UNDP I GEF
DANUBE REGIONAL PROJECT

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Iron Gate sediments evaluation

Synthesis Report

WORKING FOR THE DANUBE AND ITS PEOPLE

UNDP I GEF
DANUBE REGIONAL PROJECT

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ABBREVIATIONS

DRP	Danube Regional Project
GEF	Global Environment Facility
UNDP	United Nations Development Programme

EXECUTIVE SUMMARY

DRP's Component 4.2 has the objective to assess the sediment quality in the Iron Gate Reservoir and to prepare initial recommendations for future protection of the Danube River and Black Sea. The project is an assessment of data and information on the Iron Gate sediments and is a step in identifying gaps in the available information.

To achieve the objectives of the project

> the Romanian and Serbian national teams collected and reviewed the available data and information on sediment quality in the Iron Gates reservoir area;

> VITUKI as international laboratory was required to obtain the services of an appropriate vessel to enable samples to be collected from the Iron Gate Reservoir;

> VITUKI together with the national teams collected sediment samples for subsequent analysis;

> the sediment samples were analysed for an agreed list of determinands in the national laboratories and in VITUKI;

> the project co-ordinator compiled a synthesis report on the results and conclusions of the project.

In the first stage of the project the Romanian and Serbian national teams collected and reviewed the available data and information on sediment quality in the Iron Gates reservoir area.

As part of the project a sampling survey was carried out in September 2006 by the ship ARGUS. Grab samples and core samples were taken at the preselected 10 sections in the Iron Gate reservoir region in the Danube reach 928-1107 km.

The determinands total phosphorus, organic nitrogen, heavy metals (mercury, cadmium, lead, nickel, chromium, arsenic, copper, zinc), exctractable petroleum hydrocarbons, organochlorine pesticides (DDT, lindane, aldrin, endrin, dieldrin), nonylphenol, octylphenol, pentachlorphenol, di(2-ethylhexyl)phthalate, PAHs, PCBs and particle size distribution were analyzed by widely used methods in the laboratories of the Romanian and Serbian national teams and VITUKI Kht.

Conclusions and recommendations based on the historic data and from survey in 2006:

> sediment quality data are available mainly for the surface layer of bottom sediment and less for some vertical profiles (core samples) and suspended sediments;

> the sediment quality studies focused dominantly on heavy metals, nutrients and some organic pollutants (PAHs, PCBs, petroleum hydrocarbons and some pesticides);

> the concentration distributions of the specific pollutants generally show wide range both in space and time;

> compliance checking with different guideline values indicate the anthropogenic pollution of sediment in the Iron Gate region in surface layer of sediment and in core samples as well.

> The recent sediment survey in September 2006 also indicated that the longitudinal concentration distributions of contaminants do not show typical pattern along the Danube section in the Iron Gate reservoir.

> The vertical profiles of core samples indicate sediment pollution in the complete profile of the 50-80 cm thick core samples.

> It is recommended to continue the sediment quality monitoring in the scope of TNMN and continue the periodical sediment investigations in Joint Danube Surveys.

- Further monitoring programmes for the Iron Gates reservoir area shall continue with:
  - monitoring of WFD priority hazardous substances that have a strong preference to accumulate in sediment (such as hydrophobic organic compounds);
  - monitoring of the above mentioned substances both in terms of spatial and trend investigation. Spatial monitoring is necessary in order to evaluate the extent in which a certain contaminant is spread over a studied area and probably to detect its source based on available emission data. Trend monitoring should be carried out in order to evaluate the temporal pattern over a long time period. This type of programme shall include also the study of deeper sediment layers in order to identify the historic contamination;
  - combination of the present chemical measurements with ecotoxicological assessment and ecological field studies.
- The frequency of the Iron Gates sediment monitoring should be established based on a common agreement among the stakeholders involved and based on technical criteria such as: present information on sediment quality compliance with EQSs, sedimentation rate and existing or further identification of new anthropogenic pressures.

1. PROJECT OBJECTIVES

The overall objective of the DRP's Component 4.2 is to assess the sediment quality in the Iron Gate Reservoir and to prepare initial recommendations for future protection of the Danube River and Black Sea. The specific objectives include:

1. Collecting and reviewing the existing data and information on present situation;
2. Assessing the main types and quantities of dangerous substances;
3. Assessing the potential environmental impacts on the Danube and the Black Sea;
4. Forecasting development for a period of 20 years;
5. Discussing possible precautionary and rehabilitation measures for the Danube and the Black Sea;
6. Preparing recommendations for dealing with this problem in the forthcoming decade (measures to be included in the Joint Action Programme of the ICPDR);
7. Undertaking sampling and analysis as agreed by the overall project team
8. Proposing further monitoring programmes.

This project is an assessment of data and information on the Iron Gate sediments and is a step in identifying any gaps in the available information leading to the need for future investment (e.g. international donors) programmes for remediation.

2. APPROACH OF WORK

To achieve the objectives of the project

- the Romanian and Serbian national teams collected and reviewed the available data and information on sediment quality in the Iron Gates reservoir area;
- VITUKI as international laboratory was required to obtain the services of an appropriate vessel to enable samples to be collected from the Iron Gate Reservoir;
- VITUKI together with the national teams collected sediment samples for subsequent analysis;
- the sediment samples were analysed for an agreed list of determinands in the national laboratories and in VITUKI;
- the project co-ordinator compiled a synthesis report on the results and conclusions of the project.

3. RESULTS AND CONCLUSIONS

3.1. Data collection and assessment of available data

In the first stage of the project the Romanian and Serbian national teams collected and reviewed the available data and information on sediment quality in the Iron Gates reservoir area (ICIM 2006a, Jaroslav Cerni Institute 2006).

3.1.1. Description of data sources

3.1.1.1. EROS 2000 PROJECT – data from year 1995

This study was the output of a research contract between the European Community (PHARE Programme) and the Romanian Centre of Marine Geology and Geo-Ecology regarding the eutrophication and contamination state of the Danube River.

During the EROS Danube River Cruise (June 1995) bottom sediments were collected by grabs and corers and the samples were analysed for grain size distribution, chemistry (major compounds, heavy metals) and mineralogy (clay and heavy minerals).

The samples from the core were collected for measuring the variations in heavy metals.

3.1.1.2. ECOTOXICOLOGICAL STUDY CONCERNING THE DANUBE RIVER POLLUTION RESULTING FROM THE WAR EVENTS IN YUGOSLAVIA - data from year 1999

This study consisted of a chemical and biological survey along the border between Romania and FRY (as it was in that time) in order to assess the impact produced by relevant persistent pollutants potentially released during the conflict in Yugoslavia, on the Danube River's ecosystems.

For sediment quality investigation samples were taken in July 1999, from 9 sections along the Danube (Romanian and Yugoslavian border) between rkm 1071 - 834; sampling sites from each section were at various distances from left bank and on the main stream.

3.1.1.3. TRANS-NATIONAL MONITORING NETWORK - NATIONAL DATA BASE – Romanian data from 2000

As it was agreed within the former MLIM – Expert Group of ICPDR, for this monitoring programme, sediment samples are taken and analysed according to Standard Operating Procedures (SOPs) applied within the TNMN.

3.1.1.4. JOINT DANUBE SURVEY (JDS) – data from 2001

Sediment samples were taken from the left and right banks of the river either with a sampling net or with the grab sampler. 13 stations were in the Iron Gate reservoir. Sediment sampling was followed by on-board grain size fractionation with wet sieving for obtaining the less-than 63 µm fraction for laboratory analysis.

3.1.1.5. Determination of heavy metals

For heavy metals analysis sediment samples were pretreated according to ISO/DIS 11464:1992 – "*Soil Quality. Pre-treatment of samples for physico - chemical analyses*".

