bad" - 21.4%; "very bad" - 0.9%.

Kharkiv: "good health" - 1.5%; "satisfactory"- 35.8%; "bad" - 56.8%; "very bad" - 6.32%.

Dnipropetrovsk: "good health" - 15.2%; "satisfactory" - 60%; "bad" - 14.4%; "very bad" - 4%.

Ternopil: "good health" - 19%; "satisfactory" - 62%; "bad" - 12%; "very bad" - 0.

Tatarbunary: "good health" - 6%; "satisfactory" - 52.5%; "bad" - 29.3%; "very bad" - 5%.

Odessa: "good health" - 16.7%; "satisfactory" - 65.8%; "bad" - 14.9%; "very bad" - 0.9%.

Artemivsk: "good health" - 3.2%; "satisfactory" - 61.3%; "bad" - 32.3%; "very bad" - 3.2%.

Poltava: "good health" - 13%; "satisfactory" - 69.5%; "bad" - 14.3%; "very bad" - 1.3%.

Dniprodzerzhinsk: "good health" - 7.1%; "satisfactory" - 57.1%; "bad" - 31.4%; "very bad" - 1.4%.

Lviv: "good health" - 15.1%; "satisfactory" - 58.9%; "bad" - 17.2%; "very bad" - 2%.

Sevastopol: "good health" - 7.9%; "satisfactory" - 63%; "bad" - 20.4%; "very bad" - 3.6%.

48.8% of respondents (aggregate figure, including regular, frequent and occasional health complains) claim skin-related problems (Kyiv - 60.5%; Kharkiv - 77.3%; Dnipropetrovsk - 30.2%; Ternopil - 52.3%; Tatarbunary - 65.8%; Odessa - 61.1%; Artemivsk- 57.9%; Poltava - 53.7%; Dniprodzerzhinsk - 46.8%; Lviv - 64.2%; Sevastopol -70%).

88.1% of them specified increased exquamation of face skin after wash-up (aggregat figure, including regular and occasional complains): Kyiv - 77.7%; Kharkiv - 87.8%; Dnipropetrovsk - 85.7%; Ternopil - 66.7%; Tatarbunary - 67.8%; Odessa - 83.6%; Artemivsk - 83.6%; Poltava - 66.7%; Dniprodzerzhinsk - 59.8%; Lviv - 83.6%; Sevastopol - 85.3%).

72.4% of respondents specified back and joints' pains (aggregate figure, including regular, frequent and occasional complains): Kyiv - 82.7%; Kharkiv - 90.2%; Dnipropetrovsk - 78.9%; Ternopil - 60.7%; Tatarbunary - 94.6%; Odessa - 79.2%; Artemivsk - 85.7%; Poltava - 73.2%; Dniprodzerzhinsk - 83%; Lviv - 74.8%; Sevastopol - 78.9%.

60.3% of them specified abdominal pains (aggregate figure including regular, frequent and occasional complains): Kyiv - 74%; Kharkiv - 86%; Dnipropetrovsk - 74%; Ternopil - 67.4%; Tatarbunary - 78.8%; Odessa - 70.2%; Artemivsk - 79.2%; Poltava - 73.2%; Dniprodzerzhinsk - 83%; Lviv - 74.8%; Sevastopol - 78.9%.

58.6% of respondents specified nausea, pyrosis, regurgitation (aggregate figure, including permanent, often and occasional complains): Kyiv - 65.7%; Kharkiv - 84.6%; Dnipropetrovsk - 69.2%; Ternopil - 54%; Tatarbunary - 81.8%; Odessa - 72.9%; Artemivsk - 78.4%; Poltava - 59%; Dniprodzerzhinsk - 76.4%; Lviv - 75.5%; Sevastopol - 78.9%.

Bitter taste complains were specified by 42% of respondents (aggregate figure, including regular, frequent and occasional complains): Kyiv - 54.4%; Kharkiv - 72.6%; Dnipropetrovsk - 52%; Ternopil - 39.1%; Tatarbunary - 58.4%; Odessa - 53.5%; Artemivsk - 73.9%; Poltava - 42.2%; Dniprodzerzhinsk - 52.9%; Lviv - 56.2%; Sevastopol - 61.7%.

61,9% of respondents specified heart-related pains (aggregate figure, including permanent, often and occasional complains): Kyiv - 74.7%; Kharkiv - 86.8%; Dnipropetrovsk - 71.4%; Ternopil - 58.4%; Tatarbunary - 72.5%; Odessa - 67.8%; Artemivsk - 77.4%; Poltava - 69.5%; Dniprodzerzhinsk - 79.7%; Lviv - 71.9%; Sevastopol - 84.7%.

