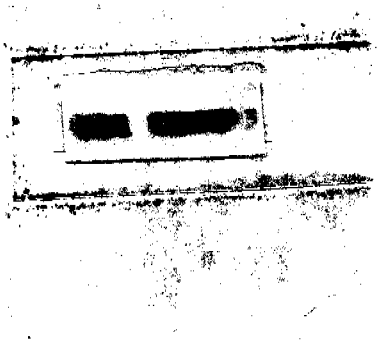

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2 WATER

2.1 SURFACE WATER

The evaluation of water quality in this chapter is carried out according to the state standard ČSN 75721 - Classification of surface water quality. Data on brooks are taken from PKVT (Prague Sewerage and Water Management). Data from studies of the Vltava and Berounka rivers were received from the ČHMÚ (Czech Hydrometeorological Institute) which collects information from appropriate River Basin Authorities.

In accordance with article No. 23 of the relevant legal code, the evaluation covers 1991 to 1992. The indicators are given in six groups in line with the requirements of the code. Categorisation is determined according to the most unfavourable indicator in the group. Surface water is divided according to the following five categories:

1. Very clean water
2. Clean water
3. Polluted water
4. Heavily polluted water
5. Very heavily polluted water

The following tables evaluate the data observed in group A (indicators of oxygen) and group B (principal chemical indicators). In other groups, unfavourable values of the following indicators were determined: fluorides, non-polar extractable substances, (group C - complementary chemical indicators), zinc, mercury, (group D - heavy metals), psychrophyl and coliform bacteria, enterococci (group E - biological and microbiological indicators), alpha activity (group F - indicators of radioactivity).

Categorisation of Water Quality According to the Relevant Groups in ČSN 75 7221, Prague 1991 -1992

	A	B	C	D	E	F
1044 Vltava Vrané	3	4	1		3	
1045 Vltava Podolí	3	4	4		3	
1046 Vltava Libčice	4	5	5			
1090 Berounka Lahovice	4	5	4			
BO01 Botič Nusle	3	4	5	3	5	
BO02 Botič Záběhlice	4	4	4	5	5	
BO03 Botič Petrovice	4	4	5	5	5	3
BO04 Botič Průhonice	3	4	5	3	5	
DL01 Dalejský potok ústí	4	4	5	4	5	3
DL02 Dalejský potok Dalejský háj	2	4	5	5	5	
DL03 Dalejský potok Řeporyje	4	4	5	5	5	3
KU01 Kunratický potok Kunratice	4	4	5	4	5	
KU02 Kunratický potok Krč	3	4	5	5	5	3
RO01 Rokytka náměstí Dr. Holého	4	5	4	3	5	
RO02 Rokytka Vinice	5	5	5	4	5	
RO03 Rokytka Koloděje	5	4	5	2	5	
RO04 Rokytka Nedvězí	3	4	5	1	5	4
SP01 Šárecký potok ústí	4	4	5	3	5	3
SP02 Šárecký potok č.p. 43	2	4	5	4	5	
SP03 Šárecký potok Jenerálka	4	4	5	3	5	
SP04 Šárecký potok Pod Džbánem	4	4	5	5	5	
SP05 Šárecký potok Nad Džbánem					5	
SP06 Šárecký potok Jiviny	5	5	5	5	5	

Source: ČHMÚ, PKVT, ČEÚ

Categorisation of Water Quality - Indicators of Oxygen - Group A (1991 - 1992)

	Dissolved oxygen	Biochemical oxygen demand	Chemical oxygen demand - dichromate	Chemical oxygen demand - permanganate
1044	1	2	3	3
1045	1	3	3	3
1046	1	3	4	3
1090	1	3	4	3
BO01	1	3	3	2
BO02	3	3	4	
BO03	2	3	4	2
BO04	2	3	2	2
DL01	1	3	4	1
DL02	1	2		1
DL03	4	3	4	2
KU01	1	3	4	2
KU02	1	3	3	2
RO01	1	4	4	2
RO02	2	3	3	2
RO03	1	2	5	2
RO04	3	2	2	2
SP01	1	3	4	2
SP02	1	2	2	2
SP03	1	3	4	2
SP04	1	2	4	2
SP05				2
SP06	4	5	5	