3.1.1.6. Determination of organic pollutants

Petroleum hydrocarbons were analysed during JDS by using different analytical methods, including GC-FID for total petroleum hydrocarbons (TPH), TPH was determined by using UV absorption and fluorescence procedures, as well as GC/MS analysis of Polycyclic Aromatic Hydrocarbons (PAHs).

The JDS list of determinants included the following:

> five organochlorine compounds (Lindane, Hexachlorobenzene, Hexachlorobutadiene, Pentachlorobenzene, pp'-DDT);
> seven polychlorinated biphenyls (PCB 25, 52, 101, 118, 153, 138, 180).
> Polycyclic Aromatic Hydrocarbons (PAHs)
> Nonylphenol (4-para-nonylphenol) and Octylphenol (para-tert-octylphenol)
> Organotin compounds (tributyltin cation – TBT).

3.1.1.7. AQUATERRA INTEGRATED PROJECT – data from 2004

The *Aquaterra Danube Survey* (August – September 2004) provided additional results and data concerning the concentration of selected chemical compounds in sediments and suspended matters.

Sampling sites were selected from the sites investigated during the Joint Danube Survey; a number of 30 stations were selected in the Danube River.

Sediment samples were taken from both left and right banks of the river, using a sampling net and a grab sampler. Sediment sampling was followed by on-board grain size fractionation with wet sieving for obtaining the less-than 63 μm fraction for laboratory analysis of selected determinants.

Sediment samples were sampled and handled according to the appropriate Standard Operations Procedures and Standards Methods, as it follows:

> ISO 5667-3:1985: Preservation and handling of samples;
> ISO 5667-6:1990: Sampling of rivers and streams;
> ISO 5667-12:1990: Sampling of bottom sediments;
> ISO 5667-15:1991: Preservation and handling of sludge and sediment samples;
> ISO 5667-17:1991: Guidance on sampling of suspended matters.

With each series of samples certified reference materials were analysed in order to assure quality control of measurements.

The elements were determined as follows:

- Cd, Cu, Fe, Mn, Ni, Pb and Zn by flame atomic absorption spectroscopy according to ISO 8288/1986 (Cd, Cu, Ni, Pb and Zn) and Cr according to EPA/600/4-79/020, 1983;
- As by hydride generation technique of atomic absorption spectroscopy ;
- Hg by cold vapour technique of atomic fluorescence spectroscopy according to EN 13506/2001;
- Al by inductively coupled plasma mass spectroscopy according to ISO 17294-2/2003.

3.1.1.8. RESULTS OF MONITORING THE SERBIAN-ROMANIAN SECTOR OF THE DANUBE RIVER (between the Iron Gate dam and km 1075) – Serbian data from the year 2001 to 2005

Sediment samples were analyzed in order to assess pollutant accumulation in the sediment, as well as biogenic elements that may enter the water column. Such parameters included: total heavy metals (Fe, Mn, Zn, Cu, Cr, Cd, As, Hg, Pb), nitrogen content (NH4 and organic nitrogen), phosphorus content (total P), organic content (loss on ignition, COD dichromate), specific organic pollutants (PCB, PAH, total hydrocarbons).

Surface sediment was sampled by Ekman dredger. Measurements and laboratory tests were performed in accordance with prescribed and standard methods, and adopted test methodology.

Investigation of sediment quality was carried on fine fraction of sediment, (particles less than 63 μm).

3.1.2. Summary of the main indicators of the data sources

- The sampling sites and the time period for the available data in the above mentioned sources are listed in Table 1;
- The groups of determinands as well as determinands from each group for which data were available are presented in Table 2;
- The approximate number of data (as number of entries) collected from the above mentioned sources (according to Table 2) is around 3700.

Table 1 List of sampling locations in the available data sets

Sampling location	River km	Location in profile	Year of available data set
Ram	1072	R	2001, 2002, 2003, 2004, 2005
Bazias/Baratska Palanka	1071	L, R	1999, 2000, 2001, 2002, 2004
Veliko Gradiste	1059	L, R	1999, 2001, 2002, 2003, 2004, 2005
Moldova Veche	1044.5	L	1995
Iron Gates Reservoir Golubac/Koronin	1040	L, R	2001, 2004
Greben	999	L	1995
Donji Milanovac	991	R	2001, 2002, 2003, 2004, 2005
Milanovac	996	L	1999

Plavisevita	969.5	L	1995
Ieselnita	959.5	L	1995
Iron Gates Reservoir Orsova/Tekija	956	L, R	1999, 2001, 2004
Ada Kale	952	L	1995
Upstream Iron Gates I Dam	947.2	L	1995
Iron Gates I Dam	943	L	1999
Kladovo	934	L	1999
Simijan/Vrbica	924	L, R	2001, 2004
Upstream Iron Gate II	867	L	1999
Kusjak	863	R	2001, 2002, 2003, 2004, 2005
Upstream Timok Gruia/Radujevac	849	L, R	1999, 2001, 2004
Pristol/NovoSelo	834	L, R	1999, 2000, 2001, 2002, 2004

Table 2 Determinands for which data were available for the river stretch rkm 1072 – rkm 834 and number of entries for each determinand

		Danube River km (rkm)																			
Group of determinands	**Determinand**	**1072**	**1071**	**1059**	**1045**	**1040**	**999**	**996**	**991**	**969.5**	**959.5**	**956**	**952**	**947.2**	**943**	**934**	**924**	**867**	**863**	**849**	**834**
WFD Priority Substances (PS)	Anthracene	9	5	11		4		1	10			14			1	10	4	1	3	5	4
	Brominated diphenylethers (Pentabromodiphenylether)		2			2						1					2			2	2
	Cadmium and its compounds	15	13	20	1	5	1	1	18	1	1	21	1	1	1	19	4	2	8	6	9
	Di (2-ethylhexyl)phthalate (DEHP)		4			4						3					4			4	3
	Fluoranthene	10	5	12		4		1	11			15			1	11	4	1	3	5	4
	Hexachlorobenzene	1	4	1		4			1			4				1	4			4	3
	Hexachlorobutadiene		4			4						3					4			4	3
	Lindane (gamma-hexachlorocyclohexane)	1	5	3		4		1	2			6			1	3	4	1	2	5	4
	Lead and its compounds	15	13	20	1	5	1	1	18	1	1	22	1	1	1	19	4	2	8	6	9
	Mercury and its compounds	10	4	11	1	5	1		11	1	1	14	1	1		11	4	1	1	4	3
	Naphthalene	9	5	10		4		1	9			13			1	9	4	1	2	5	4
	Nikel and its compounds	14	9	17	1	5	1		17	1	1	20	1	1		18	4	1	8	4	6
	4-(para)-Nonylphenol		4			4						3					4			4	3
	(para-terc-Octylphenol)		4			4						3					4			4	3
	Pentachlorobenzene		4			4						3					4			4	3
	Pentachlorophenol		4			4						15					4			4	3
Other PAHs	Benzo(a)pyrene	10	5	12		4		1	11			13			1	11	4	1	3	5	4
	Benzo(b)fluoranthene	9	5	10		4		1	9			14			1	9	4	1	2	5	4
	Benzo(g,h,i)perylene	9	5	11		4		1	10			14			1	10	4	1	3	5	4
	Benzo(k)fluoranthene	9	5	11		4		1	10			15			1	10	4	1	3	5	4
	Indeno(1,2,3-c,d)pyrene	10	5	12		4		1	11			14			1	11	4	1	3	5	4
	Crysene	9	5	11		4		1	10			14			1	10	4	1	3	5	4
	Dibenzo(a,h)anthracene	9	5	11		4		1	10			14			1	10	4	1	3	5	4