76.8% of respondents specified headache (aggregate figure, including regular, frequent and occasional complains). Distribution by particular cities: Kyiv - 86.7%; Kharkiv - 94.5%; Dnipropetrovsk - 89.7%; Ternopil - 81.7%; Tatarbunary - 87.4%; Odessa - 77.9%; Artemivsk - 89.7%; Poltava - 84.2%; Dniprodzerzhinsk - 95.1%; Lviv - 92.7%; Sevastopol - 87.9%.

51.7% of respondents suffer from dizziness (including regular, frequent and

occasional complains): Kyiv - 63.9%; Kharkiv - 75.6%; Dnipropetrovsk - 72.4%; Ternopil - 49.5%; Tatarbunary - 68%; Odessa - 52.2%; Artemivsk - 75.6%; Poltava - 59.3%; Dniprodzerzhinsk - 68.7%; Lviv - 70.5%; Sevastopol - 73.8%.

58.6% of respondents specified backache (including regular, frequent and occasional complains): Kyiv - 70%; Kharkiv - 82%; Dnipropetrovsk - 60%; Ternopil - 46%; Tatarbunary - 82%; Odessa - 74%; Artemivsk - 79%; Poltava - 65%; Dniprodzerzhinsk - 73%; Lviv - 71%; Sevastopol - 78%.

48.3% of respondents specified liver-related pains: Kyiv - 66%; Kharkiv - 81%; Dnipropetrovsk - 55%; Ternopil - 38%; Tatarbunary - 63%; Odessa - 62%; Artemivsk - 73%; Poltava - 47%; Dniprodzerzhinsk - 71%; Lviv - 57%; Sevastopol - 70%.

39.2% of respondents suffer from intestine disorders: Kyiv - 45%; Kharkiv - 74.5%; Dnipropetrovsk - 48.5%; Ternopil - 36%; Tatarbunary - 51%; Odessa - 53.8%; Artemivsk - 57%; Poltava - 43.2%; Dniprodzerzhinsk- 58%; Lviv - 58%; Sevastopol - 58%.

72,2% of respondents are prone to irritability (including frequently - 33.2%, regularly - 8%): Kyiv - 86.1%; Kharkiv - 86.8%; Dnipropetrovsk - 88.1%; Ternopil - 67.4%; Tatarbunary - 89.9%; Odessa - 80%; Artemivsk - 91.4%; Poltava - 80.6%; Dniprodzerzhinsk - 89.5%; Lviv - 86%; Sevastopol - 85.5%.

69.5% of respondents are prone to depression: Kyiv - 82.3%; Kharkiv - 92.1%; Dnipropetrovsk - 84%; Ternopil - 74%; Tatarbunary - 90.1%; Odessa - 70.4%; Artemivsk - 90.7%; Poltava - 80%; Dniprodzerzhinsk - 96.2%; Lviv - 88.7%; Sevastopol - 84,1%.

49.6% of respondents suffer from depression: Kyiv - 60.8%; Kharkiv - 84.4%; Dnipropetrovsk - 61.4%; Ternopil - 41.4%; Tatarbunary - 60.3%; Odessa - 57%; Artemivsk - 66.7%; Poltava - 51.4%; Dniprodzerzhinsk - 63.2%; Lviv - 63%; Sevastopol - 72.3%.

Among the diseases within recent five years, the first ten places occupy the following ones:

- cold (70.9%): Kyiv - 81.8%; Kharkiv - 85%; Dnipropetrovsk - 80.2%; Ternopil - 80.5%; Tatarbunary - 76%; Odessa - 70.3%; Artemivsk -73.4%; Poltava - 74.1%; Dniprodzerzhinsk - 38.2%; Lviv - 66.5%; Sevastopol - 88,8%.

- arthritis, osteochondrosis (30.4%): Kyiv - 30.5%; Kharkiv - 41%; Dnipropetrovsk- 21.6%; Ternopil - 9.2%; Tatarbunary - 45%; Odessa - 35.1%; Artemivsk - 50%; Poltava - 32.2%; Dniprodzerzhinsk - 17.7%; Lviv - 38.6%; Sevastopol - 37%.

- gastritis (24.7%): Kyiv - 26.3%; Kharkiv - 29%; Dnipropetrovsk - 25.9%; Ternopil - 9.2%; Tatarbunary - 14%; Odessa - 26.1%; Artemivsk - 43.8%; Poltava - 23.8%; Dniprodzerzhinsk - 58.8%; Lviv - 29.6%; Sevastopol - 25.8%.