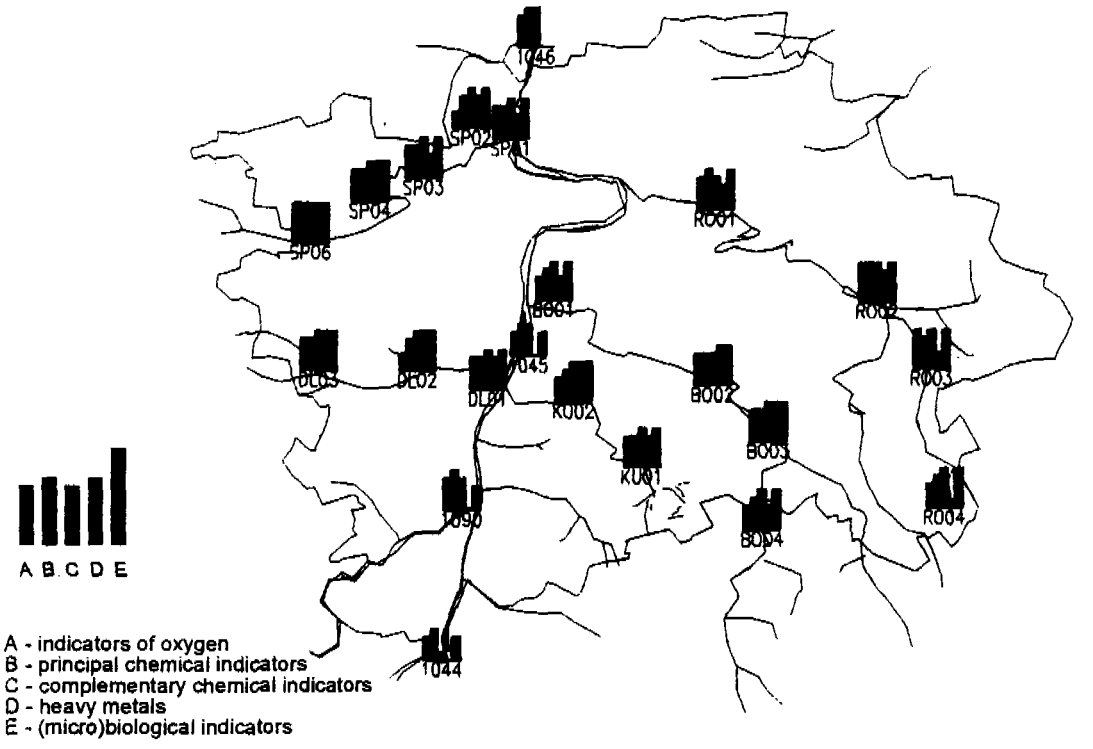
Source: ČHMÚ, PKVT, ČEÚ

Categorisation of Water Quality - Basic Chemical Indicators - Group B (1991 - 1992)

	Temperature	Water reaction (pH)	Conductivity	Ammonia	Nitrates	Nitrites	Dissolved substances	Undissolved substances	Total phosphorus	Iron	Manganese
1044	1	1	1	2	3	4	1	1	3	2	3
1045	1	1	1	3	3	4	1	1	3	2	4
1046	1	1	1	4	3	5	1	1	5	2	4
1090	1	5	2	3	3	5	2	2	4	2	3
BO01	1	4	3	4	4		3	3	4	1	4
BO02	1	4	3	4	4		3	3	5	2	4
BO03	1	1	3	3	4		3	2	4	1	4
BO04	1	1	2	4	4		3	2	4	1	3
DL01	1	1	3	3	3		3	3	4	1	4
DL02	1	1	3	4	3		4	4		1	3
DL03	1	1	4	3	3		4	1	4	1	4
KU01	1	4	3	4	4		3	3	4	2	4
KU02	1	1	3	3	4		3	3	4	2	4
RO01	1	4	3	4	3		3	4	4	3	5
RO02	1	1	4	5	4		3	4	5	1	3
RO03	1	1	3	3	4		3	2	3	1	3
RO04	2	4	3	4	3		3	1	4	1	2
SP01	1	1	3	3	3		3	3	3	2	4
SP02	1	1	3	2	3		3	1	4	1	3
SP03	1	1	3	3	3		3	3	3	2	4
SP04	1	1	3	3	4		3	2	3	1	3
SP05											
SP06	3	4	4	5	3		4	5	5		5