		Danube River km (rkm)																			
Group of determinands	**Determinand**	**1072**	**1071**	**1059**	**1045**	**1040**	**999**	**996**	**991**	**969.5**	**959.5**	**956**	**952**	**947.2**	**943**	**934**	**924**	**867**	**863**	**849**	**834**
	Acenaphthylene	9	5	11		4		1	10			13			1	10	4	1	3	5	4
	Acenaphthene	9	5	10		4		1	9			14			1	9	4	1	2	5	4
	Fluorene	9	5	11		4		1	10			14			1	10	4	1	3	5	4
	Pyrene	9	5	11		4		1	10			4			1	10	4	1	3	5	4
	Benz(a)anthracene	9	5	11		4		1	10			14			1	10	4	1	3	5	4
	Phenanthrene	9	5	11		4		1	10			14			1	10	4	1	3	5	4
Organochlorine pesticides	α-HCH		1	1				1				1			1	1		1		1	1
	β-HCH		1	1				1				1			1	1		1		1	1
	δ-HCH		1	1				1				1			1	1		1		1	1
	Aldrine		1	1				1				1			1	1		1		1	1
	Endrine	1	1	3				1	2			3			1	3		1	1	1	1
	Dieldrin	1	1	3				1	2			3			1	3		1	1	1	1
	Endrin aldehyde		1	1				1				1			1	1		1		1	1
	Endosulphan I		1	1				1				1			1	1		1		1	1
	Endosulphan II		1	2				1	1			2			1	2		1	1	1	1
	Heptachlor		1	1				1				1			1	1		1		1	1
	Heptachlor epoxid	1	1	3				1	2			3			1	3		1	1	1	1
	Endosulphan Sulphate		1	1				1				1			1	1		1		1	1
	4,4' DDE		1	1				1				1			1	1		1		1	1
	4,4' DDD		1	1				1				1			1	1		1		1	1
	4,4' DDT		5	1		4		1				4			1	1	4	1		5	4
Other WFD PS	Bisphenol		2			2						1					1			1	1
	Tributyltin Compounds		2			2						1					2			2	2
PCBs	PCB 18 (2,2',5 trichlorbiphenyl)		1	1				1				1			1	1		1		1	1
	PCB 31 (2,4',5-trichlorbiphenyl)		3	1		4		1				3			1	1	4	1		3	2
	PCB 28 (2,4,4'-trichlorbiphenyl)	7	5	8		4		1	8			11			1	8	4	1	2	5	4
	PCB 44 (2,2',3,5' tetrachlorbiphenyl)		4	1				1				1			1	1		1		1	1

		Danube River km (rkm)																			
Group of determinands	**Determinand**	**1072**	**1071**	**1059**	**1045**	**1040**	**999**	**996**	**991**	**969.5**	**959.5**	**956**	**952**	**947.2**	**943**	**934**	**924**	**867**	**863**	**849**	**834**
	PCB 52 (2,2',5,5'-tetrachlorbiphenyl)	7	5	8		4		1	8			11			1	8	4	1	2	5	4
	PCB 101 (2,2',4,5,5'-pentachlorbiphenyl)	7	5	8		4		1	8			11			1	8	4	1	2	5	4
	PCB 137 (2,2',3,4,4',5' hexachlorbiphenyl)		1	1				1				1			1	1		1		1	1
	PCB 118 (2,3',4,4',5 pentachlorbiphenyl)	7	5	8		4		1	8			11			1	8	4	1	2	5	4
	PCB 153 (2,2',4,4',5,5' hexachlorbiphenyl)		5	1		4		1				4			1	1	4	1		5	4
	PCB 138 (2,2',3,4,4',5 hexachlorbiphenyl)	7	5	8		4		1	8			11			1	8	4	1	2	5	4
	PCB 170 (2,2',3,3',4,4',5 heptachlorbiphenyl)		3	1		4		1				3			1	1	1	1		3	2
	PCB 180 (2,2',3,4,4',5,5' heptachlorbiphenyl)	7	5	8		4		1	8			11			1	8	4	1	2	5	4
	PCB 194 (2,2',3,3',4,4',5,5' octachlorbiphenyl)		1	1				1				1			1	1		1		1	1
	PCB 209 (decachlorbiphenyl)		1	1				1				1			1	1		1		1	1
	PCB 77 (3,3',4,4' tetrachlorbiphenyl)		2			4						2					2			2	2
	PCB 105 (2,3,3',4,4' pentachlorbiphenyl)		1			4						2					2			2	2
	PCB 126 (3,3',4,4',5 pentachlorbiphenyl)		2			4						2					2			2	2
	PCB 128 (2,2',3,3',4,4' hexachlorbiphenyl)		2			4						2					2			2	2
	PCB 156 (2,3,3',4,4',5 hexachlorbiphenyl)		2			4						2					2			2	2
	PCB 169 (3,3',4,4',5,5' hexachlorbiphenyl)		2			4						2					2			2	2

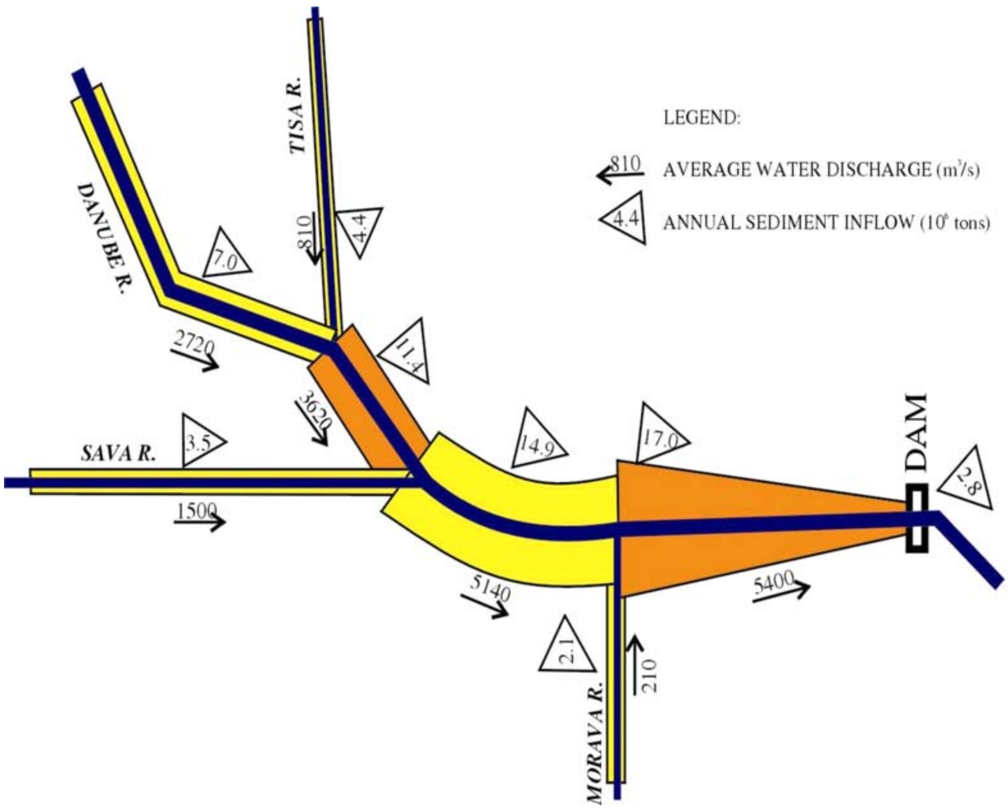
		Danube River km (rkm)																			
Group of determinands	**Determinand**	**1072**	**1071**	**1059**	**1045**	**1040**	**999**	**996**	**991**	**969.5**	**959.5**	**956**	**952**	**947.2**	**943**	**934**	**924**	**867**	**863**	**849**	**834**
Other Heavy Metals	Cu	15	13	20	1	5	1	1	18	1	1	22	1	1	1	19	4	2	8	6	9
	Cr	15	13	20	1	5	1	1	18	1	1	22	1	1	1	19	4	2	8	6	9
	Zn	15	13	20	1	5	1	1	18	1	1	22	1	1	1	19	4	2	8	6	9
	Fe		6			4						3					4			4	4
	Mn		10		1	5	1			1	1	3	1	1			4	1		4	7
	Al		4			4						3					4			4	4
	Vn				1		1			1	1		1	1				1			
	As	15	5	18	1	5	1		18	1	1	21	1	1		17	4	1	8	4	3
Aggregate variables	TEM		4			4						3					4			4	3
	Petroleum Hydrocarbons		3			2						1					2			2	3
	TOC		4			4						4					4			4	2
Nutrients	Organic N	15	2			2			18			20				20	2		8	2	2
	Total N		2			2						2					2			2	1
	Total P	15	4			4			18			21				18	4		8	4	3
TOTAL number of data		**338**	**320**	**421**	**10**	**237**	**10**	**51**	**390**	**10**	**10**	**516**	**10**	**10**	**51**	**402**	**212**	**61**	**136**	**267**	**247**