- allergy (22.1%): Kyiv - 28.3%; Kharkiv - 42%; Dnipropetrovsk - 27.6%; Ternopil - 16.1%; Tatarbunary - 19%; Odessa - 17.1%; Artemivsk - 25%; Poltava - 16.1%; Dniprodzerzhinsk - 13.2%; Lviv - 23.6%; Sevastopol - 25.5%.

- eye-related disorders (18.3%). Distribution by particular cities: Kyiv - 19.2%; Kharkiv - 37%; Dnipropetrovsk - 21.6%; Ternopil - 13.8%; Tatarbunary - 17%; Odessa - 13.5%; Artemivsk - 14.1%; Poltava - 10.5%; Dniprodzerzhinsk - 20.6%; Lviv - 19.6%; Sevastopol - 26.2%.

- hypertension (18.1%): Kyiv - 16.9%; Kharkiv - 29%; Dnipropetrovsk - 12.1%; Ternopil - 3.5%; Tatarbunary - 16%; Odessa - 17.1%; Artemivsk - 32.8%; Poltava - 17.5%; Dniprodzerzhinsk - 17.7%; Lviv - 21.8%; Sevastopol - 27.7%.

- neurosis (17.9%): Kyiv - 21.1%; Kharkiv - 47%; Dnipropetrovsk - 19%; Ternopil - 4.6%; Tatarbunary - 22%; Odessa - 9.9%; Artemivsk - 23.4%; Poltava - 15.4%; Dniprodzerzhinsk - 19.1%; Lviv - 14%; Sevastopol - 20.6%

- peptic ulcers (15.6%): Kyiv - 8.8%; Kharkiv - 15%; Dnipropetrovsk- 5.2%; Ternopil - 2.3%; Tatarbunary - 6%; Odessa - 13.5%; Artemivsk - 7.8%; Poltava - 5.6%; Dniprodzerzhinsk - 16.2%; Lviv - 7.8%; Sevastopol - 4.9%.

- intestine infections (13.4%): Kyiv - 11.4%; Kharkiv - 22%; Dnipropetrovsk - 8.6%; Ternopil - 11.5%; Tatarbunary - 15%; Odessa - 18%; Artemivsk - 10.9%; Poltava - 12.6%; Dniprodzerzhinsk - 5.9%; Lviv - 17.3%; Sevastopol - 19.5%.

- colitis (11.9%): Kyiv - 14.3%; Kharkiv - 22%; Dnipropetrovsk- 6.9%; Ternopil - 5.8%; Tatarbunary - 14%; Odessa - 7.2%; Artemivsk - 20.3%; Poltava - 7.7%; Dniprodzerzhinsk - 8.8%; Lviv - 14.5%; Sevastopol - 15.7%.

Answering the question on assumed casual relationship between the diseases they have suffered and quality of drinking water, 50.4% responded positively: Kyiv - 53.3%; Kharkiv - 76.9%; Dnipropetrovsk - 50.5%; Ternopil - 38.2%; Tatarbunary - 72.2%; Odessa - 61.5%; Artemivsk - 73.7%; Poltava - 36%; Dniprodzerzhinsk - 55.9%; Lviv - 51.4%; Sevastopol - 71.2%.

The expert's comments:

From the above range of disorders, only intestine infections and gastric-intestine disorders(gastritis, colitis, ulcers, etc.) are associated directly with quality of drinking water. At the same time water contaminated with chemicals might cause different allergic and endocrine disorders (including arthritis). According to WHO data, up to 80% of all diseases are associated with contaminated water.

Considering the means of water treatment proposed (the respondents could specify several options), the majority (59.7%) preferred house-centred water treatment installations which supply purified water to flats.

The expert's comments:

Use of single water source for drinking and washing is rather wasteful. I think, that use of house-based treatment installation which supplies the house residents with due quality drinking water is the best solution. Such an option would allow also to reduce overall volumes of water supply.

Rather substantial share of respondents (49.3%) positively perceive household water treatment installations (filters).

A quarter of the respondents positively consider use of bottled drinking water (25.2%).

14.4% of respondents would readily buy purified drinking water in some specialised facilities (Odessa experience).

As alternatives, the respondents proposed: improvement of city-level water supply installations, silver treatment of water, use of water from deep wells, ozonation instead of chlorination.

The expert's comments:

There are many different filter designs available now, including those produsedin Ukraine. Filters are to have due hygiene certificate.

