STATE AND DEVELOPMENT OF THE ENVIRONMENTAL COMPARTMENTS

AIR

WATER

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B2 WATER

B2.1 SURFACE WATER

The water quality assessment is performed according to the Czech Standard ČSN 75 7221 "Classification of Surface Water Quality" every year. The standard was made more exact on the basis of practical experience and at the same time it was closer harmonised with the surface water classification, which used in the EU Member States. The standard is focused on a uniform determination of quality classes of flowing surface water – the classification, which serves for benchmarking of water quality at various locations and in various times. Surface water is classified into five levels based on quality. Water quality is classified on the basis of check results acquired over a longer continuous period. The shortest period assessed is one year. It is recommended, at monitoring frequency of 12 samples taken per a year, to make the classification of the check results for a two-year period in order to have 24 values measured (1999–2000) at least for the characteristic value calculations. If there are less than 11 values – results of water quality checks – the classification pursuant to the standard mentioned cannot be carried out. Water quality is assessed for every single indicator separately. The assessment indicators evaluated are sorted into five groups. The indicator of the worst quality determines the entire group value. Then the group of the indicators of the worst classification value determines the overall classification of quality of water in a particular watercourse.

Tab. B2.1 Surface water quality classes according to the ČSN 75 7221

Class number	Classification
I.	Unpolluted water
II.	Slightly polluted water
III.	Polluted water
IV.	Heavily polluted water
V.	Very heavily polluted water

Tab. B2.2 Groups of surface quality indicators according to the ČSN 75 7221

Group	Indicators
A	General physical and chemical indicators
B	Specific organic substances
C	Metals and metalloids
D	Microbiological and biological indicators
E	Radiological indicators

Evaluation of hydrometric profiles of the national network located on the City of Prague territory and in its nearest vicinity

In 2006 there were 4 hydrometric profiles filed within the National Monitoring Network of Water Quality in Watercourses. Three of them – Vrané, Podolí and Libčice – are lying on the Vltava River, one of them – Lahovice is lying on the Berounka River.

At all the profiles there were measured 38 substances scheduled in **Czech Standard ČSN 75 7221**.

At the **Vltava River – Vrané** was the best evaluated profile in group **"General physical and chemical indicators"**. Only classification in total phospohorus and AOX fell into class III, other indicators were mostly classified class I.

At the **Vltava River – Podolí** four indicators from this group (AOX, BOD_5, COD_{Mn} and TOC) were classified class III, values of the remaining indicators were classified class I.

At the **Vltava River – Libčice** the same indicators as at Podolí were classified class III, total phosphorus and IM 105 °C falling into class III too.

At the **Berounka River – Lahovice** AOX and BOD_5 reached class IV, total phophorus, COD_{Mn} and TOC reached the values of class III.

At all the profiles all the indicators from **“Specific organic substances”** group met the requirements for class I, except of PAU substances, that reached class II at all the profiles.

In group **“Mettals and metalloids”** only total iron and mercury fell into class III at the Vltava River – Libčice. The rest of indicators reached class I or II.

The worst evaluated/classified indicator in group D **“Microbiological and biological indicators”** was chlorophyll. It reached class IV at Vltava River – Vrané and at Vltava River – Podolí, at Vltava River – Libčice as well as Berounka River – Lahovice class V. Chlorophyll was the only one indicator classified in class V. Thermo-tolerant coliform bacteria values were bellow the limit of class I at all of three profiles, they reached class III at Vltava River – Libčice.

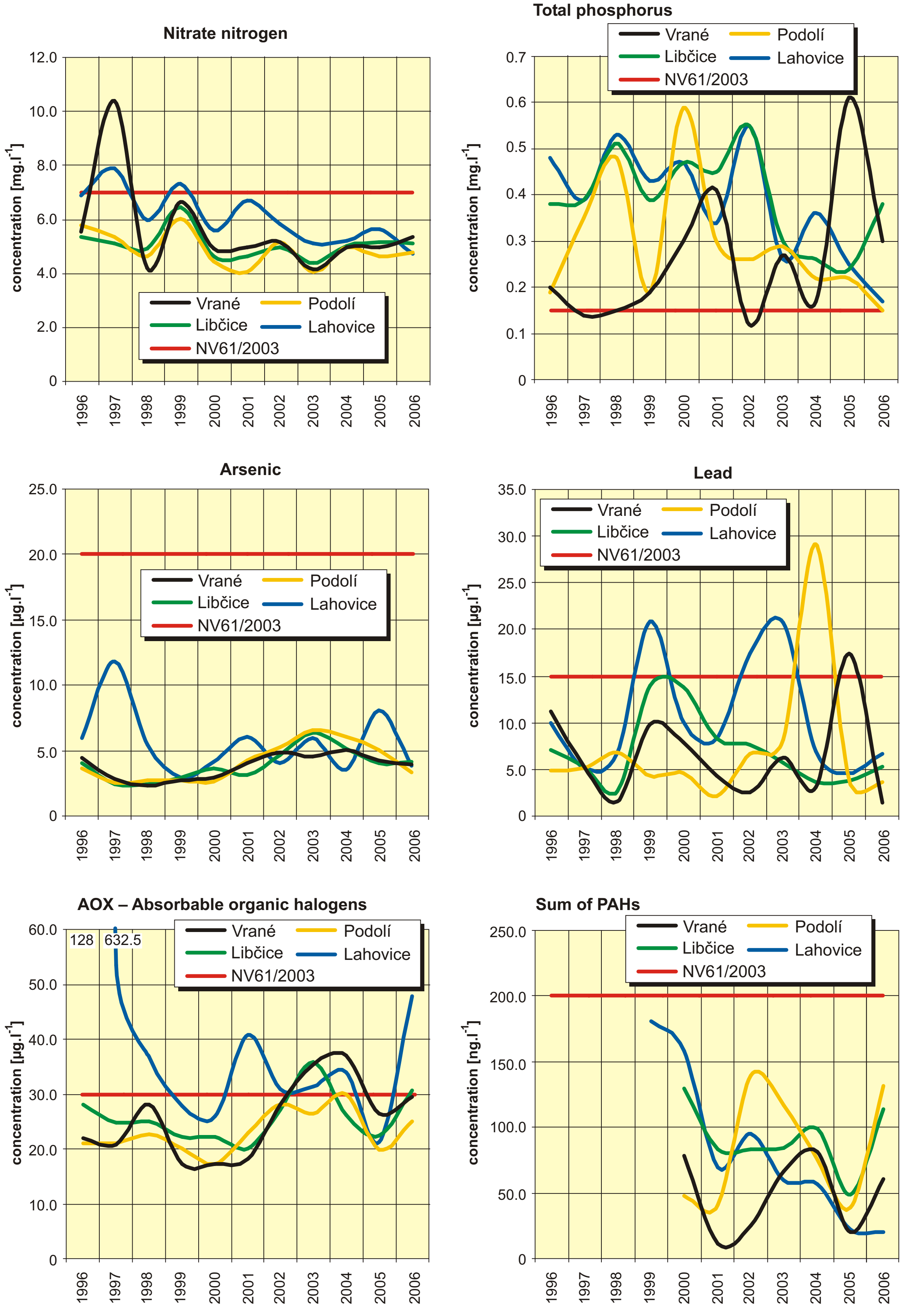
Index of saprobity was not known at the time of closing date, because the evaluation methodology had not been worked over.

Surface water can be classified on the basis of comparison of limit indicators established in the **Order of the Government of the Czech Republic No. 61/2003.** Supplement No. 3 of this Order include table “Immission standards of surface water accepted pollution indicators” and with them is the yearly measured value of C95 of respective indicators compared. Then it shows if the indicator exceeded immission standard or not.

Pursuant to the **Order of the Government of the Czech Republic No. 61/2003 Code** out of the substances enlisted in the Order the numbers measured at respective profiles were 65 at the profile Vltava – Libčice and 81 at the other profiles. The total phosphorus and pH value did not satisfy conditions at none of the profiles. IM 105 °C was exceeded at the profile Podolí, Libčice and Lahovice. Nitrate nitrogen did not satisfy the limits at all profiles at the Vltava River. AOX and BOD_5 exceeded limit at the profile Libčice and Lahovice. Ammonia nitrogen slightly exceeded the limit at the profile Libčice, as well as TOC at the Berounka River – Lahovice.

The favourable fact is that wide spectre of organic compounds and metals, which are according this Order classified as “Dangerous and very dangerous substances” did not exceeded the limit at any of monitored profile. The mercury at the profile Vltava River in Libčice was the only one exemption.

Fig. B2.1 The course of annual values of C95 of some of substances against the limit values set in the Order of the Government of the Czech Republic No. 61/2003, 1996–2006



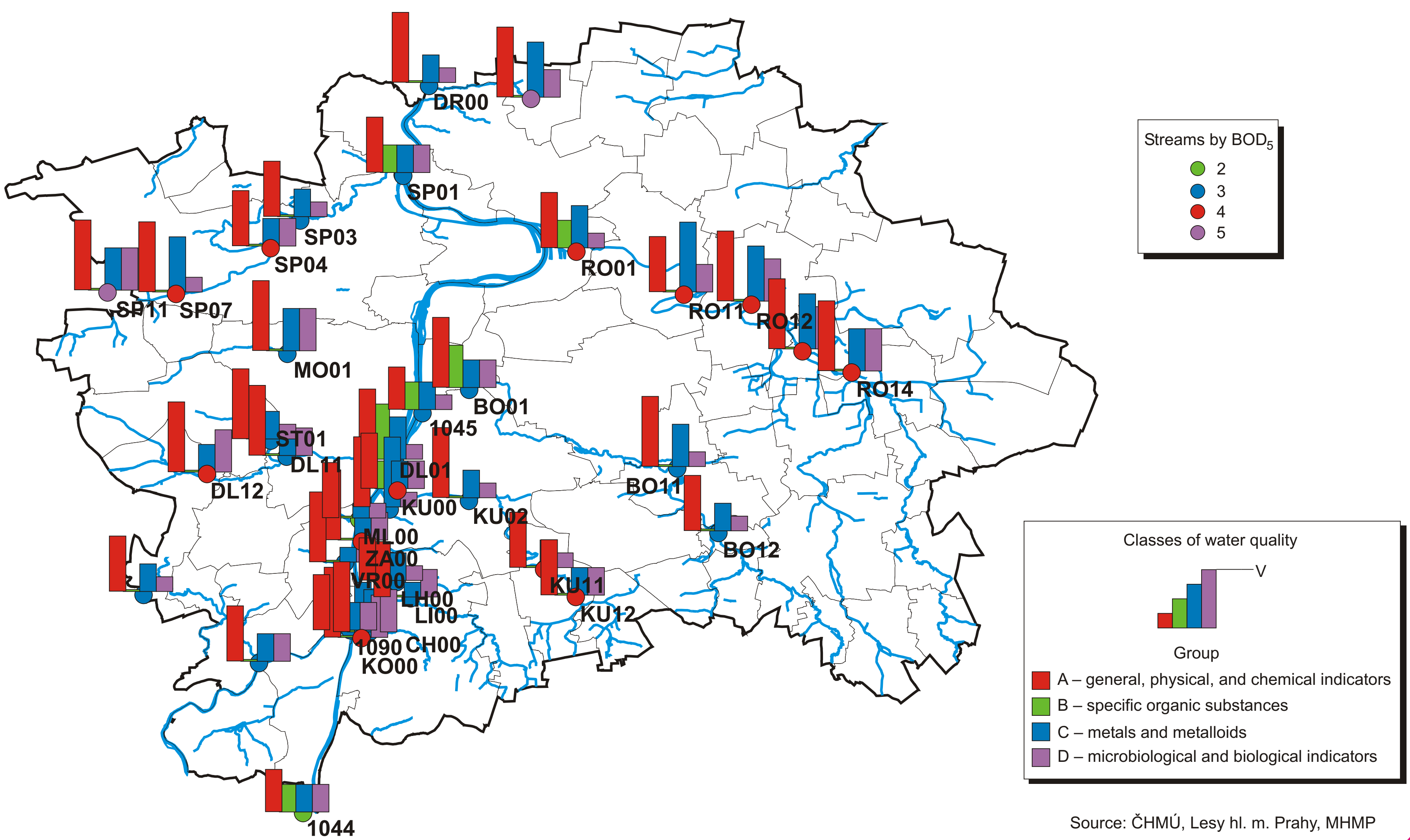
Source: PVK, a. s.