3.1.3. Assessment of the available data and information

3.1.3.1. Sedimentation in the Iron Gate reservoir

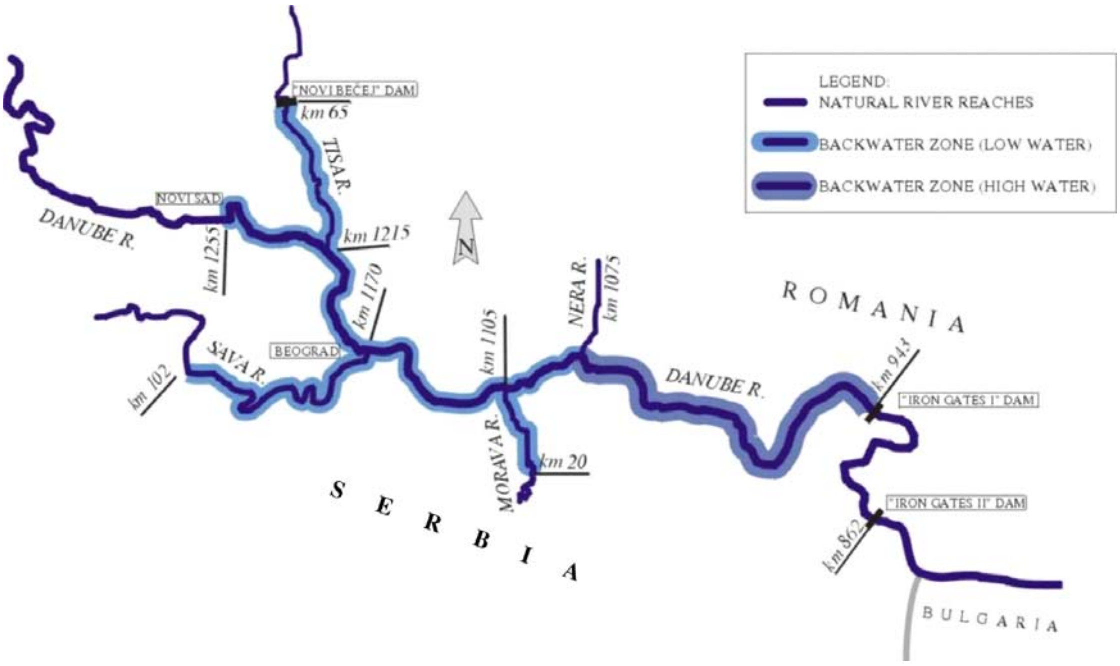
The total drainage area upstream of the Iron Gate I is 577 000 km^2. The annual water flow of the Danube River is 110 - 220 109 m^3, while daily discharges range between 1500 and 15000 m^3/s. The mean annual discharges and total annual sediment inputs of Danube River and its major tributaries in Serbian territory – Tisza, Sava and Velika Morava rivers are shown in Fig 1 (Petkovic, S. et al 2005).

Figure 1 Mean annual discharges and total annual sediment inputs of the Danube River and its major tributaries on Serbian territory (Petkovic, S. et al 2005)



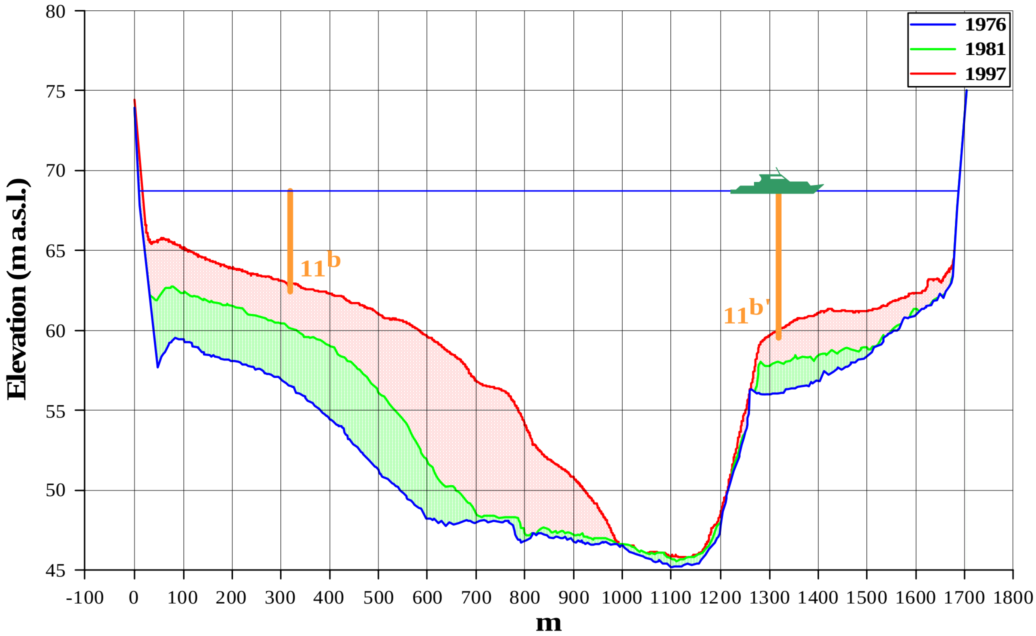
The backwater zone of the Iron Gate I is very large and extends 250-300 km upstream in the Danube River, reaching the cities of Belgrade and Novi Sad. (Fig 2).