It is worth to note, that local environmental problems of population's concern incorporate:

- drinking water quality (64% of respondents): Kyiv - 65.5%; Kharkiv - 80%; Dnipropetrovsk - 63%; Ternopil - 47.2%; Tatarbunary - 84.1%; Odessa - 84.1%; Artemivsk - 68.3%; Poltava - 47.5%; Dniprodzerzhinsk - 55.2%; Lviv - 63%; Sevastopol - 85.1%.

- chemical air pollution (57.3%): Kyiv - 65.5%; Kharkiv - 50.5%; Dnipropetrovsk - 68.9%; Ternopil - 53.9%; Tatarbunary - 31.9%; Odessa - 66.4%; Artemivsk - 41.3%; Poltava - 61.7%; Dniprodzerzhinsk - 92.5%; Lviv - 60.9%; Sevastopol - 63%.

- air particulates (48.6%): Kyiv - 44.3%; Kharkiv - 46.3%; Dnipropetrovsk- 58%; Ternopil - 62.6%; Tatarbunary - 46.5%; Odessa - 51.7%; Artemivsk - 46%; Poltava - 48.9%; Dniprodzerzhinsk - 74.6%; Lviv - 50.5%; Sevastopol - 55.4%.

- industrial facilities located nearby (23.4%): Kyiv - 24.9%; Kharkiv - 10.5%; Dnipropetrovsk - 39.5%; Ternopil - 18.9%; Tatarbunary - 1%; Odessa - 25.9%; Artemivsk - 17.5%; Poltava - 27%; Dniprodzerzhinsk - 70.2%; Lviv - 15.2%; Sevastopol - 29.7%

- noise (23.2%): Kyiv - 22.8%; Kharkiv - 28.4%; Dnipropetrovsk - 27.7%; Ternopil - 17.6%; Tatarbunary - 11.9%; Odessa - 29.3%; Artemivsk - 11.1%; Poltava - 26.2%;

Dniprodzerzhinsk - 26.9%; Lviv - 20.6%; Sevastopol - 34.1%.

- lack of green areas (19.6%): Kyiv - 18.5%; Kharkiv - 13.7%; Dnipropetrovsk - 35.3%; Ternopil - 17.6%; Tatarbunary - 30.7%; Odessa - 23.3%; Artemivsk- 19.1%; Poltava - 12.8%; Dniprodzerzhinsk - 7.5%; Lviv - 13%; Sevastopol - 29.4%.

- lack of paved roads (14.8%): Kyiv - 7.1%; Kharkiv - 19%; Dnipropetrovsk - 15.1%; Ternopil - 26.4%; Tatarbunary - 33.7%; Odessa - 22.4%; Artemivsk - 15.9%; Poltava - 18.4%; Dniprodzerzhinsk - 10.5%; Lviv - 10.9%; Sevastopol - 15.2%.

Thus, as we can see, according to the study completed, the drinking water quality is the first priority problems for the population of Ukraine.

The majority of respondents think that water treatment problems are to be managed on governmental level, that it is necessary to carry out measures funded from the State budget (50.6%, this rating is the highest in Tatarbunary - 63.3% - and the lowest in Dniprodzerzhinsk - 40%). The figure confirms the fact of deep-rooted paternalistic moods in the society (we have already analysed the phenomenon several times). Nevertheless we are glad to note, that 43.3% of respondents think that the problem of drinking water quality improvement is to be managed by local self-governance and businesses. (This rating is the highest in Sevastopol - 55,2% and the lowest in Ternopil - 34,4%). Obviously, the growing self-awareness of the country population might be attributed mainly to sceptical assessment of finance capacity of the State. On the other hand, some persons, who prioritised the local self-governance might mix self-governance bodies with governmental ones.

21.3% of respondents would rely on their own devices to improve drinking water quality. (The rating is the highest in Odessa - 37.9% and the lowest in Tatarbunary - 9.2%).

Other 15.6% of them think that it is necessary to carry out large scale awareness-raising campaign for the population on problems, associated with improvement of drinking water quality.

Only 6.9% of respondents think, that water supply is already adequate and there is no need to make any changes. (The rating is the highest in Ternopil - 17.7%, and the lowest in Odessa - 0.9%).

The expert's comments:

There is no need to discuss the necessity of major improvements in centralised water supply facilities and due quality of distribution networks. Nevertheless, it is urgent now to assess the quality of drinking water and to improve it.