Tab. B2.3 Regularly monitored hydrometric profiles on watercourses

Code	River/creek – sampling point	Stream km
1044	Vltava River in Vrané nad Vltavou	70.10
1045	Vltava River in Podolí	56.20
1046	Vltava River in Libčice	28.20
1090	Berounka River in Lahovice	0.60
BO01	Botič Stream in Nusle – Sekaninova Str. (limnigraph)	1.50
BO11	Botič Stream downstream Hostivař Dam	
BO12	Botič Stream upstream Hostivař Dam	
BR00	Branický Creek –inflow into a pipeline (Str. Údolní)	0.46
DL01	Dalejský Creek – mouth into the Vltava River	0.01
DL11	Dalejský Creek near Klukovice Amphitheatre	
DL12	Dalejský Creek Řeporyje – Str. Mládkova	
DR00	Drahaňský Creek – mouth into the Vltava River	0.01
DR02	Drahaňský Creek – downstream the upper pond	
CH00	Cholupický Creek – crossing Str. Komořanská	0.60
KO00	Komořanský Creek – mouth into the Vltava River	0.10
KU00	Kunratický Creek – inflow into a pipeline (Nad malým mlýnem)	0.44
KU02	Kunratický Creek Krč (at Zámecký Pond)	3.16
KU11	Kunratický Creek downstream Dolnomlýnský Pond	
KU12	Kunratický Creek downstream Šeberák	
LH00	Lhotecký Creek – inflow into a pipeline (Str. Čs. exilu)	1.15
LI00	Libušský Creek – inflow into a pipeline	1.48
ML00	Mariánskolázeňský Creek – mouth into the Vltava River	0.01
MO01	Motolský Creek – inflow into a pipeline	4.75
RA01	Radotínský Creek – mouth into the Berounka River	0.01
RA02	Radotínský Creek – at Rutický mlýn	
RO01	Rokytka Voctářova (dr. Holého Square – limnigraph)	0.27
RO11	Rokytka downstream Kyjský Pond	
RO12	Rokytka before Kyjský Pond	
RO13	Rokytka downstream Počernickým Pond	
RO14	Rokytka upstream Počernický Pond	
SP01	Šárecký Creek – mouth into the Vltava River	0.01
SP03	Šárecký Creek downstream Džbánem (Jenerálka)	4.85
SP04	Šárecký Creek before Džbán	10.95
SP07	Šárecký Creek Jiviny pod hrází	15.09
SP11	Šárecký Creek before Strnad	
ST01	Stodůlecký Creek Prokopské údolí	1.28
VR00	Vrutice – mouth into the Vltava River	0.20
ZA00	Zátišský Creek – mouth into the Vltava River	0.10

Source: ČHMÚ, Lesy hl. m. Prahy, MHMP

Fig. B2.2 Monitored hydrometric profiles of surface watercourses – classes of water quality in the groups of indicators



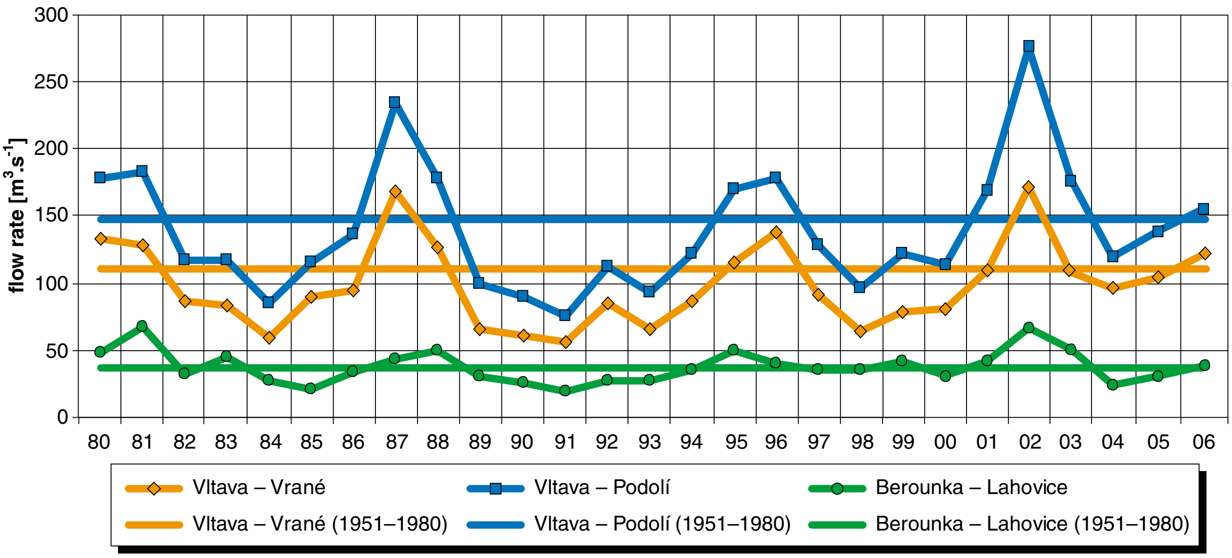
Source: ČHMÚ, Lesy hl. m. Prahy, MHMP

Tab. B2.4 Average values of selected indicators (concentration in mg.l^{-1}), 2001–2006

	Hydrometic profile	2001	2002	2003	2004	2005	2006
				BOD_5			
1044	Vltava – Vrané	2.06	1.76	2.14	1.53	1.53	1.64
1045	Vltava – Podolí	1.74	2.14	2.53	2.21	2.10	2.17
1046	Vltava – Libčice	3.30	2.98	3.05	2.87	2.66	3.08
1090	Berounka – Lahovice	3.65	3.15	6.24	4.51	3.49	3.49
				COD (Cr)			
1044	Vltava – Vrané	21.50	22.46	17.29	17.81	18.57	20.36
1045	Vltava – Podolí	20.60	23.55	23.10	19.43	19.39	22.19
1046	Vltava – Libčice	24.10	23.64	21.83	22.03	20.27	22.96
1090	Berounka – Lahovice	20.80	19.18	23.92	20.33	17.19	17.66
				NO_3			
1044	Vltava – Vrané	3.23	3.70	2.91	3.09	3.05	2.84
1045	Vltava – Podolí	3.17	3.68	2.86	3.10	3.06	2.70
1046	Vltava – Libčice	3.62	3.86	3.12	3.24	3.29	3.10
1090	Berounka – Lahovice	4.01	4.16	2.64	2.84	3.20	2.89
				Total phosphorus			
1044	Vltava – Vrané	0.16	0.10	0.11	0.10	0.15	0.11
1045	Vltava – Podolí	0.18	0.15	0.14	0.13	0.12	0.10
1046	Vltava – Libčice	0.24	0.27	0.21	0.19	0.16	0.16
1090	Berounka – Lahovice	0.21	0.21	0.16	0.17	0.13	0.12
				Flow rate [m^3.s^{-1}]			
1044	Vltava – Vrané	109.60	170.67	109.84	98.25	104.20	121.85
1045	Vltava – Podolí	168.00	275.93	175.64	120.64	137.78	151.95
1046	Vltava – Libčice	169.60	248.35	177.32	121.80	139.10	153.40
1090	Berounka – Lahovice	42.00	67.38	51.16	23.42	29.91	42.41

Source: ČHMÚ, MHMP

Fig. B2.3 Average yearly flow rate at selected hydrometric profiles, 1980–2006



Source: ČHMÚ, MHMP

Tab. B2.5 Classes of water quality of surface watercourses, 2005–2006

Indicator	VL1044	VL1045	VL1046	BE1090	BO01	DL01	KU00	RO01	SP01
A – GENERAL, PHISICAL AND CHEMICAL INDICATORS	**III.**	**III.**	**III.**	**IV.**	**V.**	**V.**	**IV.**	**IV.**	**IV.**
Electrolytic conductivity	I.	I.	I.	II.	III.	V.	IV.	IV.	IV.
Dissolved matter	I.	I.	I.	II.	0	0	0	0	0
Unsoluble matter	II.	II.	II.	II.	III.	IV.	II.	III.	III.
Dissolved oxygen	II.	II.	I.	I.	I.	I.	I.	I.	I.
Biochemical oxygen demand	II.	III.	III.	III.	III.	III.	IV.	IV.	III.
Chemical oxygen demand by permanganate	II.	II.	III.	II.	0	0	0	0	0
Chemical oxygen demand by dichromate	II.	II.	III.	III.	III.	III.	III.	III.	III.
Organic carbon	II.	III.	III.	III.	V.	II.	III.	III.	III.
Absorbable organohalogens (AOX)	III.	III.	III.	IV.	0	0	0	0	0
Ammonia nitrogen	I.	I.	II.	II.	III.	II.	III.	IV.	II.
Nitrate nitrogen	II.	II.	II.	II.	II.	III.	II.	II.	III.
Total phosphorus	III.	III.	III.	III.	III.	IV.	IV.	IV.	III.
Chlorides	I.	I.	I.	I.	II.	III.	III.	II.	II.
Sulphates	I.	I.	I.	I.	II.	III.	III.	III.	III.
Calcium	I.	I.	I.	I.	I.	II.	I.	I.	I.
Magnesium	I.	I.	I.	I.	I.	I.	I.	I.	I.
B – SPECIFIC ORGANIC COMPOUNDS	**II.**	**II.**	**II.**	**II.**	**III.**	**IV.**	**II.**	**II.**	**II.**
Dichlorobenzene – mixture of congeners	I.	I.	I.	I.	0	0	0	0	0
Chlorobenzene	I.	I.	I.	I.	0	0	0	0	0
1,2-dichloroethane	I.	I.	I.	I.	0	0	0	0	0
Trichloroethene	I.	I.	I.	I.	0	0	0	0	0
Tetrachloroethene	I.	I.	I.	I.	0	0	0	0	0
Chloroform	I.	I.	I.	I.	0	0	II.	0	II.
Tetrachloromethane	I.	I.	I.	I.	0	0	0	0	0
Lindane	I.	I.	I.	I.	0	0	0	0	0
Sum of PCB congeners	I.	I.	I.	I.	0	IV.	0	0	0
Sum of PAU (6 compounds)	II.	II.	II.	II.	III.	0	0	II.	0
C – METALS AND METALLOIDS	**II.**	**II.**	**II.**	**II.**	**II.**	**III.**	**II.**	**III.**	**II.**
Chromium	I.	I.	I.	I.	0	0	I.	I.	0
Manganese	II.	II.	II.	II.	II.	I.	II.	III.	II.
Iron	I.	II.	II.	II.	II.	II.	I.	II.	II.
Nickel	I.	II.	I.	II.	II.	I.	II.	II.	0
Copper	I.	I.	I.	I.	0	0	0	0	0
Zinc	II.	II.	II.	II.	0	0	0	0	I.
Cadmium	I.	II.	II.	II.	0	III.	0	0	0
Mercury	I.	I.	I.	I.	0	0	0	0	0
Lead	I.	I.	II.	II.	0	0	0	0	0
Arsenic	II.	II.	II.	II.	II.	I.	II.	II.	II.
D – MICROBILOGICAL AND BIOLOGICAL INDICATORS	**II.**	**I.**	**III.**	**II.**	**II.**	**I.**	**II.**	**I.**	**II.**
Faecal coliforms	I.	I.	III.	I.	II.	I.	II.	I.	II.
Enterococci	II.	I.	0	II.	0	0	0	0	0
Index of saprobic benthos	0	0	0	0	0	0	0	0	0
Chlorophyll	0	0	0	0	0	0	0	0	0

Source: ČHMÚ, Lesy hl. m. Prahy, MHMP

Tab. B2.6 A – General physical and chemical indicators, concentrations and effluents, 2006

a) Concentrations

Code	Indicator	Unit	VL1044	VL1045	VL1046	BE1090	BO01	KU02	RO01	SP07
SPV	Electrolytic conductivity	$mS.m^{-1}$	25.0000	27.7000	31.6000	40.0000	94.2000	124.0000	103.0000	99.8000
RL	Dissolved matter	$mg.l^{-1}$	172.0000	179.0000	217.0000	264.0000	–	–	–	–
NRL	Unsoluble matter	$mg.l^{-1}$	8.6700	12.5000	15.3000	15.1000	14.7000	13.2000	17.4000	32.1000
RO_2	Dissolved oxygen	$mg.l^{-1}$	9.8800	10.6000	12.0000	12.0000	11.6000	10.3000	11.7000	8.9500
BSK	Biochemical oxygen demand	$mg.l^{-1}$	1.6400	2.1700	3.0800	3.4900	4.4900	4.7600	5.1000	7.0800
CHM	Chemical oxygen demand by permanganate	$mg.l^{-1}$	7.4200	7.5800	7.9700	6.3800	–	–	–	–
CHC	Chemical oxygen demand by dichromate	$mg.l^{-1}$	20.4000	22.2000	23.0000	17.7000	23.0000	22.1000	23.1000	45.6000
TOC	Organic carbon	$mg.l^{-1}$	8.7800	9.4200	9.2800	8.4800	12.9000	8.8800	10.8000	16.9000
AOX	Absorbable organic halogens	$\mu g.l^{-1}$	18.6000	18.9000	22.1000	25.9000	–	–	–	–
NH_4	Ammonia nitrogen	$mg.l^{-1}$	0.0600	0.0900	0.2600	0.1090	0.3260	0.4980	0.8010	1.2400
NO_3	Nitrate nitrogen	$mg.l^{-1}$	2.8400	2.7000	3.1000	2.8900	3.3500	2.4100	3.3700	2.1000
PCL	Total phosphorus	$mg.l^{-1}$	0.1080	0.1040	0.1550	0.1160	0.1590	0.2490	0.2510	0.3390
CL	Chlorides	$mg.l^{-1}$	18.2000	18.8000	24.3000	31.0000	157.0000	189.0000	122.0000	109.0000
SO_4	Sulphates	$mg.l^{-1}$	30.1000	35.0000	39.9000	54.1000	109.0000	176.0000	175.0000	169.0000
CA	Calcium	$mg.l^{-1}$	25.6000	29.8000	32.4000	39.3000	77.2000	111.0000	96.6000	110.0000
MG	Magnesium	$mg.l^{-1}$	6.1900	7.3600	7.8800	10.9000	16.5000	26.4000	24.6000	20.0000

b) Effluentes

Code	Indicator	Unit	VL1044	VL1045	VL1046	BE1090	BO01	KU02	RO01	SP07
PRT	Flow rate	$m^3.s^{-1}$	122.0000	152.0000	153.0000	42.4000	0.4130	0.0768	0.4040	0.1420
RL	Dissolved matter	$t.year^{-1}$	690000.0000	910000.0000	1030000.0000	310000.0000	–	–	–	–
NRL	Unsoluble matter	$t.year^{-1}$	45200.0000	86700.0000	79500.0000	25400.0000	209.0000	32.5000	281.0000	111.0000
RO_2	Dissolved oxygen	$t.year^{-1}$	45600.0000	57200.0000	64100.0000	15000.0000	147.0000	28.5000	149.0000	42.0000
BSK	Biochemical oxygen demand	$t.year^{-1}$	6810.0000	11300.0000	13700.0000	3970.0000	60.5000	12.2000	75.7000	27.5000
CHM	Chemical oxygen demand by permanganate	$t.year^{-1}$	29300.0000	38100.0000	38400.0000	9560.0000	–	–	–	–
CHC	Chemical oxygen demand by dichromate	$t.year^{-1}$	76100.0000	109000.0000	103000.0000	25000.0000	355.0000	57.8000	349.0000	183.0000
TOC	Organic carbon	$t.year^{-1}$	34800.0000	47800.0000	44300.0000	12400.0000	162.0000	23.9000	151.0000	60.4000
AOX	Absorbable organic halogens	$kg.year^{-1}$	72100.0000	94100.0000	103000.0000	30000.0000	–	–	–	–
NH_4	Ammonia nitrogen	$t.year^{-1}$	646.0000	835.0000	1530.0000	157.0000	4.4700	2.0500	10.0000	11.2000
NO_3	Nitrate nitrogen	$t.year^{-1}$	13700.0000	16000.0000	18100.0000	4650.0000	43.9000	7.2800	48.0000	14.4000
PCL	Total phosphorus	$t.year^{-1}$	638.0000	580.0000	686.0000	163.0000	2.0500	0.5700	3.5600	1.5700
CL	Chlorides	$t.year^{-1}$	68500.0000	89400.0000	112000.0000	33100.0000	1750.0000	444.0000	1580.0000	568.0000
SO_4	Sulphates	$t.year^{-1}$	113000.0000	169000.0000	181000.0000	63800.0000	1390.0000	345.0000	2220.0000	789.0000
CA	Calcium	$t.year^{-1}$	97100.0000	142000.0000	149000.0000	43300.0000	964.0000	241.0000	1220.0000	579.0000
MG	Magnesium	$t.year^{-1}$	23800.0000	35300.0000	36800.0000	12800.0000	212.0000	58.2000	298.0000	89.4000