Source: ČHMÚ, PKVT, ČEÚ

The Quality of Surface Water, Prague 1991- 1992



A - indicators of oxygen
B - principal chemical indicators
C - complementary chemical indicators
D - heavy metals
E - (micro)biological indicators

max. = category 5

Source: ČEÚ

2.2 DRINKING WATER

Drinking water to supply the inhabitants of Prague and parts of central Bohemia from a public network of pipes is produced partly from surface water and partly from underground water. Depending upon the type and quality of the source of raw water, the water treatment plant uses such technical equipment as will enable it to treat the water in such a way that the final product corresponds with the requirements of the state standard ČSN 75 7111.

In order to supply drinking water to the inhabitants of Prague and parts of central Bohemia from the public network of pipes, Prague Waterworks operate three water treatment plants and one small local source. Besides the public network of pipes for drinking water, the city's water treatment plants also operate industrial water pipes with a plant whose purpose is to service water for industries in the north east of Prague.

The Vltava river is the source of water for the Praha-Podolí water works. The river has not yet been declared a source of water and it has a negative influence on the quality of raw water. The water works at Podolí are undergoing reconstruction and this limits their capacity considerably.

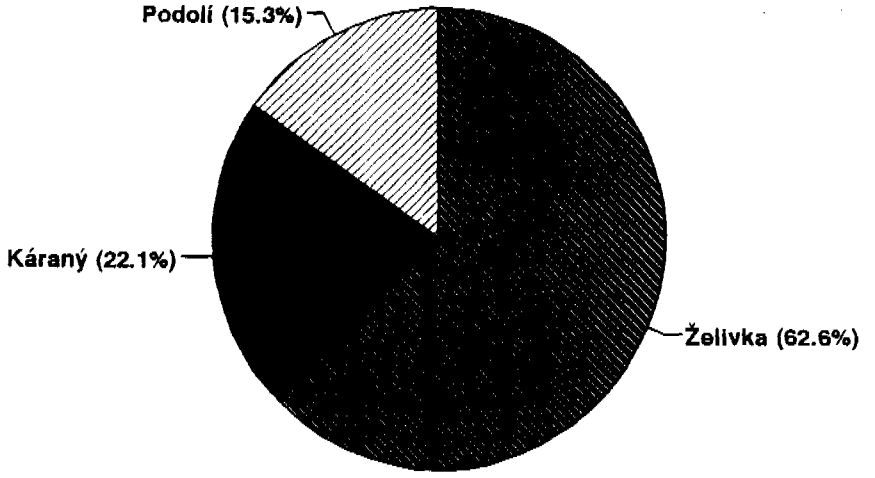
The water works in Káraný are located at the confluence of the Jizera and Labe rivers at a distance of about twenty five km from Prague. The source of water for this water works is partially underground water from layers of gravel and sand and from artesian wells, and partially surface water from the river Jizera treated by artificial filtration. The advantage

of the water from this plant is its good quality, whilst its disadvantage is its long-term and short-term dependency on weather conditions. In 1992 and in the first half of 1993 one of the main water pipes was reconstructed which caused a temporary reduction in the capacity of the Káraný water works. In order to lessen the risk of endangering the water quality, military trenches in the I. and II. districts of hygienic protection were cleaned in 1992.

The most significant source of drinking water for Prague and part of central Bohemia, in terms of capacity, is the water works Želivka. Untreated water from the Želivka river accumulates in the water reservoir at Švihov as a source of water for this plant. The level of water quality and the fall in water levels in the tank have been a source of considerable attention both from professionals and from the lay public. Drinking water from the Želivka water works is transported to Prague through an underground canal for a distance of 52 km until it reaches the Jesenice reservoir which ranks among the biggest in Europe. A new technology for water treatment is being developed in the Želivka water works.