Annex 4

L.I.MEDVED' INSTITUTE of ECO-HYGIENE and TOXICOLOGY

REPORT

ON RESULTS OF DRINKING WATER QUALITY STUDY FROM DISTRICTS OF CITIES ARTEMIVSK (DONETSK REGION), ODESSA, TATARBUNARY (ODESSA REGION), KYIV

Research work manager:
Deputy Director on researches,
Doctor of Medicine R.Yu.Sova

Kyiv - 1998

LIST OF EXECUTORS

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Organoleptic, sanitary-chemical and microbiological studies were carried out of water samples presented for independent environmental examination from the cities of Kyiv, Odessa, Tatarbunary and Artemivsk in accordance with the agreement No.275 of 19.02.1998 with nongovernmental women organization MAMA-86 at Department of Polymers Health and Toxic Wastes of L.I.Medved Institute of Eco-Hygiene and Toxicology.

Sampling of drinking water in Kyiv was carried out by researchers of Institute of Eco-Hygiene and Toxicology in presence of members of organization MAMA-86 (see Appendix No.2) at following addresses: No.1 - Bereznyakivska Str. 14, No.2 - Marganetska Str. 22, No.3 - Tymoshenko Str. 13, No.4 - Geroiv Dnipra Str. (artesian drillhole), No.5 - Svobody Ave. 30, No.6 - Melnikova Str. (artesian drillhole), No.7 - Malopidvalna Str. 21/8.

Sampling of drinking water in Odessa was carried out in the following points:
No.1 - Luzanivka (water line), No.2 - water line, No.3 - Station Dniester, No.4 - M.Arnautska Str. 135a (water line), No.5 - Kanatna Str. 92 (water line).

Sampling of drinking water in Tatarbunary was carried out in the following points:
No.6 - river Fontanka, No.7 - Kotovsky Str. (water intake), No.8 - school No.1 (artesian drillhole), No.9 - communal water intake, No.10 - cloth factory (artesian drillhole).

Sampling of drinking water in Artemivsk was carried out in the following points:
No.1 - filtration station, No.2 - center of the city, water line - filtration station, No.3 - eastern part of the city (old water line), No.4 - western part of the city (new water line combined), filtration station and Krasnoselitska artesian drillhole.

Sampling, storage and transporting of water samples were carried out according to requirements of State Standard GOST 18963-73 "Drinking water. Methods of sanitary-bacteriological analysis".

Samples were delivered to the laboratory on 19.02.1998.
Analyses were being carried out from 20.02 to 27.03.1998.

The program of studies includes:

1. Examination of documents presented.
2. Organoleptic studies of drinking water samples from the cities' districts of

Artemivsk, Odessa, Tatarbunary (Odessa region), Kyiv.

3. Sanitary-chemical studies of drinking water samples from the cities' districts of Artemivsk, Odessa, Tatarbunary, Kyiv for content of:

- inorganic compounds
- heavy metals
- pesticides.

PROCEDURES

Sanitary-chemical studies were carried out in accordance with State Standard GOST 2874-82 "Drinking water. Sanitary requirements and quality control", Sanitary Norms and Rules DSanPiN "Drinking water. Sanitary requirements for water quality in centralized drinking and household water supply" No.383 of 23.12.96.

Content of heavy metals in samples was analyzed by the method of atomic-absorption spectrophotometry (Methodical recommendations for spectrochemical analysis of heavy metals in objects of the environment, polymers and biological material, No.4096-86, Standard of COMECON 5340-85. GOST 2201-87 "Method of atomic-absorption photometry"). Sensitivity of the method is 0.002-0.008 mg/dm3.

Content of pesticides (HCCH - hexachlorocyclohexane, lindane, DDT - 1,1,1-trichloro-2,2-bis (p-chlorophenylethane and its metabolites, simtriazin) was analyzed by the method of gas-liquid chromatography according to "Methodical directions on analysis of chlororganic pesticides and products of their degradation...", No.4120-86 of 01.07.86. Detectability for HCCH is 0.003, for DDT - 0.004.

RESULTS OF STUDIES

Organoleptic studies were carried out according to requirements of Instruction No.4259-87. Odour and after-taste of water samples were of amount 1. Samples were transparent, without turbidity, sediment, colour.