Source: ČHMÚ, Lesy hl. m. Prahy, MHMP

Tab. B2.7 B – Specific organic substances, concentration and effluents, 2006

a) Concentrations

Code	Indicator	Unit	VL1044	VL1045	VL1046	BE1090	BO01	KU02	RO01	SP07
CLB_2SUMA	Dichlorobenzenes B19 – mixture	$ng.l^{-1}$	0.0000	0.0000	0.0000	0.0000	–	–	–	–
CLB_MCLB	Chlorobenzene	$ng.l^{-1}$	0.0000	0.0000	0.0000	0.0000	–	–	–	–
CLC_12CLE	1,2-dichloroethane	$ng.l^{-1}$	0.0000	0.0000	0.0000	0.0000	–	–	–	–
CLC_3CLET	Trichloroethene	$ng.l^{-1}$	0.0000	0.0000	0.0000	0.0000	–	–	–	–
CLC_4CLET	Tetrachlorethene	$ng.l^{-1}$	0.0000	23.3000	30.8000	7.5000	–	–	–	–
CLC_CHCL3	Chloroform	$ng.l^{-1}$	0.0000	0.0000	20.0000	0.0000	–	0.0000	–	0.0000
CLC_CHCL4	Tetrachloromethane	$ng.l^{-1}$	0.0000	0.0000	0.0000	0.0000	–	–	–	–
PST_LIN	Lindane	$ng.l^{-1}$	0.0000	0.0000	0.0000	0.0000	–	–	–	–
PCB_SUMA	Sum of PCB congeners	$ng.l^{-1}$	0.0000	0.0000	0.0000	0.0000	–	–	–	–
PAU_SUMA	Sum of PAH (6 compounds)	$ng.l^{-1}$	20.5000	32.8000	37.2000	16.1000	46.9000	–	24.9000	–

b) Effluentes

Code	Indicator	Unit	VL1044	VL1045	VL1046	BE1090	BO01	KU02	RO01	SP07
PRT	Flow rate	$m^3.s^{-1}$	122.0000	152.0000	153.0000	42.4000	0.4130	0.0768	0.4040	0.1420
CLB_2SUMA	Dichlorobenzenes B19 – mixture	$g.year^{-1}$	0.0000	0.0000	0.0000	0.0000	–	–	–	–
CLB_MCLB	Chlorobenzene	$g.year^{-1}$	0.0000	0.0000	0.0000	0.0000	–	–	–	–
CLC_12CLE	1,2-dichloroethane	$g.year^{-1}$	0.0000	0.0000	0.0000	0.0000	–	–	–	–
CLC_3CLET	Trichloroethene	$g.year^{-1}$	0.0000	0.0000	0.0000	0.0000	–	–	–	–
CLC_4CLET	Tetrachlorethene	$g.year^{-1}$	0.0000	83200.0000	113000.0000	3980.0000	–	–	–	–
CLC_CHCL3	Chloroform	$g.year^{-1}$	0.0000	0.0000	65000.0000	0.0000	–	0.0000	–	0.0000
CLC_CHCL4	Tetrachloromethane	$g.year^{-1}$	0.0000	0.0000	0.0000	0.0000	–	–	–	–
PST_LIN	Lindane	$g.year^{-1}$	0.0000	0.0000	0.0000	0.0000	–	–	–	–
PCB_SUMA	Sum of PCB congeners	$g.year^{-1}$	0.0000	0.0000	0.0000	0.0000	–	–	–	–
PAU_SUMA	Sum of PAH (6 compounds)	$g.year^{-1}$	126000.0000	189000.0000	219000.0000	22100.0000	635.0000	–	588.0000	–

Source: ČHMÚ, MHMP

Tab. B2.8 C – Metals and metalloids, D – Microbiological and biological indicators, concentrations and effluents, 2006

a) Concentrations

Code	Indicator	Unit	VL1044	VL1045	VL1046	BE1090	BO01	KU02	RO01	SP07
CR	Chromium	$\mu g.l^{-1}$	0.3500	0.3830	0.6000	0.9000	0.0000	0.0000	0.0000	0.0000
MN	Manganese	$mg.l^{-1}$	0.0758	0.0783	0.0900	0.0742	0.0788	0.1650	0.2110	0.2390
FE	Iron	$mg.l^{-1}$	0.2490	0.2630	0.3330	0.3720	0.2320	0.2540	0.3580	0.4610
NI	Nickel	$\mu g.l^{-1}$	2.2700	2.3500	2.6500	3.2900	0.0000	0.0000	3.6000	5.7000
CU	Copper	$\mu g.l^{-1}$	1.8100	2.4900	2.4800	2.7000	2.8500	7.1000	0.0000	0.0000
ZN	Zinc	$\mu g.l^{-1}$	6.7800	10.7000	15.6000	11.7000	7.7500	18.6000	9.9000	32.9000
CD	Cadmium	$\mu g.l^{-1}$	0.0208	0.0583	0.0308	0.0892	0.0000	0.0000	0.0000	0.0000
HG	Mercury	$\mu g.l^{-1}$	0.0000	0.0000	0.0183	0.0000	0.0750	0.1700	0.0000	0.4000
PB	Lead	$\mu g.l^{-1}$	0.5420	0.8580	1.2700	2.0900	0.0000	0.0000	0.0000	0.0000
AS	Arsenic	$\mu g.l^{-1}$	2.5900	2.3700	2.4300	2.1400	0.0000	0.0000	0.9000	4.9000
FEK	Faecal coliforms	$KTJ.ml^{-1}$	1.0800	3.1700	59.3000	8.1700	5.5800	4.3300	7.2500	1.3300
ENT	Enterococci	$KTJ.ml^{-1}$	1.0000	1.7500	–	1.9200	–	–	–	–
ISB	Index of saprobic benthos		–	–	–	–	–	–	–	–
CHL	Chrophyll	$\mu g.l^{-1}$	–	–	–	–	–	–	–	–

b) Effluentes

Code	Indicator	Unit	VL1044	VL1045	VL1046	BE1090	BO01	KU02	RO01	SP07
PRT	Průtok	$m^3.s^{-1}$	122.0000	152.0000	153.0000	42.4000	0.4130	0.0768	0.4040	0.1420
CR	Chromium	$kg.year^{-1}$	2770.0000	3510.0000	4110.0000	1500.0000	0.0000	0.0000	0.0000	0.0000
MN	Manganese	$t.year^{-1}$	367.0000	446.0000	485.0000	103.0000	1.1200	0.4380	2.8800	1.1600
FE	Iron	$t.year^{-1}$	1720.0000	2350.0000	2500.0000	798.0000	3.1500	0.7940	5.3600	1.7400
NI	Nickel	$kg.year^{-1}$	10300.0000	13900.0000	14500.0000	5180.0000	0.0000	0.0000	98.0000	75.5000
CU	Copper	$kg.year^{-1}$	8020.0000	13400.0000	13000.0000	4400.0000	35.1000	58.7000	0.0000	0.0000
ZN	Zinc	$kg.year^{-1}$	28500.0000	76500.0000	78500.0000	19800.0000	95.6000	154.0000	269.0000	436.0000
CD	Cadmium	$kg.year^{-1}$	60.4000	643.0000	240.0000	163.0000	0.0000	0.0000	0.0000	0.0000
HG	Mercury	$kg.year^{-1}$	0.0000	0.0000	62.0000	0.0000	0.9250	1.4000	0.0000	5.3000
PB	Lead	$kg.year^{-1}$	3000.0000	8110.0000	7210.0000	3490.0000	0.0000	0.0000	0.0000	0.0000
AS	Arsenic	$kg.year^{-1}$	11400.0000	11900.0000	13300.0000	2650.0000	0.0000	0.0000	24.5000	64.9000
FEK	Faecal coliforms	$10^{12} j.y^{-1}$	5240.0000	25900.0000	242000.0000	6510.0000	49.3000	3.3400	71.7000	8.7200
ENT	Enterococci	$10^{12} j.y^{-1}$	1350.0000	5540.0000	–	2160.0000	–	–	–	–
CHL	Chrophyll	$kg.year^{-1}$	–	–	–	–	–	–	–	–

Source: ČHMÚ, MHMP

B2.2 DRINKING WATER

B2.2.1 Drinking water supply through the public water supply system

The public water supply system in Prague and the drinking water treatment plants for the customer drinking water supply has been administered by the joint stock company of Pražská vodohospodářská společnost, a. s. since the beginning 1998.

The joint stock company of Pražské vodovody a kanalizace, a. s. (PVK, a. s.) is the operator of the Prague's water supply system.

Drinking water treatment plants

In 2006 the long-term descending trend in the water production nearly stopped. Yet the annual decrease had been lowest in last 10 years. Compared to the situation in 2005 the production dropped by 0.5 mill. m^3 water, i.e. the decrease by 0.4 %.

Compared to the previous year in the area of drinking water supply no substantial change happened in the output of water treatment plants.

Drinking Water Treatment Plant Podolí has been in use for a minimum time due to the long-term, decrease in the water consumption. It has been, however, permanently maintained at the operating state.

In 2006 the Water Treatment Plant Podolí was under operation merely for three month, it produced 3.2 mill. m^3 drinking water, that is its share of the total water produced in PVK, a. s. was 2.4 %. It is a relatively small share, however, the water treatment plant forms a very important spare water source to Prague. Compared to the situation in 2005 the production of the Water Treatment Plant Podolí increased by 2 mill. m^3.

Drinking Water Treatment Plant in Kárané is located at the confluence of the Jizera River and the Labe River. It was commissioned in 1914 when it became the first water treatment plant providing Prague with innocuous drinking water.

Its maximum capacity is approx. 1,900 $l.s^{-1}$. The water is pumped to Prague by means of three discharge mains 23 km in length each. A portion of the water produced is supplied to municipalities and communities to the plant immediate surroundings.

The Water Treatment Plant in Kárané is the only one of three water treatment plants serving Prague, which a portion of water comes from groundwater sources from sand-gravel strata and artesian wells. Its other source of water is surface water from the Jizera River treated by the artificial groundwater recharge.

Advantage of water from the treatment plant is its excellent quality. The drawback is its long-term as well as short-term limitations by weather conditions and the need of energy-demanding pumping to Prague.

The time dependence of water abstraction from classic (groundwater) sources is shown in Figure. It is obvious from the time dependence given that the most significant short-term drops happened in summer 2002, 2005 and 2006. These short-term drops were related to operating reasons (reconstruction of collecting mains), and has no context with substance of groundwater. Concerning the long-term development it is essential that recently the drop of these abstractions relates to the decreasing trend in water consumption and also for the reason of increased fees for the groundwater abstraction.

In 2006 the Káraný Plant produced in total 31.8 mill. m^3 drinking water (summary of traditional sources and artificial recharge ones), which was approximately the same volume as in the previous year. This also means the Káraný Plant's production accounted for 24.2 % of the total drinking water production of the PVK, a. s. that is a slight increase in the share compared to 2005 (by 0.2 per cent point).

Drinking Water Treatment **Plant Želivka** is the most modern drinking water source to Prague having the largest capacity as well. It was commissioned in 1972. Its maximum output is about 7,000 $l.s^{-1}$ yet due to the decreasing water consumption it has been utilised up to its half only. Besides Prague the plant supplies drinking water a part of the Vysočina Region and smaller areas in the Central Bohemia Region.