Figure 2 Layout of the "Iron Gate" System (Petkovic, S. et al 2005)



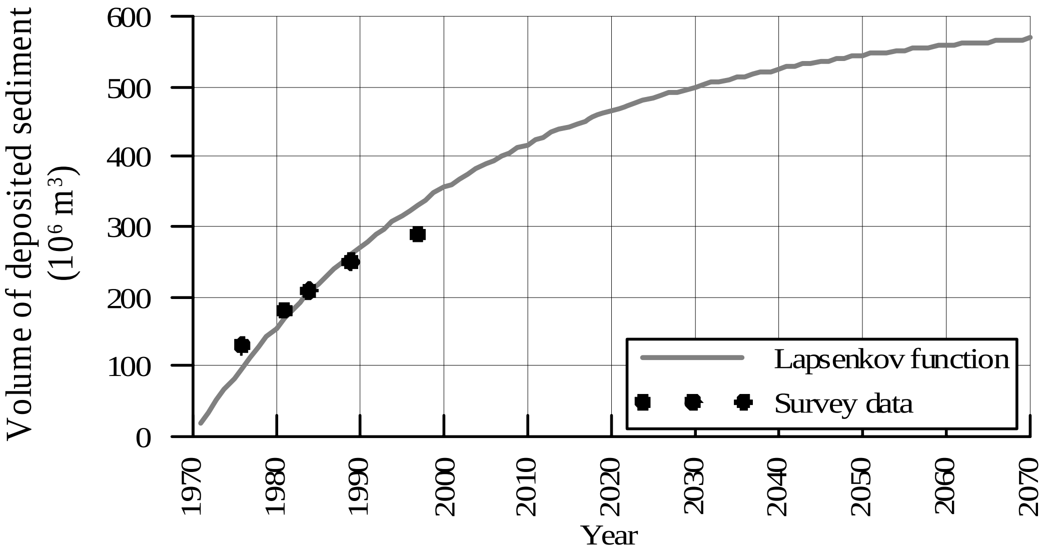
The problem of sedimentation of Iron Gate I reservoir is very complex and serious. Although the suspended sediment concentrations in the Danube River are rather low (10^{-3} to 10^{-1} kg/m^3), considerable volumes of sediment enter the reservoir (7-30 million tons per year). Some characteristics of the Iron Gate reservoir sedimentation are quite specific. The aggradation trend has not been present neither on the upstream part of 300 km long reservoir nor in the Dam vicinity (at km 943). The highest sediment deposits were formed between km 970 and km 1003 of the Danube River (near Donji Milanovac town), where a channel expansion in the Djerdap gorge acts as a natural sediment trap. All cross sections in this area show significant changes, with sediment deposits on former flood plains exceeding 8 m (**Fig 3**).

Figure 3 Characteristic River Cross Section at the Donji Milanovac Sector (Babic-Mladenovic et al 2003)



The average volume of the natural riverbed at the Donji Milanovac sector of about $162x10^6$ m^3, increased to $767x10^6$ m^3 due to impoundment. It can be assumed that a new equilibrium (with the river bed volume approximately equal to natural) will be reached when $600x10^6$ m^3 of sediment settles in this area. Since in 25 years of exploitation (1972-1997) $290x10^6$ m^3 of sediment has already been retained, the available volume for sediment deposition is already reduced by 50%. Rough estimates of future sediment deposition are made by using empirical relations. **Fig 4** shows the estimation of sedimentation.

Figure 4. The estimation of future sediment deposition (Babic-Mladenovic et al 2003)



3.1.3.2. Assessment of chemical pollutants in sediment

The Romanian and Serbian reports on identification and assessment of existing data presented the data from the data sources listed in paragraph 3.1.1.

Presentation and interpretation of the data involved comparison with different sediment quality standards and guidelines (Canadian, Dutch, US EPA, ICPDR, Romanian limit values).

The main conclusions of sediment quality assessment based on the available data:

- sediment quality data are available mainly for the surface layer of bottom sediment and less for some vertical profiles (core samples) and suspended sediments;
- the sediment quality studies focused dominantly on heavy metals, nutrients and some organic pollutants (PAHs, PCBs, petroleum hydrocarbons and some pesticides);
- the concentration distributions of the specific pollutants generally show wide range both in space and time;
- compliance checking with different guideline values indicate the anthropogenic pollution of sediment in the Iron Gate region in surface layer of sediment and in core samples as well.

3.2. Results and assessment of data of the sediment survey in 2006

As part of the project a sampling survey was carried out in September 2006 by the ship ARGUS. Grab samples and core samples were taken at the preselected 10 sections in the Iron Gate reservoir region in the Danube reach 928-1107 km.

The determinands total phosphorus, organic nitrogen, heavy metals (mercury, cadmium, lead, nickel, chromium, arsenic, copper, zinc), exctractable petroleum hydrocarbons, organochlorine pesticides (DDT, lindane, aldrin, endrin, dieldrin), nonylphenol, octylphenol, pentachlorphenol, di(2-ethylhexyl)phthalate, PAHs, PCBs and particle size distribution were analyzed by widely used methods in the laboratories of the Romanian and Serbian national teams and VITUKI Kht. The applied analytical methods are presented in the reports VITUKI 2006 and ICIM 2006.

The sampling sites and sampling dates are listed in **Table 3** and in **Figs 5-7**.

Table 3 Sampling sites and sampling dates of the sediment survey in September 2006

Iron Gates sample number	Sample type	Km index	Location	Location in Profile	GPS Coordinates						Sampling Date [MM/DD/YYYY]	S. Time [HH:MM]
					Latitude			Longitude				
					°	`	``	°	`	``		
1	grab	1107	Upstream Velika Morava	L	44	43	33,8	21	00	09.9	2006.09.11	13:30
1	grab	1107	Upstream Velika Morava	R	44	42	58,1	21	00	25,8	2006.09.11	12:50
2	grab	1097	Downstream Velika Morava	L	44	44	16,4	21	07	37,0	2006.09.11	14:45
2	grab	1097	Downstream Velika Morava	R	44	43	44,8	21	07	51,8	2006.09.11	14:57
-	**core**	**1077**	**Stara Palanka - Ram**	**R**	**44**	**48**	**33,0**	**21**	**19**	**43,2**	**2006.09.11**	**17:00**
	0-10 cm											
-	10-20 cm											
-	20-30 cm											
-	30-40 cm											
-	40-50 cm											
-	50-60 cm											
-	60-70 cm											
-	70-77 cm											
3	grab	1072	Bazias	L	44	48	12,9	21	23	31,0	2006.09.11	19:10
3	grab	1072	Bazias	R	44	48	17,3	21	22	48,4	2006.09.11	19:30
4	grab	1061	Veliko Gradiste / Belobresca	L	44	46	33,2	21	29	44,6	2006.09.12	10:00

Iron Gates sample number	Sample type	Km index	Location	Location in Profile	GPS Coordinates						Sampling Date [MM/DD/YYYY]	S. Time [HH:MM]
					Latitude			Longitude				
					°	`	``	°	`	``		
4	grab	1061	Veliko Gradiste / Belobresca	R	44	46	05.3	21	29	36,3	2006.09.12	10:20
5	grab	1040	Golubac / Koronin	L	44	40	06.7	21	41	20,0	2006.09.12	12:15
5	grab	1040	Golubac / Koronin	R	44	39	40,8	21	41	2,6	2006.09.12	12:00
6	grab	1022	Dobra Lubcova	L	44	38	59,9	21	53	51,3	2006.09.12	14:10
6	grab	1022	Dobra Lubcova	R	44	38	38,7	21	52	56,4	2006.09.12	14:00
7	grab	991	Donji Milanovac	L	44	28	45,4	22	08	35,8	2006.09.13	10:30
7	grab	991	Donji Milanovac	R	44	27	56,3	22	08	15,1	2006.09.13	9:30
-	**core**	**991**	**Donji Milanovac**	**L**	**44**	**28**	**45,4**	**22**	**08**	**35,8**	**2006.09.13**	**12:00**
	0-10 cm											
-	10-20 cm											
-	20-30 cm											
-	30-40 cm											
-	40-50 cm											
-	50-60 cm											
-	60-70 cm											
-	70-74 cm											
-	**core**	**991**	**Donji Milanovac**	**R**	**44**	**27**	**56,3**	**22**	**08**	**15,1**	**2006.09.13**	**9:45**
	0-10 cm											