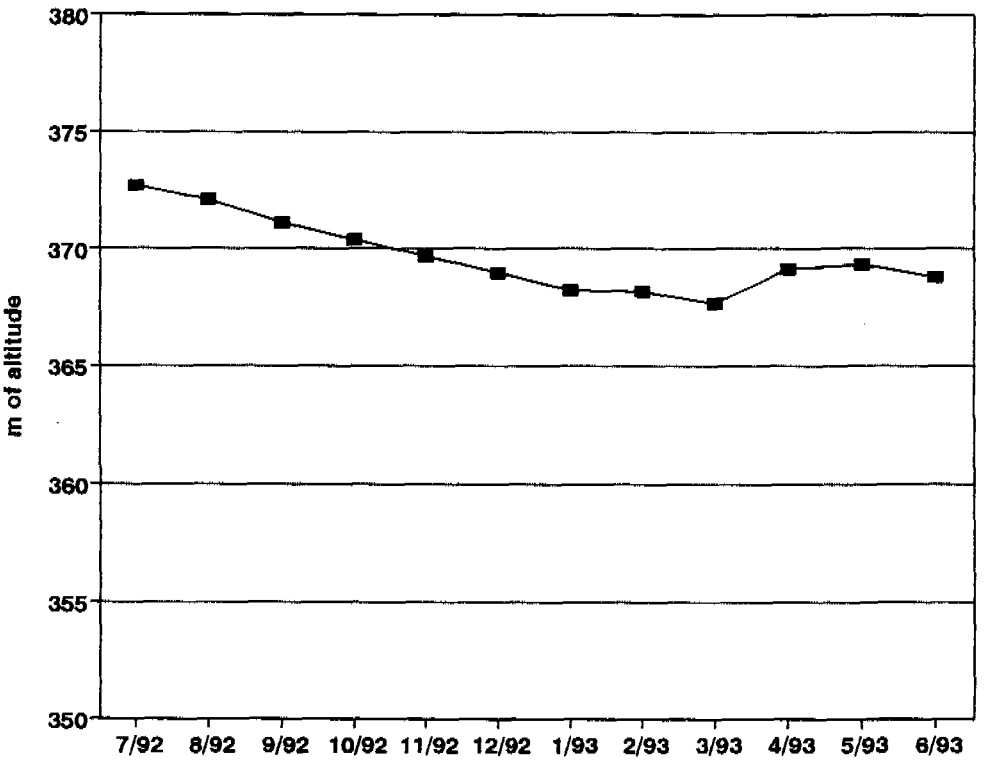
During recent years water consumption has dropped and thus the demand for drinking water has declined. Apart from the stagnation of industrial production, this is caused to quite a large extent by rising water prices.