This water treatment plant water source is raw water from the Želivka River accumulated in the Švihov Water Reservoir. The water reservoir was designed as a many-year reservoir with the usable volume of storage space 246 mill. m^3 in between the spot heights 377.00 m and 343.10 m. The water level in the reservoir from January 1993 is shown in Figure. Since the beginning of 1995 the permanent trend in water level increase has been apparent and since January 1996 water in the reservoir has been fully swollen and only short-term drops in water level occur depending on precipitation. The fact also relates to the drop in the water consumption and thus with the decrease of the water production in the Water Treatment Plant Želivka in recent years. The extremely dry spell in 2003 incurred the lowest drop of level since 1996 down to the spot height 373 m yet when compared to the situation in the first half of the 1990s this is a low importance drop concerning the reservoir operation. In the course of the first half of 2004 the level got swollen back almost reaching the maximum level and no further significant drops happened. The short-term increase in the water level in spring 2006 was caused by floods.

Raw water is treated by sand percolation filters with fast filtration. The filtered water is taken to ozonation, which improves organoleptic properties of water. Health innocuousness is provided by means of chlorine dosing.

Treated water is led to Prague through a shaft mains approx. 52 km long and 2.64 m in diameter to the distribution reservoir in Jesenice. From the distributing reservoir water is delivered to the territory of the City of Prague in the area in between Písnice and Hrnčíře.

Major advantages of the source Želivka encompass the relative stability of raw water quality, substantial capacity of the source, and low energy demand due to the gravitational transport of water to Prague.

In 2006 the Želivka Water Treatment Plant produced in total 96.4 mill. m^3 drinking water, which means 73.4 % of the total water production of the company of Pražské vodovody a kanalizace, a. s. Inter-yearly this plant registered production decrease of 2.95 mill. m^3.

Besides the drinking water sources mentioned here above the company of Pražské vodovody a kanalizace, a. s. also operates an **industrial water supply system**, which delivers industrial water to enterprises in the Northeast part of the City. The abstraction station thereof is located on the Libeňský Island and it uses the Vltava River as water source. In 2002 floods the pump station was submerged and heavily damaged. For the reason the industrial water supply system had to be shutdown. After the large reconstruction was the plant opened again in August 2006. In 2006 the industrial water supply system produced 379,000 m^3 service water, that is its share of the total water produced in PVK, a. s. (Prague Water Supply and Sewerage) was 0.3 %.

Tab. B2.9 The production of treated water in respective treatment plants of the Pražské vodovody a kanalizace, a. s. in 2006

Treatment Plant	Production [1,000 m^3]	Share [%]
Želivka	96,414	73.18
Káraný	31,767	24.11
Podolí	3,185	2.42
Industrial water supply system	379	0.29
Total	131,746	100.00

Source: PVK, a. s.

Water supply system

Because of complex topography the water distribution across the City territory is very demanding for technology. The drinking water supply system utilises 3,471 km of water mains (out of that 3,431 km are drinking water mains), 711 km of water branches, 39 pumping stations, and 68 distribution reservoirs of total volume 682,800 m^3.

The water supply system features a relatively high failure rate due to its age, conditions of its construction, corrosion, material composition, and other effects. Approximately 1,000 km that is almost one third thereof out of the total system of pipes are over sixty years old. In 2006 the number of opened accident pits, which had to be performed in order to provide for the Prague's water supply system operation, accounted for 2,836 which is by 252 (8.1 %) less than in 2005. The average period of accident duration was one day fifteen hours and 3 minutes. Of the total amount of accidents number 49 represent accident of 1st category and number 112 of 2nd category.

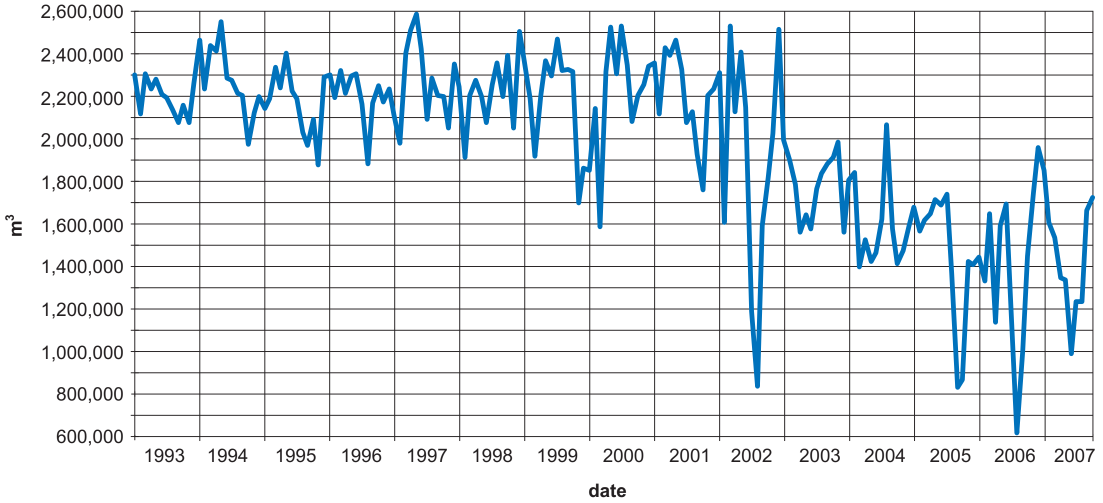
In recent years the company managed substantially reduce water loss. The highest water loss was found in the half of the 1990s (up to 46 %). Since 1996 the water loss has been decreasing year after year. The trend is demonstrated in Figure.

Water consumption and supply

In 2006 the total water production was 131,745,761 m^3, out of that 131,366,263 m^3 was drinking water, that represents 99.71 %. Out of that volume 15,116,046 m^3 were supplied to clients located outside the Prague's territory. All water consumed in Prague was produced in sources operated by Pražské vodovody a kanalizace, a. s.

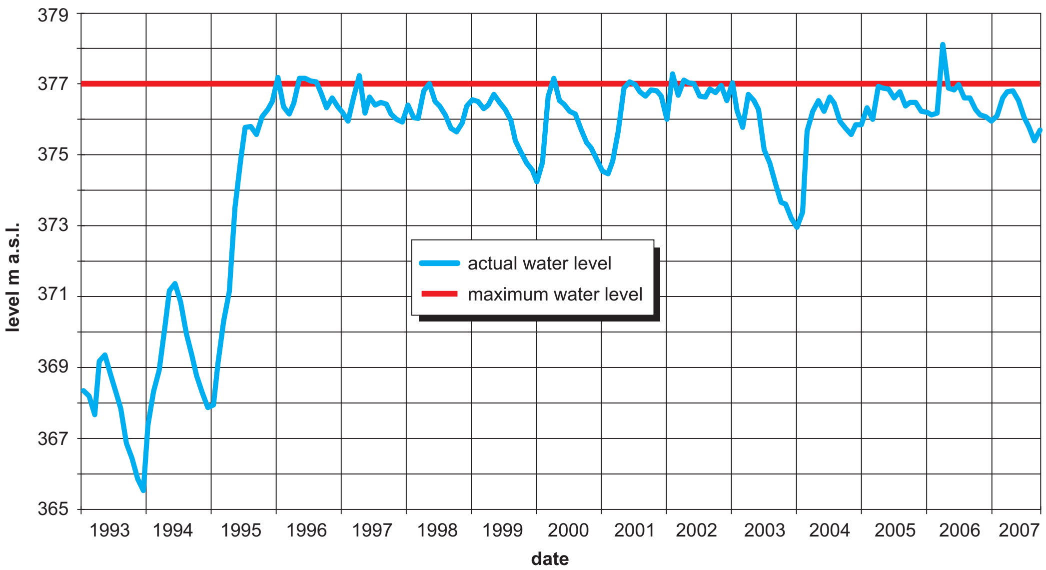
The tendency in the drinking water production since 1986 and in respective water treatment plants is shown in Figure. The graph clearly demonstrates still continuing long-term trend in every year decreasing water production lasting since 1991. The year 1996 was the only exemption when annual water production increased. It is obvious in recent years that the rate of the water consumption decrease has been gradually slowing down.

Fig. B2.4 Time dependence of water abstraction from classic sources in Káraný



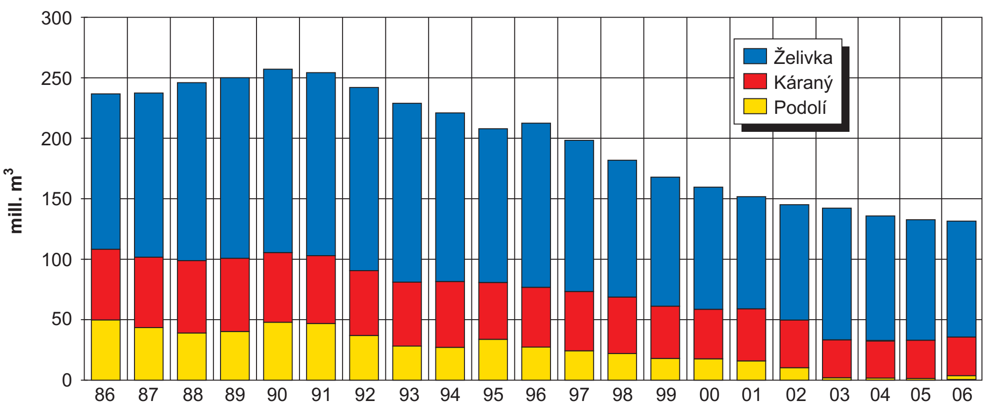
Source: PVK, a. s.

Fig. B2.5 Water level development in the Water Reservoir Švihov



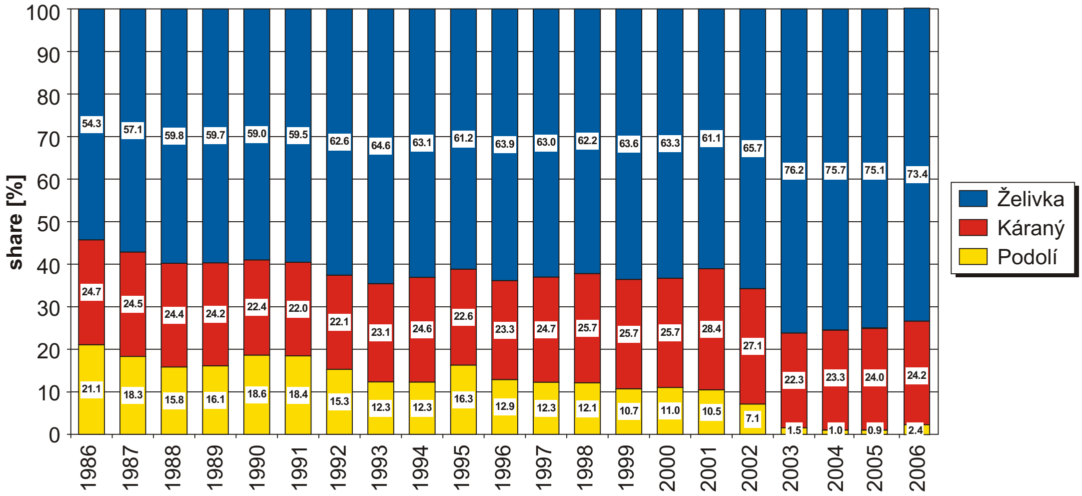
Source: PVK, a. s.

Fig. B2.6 Drinking water production since 1986 in respective water treatment plants



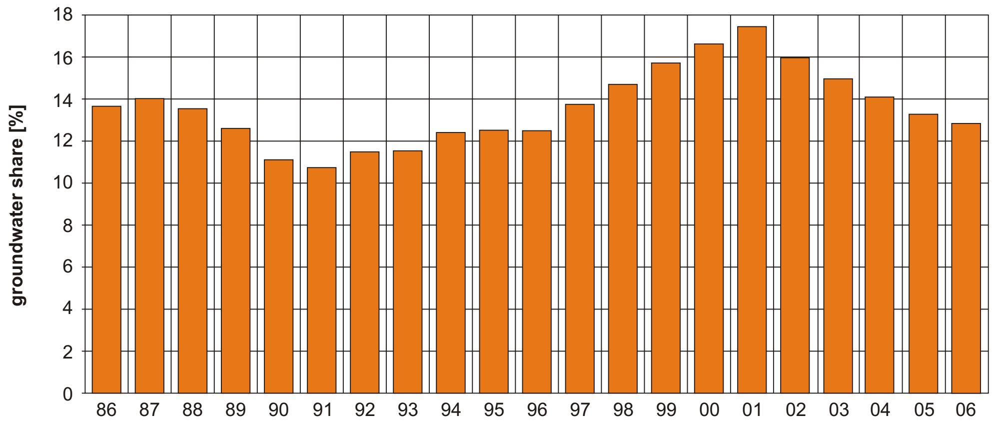
Source: PVK, a. s.

Fig. B2.7 Share of respective water treatment plants of the total production of drinking water



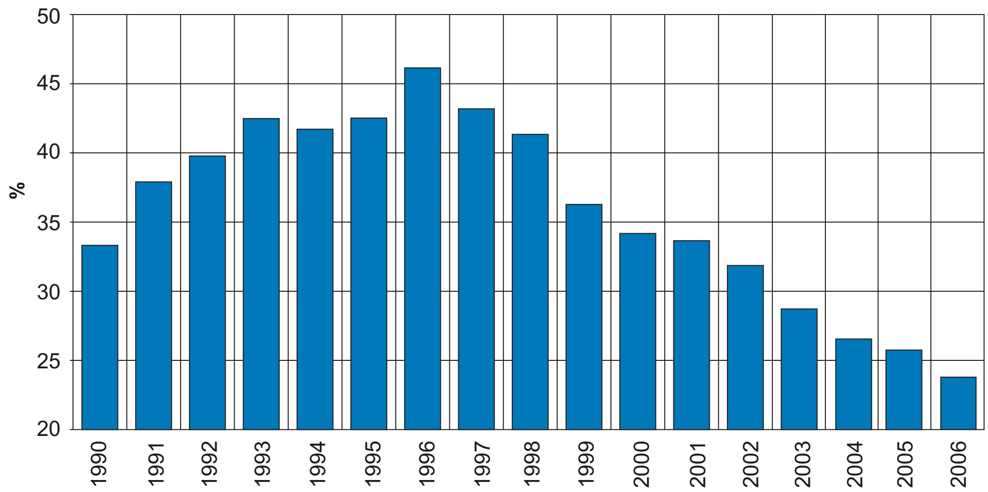
Source: PVK, a. s.