Iron Gates sample number	Sample type	Km index	Location	Location in Profile	GPS Coordinates						Sampling Date [MM/DD/YYYY]	S. Time [HH:MM]
					Latitude			Longitude				
					°	`	``	°	`	``		
-	10-20 cm											
-	20-30 cm											
-	30-40 cm											
-	40-50 cm											
-	50-60 cm											
-	60-67 cm											
no sediment found on the left side												
8	grab	971	Dubova	R	44	36	23,0	22	16	24,6	2006.09.13	11:40
9	grab	956	Tekija / Orsova	L	44	41	26,0	22	23	43,9	2006.09.13	13:50
9	grab	956	Tekija / Orsova	R	44	41	03.4	22	24	26,1	2006.09.13	13:20
-	**core**	**956**	**Tekija / Orsova**	**L**	**44**	**41**	**26,0**	**22**	**23**	**43,9**	**2006.09.13**	14:00
	0-10 cm											
	10-20 cm											
	20-30 cm											
	30-40 cm											
	40-50 cm											
	50-60 cm											
	60-70 cm											

Iron Gates sample number	Sample type	Km index	Location	Location in Profile	GPS Coordinates						Sampling Date [MM/DD/YYYY]	S. Time [HH:MM]
					Latitude			Longitude				
					°	`	``	°	`	``		
	70-78 cm											
	core	**956**	**Tekija / Orsova**	**R**	**44**	**41**	**03.8**	**22**	**24**	**26,7**	**2006.09.13**	13:30
	0-10 cm											
	10-20 cm											
	20-30 cm											
	30-40 cm											
	40-50 cm											
	50-60 cm											
	60-70 cm											
	70-82 cm											
10	grab	928	Mala Vrbica / Simian	L	44	37	12,1	22	41	06.9	2006.09.13	19:30
10	grab	928	Mala Vrbica / Simian	R	44	36	29,8	22	40	47,6	2006.09.13	19:00
	core	**928**	**Mala Vrbica / Simian**	**R**	**44**	**36**	**29,8**	**22**	**40**	**47,6**	**2006.09.13**	19:00
	0-10 cm											
	10-20 cm											
	20-30 cm											
	30-40 cm											
	40-50 cm											

Iron Gates sample number	Sample type	Km index	Location	Location in Profile	GPS Coordinates						Sampling Date [MM/DD/YYYY]	S. Time [HH:MM]
					Latitude			Longitude				
					°	`	``	°	`	``		
	50-60 cm											
	60-70 cm											
	70-80 cm											

Figure 5. Sediment sampling sections of the sediment survey in September 2006.

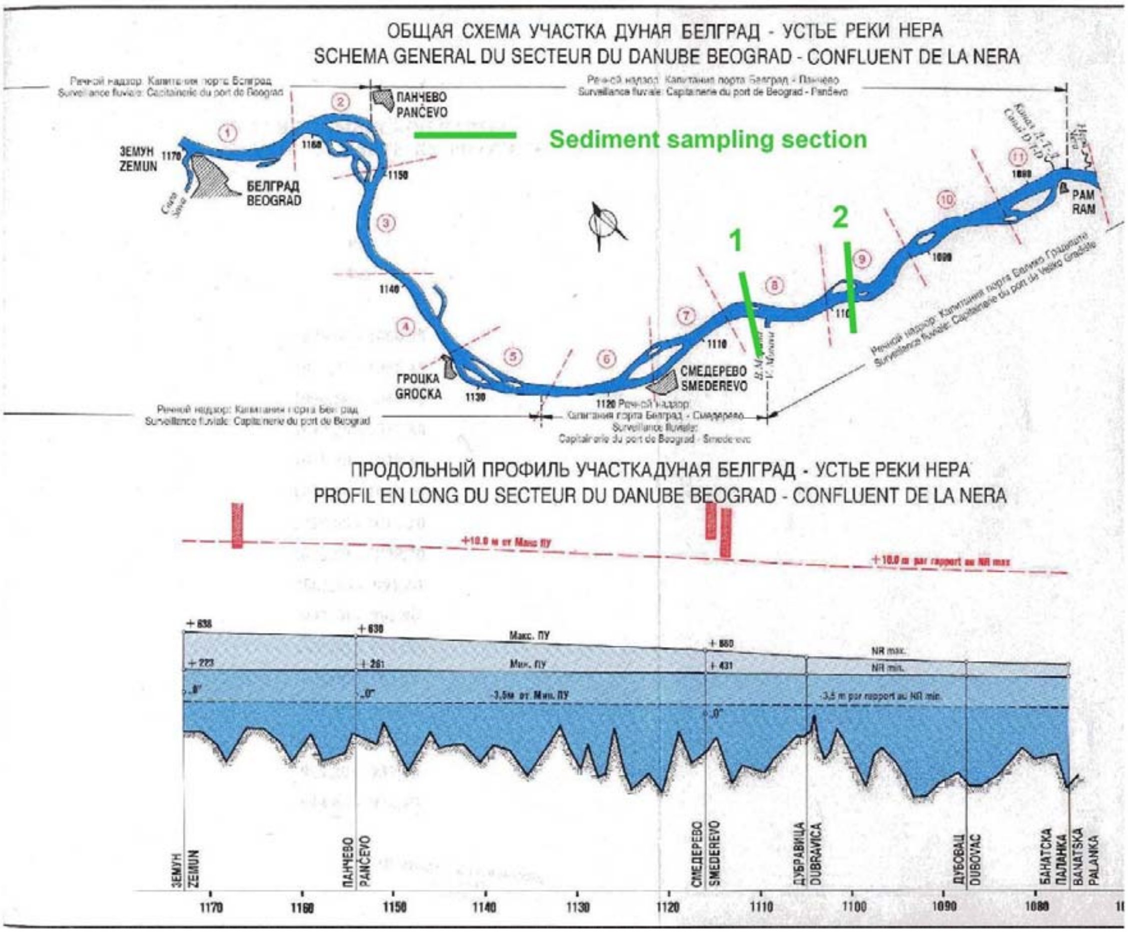


Figure 6. Sediment sampling sections of the sediment survey in September 2006.