Share of Water Treatment Plants in the Production of Drinking Water in 1992



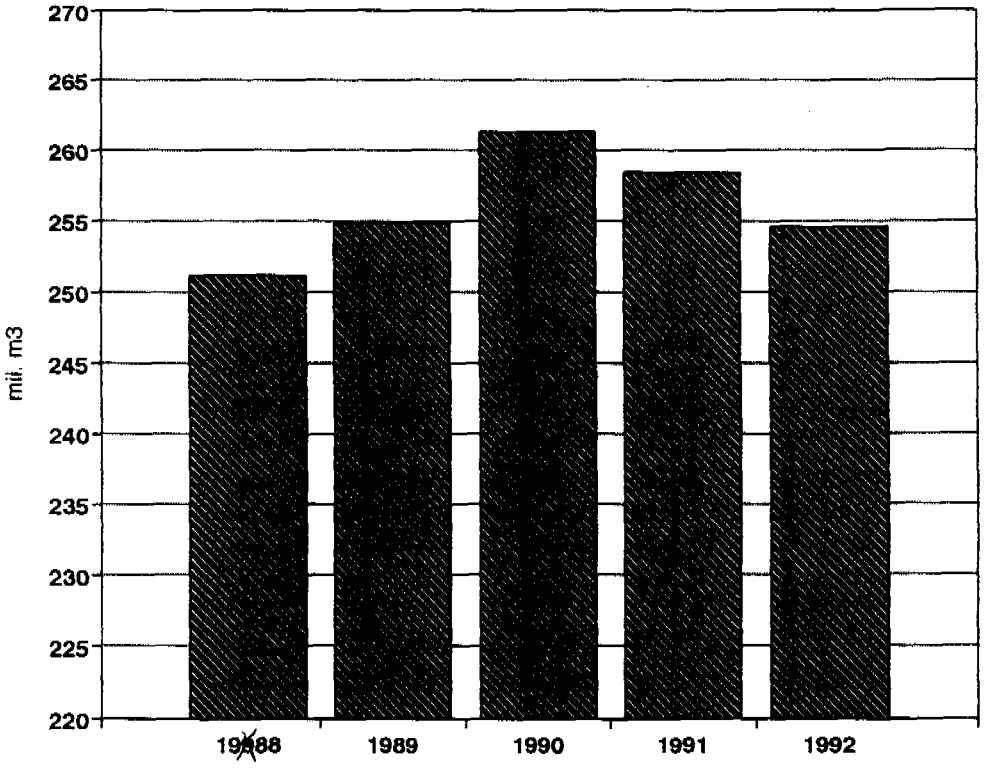
Source: Prague Waterworks

Development of the Water Level in the Švihov Reservoir



Source: Prague Waterworks

Drinking Water Production in 1988 - 1992



Source: Prague Waterworks

In spite of some problems with water quality in the Jizera river, the water from Káraný still remains the best, in terms of quality, for supplying Prague.

Appraisal of water quality during the whole year revealed no levels exceeding the limits set down by ČSN 75 7111 (only the nitrate level exceeded recommended levels, and legal limits were never exceeded).

However, it is necessary to point out not only that the quality of water in the Jizera river fluctuates considerably, but also that there are marked trends of a worsening of its quality, particularly in terms of nitrogen content, phosphoric substances and cloudiness. This situation is caused by the absence of purifying stations in some cities, by the inefficiency of those which exist because of the high proportion of agro-chemicals in the river basin, and by the effects of erosion from areas of deforestation. These problems have not yet been satisfactorily dealt with.

Želivka, as mentioned before, supplies Prague with more than sixty percent of its overall consumption. Water from this waterworks, apart from a few exceptions has so far met the ČSN 757111 requirements. The threat to water quality in the reservoir is, however, sufficiently serious to have merited goverment action (in resolution No. 196 from March 18, 1992).

The problems entailed in carrying out this resolution (for example removing phosphorus), however lead to an increase in nutrients load (eutrofication) in the water in the reservoir.

The source of water of the worst quality is the Podolí waterworks and it is so despite an improvement in quality which took place after the evaporation plant was installed. Nevertheless the Sázava river and the Berounka river in particular, together with industrial plants close to the point where the water is drawn from the river, are causing a substantial worsening in the quality of untreated water in the river Vltava. Biological indicators show that it is not possible to purify the water from the Vltava at the Podolí works when it is in maximum use - the efficiency of treatment would have to be at least 99.95 % !!! The only remaining solution is to shift the point of collection beyond the confluence with the Berounka. A move beyond the confluence with the Sázava, however, would be better. This also applies to bacteriological indicators, although the situation could also be improved considerably by ozonisation and better homogenisation in combination with a longer period of contact between the water and chlorine (fulfilling the two hours required by the standard).

The content of organic micropollutants and of heavy metals did not exceed permissible limits in either of the water treatment plants.

The laboratory-tested results from the Prague water treatment plants accord with the results of an control analysis carried out by the Municipal Hygienic Institute of Capital Prague.

Average Values of Basic Indicators in Water Treated Between 1990 and 1992

	Želivka			Podolí			Káraný		
Year	1990	1991	1992	1990	1991	1992	1990	1991	1992
Chemical oxygen demand - permanganate	1.89	1.85	1.89	2.35	2.06	1.54	0.8	0.8	0.88
Nitrates	26.7	22.6	36.6	15.9	15.9	22.7	18.8	17.2	17.6
Residual coagulants	0.05	0.04	0.04	0.1	0.05	0.07	-	-	-

Source: Prague Waterworks

2.3 WASTE WATER

The very unsatisfactory situation in the quality of surface waters in Prague is the result both of the many large and small sources of pollution and of the absence of entirely objective analysis of surface pollution. Significant sources of pollution are registered by water administrators - Povodí Vltavy (Vltava River Basin Authority) is the plant whose catchment area is the Berounka and the Vltava rivers and the administrative centre PKVT (Prague Sewerage and Water Management) is the plant which is responsible for most of the small streams. Other information can be obtained from the relevant authorities and ČIŽP (Czech Inspectorate of the Environment - Division for Water Protection).