Fig. B2.8 Share of groundwater of the total volume of drinking water produced



Source: PVK, a. s.

Fig. B2.9 Water loss in water supply system



Source: PVK, a. s.

Percentage shares of respective water treatment plants on the total water production since 1986 are depicted in Figure. Within the period plotted the Water Treatment Plant Podolí recorded the highest drop in share of total production. While in the half of the 1980s its share was about 20 % in 2006 it was mere 2.4 %. In 2006 in the case of the Water Treatment Plant Kárané its share of the drinking water produced was 24.2 %, which is approximately the value ion the second half of the 1980s. In 2006 the Water Treatment Plant Želivka attained the share of 73.2 %, which was a substantial increase compared to the 1980s and the 1990s.

The groundwater share of the total volume of the drinking water produced is graphically demonstrated in Figure illustratively documenting that following a couple years of permanent growth each year its share has slightly dropped since 2002. In 2006 the share was 12.9 %.

B2.2.2 Drinking water quality

In 2006 Prague was supplied for 10 months from two water treatment plants (Želivka and Káraný), in November and December from three water treatment plants – Želivka, Káraný, and Podolí.

Since the end of 2002 the Water Treatment Plant Podolí has been serving as a spare source for Prague then. In February 2006 the Water Treatment Plant Podolí was operation with water distribution to the water supply network and water produced there was supplied to consumers, because of relining 2 supply lines (2× DN 1100) from Kárané to Hagibor, so it was necessary to ensure water from the Water Treatment Plant Podolí for the time of supply lines dead plate. For the rest of the year water from this plant was not delivered for distribution into the network.

Drinking water quality was monitored pursuant to the Decree No. 252/2004 Code. The order establishes requirements on drinking and warm water, and the drinking water checks frequency and range. Last amended Decree No. 293/2006 Code, valid from 19th June 2006 solves particularly warm water quality. Pursuant to this regulation lighter limit of chlorite parameters (limiting value 400 $\mu g.l^{-1}$). There are no chlorites in drinking water in Prague because of Prague WTP's disinfection method.

This is an executive decree to the Act No. 258/2001 Code on the public health protection in valid wording thereof. The aforementioned regulations are in accordance with the EU requirements for drinking water.

In 2006 the drinking water production process was monitored by laboratories at respective water treatment plants within the scope of indicators inevitable from the technology standpoint. Analyses in the full scope of requirements of the Decree were carried out at the Department of Laboratory Control Prague (OLK Praha). Since 2001 all laboratories of the company of PVK, a. s. (for the quality control of drinking water as well as waste water, including sampling thereof) have been merged into the Department of Water Quality Control. The drinking water laboratories of OLK Prague, OLK Káraný, and OLK Želivka are accredited, in compliance with the Czech Standard EN ISO/IEC 17025, including the sampling, by the Czech Institute for Accreditation (ČIA), certificates No. 1247; 1247,1; and 1247,2.

The programme of water quality monitoring, both for the water treatment plants and the distribution network, was developed for the year 2006 in accordance with requirements of the applicable legislation and those of the Public Health Authority of the Capital City of Prague and the Regional Public Health Authority of the Central Bohemia Region, respectively and following needs of respective water treatment plants and requirements of respective technologists.

Tab. B2.10 The scope of drinking water monitoring in 2006

Locality	Total number of samples taken for microbiological and biological analyses / number of parameters	Total number of samples taken for chemical analysis / number of parameters
WTP Želivka	374 / 2,313	375 / 3,179
WTP Káraný	387 / 2,482	378 / 4,042
WTP Podolí	69 / 417	310 / 1,745
Distribution network – water reservoirs, mains	643 / 4,626	619 / 9,644
Distribution network – end consumer	2,733 / 18,427	2,634 / 43,877
Total	4,206 / 28,265	4,316 / 62,487

Out of the total number of the drinking water analyses carried out there were 1.3 % non-compliant with the Decree.

Source: PVK, a. s.

Drinking Water Treatment Plant Želivka

The Drinking Water Treatment Plant Želivka is the most up-to-date and largest water treatment plant serving Prague. The drinking water is transported through a shaft influent conduit 2.64 m in diameter and 51.97 km long. In 2006 the share of the Drinking Water Treatment Plant Želivka supply of the total drinking water supply to the City was 73.2 %. The Drinking Water Treatment Plant Želivka also supplies drinking water to areas of the Central Bohemia Region and Vysočina Region.

With its maximum peak output of 6,900 $l.s^{-1}$ of drinking water and output in 2006 of approx. 96.4 mill. m^3 per year the Drinking Water Treatment Plant Želivka belongs to the largest water treatment plants in Europe and is the largest one in the Czech Republic.

In 2006 treated water quality met limit values as established in the valid legislation. The only troublesome parameter of the treated water was microscopic image in the course of the spring and autumn circulation at Švihov Dam. These natural effects in the water management reservoir require reinforced technology measures in critical nodes, both in the water treatment technology line and in the course of the treated water distribution in order to deliver water of required quality to customers. In the relation to the increased number of micro-organisms the microcystin-LR was purposefully monitored due to SZÚ methodic advises. The number of cyanobacterium cells did not achieve the limit for microcystin-LR monitoring in raw water in 2006.

Because of the raw water source nature (surface water) the mineral content is very low and water, even if treated with final alkalizing, does not have the optimum calcium-carbonate equilibrium. According to the TNV 75 7221 water was classified of the second degree of aggressiveness concerning corrosion of metallic pipelines, which means the water is medium aggressive. The Želivka's water corrosiveness is reduced by addition of optimized dose of hydrated calcium oxide to final adjustment of the pH of water treated to 8 to 8.5, as the current legislation allows. In 2006 the lime husbandry was re-opened at this Water Treatment Plant in order the permanent optimal alkalinization could be pursued. In process of monitoring the seasonal variability of the monitored pesticides appearance was proven. The monitored pesticides spectra has been enlarging subsequently.

Since 2001 PVK, a. s. has been purposefully monitoring the family of triazine herbicides. Namely following the flood situations, alarming concentration values nearing the limit value for drinking water of these compounds were determined in raw water. Concentration values of these compounds several times exceeding the limit value (100 $ng.l^{-1}$ for respective pesticide, 500 $ng.l^{-1}$ for sum of the pesticides) were repeatedly found in tributaries to the water reservoir. In the Švihov Dam Lake the companies of PVK, a. s. and Povodí Vltavy, s. p. carry out jointly monitoring concerning basic chemical and microbiological parameters and on the basis of findings of triazine-based herbicide occurrence the joint monitoring programme was expanded to cover these compounds since 2004.

Water from buffer water reservoir of the Drinking Water Treatment Plant Želivka is led through shaft mains into the water reservoir in Jesenice, and from this reservoir, after being after-chlorinated to required level, it is distributed across Prague.

Drinking Water Treatment Plant Káraný

The Drinking Water Treatment Plant Káraný, as the only plant, produces and supplies groundwater to the City that features excellent quality parameters resulting in beneficial biogenic properties. This groundwater features balanced contents of ions, which in positive way affects organoleptic properties of water.

In Káraný the drinking groundwater is acquired from three systems: natural groundwater recharge, artificial groundwater recharge, and artesian water sources (water of extraordinary quality collected from 7 artesian wells 60–80 m deep). Iron is removed from the artesian water by aeration and sand percolation. The water is, after the compulsory sanitary chlorinating, pumped to Prague through three pump water mains of identical length 23 km.

In 2006 quality of the water from the Plant Káraný met limit values of all indicators monitored according to the valid legislation. Organic pollutants monitored in compliance with the valid legislation have been permanently below the limit of determination. Concerning corrosion the water is close to calcium-carbonate equilibrium having very little corrosion effects on metallic pipelines. According to TNV 75 7221 water was classified at the brink of 1^{st} and 2^{nd} category of aggressiveness, which means the water is slightly to medium aggressive. The Act on Water (No. 254/2001 Code) deals with water source protective zones in the form of general protection. Therefore the operator shall provide monitoring of quality of abstracted water and raw water for control in the Jizera River, including other check localities of the area concerned. Since 2004 the mathematic model of the whole catchment area Káraný has been in use for the treatment plant operation and the catchment area monitoring. The targeted "monitoring of nitrates" at abstraction series of bank recharge has been still under operation. The mathematical model is, on the basis of monitoring results, calibrated once in two years. The above limit nitrate concentrations were measured, at certain places of absorptive area. Thanks to management water quality from Káraný Plant was not attached.

In 2006 the share of the Drinking Water Treatment Plant Káraný accounted for 24.1 % of the City drinking water total supply. In 2006 the Plant produced approximately 31.8 mill. m^3 high quality water (close to groundwater in its characteristic).

Drinking Water Treatment Plant Podolí

As already stated in the introduction since the end of 2002 the Drinking Water Treatment Plant Podolí has been serving as a spare source to Prague. The Plant is regularly maintained in such shape to be able to start the drinking water production any time as the need may be.

In 2006 the Plant produced water to the distribution network from November to December, when raw water quality was good in terms of its treatability. Quality of produced water complied with all requirements of the Decree. It may be stated that raw water quality in 2006 was within usual range of values and it was treatable to obtain drinking water as laboratory tests proved.

Because of the raw water source nature (surface water) the treated water, even after the final alkalizing, does not have the optimum calcium-carbonate equilibrium. According to the TNV 75 7221 water was classified of the second degree of aggressiveness concerning corrosion of metallic pipelines, which means the water is medium aggressive.

The triazine-based herbicides are systematically monitored in raw water year-round, that means even in the period when he Plant Podolí does not produce water for the network. The monitoring is carried out to have the Plant ready for start-up as a spare source. In the case of increased concentration of triazine herbicides in treated water at the Plant output (the current technology in the Plant is not able to eliminate the herbicides) it is necessary to mix the water treated with water from other sources so no limit value at the end consumer is exceeded in the distribution network. In case of the emergency start-up of the treatment plant as a spare source, if increased concentrations of pesticides are found, this regime of „source mixing" shall be applied.

In 2006 the share of the Water Treatment Plant Podolí in the drinking water supply to Prague was approx. 2.4 %, the total volume of drinking water produced in the two month operation was approx. 3.19 mill. m^3.

Water Supply System Network

In the course of drinking water distribution quality has been changing due to:

- Effects of materials in contact with drinking water (secondary increased iron content due to corrosion).
- In relation to the drop in water consumption residence time of water in the distribution network (hereinafter as the DN) has been prolonging, flow velocity is decreased (decrease in final volume of Cl_2 potential for microbiological non-compliance).
- High failure rate of the distribution network.
- Handling operations caused by reconstruction of water mains.
- In the period of increased bioseston in raw water in the case of the Želivka Water Dam doses of ozone and Cl_2 are increased at the plant outlet. Therefore an increase of chlorination by-products (THMs) at consumer is found in the DN. Total sum of THMs did not exceed permitted limit values established by Decrees in 2006. The critical parameter in total THM sum is chloroform – the main chlorination by-product. The chloroform value in range (limit value + inaccuracy of measuring) was measured at 1.7 % out of the total number of samples. Neither respective trihalogen methane derivatives nor the total sum of THMs exceeded permitted limit values established in legislation in 2006.
- Due to the prolonged residence time of water it was necessary to provide for additional-chlorination of determined DN sections in order to ensure microbiological innocuousness. Except for stable locations of additional disinfection (Cl_2, NaClO), it is possible on the basis of accidents found to provide ad-hoc disinfection of a target section of the DN by means of a mobile battery unit.
- Analogically to the treatment plants all accumulation facilities and pumping stations of the DN were regularly sanitised with water quality control following the cleaning.
- For the sake of water quality improvement in the DN the "Sludge Removing Code for Major Distribution Mains" was applied 2006. In 2006 the 8 flushings of the typed supply mains were carried out. Besides target flushing of local troublesome areas of the DN are carried out.
- In areas of the Prague's DN where limit values of iron are permanently exceeded (due to corrosion of pipe material) the Public Health Authority issued a time-limited exemption for the limit value of this parameter. These are three localities in Prague, that as the same time are falling to enhanced control regime of drinking water. Till the exemption expiration the situation shall be fixed either by reconstruction of the existing pipeline or by the replacement of the pipeline system. Concerning water quality these areas under exemption have been favoured in planned repairs and/or investments.

The aforementioned reasons have caused quality deterioration that is reason for approximately 1 % increase in non-compliant parameters determined compared to percentage of non-compliant analyses at the outlet from the treatment plants. These are mainly secondary water quality deterioration at consumer, caused by indoor substance. It has been proving indirectly – by local monitoring.

The Public Health Authority of the Capital City of Prague controls quality of drinking water in the distribution network on a regular basis. In 2006 no serious fluctuations in water quality were found in samples monitored within the super-control activities of the Public Health Authority of the Capital City of Prague. Since 2004 the results of water quality at consumers tested have been handed over in an electronic form to the National Monitoring Programme of the Public Health Authorities (software PiVo), as this duty is established by the Act No. 258/2000 Code in valid wording thereof. Results of control radiological analyses of treated water at the treatment plants are, in compliance with the requirement of the valid legislation, annually handed over to the State Institute of Nuclear Safety (SÚJB). The supplied water quality was fully in compliance with requirements for the acceptable content of radioactive materials pursuant to the Decree of the SÚJB No. 307/2002 Code.