Table 1. Results of chemical substances analysis in water

No. of sample	Nitrites mg/dm^3	Nitrates mg/dm^3	Sulfates mg/dm^3	Chlorides mg/dm^3	Dry residue mg/dm^3	pH
Artemivs'k						
1	0.03	n.d.	80	80	732.0	8.7
2	0.013	0.93	85	78	727.2	8.9
3	0.02	n.d.	95	75	553.2	8.9
4	0.02	n.d.	90	77	710.0	8.7
Odessa						
1	0.01	0.6	46.5	45	504.4	8.6
2	0.01	0.2	62	45	457.6	8.8
3	0.01	n.d.	62	60	430.0	8.7
4	0.06	1.42	54	47	298.4	8.6
5	0.06	n.d.	54	43	400.2	8.7
Tatarbunary						
1	0.04	0.1	150	150	6600	7.5
2	0.03	0.6	150	200	2488.8	8.3
3	0.22	0.7	150	100	1641.4	8.5
4	0.06	0.5	160	200	2399.4	8.4
5	0.05	0.3	200	200	2321.6	8.4
Kyiv						
1	0.003	0.3	14.0	9.0	240.8	7.8
2	0.003	0.5	13.0	11.0	238.8	7.4
3	0.033	0.1	6.8	125.0	441.2	7.5
4	0.045	n.d.	4.8	130.0	282.8	8.0
5	0.013	0.18	2.8	8.0	240.4	8.0
6	0.1	n.d.	2.0	6.0	280.8	7.8
7	n.d.	n.d.	16.0	7.0	237.6	7.6

n.d. - not determined

Table 2. Content of metals in water samples

No. of sample	Iron, mg/dm^3	Cadmium, mg/dm^3	Zinc, mg/dm^3	Copper, mg/dm^3
Artemivs'k				
1	< 0.2	< 0.001	0.08	< 0.1
2	< 0.2	< 0.001	0.09	< 0.1
3	0.5	< 0.001	0.06	< 0.1
4	< 0.2	< 0.001	0.08	< 0.1
Odesa				
1	0.2	< 0.001	0.1	< 0.1
2	< 0.2	< 0.001	0.04	< 0.1
3	< 0.2	< 0.001	0.1	< 0.1
4	< 0.2	< 0.001	0.12	< 0.1
5	< 0.2	< 0.001	0.05	< 0.1
Tatarbunary				
1	< 0.2	< 0.001	0.15	< 0.1
2	< 0.2	< 0.001	0.06	< 0.1
3	0.3	< 0.001	0.05	< 0.1
4	< 0.2	< 0.001	0.09	< 0.1
5	< 0.2	< 0.001	0.07	< 0.1
Kyiv				
1	< 0.2	< 0.001	0.08	< 0.1
2	< 0.2	< 0.001	0.06	< 0.1
3	0.2	< 0.001	0.05	< 0.1
4	< 0.2	< 0.001	0.06	< 0.1
5	0.2	< 0.001	0.03	< 0.1
6	< 0.2	< 0.001	0.03	< 0.1
7	< 0.2	< 0.001	0.04	< 0.1

Table 3. Results of pesticides content study in drinking water samples

No.	HCCH mg/dm^3	Lindane mg/dm^3	DDT mg/dm^3	DDD mg/dm^3	Dichlorobenzophenon mg/dm^3	Simazin mg/dm^3
				Artemivs'k		
1	n.d.	n.d.	n.d.	n.d.	0.0018	n.d.
2	n.d.	n.d.	n.d.	n.d.	0.00091	n.d.
3	n.d.	n.d.	n.d.	n.d.	0.00073	n.d.
4	n.d.	n.d.	n.d.	n.d.	0.0031	n.d.
5	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
				Odesa		
1	0.045	0.05	n.d.	0.058	0.02	n.d.
2	0.00595	0.00244	n.d.	0.00158	0.02	n.d.
3	n.d.	n.d.	n.d.	0.000224	0.00527	n.d.
4	0.001	0.00236	0.001626	0.00443	0.00091	n.d.
5	0.001	0.00248	0.0271	0.00583	0.00181	0.0001
				Tatarbunary		
1	0.00388	0.0025	n.d.	0.002279	n.d.	n.d.
2	0.0024	0.00248	n.d.	n.d.	0.00168	n.d.
3	0.00072	0.00072	n.d.	n.d.	0.00427	n.d.
4	0.0004	0.0004	n.d.	n.d.	0.00291	n.d.
5	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
				Kyiv		
1	0.00052	0.00048	n.d.	0.0165	0.0066	n.d.
2	0.00148	0.0016	n.d.	0.001017	0.00154	n.d.
3	n.d.	n.d.	0.00165	0.0033	0.00186	n.d.
4	n.d.	n.d.	0.0031	n.d.	0.00081	n.d.
5	n.d.	n.d.	n.d.	0.00147	0.0031	n.d.
6	n.d.	n.d.	n.d.	0.00202	0.0036	n.d.
7	n.d.	n.d.	n.d.	n.d.	0.00227	n.d.