Most waste water flows into the Prague sewer network which runs, except for some outskirts of the city, into the ÚČOV (Central Sewage Treatment Plant) which is located on Trojský Island. The sewer network and ÚČOV are administered by PKVT. The operation of the sewer network runs according to rules for sewerage which encompass the whole area managed by ÚČOV. The sources of waste water consist of two main groups. The first group includes most of the key industrial sources of waste waters, who have their own limits for the quality of water they discharge, prescribed by the water administrator. The second group is a general group of pollutors which includes all other sources which are regulated by prescribed limits for the levels of pollution in discharged waste water.

In 1991 the PKVT formed a new body to control the sources of waste water and ensured that the regulations concerning sewerage were adhered to. A suprising number of breaches of prescribed limits were discovered. 84 % of samples taken during this period failed to meet the limits for at least one indicator .

Outline of Samples Taken from Sources of Waste Water in the ÚČOV Sewer Network Area

	Number of samples taken			
	1991		1992	
	Total	Exceeding limits	Total	Exceeding limits
Mechanical and Electrical engineering plants	62	54	162	84
Chemical plants	19	15	59	36
Energy producers	3	2	6	1
Food industry	4	3	35	26
Printing works	3	3	10	9
Others	3	2	46	25
Total	94	79	318	181

Source: PKVT

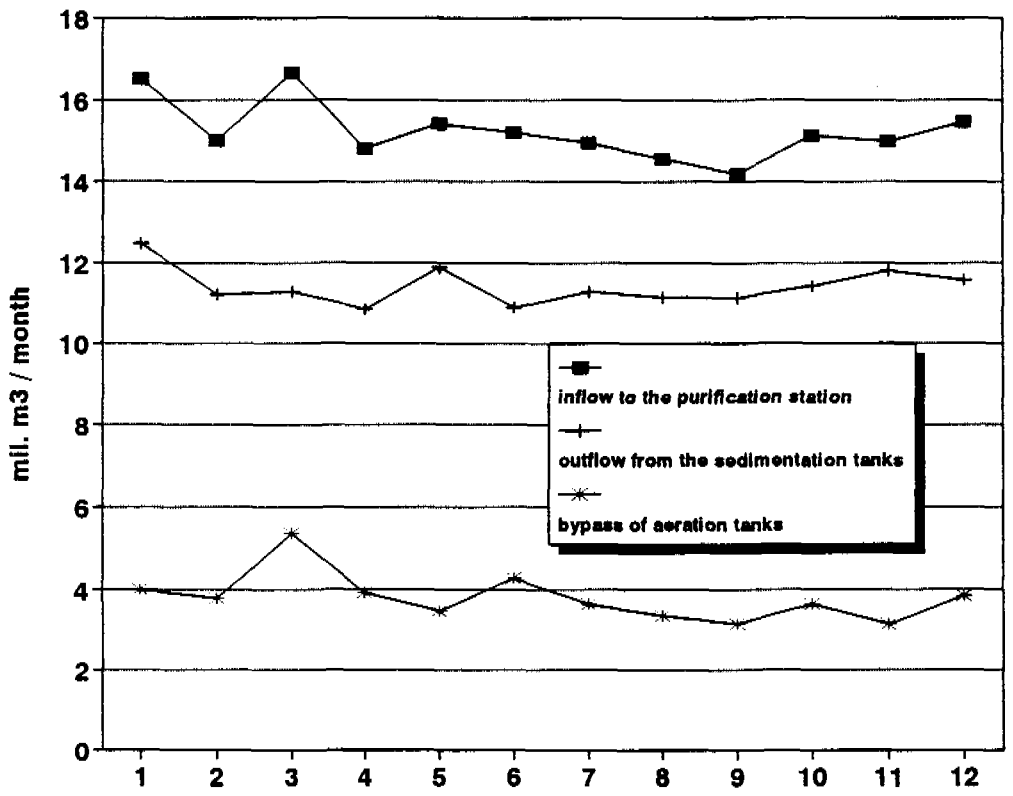
Remedying the situation will require time. Improvement can be speeded up by the consistent and systematic control of the sources of waste water, which will put psychological and economic pressure on the pollutors. The activity of the PKVT control body aims to apply such pressure.

At the time of issuing this publication improvement work on ÚČOV should have started. The costs are estimated at 150 million crowns and this, together with the reconstruction of the existing ÚČOV, will cost a grand total of 800 million crowns. The construction of a new purifying station has been deferred for economic reasons to the remote future (perhaps sometime after 2005).