In the second half of year 2006 the industrial water supply system was put into operation after longer shutdown caused by floods in 2002. In 2006 the industrial water supplement supplied by industrial water supply system was approximately 380,000 m^3, that represents 0.3 % of PVK's total production.

B2.3 GENERAL PLAN FOR WATER SUPPLY TO THE CITY OF PRAGUE

General Plan for Water Supply to the City of Prague – Hlubočepy, Holyně – detailed phase was developed in 2006

General Plan for Water Supply was worked out as project, which linked to conceptual phase of the General Plan for Water Supply of the City of Prague – Conceptual Model of Distribution System in extenso.

The area is situated to river-basin of the Dalejský Creek, and it includes locality of Hlubočepy, Řeporyje, Slivenec, Lochkov, and Holyně. Integrates storing zones as following:

n319	ČS (Water Pump Station) Slivenec, AT Ovčín
n323	GR (Reservoir's Gravitation) Slivenec
n318	GR Ovčín
r318 – I	GR Ovčín
n333	GR Holyně
n312	GR Kopanina pro JZM
c327	GR Jesenice RV V Bokách II

The objective of the detailed phase was to propose the adjustment of storing zones' borders for actual state. In the frame work of the valid Land Use Plan of the City of Prague and discussed changes the proposal of the area development was developed. The proposal of storing zones borders was provided with reference to optimizing pressure difference in the water supply network, and led to optimal utilization of existing reservoirs and water pump stations without any additional demand on reservoir or water pump station. Modified borders of the storing zones were appointed so all urban development areas would be situated wthin the borders, and further more modified storing zones would optimise the retention period, and pressure difference in the water supply network.

The concept of the development of the water supply network was proposed at the same time. Capacity of the existing water supply network was assessed for long-rage water demand, and there were stated design parameters, traces, and process of renewal and additional construction of the water supply network in the whole locality. The water supply network was analysed with reference to fire precaution within the project, the analysis of the fire water supply demands was performed as well.

The project was ordered by the Pražská vodohospodářská společnost, a. s. (PVK – Prague Water Management Company). The supplier was HYDROPROJEKT CZ, a. s., d-plus project and engineering firm, DHI Hydroinform, a. s.

The documents was developed and discussed with the company of PVK, a. s.

The General Plan for Water Supply to the South-east part of Prague (detailed phase)

The document was completed in December 2007. Detailed phase processing of the General Plan for Water Supply to the South-east Part of Prague is the subject of document's performance. Relevant area is situated to the South-east part of Prague and includes localities as following: Šeberov, Újezd u Průhonic, Křeslice, Petrovice, Horní Měcholupy, Dolní Měcholupy, Štěrboholy, Hostavice, Dolní Počernice, Běchovice, Klánovice, Újezd nad Lesy, Koloděje, Dubeč, Hájek, Uhříněves, Pitkovice, Královice, Benice, Kolovraty, Nedvězí, and Lipany.

The localities (except Újezd and Průhonice) are supplied with the reservoir of Kozinec now. The reservoir got near its limit of efficiency, it supplies 110,000 inhabitants of Prague. The increase should reach 134,000 inhabitants. Water is not possible to be connected ultra vires the Land Use Plan with reference to the capacitive limits of the water supply network in particular locality.

That is why it is necessary to build new DN 800 supply line from the Jesenice Reservoir II to localities Uhříněves, Pitkovice, and Benice. The new line would supply the part of the area from the Jesenice II Reservoir.

- The DN 800 supply line construction is important for the cross substitutability at accidents and in case of renewal of the supreme water supply system. The locality could be supplied by water from the Kozinec Reservoir (supplies the Želivka and Káraný water treatment plants) and with Jesenice II.
- All development areas could by supplied in the case of DN 800 construction, which should be for approximately 9,600 m long, and DN 400 for 572 m.
- The DN 800 and the gravity conduct switch over between reservoirs Kozinec and Water Pump Station Uhříněves should provide the water supply to all of localities, which are supplied by the Water Pump Station Uhříněves now (Uhříněves, Pitkovice, Benice, Královice, Hájek, Kolovraty, Lipany, Nedvězí).
- The rest of DN 800 capacity will be utilized as reserve supply to the reservoir of Kozinec in emergency. Kozinec will serve as non-expendable supply.

The project was ordered by the Pražská vodohospodářská společnost, a. s. The supplier was d-plus project and engineering firm, DHI Hydroinform, a. s., HYDROPROJEKT CZ, a. s.

The document is developed and discussed with the company of PVK, a. s.

Plan for completion the General Plan for Water Supply of the City of Prague

- **Detailed Phase of the General Plan for Water Supply of the City of Prague – Podolí, Michle, Nusle, Krč, Bráník** – expected implementation 2009.
- **Detailed Phase of the General Plan for Water Supply of the City of Prague – Smíchov** – expected implementation 2009.
- **Detailed Phase of the General Plan for Water Supply of the City of Prague – Modřany, Komořany, Libuš** – expected implementation 2010.
- **Detailed Phase of the General Plan for Water Supply of the City of Prague – Chodov, Háje** – expected implementation 2010.
- **Detailed Phase of the General Plan for Water Supply of the City of Prague – northern parts of Prague** – expected implementation 2011.
- **Detailed Phase of the General Plan for Water Supply of the City of Prague – Radlice, Košíře, Jinonice** – expected implementation 2012.
- **Detailed Phase of the General Plan for Water Supply of the City of Prague – Přední Kopanina, Nebušice, Lysolaje, Suchdol** – expected implementation 2013.
- **Detailed Phase of the General Plan for Water Supply of the City of Prague – Zličín, Řepy, Motol** – expected implementation 2014.
- **Detailed Phase of the General Plan for Water Supply of the City of Prague – Zadní Kopanina, Radotín, Lipence** – expected implementation 2015.

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B2.4 WASTE WATER

Legislation requirements for the waste water treatment in the Czech Republic

The Member States of the European Union are bound by the Council Directive 91/271/EEC of 21st May 1991 on treatment of urban waste water. In the Czech Republic the main regulations on water management is the Act No. 254/2001 Code, on water and amending certain acts (hereinafter as the Water Act), which became effective on 1st January 2002 and has been harmonized by EU regulations several times since then. Pursuant to Section 38, paragraph 5 of the Water Act the Government of the Czech Republic shall establish acceptable values of pollution for the waste water discharge into watercourses and the Government established them in the Order of Government No. 61/2003 Code, on indicators and values of acceptable pollution of surface water and waste water, on details of the permit for the waste water discharge into surface water and into sewerage systems, and on sensitive areas.

Just for the sake of getting oriented in the issues let us compare requirements of emission standards of the Order of the Government of the Czech Republic No. 61/2003 Code (hereinafter as the OG No. 61) and those of the EU Directive for quality of the waste water discharged:

Tab. B2.11 Emission standards of indicators of acceptable waste water pollution pursuant to the Order of the Government of the Czech Republic No. 61/2003 Code

Source size (p.e.)	BOD_5 [$mg.l^{-1}$]		COD_{Cr} [$mg.l^{-1}$]		Insoluble matter [$mg.l^{-1}$]		$N\text{-}NH_4^+$ [$mg.l^{-1}$]		N_{total}* [$mg.l^{-1}$]		P_{total}* [$mg.l^{-1}$]	
	p	m	p	m	p	m	p	m	p	m	p	m
500–2,000	30	60	125	180	35	70	–	–	–	–	–	–
2,001–10,000	25	50	120	170	30	60	15	30	–	–	–	–
10,001–100,000	20	40	90	130	25	50	–	–	15	20	2	6
Over 100,000	15	30	75	125	20	40	–	–	10	20	1	3

The unit p.e. means the population equivalent load of one inhabitant.

* “p” values are acceptable concentrations and may be exceeded within a tolerable extent, which is established in the Annex No. 5 to the OG No. 61 (approx. in 10 % of all determinations). “p*” values for N_{total*} and P_{total*} are yearly averages. “m” values are maximum concentrations, which may not be exceeded.

Tab. B2.12 The Council Directive 91/271/EEC

Pollution source (p.e.)	BOD_5 [$mg.l^{-1}$]	COD_{Cr} [$mg.l^{-1}$]	Insoluble matter [$mg.l^{-1}$]	N_{total}* [$mg.l^{-1}$]	P_{total}* [$mg.l^{-1}$]
2,000–10,000	25	125	60	–	–
10,001–100,000	25	125	35	15	2
Over 100,000	25	125	35	10	1

* Only for sensitive areas, year average is evaluated. Values of other indicators may be exceeded within a tolerable extent. The tolerable extent is the same as that in the OG No. 61, in which the table of exceedances was taken over from the Directive. The maximum values, which may not be exceeded, can attain double the values given.

It follows from the tables presented that **requirements** for the pollution discharged along with waste water **in the EU Directive are less strict than those imposed in the Czech Republic**. Therefore it can be stated that the Order of Government of Czech Republic No. 61/2003 Code introduced very strict limit values in a uniform manner, which in turn would lead to retrofits of waste water treatment plants with capacity over 10,000 p.e., which would otherwise meet the requirements of the Council Directive 91/271/EEC (except for sensitive areas). The advantage of the Council Directive 91/271/EEC is it enables the Member States to set priorities in water protection by means of the establishing of so-called “sensitive areas” and to proceed at the revisions required every fourth year depending on, among others, their economic potential. The emission standards were partly amended at the OG No. 61/2003 Code, that came valid on 1st October 2007 (amended Order of Government of Czech Republic No. 229/2007 Code).

The Order No. 61 robbed the citizens of the Czech Republic of this advantage “to proceed depending on its economic potential”, which declared the whole territory of the Czech Republic as the “sensitive area” in the Agreement on the Czech Republic accession to the European Union. Even if all waste water treatment plants with capacity larger than 10,000 p.e. in the Czech Republic must comply with conditions of the OG No. 61 by 31st December 2010 at the latest, any reduction in the nitrogen and phosphorus pollution discharged from settlements lower than 10,000 p.e. may not be realistically expected without implementing further measures.

Disposal and treatment of sewage (urban waste water)

The downtown sewerage system was founded in Prague at the beginning of the last century as an **integrated** sewerage system taking the mixed sewage and rainwater in the same pipes. The newly built housing estates at the Prague outskirts have **separated** sewerage systems, which do not mix together sewage and rain-water and taking them away in separated systems. The housing estates sewerage systems are connected to main sewers of the Integrated Centralised Sewerage System in the downtown. This system disposes water to the Central Waste Water Treatment Plant (CWWTP) on the Cesar Island in Bubeneč. Besides this Central WWTP, there are other auxiliary (local) waste water treatment plants (26 in total) under operation on the City territory and two on the Ruzyně Airport. These sewerage systems are led into separate communities. Only WWTPs in Běchovice, Čertouzy, Miškovice, Újezd n. L., and in Kbely have integrated sewerage systems. In 2006 these waste water treatment plants treated approx. 6.2 % of the urban waste water from Prague.

In November 2006 the WWTP Sedlec, whose drainage area is connected to CWWTP, was put under-operation. Further more the WWTP's Královice and WWTP's Zbraslav reconstructions were completed, both treatment plants were put to setting up operation. Reconstruction on WWTP Čertouzy, Březiněves, Nebušice and Kolovraty was continuing. The most of auxiliary WWTPs is supplied with nutrients (nitrogen and phosphorus) removing systems and meets emission limits established in the GO of Czech Republic No. 61/2003 Code.

The CWWTP was under partly reconstruction as well (removing of superchargers for aeration tanks, substation and distribution mains renovation, storage tank for aluminium sulphate and ferric sulphate installation, general reconstruction of sludge tanks No. 7 and No. 8).

At present the CWWTP does not met with requirements of GO of Czech Republic No. 61/2003. That is why the City of Prague prepares large reconstruction and enlargement, to ensure accomplishing the strong limits of total emitted nitrogen. Based on this fact pursuant to Section 38, paragraph 5 of the Water Act, the Water Act Office issued on 23rd June 2005 the statement on prolonging the present permission from 22nd November 2000 to 31st December 2010.

Values permitted by the Department of Development of the City of Prague Re. No. MHMP-76063/ 2000/VYS/Tr of 22nd November 2000 for purified waste water discharge from the Central Waste Water Treatment Plant Prague into the Vltava River at the river kilometre 43.3 are as follows:

Tab. B2.13 Permitted amounts of waste water discharged

	Q_{24}	Q_{day}	Q_{max}	Q_{year}
CWWTP Prague	6.0 $m^3.s^{-1}$	7.0 $m^3.s^{-1}$	8.2 $m^3.s^{-1}$	189,216 000.0 $m^3.year^{-1}$

Value of Q_{max} is valid for one-hour period only

Tab. B2.14 Permitted values of selected indicators

	BOD_5 [$mg.l^{-1}$]		COD_{Cr} [$mg.l^{-1}$]		Insoluble matter [$mg.l^{-1}$]		$N\text{-}NH_4^+$ [$mg.l^{-1}$]		P_{total} [$mg.l^{-1}$]		N_{inorg} [$mg.l^{-1}$]	
	p	m	p	m	p	m	p	m	p	m	p	m
CWWTP Prague	20	40	80	140	25	70	12	18	1.8	4	22	32
For winter season							18	32			27	40

m = maximum acceptable value of concentration for analysis of simple samples of the waste water discharged
p = acceptable value of concentration for analysis of mixed samples of the waste water discharged

Tab. B2.15 Permitted and discharged annual amounts of the discharged pollutants from the CWWTP Prague in tonnes per year in 2006

ÚČOV Prague	BOD_5 [$t.year^{-1}$]	COD_{Cr} [$t.year^{-1}$]	Insoluble matter [$t.year^{-1}$]	$N\text{-}NH_4^+$ [$t.year^{-1}$]	P_{total} [$t.year^{-1}$]	N_{inorg} [$t.year^{-1}$]
Permitted	2,838.2	13,245.1	3,784.3	1,892.2	238.8	3,784.3
Discharged	606.0	4,510.0	887.0	488.0	71.0	1,872.0

Source: PVK, a. s.