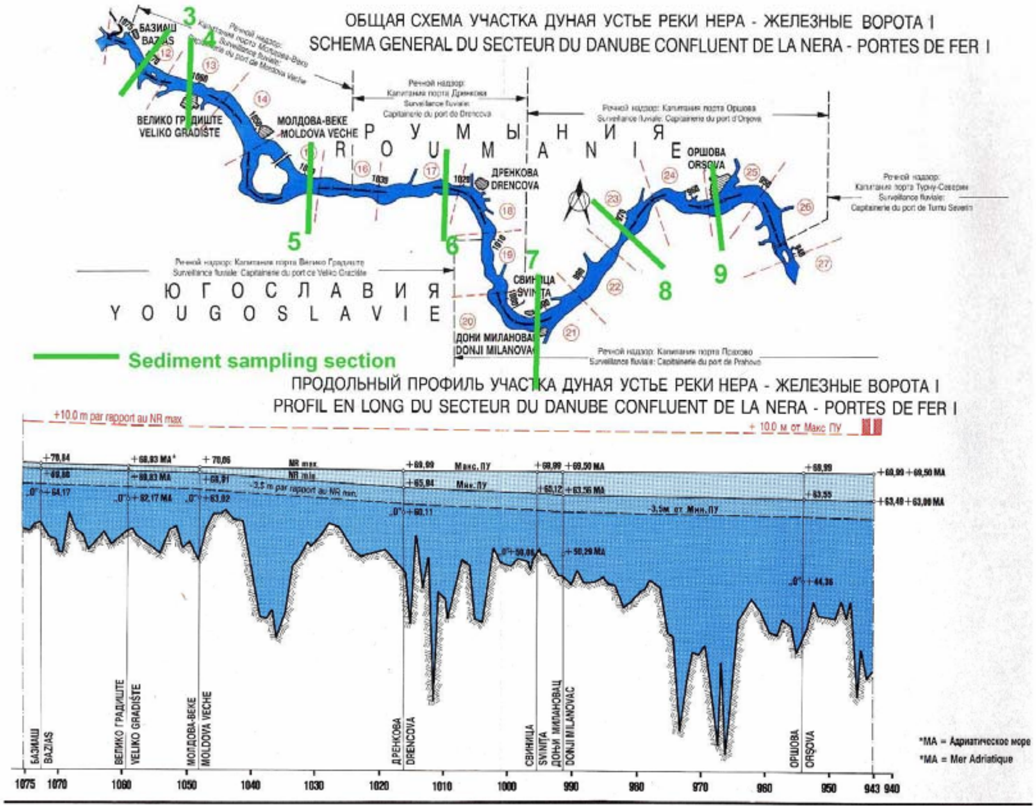
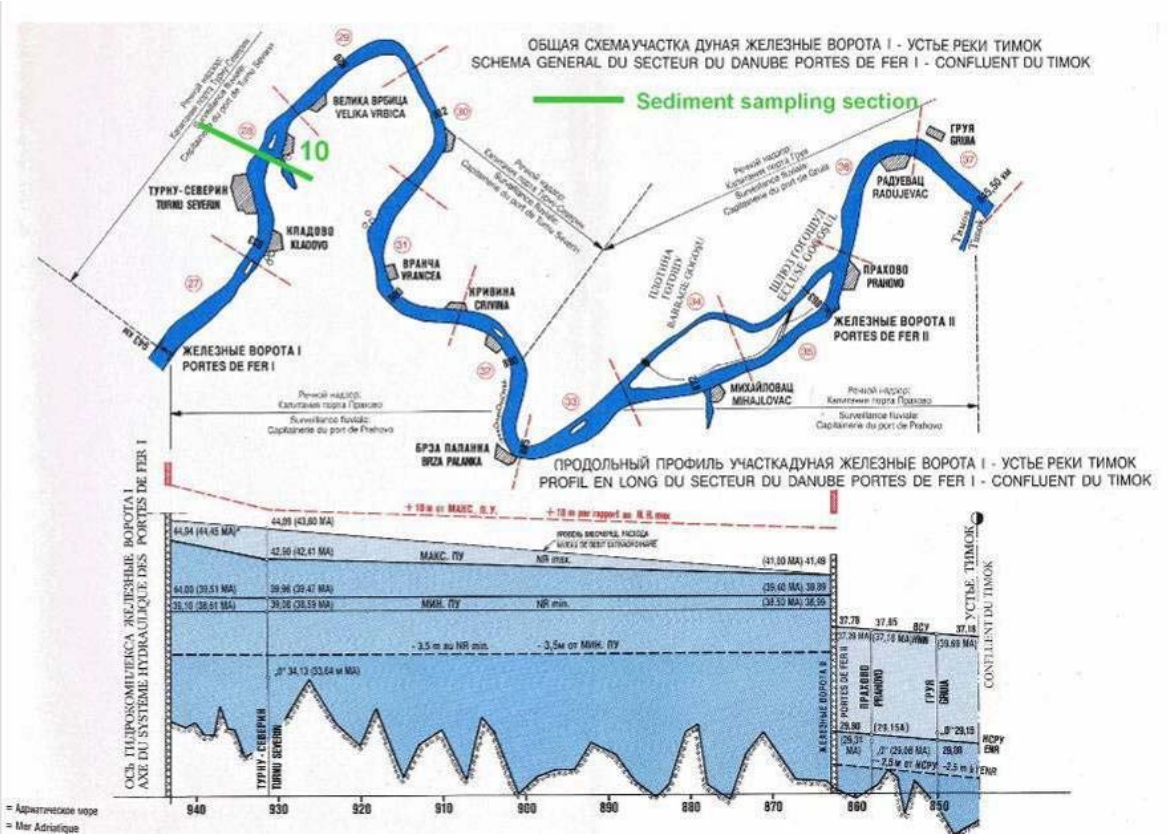


Figure 7. Sediment sampling sections of the sediment survey in September 2006.



Grab sediment samples were taken using a standard Ponar dredge from both left and right banks of the river, at each sampling site, except for site no 8 (Dubova, river km 971 where no sediment was found on the left side. Grab sampling was followed by wet sieving in order to obtain the less-than 63 µm fraction for chemical analysis in the lab. Core sampling was carried out using an Eijkelkamp core sampler and samples were taken from the right side at river km 1077 (Stara Palanka – Ram) and at rkm 924 (Vrbica / Simijan) and from the both sides of the river at sampling sites no 7 and 9 (Donji Milanovac, river km 991 and Orsova, river km 956 respectively. The core sample was then divided into 10 centimetres slices for further analysis in the lab.

The samples were analyzed by widely used methods in the laboratories of the Romanian and Serbian national teams and VITUKI.

The results of the measurements are listed in **Tables 4-6** and shown in **Figs 8-12.**

3.2.1. Conclusions of the sediment survey in September 2006

> The sediment sampling survey was carried out according to the proposed plan: grab samples and core samples were taken at the preselected sites in the Iron Gate reservoir region.

> The applied analytical methods were widely used procedures.

> The analytical results indicate the spatial (longitudinal, cross-sectional and vertical profile) concentration distribution of different contaminants in the bottom sediment of the Iron Gate reservoir.

> The longitudinal concentration distributions of contaminants do not show typical pattern along the Danube section in the Iron Gate reservoir.

> The vertical profiles of core samples indicate sediment pollution in the complete profile of the 50-80 cm thick core samples.

4. ASSESSING THE POTENTIAL ENVIRONMENTAL IMPACTS ON THE DANUBE AND THE BLACK SEA, FORECASTING DEVELOPMENT

The potential environmental impact of the polluted sediment on the Danube can be estimated hardly by chemical measurement of the pollutants without additional ecotoxicological, bioassay measurements and ecological field investigations (triad approach).

Simplified estimation of environmental impact is based on measurement of pollutant concentrations in sediment and compliance checking with guideline values which consider requirements of aquatic life. This type of simplified assessment indicated that zinc, copper and cadmium deserve most attention from heavy metals.

The effect of polluted sediment of the Iron Gate reservoir on the Black Sea can be estimated with very high uncertainty because knowledge is very poor on the bioavailability of pollutants in Danube sediment in marine environment.

Development of sedimentation in the next decades was forecasted by Babic-Mladenovic et al (2003). The volume of deposited sediment will increase by 100 million tons in the sedimentation area of the Iron Gate reservoir near Donji Milanovac in the next 20 years.

Sediment quality forecast is very uncertain, prediction is not available.

5. PRECAUTIONARY MEASURES

The basic precautionary and rehabilitation measure for the Danube river and the Black Sea would be the implementation of pollution reduction programme in the Danube River Basin.

In EU member and accession states it assumes full implementation of relevant Community legislation, in particular the Integrated Pollution Prevention and Control Directive (96/61/EC), the Urban Wastewater Treatment Directive (91/271/EEC), the legislation on the placing on the market of plant protection products (91/414/EEC) and biocides (98/8/EC), and other key legislation regulating the assessment, use and marketing of chemicals (in particular Directive 76/769/EEC on the approximation of the laws, regulations and administrative provisions of the Member States relating to restrictions on the marketing and use of certain dangerous substances and preparations, and Regulation No. EEC 793/93 on the evaluation and control of the risks of existing substances). This measure also involves full implementation of Directive 76/464/EEC on pollution caused by dangerous substances discharged into the aquatic environment of the Community and its daughter directives.