Some significant changes are currently taking place. The sewer E which flowed into the Vltava with untreated sewerage has been connected to the purification plant. Following a considerable decrease in heavy metal content (through better checks on producers), it has been possible to use digested sludge to reclaim non-agrarian soil. In the longer term, the digested sludge could be removed in other ways, for example by burning in cement factories.

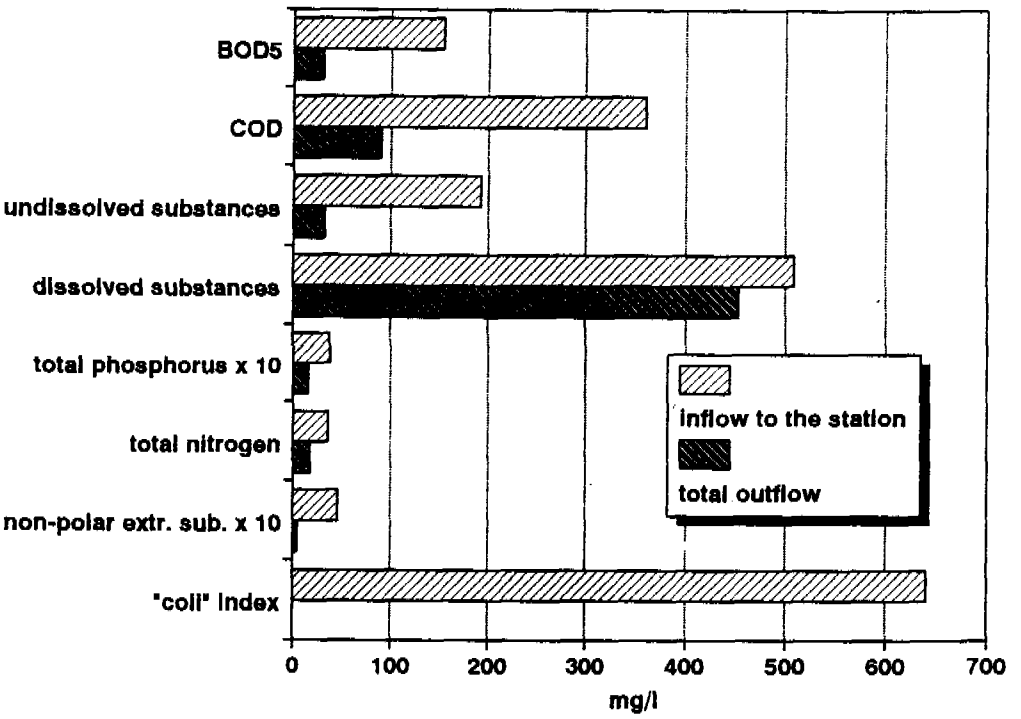
A drop in the consumption of drinking water has also become evident in a reduction of the amount of waste water. Whilst in the middle of 1991 about 6 $m^3.s^{-1}$ flowed into ÚČOV, in 1992 it was 5.7 $m^3.s^{-1}$. After connecting sewer E the figure was about 6.2 $m^3.s^{-1}$(in 1991 the sewer had about 0.8 $m^3.s^{-1}$) so that the tendency is one of decline.