Yet the pollution discharged from the CWWTP is not the only source of pollution to the recipient watercourses. In rainy periods the integrated sewerage system separates a portion of the mixed rainwater and sewage and takes the mixture directly to recipient watercourses. All overflows at the territory of Prague meet conditions established by Water Act Office so that the spill water is not needed to classify as waste water.

In 2006 the floods significantly influenced CWWTP operation at the end of March and in first half of April. According to the High-water Plan for CWWTP's river basin the waste water had been discharging directly into the Vltava River for eight days. Yet within total annual balance this pollution discharge is not important.

Tab. B2.16 Maximums and averages attained at the CWWTP in 2006

Quality indicator [$mg.l^{-1}$]	Inflow to the CWWTP	Discharge from the CWWTP	Inflow to the CWWTP	Discharge from the CWWTP	Effectivity
	max [$mg.l^{-1}$]	max [$mg.l^{-1}$]	average [$mg.l^{-1}$]	average [$mg.l^{-1}$]	average [%]
BOD_5	340.0	12.7	237.0	5.1	97.9
COD	880.0	72.0	624.0	37.7	93.9
Insoluble matter	652.0	32.6	363.0	7.4	98.0
$N\text{-}NH_4$	38.4	12.5	27.3	4.1	–
N_{inorg}	40.4	26.2	28.6	15.6	–
N_{total}	66.3	26.5	53.6	18.3	65.8
P_{total}	12.0	1.8	6.3	0.6	90.3

Source: PVK, a. s.

In 2006 slightly increasing trend in pollution was renewed approximately by 8 % compared to previous year. The only exception is total phosphorus indicator. Its decreasing trend may be influenced by the expiry of selling phosphate washing powders. Operator managed to maintain the outfall concentrations and effectiveness of waste water treatment on very good level, nearly as good as in previous year. But this brought higher costs (chemical dosing, flood drainage) and more sophisticated plant managing. Average concentrations of penalty fee indicators were kept below the penalty limits. The average inflow of waste water into the CWWTP in 2006 was 327,760 $m^3.d^{-1}$, that means 3.79 $m^3.s^{-1}$. Compared to yearly average of the previous years it means that gentle but permanent annual decrease in flow was stopped.

Tab. B2.17 Average flow rates of waste water at CWWTP in long-term period

	Flow rate at CWWTP	
	[$m^3.year^{-1}$]	[$m^3.s^{-1}$]
1996	183,937,000	5.83
1997	170,190,100	5.40
1998	154,203,200	4.89
1999	150,482,750	4.77
2000	143,208,000	4.54
2001	147,590,750	4.68
2002	127,243,950	4.03
2003	128,069,600	4.06
2004	125,423,675	3.98
2005	119,639,100	3.79
2006	119,632,250	3.79

Flow rate are including rainy circumstances.
The balance values in 2002 are influenced by keeping CWWTP out of operation in period from 13th August to half of September for the reason of floods.

Source: PVK, a. s.

The operation of CWWTP's sludge management, where the sludge produced by water treatment is cultivated, was partly restricted. Before the end of 2006 the action "covering and deodorization of handling tank" began and the general repair of one pair of digesters had been in process all year long. Unpleasant operational situation caused by digesters shutdown will be in process for few more years. For ensuring the operation the successive reconstruction of digesters is necessary. Stabilization effectiveness of sludge produced by waste water treatment has been lower than full operation of six pairs of digesters.

38,771 tonnes of sludge dry residue was worked out at WWTP sludge management in 2006. That makes volume production of nearly 1,900 $m^3.day^{-1}$. In 2006 another 72,154 t of dehydrated sludge was passed to further treatment.

In spite of depressed capacity of sludge digesters the digester gas production has been even higher and it came near 50,000 $Nm^3.D^{-1}$. The Energycentre of CWWTP generated, by biogas combustion in co-generation units, such amount of electric energy that covered approx. 61.3 % of the total energy consumption of CWWTP. Partial down-thrust in planned production of electric energy had been caused, among others, by serious accidents of co-generation units, these were the cause of increased concentration of silicon in biogas. To eliminate these types of accidents the preparation of investment to biogas treatment equipment had immediately began, the realization is planned in 2007.

Pollution, that comes to WWTP by waste water, is limited by the values set by the drainage management authority for single drainage area. The operator of PVK, a. s. has set up the section, that controls the producers in terms of complying drainage system regulations. Building up and reconstruction of the outfall places for gully emptiers enabled the enhanced control of waste water importers. Installed technology allows to detect exceedances of limit values established in drainage system regulations. It also helps in demanding the sanctions on importers. Undiscipline of pollution producers is persisting problem. Despite the risk of expensive sanction producers flow chemicals into drainage system. Extreme case is represented by inflow of high concentration of surfactants, which flew into CWWTP on 17th October 2006. And thanks to aeration technology the surfactants caused four meters high foam in aeration tanks. WWTP fastened and removed approx. 99 % of surfactants, despite the residual concentrations foam sweep appeared on the Vltava River. The foam appeared behind weirs as well. This situation was announced to appropriate authorities.

Undiscipline of industry producers influence the quality of produced sludge. Because the Decree of Ministry of Environment of the Czech Republic No. 382/2001 Code, on conditions of the usage of treated sludge on agricultural land, establishes limit values of concentrations of selected hazardous materials for the application onto agricultural land, their maximum values determined in 2006 are also given just for illustration.

Tab. B2.18 Contents of selected metals in pressed digested sludge from the CWWTP in the period 1997–2006 compared to values of 1989 [$mg.kg^{-1}$]

Year	Chromium	Lead	Copper	Zinc	Cadmium	Nickel	Cobalt	Mercury
1989	742	400	713	2,333	22.8	121.0	–	
1997	73	192	338	1,395	5.3	58.4	5.2	2.7
1998	80	125	326	1,198	4.2	46.5	5.5	2.6
1999	150	93	266	1,144	4.0	42.0	8.9	3.9
2000	193	89	308	1,314	5.1	41.1	10.1	4.4
2001	227	81	298	1,612	3.8	46.5	9.3	3.8
2002	311	83	322	1,544	3.6	55.3	9.8	3.1
2003	271	119	359	2,424	6.7	67.2	8.7	4.0
2004	254	84	335	2,837	2.9	74.0	10.0	3.6
2005	92	124	332	1,179	2.8	51.0	9.8	3.0
2006	107	115	308	1,642	2.9	45.0	9.5	3.4
Max 2006	**300**	**350**	**350**	**4,300**	**4.7**	**68.0**	**13.0**	**8.3**
Limit pursuant to Czech Standard	1,000	500	1,200	3,000	13.0	200.0	–	10.0
Decree No. 382/01 Code	200	200	500	2,500	5.0	100.0	–	4.0

Note: For the sake of information there are limit values of selected metals for the permitted sludge usage given as follows:
a) for the production of industrial composts pursuant to the Czech Standard ČSN 46 5735 effective since 1st June 1991;
b) into agricultural land pursuant to the Decree No. 382/2001 Code, effective since 1st January 2002, and giving limit concentration values.

Source: PVK, a. s.

It may be seen from the given values that the application of sludge onto agricultural land was troublesome due to the maximum concentration of chromium, zinc, lead and mercury attained and that its direct application is not possible now.

The course of the year demonstrated that investments, which shall lead to solving present problems, must be launched.

B2.5 ACCIDENTAL CONTAMINANT SPILLS

Two institutions are authorised to perform government functions in water management in accordance with paragraph 41 the Act No. 254/2001 Code, on water and amending certain act (hereinafter as the Water Act) in wording of later regulations. These are the Czech Environmental Inspection (CEI) – Prague Regional Inspectorate, Department of Water Protection, and the Prague City Hall (Magistrát hl. m. Prahy – MHMP) – Division for Development, Department of Water Management. Emergency outflows of defective matter are mostly announced to Fire and Rescue Squad of the City of Prague and subsequently to Action Committee of the City of Prague. These inform the Department of Water Protection, the Czech Environmental Inspection and the Povodí Vltavy (the Vltava River Basin, Government Enterprise) and other authorities that are responsible for removing the accident. At the same time the Department of Water Protection announces the order of defective state repairs.

In 2006 the Department of Water protection intervened in 46 accidents and announces 40 administrative decisions consequently. If the originator of accidental contamination is not known, the Department of Water protection removes the pollution at the expense of Prague City Hall by qualified person (or physical person enterprises according to specific regulations). In 2006 the originator was found in 15 cases. In 2006 the section of water protection of CE – Prague Regional Inspectorate, searched into 39 cases of water pollution at the territory of the Prague. In 19 cases the originator has not been found.

Tab. B2.19 Overview of Accidents Registered by the CEI Prague Office in 2006

Date	Originator	Cause of the contamination	Contaminant spilled	Accident Location
4th Jan.	not found	not found	not found	Prague, drainage network
30th Jan.	Jolana Kramarovičová	fuel tank of motor vehicle	fuel	Prague 4, Street 5. května, Roztyly
2nd Feb.	Pražské vodovody a kanalizace, a. s.	WWTP equipment	waste water	WWTP Újezd nad Lesy
3rd Feb.	Pražské vodovody a kanalizace, a. s.	technological complex	oil spill	Prague - Lahovice, 500 m upstream Berounka and Vltava junction
15th Feb.	not found	not found	not found	Prague, Vltava – right bank under the Štefánik's Bridge
16th Feb.	not found	not found	dung-water	Prague 4, Písnický Creek
17th Feb.	not found	not found	not found	Left bank of the Vltava River, under the Negrellis viaduct to the Štefánik's Bridge
2nd March	not found	not found	not found	Prague - Lahovice, former boiler house
10th March	not found	not found	not found	Prague 13
16th March	Prague 9 Municipal Office	not found	waste water	Prague 9, Červenomlýnský Creek
17th March	not found	fuel tank of motor vehicle	not found	Prague 5, Robin Oil pump station, Strakonická Str.
24th March	CONOCOPHILLIPS Czech Republic, s. r. o.	technological complex	petrol	Prague 9 - Běchovice, JET pump station
27th March	not found	not found	dung-water	Prague 22, Rokytka at inflow to the Kolodějská Game Preserve
28th March	POLAR Transport	fuel tank of motor vehicle	fuel	Prague 4, Lomnického Street
5th April	not found	not found	not found	Prague 8, Rokytka – mouth into the Vlatava River
12th April	Pražské vodovody a kanalizace, a. s.	WWTP equipment	waste water	Prague - Lochkov, WWTP
13th April	Roman Maroš	not found	not found	Prague 4, former area of CESAMO company, Str. U skladu 2219/1c

Date	Originator	Cause of the contamination	Contaminant spilled	Accident Location
5th May	Torda Trans KFT	fuel tank of motor vehicle	fuel	Prague, K Barrandovu Str.
13th May	Intergroup Praha, s. r. o.	ship	oil spill	Prague, Dvořákovo Quay
1st June	not found	not found	not found	Prague, streets Vstupní and Zahradníčkova
18th June	Pražské vodovody a kanalizace, a. s.	not found	not found	Prague, DUN above Kyjský Pond
22nd June	Agro Jesenice	not found	dung-water	Prague, Písnice, Obecňák Pond
22nd June	Pražská teplárenská, a. s.	intercepting and storage reservoir	waste water	Prague, Poděbradská Str., Rokytka
1st July	Česká správa letišť	fuel tank of motor vehicle	fuel	Prague - Ruzyně – Airport near F hangar
12th July	VIKTORIAGRUPPE	distribution pipe-line and armour in company area	fuel	Prague 9, area of Teplárny Třeboradice, Za tratí 197
20th July	not found	not found	not found	Prague 10 - Vršovice, Sámova Str.
29th July	not found	not found	not found	Prague - Záběhlice, Botič
28th July	not found	not found	not found	Prague 10 - Hostivař, U břehu Str., separator OK83
26th Aug.	not found	fuel tank of motor vehicle	fuel	Prague, Pod náhonem Str.
12th Sept.	Pražské vodovody a kanalizace, a. s.	WWTP equipment	biological foam	Prague - Troja, Vltava downstream WWTP
5th Oct.	Milan Kouba	heavy truck – cistern	acrylic colour	Prague - Radotín, Radotínský Creek, K cementárně Str. × Na Cikánce Str.
6th Oct.	not found	not found	not found	Prague - Zbraslav, Romana Blahníka Str., Podéšťova
17th Oct.	Pražské vodovody a kanalizace, a. s.	WWTP equipment	foam	Prague, WWTP
5th Nov.	not found	not found	not found	Prague, down the Štefánik's Bridge
6th Nov.	Polabská stavební CZ, s. r. o.	fuel tank of motor vehicle	fuel	Prague - Běchovice, Rokytka
13th Nov.	Miloš Vávra	heavy truck – cistern	not found	field road between Třeboradice and Miškovice
14th Nov.	not found	not found	waste water	Prague - Řeporyje, Dalejský Creek
27th Nov.	TvS – centrum, s. r. o.	not found	waste water	Prague - Modřany, DUN
28th Nov.	not found	fuel tank of motor vehicle	fuel	Prague, Jižní spojka above Švehlova Str.