Table 4. Microbiological indices of drinking water samples in Kyiv

Analyzed indices	Requirements of norms (content in 1g, cm^3)	Actual value (content in 1g, cm^3)	Documents for methods of analysis
TMN in 1 cm^3	100		GOST 18963-73
1		84	
2		170	
3		70	
4		31	
5		46	
6		26	
7		67	
CFB in 1 dm^3	3		GOST 18963-73
Samples 1-7		<3	

Note: TMN - Total Microbe Number
CFB - Coliform Bacterium

Table 5. Results of microbiological studies of water samples in Odesa and Tatarbunary

Analyzed indices	Requirements of norms (content in 1g, cm^3)	Actual value (content in 1g, cm^3)	Documents for methods of analysis
TMN in 1 cm^3	100		GOST 18963-73
1		8	
2		4	
4		6	
5		2	
6		1	
7		26	
8		3	
9		2	
10		3	
CFB in 1 dm^3	3		
Samples No.1-10		<3	
Ps.aeruginosa in 1 dm^3	not permissible		
Samples No.1-10		not determined	

Note: TMN - Total Microbe Number
CFB - Coliform Bacterium

Table 6. Results of microbiological study of river water sample from river Dniester (station Dniester)- sample No.3

Indices determined	Actual value (presence in 1 g, cm^3)
TMN in 1 cm^3	300
LPIB in 1 cm^3	270
E.coli feacalis in 100 cm^3	not found
Ps.aeruginosa in 1 dm^3	not found
Salmonella in 1 dm^3	not found
Enterococcus in 1 dm^3	not found
Coliphage in 1 dm^3	not found

Note: TMN - Total Microbe Number
LPIB - Lactose-Positive Intestine Bacillus

Summary table of drinking water quality standards (LPC) for heavy metals and pesticides

Parameter	Measuring unit	EC	WHO	Ukraine
Cadmium	mg/dm^3	0.005	0.005	0.003
Zinc	mg/dm^3	5.0	5.0	5.0
Copper	mg/dm^3	0.1/3*	1.0	2.0
Chromium	mg/dm^3	0.05	0.05	0.05
Iron	mg/dm^3	0.2	0.3	0.3
Manganese	mg/dm^3	0.05	0.1	0.1
Lead	mg/dm^3	0.05	0.05	0.05
Mercury	mg/dm^3	0.001	0.001	0.001
Lindane	mg/dm^3	–	0.003	0.002
DDT	mg/dm^3	–	0.01	0.02
Simazin	mg/dm^3			
HCCH	mg/dm^3			

SUMMARY

Results of sanitary-chemical studies of quality characteristics of Odessa water (see Appendix No.1) from water line during the period 1995-1997 (according to data of the laboratory of drinking water hygiene at Ukrainian Research Institute of Transport Medicine) permit to determine deviations from requirements in some drinking water samples. Odour and after-taste had amount of 3 by the norm set of 2. Turbidity and colour are 1.5 time higher than required. Content of cadmium is much higher in comparison with the limiting permissible norms in some samples from Odessa. High concentrations of lead and arsenic was also registered. Excess of phenol, halogen-containing compounds (in some samples up to 3 times higher) and oil products was analyzed in drinking water samples from Odessa.

On the basis of organoleptic, sanitary-chemical and microbiological studies of drinking water samples that have been carried out and according to the results obtained one could make the following conclusions:

The samples of drinking water presented to examination from Kyiv, Artemivsk, Odessa and Tatarbunary correspond to requirements of GOST 2874-82 "Drinking water. Sanitary requirements and quality control" as for organoleptic properties.

Sharp raise of water mineralization was determined in drinking water samples from Tatarbunary (Odessa region) due to inorganic compounds content. Thus, dry residue in samples No.2,4,5 is 1.5 times higher than sanitary norm and in sample No.1 it is 7 times higher.

Heavy metals content which doesn't meet sanitary norms was revealed in the following samples: content of iron in sample No.3 from Artemivsk is 2.5 times the norm, 1.5 times higher in No.3 from Tatarbunary. It should be noted that concentration of iron in some samples from Kyiv and Odessa is also relatively high. It says in the first place about obsoleteness of water supply network.

According to microbiological characteristics one sample of drinking water (No.2, Marganets'ka Str.) from Kyiv does not fulfill requirements of GOST 2874-82 "Drinking water. Sanitary requirements and quality control". Total Microbe Number is 2 times higher the norm.

According to content of pesticides the results obtained permit to come to a conclusion that nearly in all samples of drinking water admixtures were found of chlororganic compounds.