Rates of Flow at ÚČOV in 1992



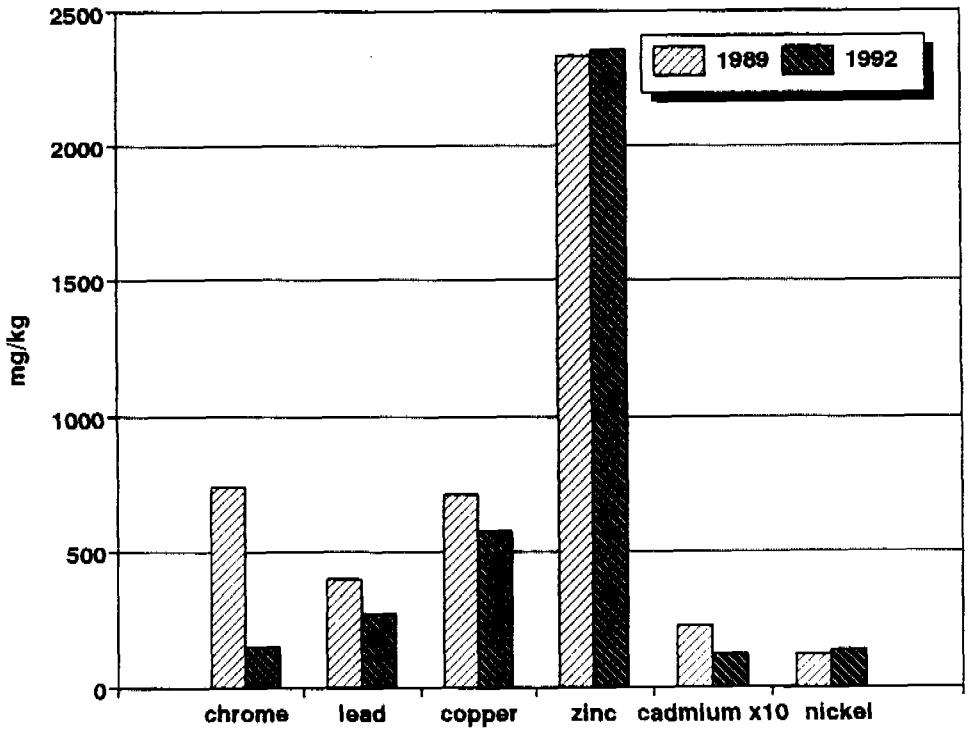
Source: PKVT

Selected Parameters at ÚČOV in 1992



Source: PKVT

Content of Selected Metals in Digested Sludge from ÚČOV in 1989 and 1992



Source: PKVT

of the bodies mentioned are entitled to carry out the responsibilities of the district office in Prague. For this reason the situation must be changed by legal amendment. A clear example is Act ČNR No. 114/1992 of the legal code concerning protection of the natural environment and the landscape. No sooner had it been passed than it required to be supplemented by a legal measure of the governing body of the Czech National Council (No. 347/1992). However, another transfer of responsibilities is not impossible even in this current bureaucratically entangled case.

3. An almost "perfect" situation would be that in which the special law contained the "transformation clause" cited in point 1., and also contained a "transformation clause for the municipal parts", but one which referred to their different competences as district and local areas. The Statute could then solve the problem of executing state administration through the municipal parts Praha-Jižní Město, Praha-Jihozápadní Město and Praha-Modřany. This method is used currently in the area of protecting agrarian soil.

There are paradoxical situations in Prague when the Municipal Authoritiy of Capital Prague (MHMP) "ex lege" executes the responsibilities of municipal office, the special law entrusts the MHMP with responsibilities for district government and finally the sphere of competence of Prague as an independent municipality is added to the indigestible bureaucratic stew. The result often strays over the edges of legal acceptability.

The section for environmental protection of the Prague City council currently manages the following areas for the protection of the environment: (Note: If some responsibilities are entrusted to the municipal parts by Statute there is (S), if the matter is dealt with by law there is (Z)).

- Area of waste management (S)
- Area of air protection (S)
- Area of protection of nature and the landscape including urban green areas (Z). In this area the (S) will have to be adjusted.
- Area for protection of agrarian and forest soils, veterinary care and protection of animals against cruelty (Z) and (S).
- Area for evaluation of influences on the environment (S)
- A broad area covering tasks within the framework of an independent municipal sphere of competence (care of urban greenery, information technology ...)

6.2 QUALITY AND CONTAMINATION OF FOOD PRODUCTS

In 1992 the Regional Inspectorate of the Czech Agricultural and Food Inspection Service in Prague (KI ČZPI) monitored contaminants and additives in samples of agricultural products and food, mostly of a vegetable origin. Measurements were arrived at within the context of regular monitoring and some special activities aimed, for example, at appraising the content of nitrates in bananas , aluminium in beer and soft drinks and di-n-butylphtalate in alcoholic drinks, all sold in the Prague area. Part of ČZPI's activities is so-called "point monitoring" which targets selected agricultural products and localities within the whole Czech Republic.

In 1992 thirty six measurements of contaminants and additives out of 825 failed to meet hygienic standards. This is about 4.4 %.

According toPublic Health Service, the Czech population is most endangered, in terms of a burden on the human organism, by cadmium and nitrates which are present at levels of 90 % of ADI (acceptable daily intake), whilst in other developed countries of Western Europe it is about 30 %. This figure can be found in Prague as well as in the Czech Republic as a whole.