Source: ČIŽP (CEI Office)

Tab. B2.20 Overview of accidental outflow solved by the Division for Development of the City of Prague in 2006

Date	Originator	Cause of the contamination	Contaminant spilled	Accident Location	Subject of pollution
11th Jan.	Štefan Vosátko	car accident	oil spill	Semilská Str., Prague 9 - Kbely	field
30th Jan.	Jolana Kramarovičová	car accident	oil spill	5. května Str., Prague 4	field
31st Jan.	not found	car accident	fuel	Hostavický Creek, K lesíku Str., Prague 10	surface water
31st Jan.	BM TRANS LOGISTIC, s. r. o.	car accident	oil spill	Nad Vršovskou horou Str., Prague 10	field
3rd Feb.	Pražské vodovody a kanalizace, a. s.	technical	oil spill	the Vltava River, near Strakonická Str., Prague 5 - Lahovice	surface water
16th Feb.	Václav Souček – Autodoprava	technical	fuel	area of Lipence Market, Prague 5	surface water
2nd March	not found	not found	oil spill	flood area of the Vltava River, Prague 5 - Velká Chuchle	surface water, field
9th March	not found	not found	oil spill	outflow from wreck a car into Rokytka Creek, Nad rybníkem Str., Prague 9	surface water
14th March	Roman Volovik – ROVO Trans	technical	engine oil	Jižní spojka, in direction to Barrandovský Bridge	surface water
17th March	not found	car accident	engine oil	Strakonická Str., Prague 5	field
28th March	POLAR Transport	technical	fuel	rod pollution and outflow into the Vlatava River, near Podolské Quay, Prague 4	surface water

Date	Originator	Cause of the contamination	Contaminant spilled	Accident Location	Subject of pollution
8th April	Josef Rössler	human factor	mixture of oil spill	the Vltava River, Podolí dockside, Prague 4, outflow from passenger ship	surface water
13th April	Roman Maroš	human factor	engine oil	U skladu Str., Prague 12 - Komořany	field
14th April	not found	not found	mixture of organic liquids	Prague 10 - Křeslice	field
20th April	Johann Kopp	car accident	defective matter	Novořeporyjská Str, Prague 5	field
3rd May	not found	not found	mixture of oil spill	the Vltava River, Podolí dockside, Prague 4	surface water
5th May	TORDA-TRANS KFT	technical	fuel	Motorway K Barrandovu Str.	sewerage system and DUN
13th May	Intergroup Praha, s. r. o.	technical	mixture of oil spill	the Vltava River, passenger boat sank, Na Františku Quay, Prague 1	surface water
23th May	Leskona Teplice, s. r. o.	technical	fuel	Výpadová Str., Prague 5	underground water
25th May	not found	not found	oil spill	the Vltava River, the Císařská Green Field, Prague 5	surface water
1st June	Josef Rössler	human factor	mixture of oil spill	the Vltava River, Podolí Dockside, Prague 4	surface water
15th June	not found	not found	defective matter	the Vltava River, the Císařská Green Field, Prague 5	surface water
15th June	not found	not found	fuel	AGIP pump station, Průmyslová Str., Prague 10	surface water
15th June	Miroslav Novák – autodoprava	technical	mixture of oil and water	heavy truck burning, Bečovská Str., Prague 10	surface water
17th June	AutoMotoNet, s. r. o.	car accident	fuel	východní spojka, in direction from centre, km 2.0, Prague 14	field
17th June	not found	not found	fuel	Strakonická Str., Prague 5	surface water
17th June	not found	not found	defective matter	DUN upstream Kyjský Pond, Prague 14	surface water
26th June	Exel Food Logistics, s. r. o.	technical	fuel	Bečovská Str., Prague 10	underground water
30th June	Palivo Trans, s. r. o.	car accident	fuel	Novořeporyjská Str., Prague 5	surface water
30th June	not found	not found	oil spill	Květnového vítězství Str., Prague 4	field
12th July	Viktoriagruppe AG	technical	fuel	Třeboradice Heat Station, Prague 9	field
18th July	not found	not found	defective matter	Krhanická Str., Prague 4 - Kamýk	field
4th Aug.	Eldorádo Stav, s. r. o.	technical	engine oil	Pod farou Str., Prague 4	field
4th Sept.	not found	not found	mixture of oil spill	the Vltava River, Štvanive lock chamber	surface water
14th Sept.	Komwag, a. s.	technical	engine oil	streets Na slupi and Vinařického, Prague 2	road
19th Sept.	not found	not found	fuel	Evropská Str., Prague 6	sewerage and DUN
25th Sept.	Autodoprava Chalupecký, s. r. o.	car accident	fuel	Horoměřická Str., Prague 6	field
5th Oct.	Metrostav, a. s.	technical	flue-dust suspension	Cholupický Creek, Prague 12 - Komořany	surface water
5th Oct.	Milan Kouba	technical	mixture of colours	K cementárně Str., Prague 5	field
6th Oct.	not found	not found	oil spill	Romana Blahníka Str., Prague 5	field
20th Oct.	not found	not found	engine oil	Wassermannova Str., Prague 5	field
3rd Nov.	DPHMP	car accident	fuel	Černokostelecká Str., Prague 10	sewerage
6th Nov.	Polabská stavební CZ, s. r. o.	human factor	fuel	Inflow into the Rokytka Creek, near K Jalovce Str., Prague 9 - Běchovice	surface water
13th Nov.	not found	not found	defective matter	Svěceného Str., Prague 9 - Miškovice	field
27th Nov.	TvS-centrum, s. r. o.	technical	waste water	DUN at Klostermannova Str., Prague 12 - Modřany	surface water
28th Nov.	Marek Čverčko	car accident	fuel	Slatinský Creek, Jižní spojka, Prague 10, slack skyline bridge	surface water

Source: OOP MHMP (Department of Environmental Protection of the City of Prague)

B2.6 GENERAL PLAN FOR DEWATERING OF THE CITY OF PRAGUE

Works continued on deatailed phase II of the General Plan for Dewatering of the City of Prague in 2006 and 2007. Detailed phase II reassumes the Concept I of the General Plan for Dewatering of the City of Prague. Works continued with parts of the projects. Waste water and rain water freeness' solution was developed using the same methodology as the detailed phase II of the GPD of Prague.

- Solution optimizing the waste water inlet was worked out for CWWTP Prague in 2006. The document is named **"Modification of the Sewerage Network's Inlet Labyrinth for the Entire Reconstruction and Enlargement of the CWWTP at the Císařský Island"**. The study worked out the proposal for central sewers' optimal inlet solution for the central waste water pump station, which will differentiate the discharge to both water lines of the CWWTP. Study includes proposal for placing the retention zone out of the treatment plant. Further more study comes with solution for the central sewers B and D on the right side of the Vltava River, including changing the gravity flow in sewerage short sections, modifying the existing pump station for the central sewer F and central sewer E and changing their gravity flow as well. So the ensuring regime would not limit the project's preparation and the construction of the Entire Reconstruction and Enlargement of the CWWTP in Bubeneč", the preparation and the operation process of inlet labyrinth is provided.
- **"General Plan for Dewatering of the City of Prague for area of Hlubočepy - Holyně"** was the first of two years long projects which were worked out in 2006 and 2007. Proposed solution utilizes existing system of dewatering in maximum. Waste water is drained to the CWWTP in Bubeneč, rain water is stored in territory (because of new development areas) and a part of it is drained down the surface to local water courses. The objective of the General Plan is to keep the existing water balance within territory, if possible, and ensure the natural rain water outflow with reference to the capacity of water courses.
- **"General Plan for Dewatering of the Northern Part of the City of Prague Including Letňany, Čakovice, Miškovice, Ďáblice, Březiněves, Třeboradice, and the Part of Střížkov and Prosek"** was the second two years long project. Data collection was performed and implemented to the situation report in 2006. Works included the missing field data completion and ensuring the sewerage network's monitoring and rainfall monitoring. These data are necessary for the mathematic models calibration and verification. There was developed the assessment on actual state of dewatering and proposal of area dewatering for the perspective state of the area development in 2007. Designed concept respects the existing waste water drainage system, and it proposes additional construction, and capacitive increase of sewerage system and auxiliary WWTPs. Limits are established for the rain water drain with regard to descend capacity of the Mratínský Creek. Retention is designed for respective development areas.
- **"General Plan for Dewatering of the South-eastern Part of the city of Prague Including Újezd u Průhonic, Benice, Kolovraty, Uhříněves, Křeslice, Petrovice, Dolní Měcholupy, Dubeč, Štěrboholy, a Part of Prague 15"** is the third project worked out in 2006 and 2007. Dewatering is developed for the present and perspective state according to proposal of the Land Use Plan of the City of Prague and its amendings. General Plan solves the influence of dewatering for water courses through particular locality. In 2006 situation reports were carry out, reports include all reasonable information, which are necessary for working out the General Plan of Dewatering. Rain water drainage and waste water drainage monitoring, as well as the rainfalls monitoring and missing geodetic data completion are included. Work on the General Plan continued in 2007, too. Simulation mathematical models were performed, calibrated, and verified as well. Proposal for waste water and rain water drain from particular area resulted from assessment of the actual state of dewatering. Major part of the territory is designed to be connected to the CWWTP in Bubeneč. Disestablishment of the two auxiliary WWTP is performed as well as the additional construction and increasing the capacity of drainage network. Rain water drain is resolved by retention and by retardation at respective areas, with regard to low percolating ability in particular area. The influence of dewatering was evaluated for water courses. Designed acquisition will ensure that flow rates would not be descending in water courses after urban constructions will be finished.

Two studies were written within the managing and updating the General Plan for Dewatering. These studies resolved drainage network's actual problems on the basis of parts from the General Plan for Dewatering. Aforementioned problems are as follows:

- Hydro-technical calculations, which were performed on the basis of the former acquisitions in drainage area of central sewers C and OK 1C, were updated, because of undesirable road flooding with water from sewer OK 1C Maďarská in the Papírenská Street and the Mlýnská Street. The solution was proposed for removing the floods from streets and neighbouring objects.
- Recalculation of the sewerage network was performed for the drainage area of the OK 102K with regard to new finding of the sewerage network's research, so there could be resolved the accident and resulting reconstruction of sewerage in the Šermířská Street, and the additional reconstruction of the interceptor in the Kinských Garden. Proposal of the optimal profile was performed for particular area, so there would not occur any forced fluctuation on sewers.

B2.7 FLOOD CONTROL MEASURES

Information on the construction of flood protection system of the City of Prague

An intensive construction of flood protection system has been ongoing on the whole territory of the City of Prague. Once the system is completed the City shall be protected against the flooding of high water of the Vltava River and the Berounka River as in the case of the great deluge of August 2002 plus the spare margin of water level + 30 cm.

The construction of flood control measures was originally in 1997 designed for 100-year water and subdivided into seven phases as follows: 1 – Old Town and Josefov, 2 – Lesser Town and Kampa, 3 – Karlín and Libeň, 4 – Holešovice and Royal Game Preserve Stromovka, 5 – Podolí and Výtoň, 6 – Smíchov, Zbraslav, Radotín and Velká Chuchle, and 7 – Troja, Prague 6.

After the 2002 flood it was decided to elevate the existing protective dykes in preparations and to expand the construction of flood-control measures for two more phases as follows:

- phase 0008 Modřany – the extension of the protected area from Street U kina to the Sugar Mill Komořany, modifications of creeks taken in pipes, and protection of Modřany by increasing of the railway tracks;
- and the phase 0009 of measures against internal water, which shall take rainwater and water from the sewerage system from areas located behind the flood-control measures.

Following the experience from the 2002 floods, mathematical models, and other background materials, further changes were carried out to the protection system and to projects to provide for much more perfect protection of Prague.

The construction of 1st phase the Old Town and Josefov was completed in 2000 and saved the Old Town from flooding even at the vast deluge in August 2002.

State of preparations and construction of respective phases of the Construction 0012

Phase 0002 the Malá Strana (Lesser Town) and Kampa is completed and its whole section Říční Street down to Čertovka and the formerly completed section at the Office of the Government of the Czech Republic protects the Staré Město (Old Town) against the flood. At present the supplier finishes with the fixing of defects which were found at the construction approval. More efficient driving mechanism was proved and bought last year.

Phase 0003 Karlín – Libeň is, concerning the technical merit as well as the extent of works, the most complex and financially one of the most demanding phases. All works has been completed. In 2007 the final solution of the interim barrier has been solved in the area of Metrostav on Rohanský Island.

Phase 0004 Holešovice – Stromovka – The work is duly completed.

Phase 0005 Výtoň, Podolí, Smíchov – It was implemented and the work is completed, pursuant to construction documentation and amendments to it.

Phase 0006 Zbraslav – Radotín – At present documentation sets for the selection of suppliers of respective sections of this construction are being completed and the call for tenders are under preparation. These are section 13 Zbraslav – North, section 14 Zbraslav – South, section 21 Radotín, U školy – Věštínská Street, section 26 Radotín Věštínská Street – Street U Jankovky, and the section 22 Velká Chuchle.

In 2007 the selection procedure was achieved for reconstruction section 12 Zbraslav (internal water drain). Building operations began on few stop-plank chambers.

Section 31 Lipence – Dolní Černošice will be part of discussion connected to the land-use plan.

Phase 0007 Troja – In 2007 the realization of section 14 Troja began – urban ring has been under construction in tide cooperation with construction of urban ring tunnels in Troja.

Final line documentation of flood control measures is completed at the following sections. Land-use decision had been discussed and documentation for selection procedure had been prepared.

Legitimized land-use decision on enhancement the capacity of Šárecký Creek (section 21) had been passed after wide discussions with citizens.

Phase 0008 flood-control measures Modřany – The works are completed and along with the construction of KOMOKO form an integrated section of the flood-control measures of Modřany. In this phase the preparation of the boat depot construction for a canoe sport society, which original storage facility was destroyed due to the construction, is in final stage.

Phase 0009 Measures against internal water – it is transferred into the investment plan of the Prague Water Management Company.