It is necessary to note the exceed of norms in the first place in samples from Odessa. Thus, in sample No.2 concentration of hexachlorocyclohexanes is more that 2.5 times the limiting permissible levels (LPL) and in sample No.1 is even 20 times. To some extent a high level of HCCH was revealed also in drinking water from Tatarbunary (samples No.1 and No.2). Level of HCCH is close to the LPL in sample No.2 from Kyiv. The excess of DDT and its metabolities was detected in samples No.1 and No.5 from Odessa and their level in sample No.1 from Kyiv was very close to LPL. It should be stressed that only in sample No.5 from Odessa one could speak about contamination by DDT itself. In other samples we find old contaminations due to metabolites of DDT. Simazin was found in one sample (No.5, river Fontanka) from Odessa. It is one of stable class of herbicides - simtreazines that are used in irrigation agriculture.

Appendix No.1

Results of sanitary-chemical studies of quality characteristics of Odesa drinking water (according to data of laboratory of drinking water sanitary of Ukrainian Research Institute of MT during the period 1995-1997)

Indices, Measuring units	Ranges of Concentrations (min-max)	Norms
Odour, amount (20 and 60 °C)	0-3	2
Taste (after-taste), amount (20 °C)	0-3	2
Turbidity, mg/dm^3	0.5-3.8	1.5
Colour, degrees	8-38	20
pH	7.6-8.0	6.0-9.0
Dry residue, mg/dm^3	480-580	1000
Hardness, mg-eqv/dm^3	4.4-6.7	7
Calcium, mg/dm^3	61.0-85.0	
Magnesium, mg/dm^3	19.0-38.0	
Sodium, mg/dm^3	60-85	200
Potassium, mg/dm^3	7.0-12.0	
Rests of active chlorine, mg/dm^3	0.3-2.5	0.3-0.5
Permanganate oxidizability, mgO/ dm^3	2.45-7.8	
Alkalinity, mg-eqv/dm^3	2.8-4.5	
Polyphosphates, mg/dm^3	0.02-0.02	3.5
Phosphates, mg/dm^3	0.18-0.3	
Chlorides, mg/dm^3	54.0-98.0	350
Sulfates, mg/dm^3	65.0-95.0	500
Nitrites, mg/dm^3	0.002-0.5	3.3
Nitrates, mg/dm^3	1.2-15.0	45
Ammonia, mg/dm^3	<0.05-1.4	2.0
Fluorides, mg/dm^3	0.2-0.5	0.7-1.5
Silicon, mg/dm^3	3.6-8.0	10
Lead, mg/dm^3	0.001-0.027	0.03
Iron, mg/dm^3	<0.005-1.4	0.3
Copper, mg/dm^3	<0.02-0.12	1.0
Manganese, mg/dm^3	0.001-0.01	0.1
Zinc, mg/dm^3	0.001-0.12	5.0
Cadmium, mg/dm^3	0.001-0.002	0.001
Strontium, mg/dm^3	0.8-2.0	7.0
Aluminium, mg/dm^3	0.02-0.3	0.5
Chromium (VI), mg/dm^3	<0.02-0.02	0.05
Chromium (III), mg/dm^3	<0.02-0.05	0.5
Mercury, mg/dm^3	0.000002-0.00006	0.0005
Tallium, mg/dm^3	0.00001-0.00007	0.0001
Arsenic, mg/dm^3	<0.0005-0.05	0.05
Chloroform, mg/dm^3	0.01-0.28	0.1
Phenols, mg/dm^3	<0.001-0.003	0.001
Anion-active SAS, mg/dm^3	0.1-0.4	0.5
DDT, mg/dm^3	<0.000009	0.02
Lindane, mg/dm^3	<0.000003	0.002
Hexachlorobenzene, mg/dm^3	<0.000001	0.05
Oil products, mg/dm^3	< 0.1-0.4	0.3

Appendix No.2

PROTOCOL
of drinking water sampling on territory of Kyiv

7 drinking water samples were taken out on the 19th of February, 1998: 5 samples from water line and 2 samples from deep water well. The sampling was carried out by the 1st Category Engineer V.V.Koverin of the Department of Polymers Sanitary and Toxic Wastes of L.I.Medved Institute of Eco-Hygiene and Toxicology in presence of O.S.Zubko, member of nongovernmental environmental organization MAMA-86.

List of drinking water sampling points

Sample No.	Address	Time
1	Bereznyakivska,14	10^{40}
2	Marganetska, 22	11^{10}
3	Tymoshenka,13	12^{10}
4	Geroiv Dnipra (artesian drillhole)	12^{30}
5	Svobody Ave., 30	12^{55}
6	Melnikova (artesian drillhole)	13^{25}
7	Malopidvalna, 21/8	13^{45}

Engineer of 1st Category Koverin V.V.

Representative of MAMA-86 Zubko O.S.