6. PROPOSING FURTHER MONITORING PROGRAMMES

- It is recommended to continue the sediment quality monitoring in the scope of TNMN and continue the periodical sediment investigations in Joint Danube Surveys.
- Further monitoring programmes for the Iron Gates reservoir area shall continue with:
  - monitoring of WFD priority hazardous substances that have a strong preference to accumulate in sediment (such as hydrophobic organic compounds);
  - monitoring of the above mentioned substances both in terms of spatial and trend investigation. Spatial monitoring is necessary in order to evaluate the extent in which a certain contaminant is spread over a studied area and probably to detect its source based on available emission data. Trend monitoring should be carried out in order to evaluate the temporal pattern over a long time period. This type of programme shall include also the study of deeper sediment layers in order to identify the historic contamination;
  - combination of the present chemical measurements with ecotoxicological assessment and ecological field studies.
- The frequency of the Iron Gates sediment monitoring should be established based on a common agreement among the stakeholders involved and based on technical criteria such as: present information on sediment quality compliance with EQSs, sedimentation rate and existing or further identification of new anthropogenic pressures.

Table 4 Analytical results of the sediment investigation in September 2006. VITUKI KHT.

Sample code		1-1107-L	1-1107-R
Components	Unit	Concentration	
Fluoranthene	µg/kg	86	87
Benzo(b)fluoranthene	µg/kg	143	136
Benzo(k)fluoranthene	µg/kg	95	88
Benzo(a)pyrene	µg/kg	114	103
Indeno(1,2,3)pyrene	µg/kg	66	61
Benzo(g,h,i)perylene	µg/kg	25	23
PCB-28	µg/kg	<1	<1
PCB-52	µg/kg	<1	<1
PCB-101	µg/kg	<1	<1
PCB-118	µg/kg	<1	<1
PCB-138	µg/kg	<1	<1
PCB-153	µg/kg	<1	<1
PCB-180	µg/kg	<1	<1
Aldrin	µg/kg	<1	<1
Dieldrin	µg/kg	<1	<1
Endrin	µg/kg	<1	<1
DDT	µg/kg	2,1	1,5
Lindane	µg/kg	<1	<1
Octylphenol	µg/kg	<5	<5
Nonyphenol	µg/kg	89	86
Pentachlorphenol	µg/kg	<5	<5
TPH	mg/kg	60	33
DEHP	mg/kg	<0,1	0,2
Mercury	mg/kg	0,25	0,28
Arsenic	mg/kg	13,5	14,2
Cadmium	mg/kg	2,6	3,0
Lead	mg/kg	60	61
Copper	mg/kg	58	47
Zinc	mg/kg	247	288
Chromium	mg/kg	58	66
Nickel	mg/kg	55	84
Total phosphorus	mg/kg	1159	1173
Organic nitrogen	mg/kg	2228	1948

Sample code		2-1097-L	2-1097-R
Components	Unit	Concentration	
Fluoranthene	µg/kg	132	84
Benzo(b)fluoranthene	µg/kg	303	108
Benzo(k)fluoranthene	µg/kg	153	56
Benzo(a)pyrene	µg/kg	204	73
Indeno(1,2,3)pyrene	µg/kg	107	49
Benzo(g,h,i)perylene	µg/kg	51	25
PCB-28	µg/kg	<1	<1
PCB-52	µg/kg	<1	<1
PCB-101	µg/kg	<1	<1
PCB-118	µg/kg	<1	<1
PCB-138	µg/kg	<1	<1
PCB-153	µg/kg	<1	<1
PCB-180	µg/kg	<1	<1
Aldrin	µg/kg	< 1	< 1
Dieldrin	µg/kg	< 1	< 1
Endrin	µg/kg	< 1	< 1
DDT	µg/kg	2	< 1
Lindane	µg/kg	< 1	< 1
Octylphenol	µg/kg	<5	<5
Nonyphenol	µg/kg	64	96
Pentachlorphenol	µg/kg	<5	<5
TPH	mg/kg	16	29
DEHP	mg/kg	0,26	0,53
Mercury	mg/kg	0,27	0,25
Arsenic	mg/kg	16,4	18,8
Cadmium	mg/kg	3,0	3,0
Lead	mg/kg	67	82
Copper	mg/kg	66	49
Zinc	mg/kg	284	282
Chromium	mg/kg	69	100
Nickel	mg/kg	71	143
Total phosphorus	mg/kg	1335	1196
Organic nitrogen	mg/kg	2450	1765

Sample code		3-1072-L	3-1072-R
Components	Unit	Concentration	
Fluoranthene	µg/kg	78	62
Benzo(b)fluoranthene	µg/kg	139	107
Benzo(k)fluoranthene	µg/kg	86	71
Benzo(a)pyrene	µg/kg	105	79
Indeno(1,2,3)pyrene	µg/kg	70	48
Benzo(g,h,i)perylene	µg/kg	25	19
PCB-28	µg/kg	<1	<1
PCB-52	µg/kg	<1	<1
PCB-101	µg/kg	<1	<1
PCB-118	µg/kg	<1	<1
PCB-138	µg/kg	<1	<1
PCB-153	µg/kg	<1	<1
PCB-180	µg/kg	<1	<1
Aldrin	µg/kg	<1	<1
Dieldrin	µg/kg	<1	<1
Endrin	µg/kg	<1	<1
DDT	µg/kg	1,4	1,2
Lindane	µg/kg	<1	<1
Octylphenol	µg/kg	<5	<5
Nonyphenol	µg/kg	87	170
Pentachlorphenol	µg/kg	<5	<5
TPH	mg/kg	24	78
DEHP	mg/kg	0,14	0,57
Mercury	mg/kg	0,27	0,39
Arsenic	mg/kg	14,4	17,2
Cadmium	mg/kg	2,8	3,5
Lead	mg/kg	68	78
Copper	mg/kg	63	57
Zinc	mg/kg	275	320
Chromium	mg/kg	82	79
Nickel	mg/kg	65	96
Total phosphorus	mg/kg	1248	1184
Organic nitrogen	mg/kg	2344	2233

Sample code		4-1061-L	4-1061-R
Components	Unit	Concentration	
Fluoranthene	µg/kg	114	93
Benzo(b)fluoranthene	µg/kg	343	236
Benzo(k)fluoranthene	µg/kg	168	122
Benzo(a)pyrene	µg/kg	242	146
Indeno(1,2,3)pyrene	µg/kg	119	61
Benzo(g,h,i)perylene	µg/kg	57	30
PCB-28	µg/kg	<1	<1
PCB-52	µg/kg	<1	<1
PCB-101	µg/kg	<1	<1
PCB-118	µg/kg	<1	<1
PCB-138	µg/kg	<1	<1
PCB-153	µg/kg	<1	<1
PCB-180	µg/kg	<1	<1
Aldrin	µg/kg	< 1	< 1
Dieldrin	µg/kg	< 1	< 1
Endrin	µg/kg	< 1	< 1
DDT	µg/kg	1,6	1,1
Lindane	µg/kg	< 1	< 1
Octylphenol	µg/kg	<5	<5
Nonyphenol	µg/kg	53	260
Pentachlorphenol	µg/kg	<5	<5
TPH	mg/kg	41	22
DEHP	mg/kg	0,3	0,27
Mercury	mg/kg	0,30	0,36
Arsenic	mg/kg	16,3	22,6
Cadmium	mg/kg	3,0	3,5
Lead	mg/kg	69	93
Copper	mg/kg	64	60
Zinc	mg/kg	286	320
Chromium	mg/kg	78	127
Nickel	mg/kg	68	147
Total phosphorus	mg/kg	1306	1245
Organic nitrogen	mg/kg	1676	1946

Sample code		5-1040-L	5-1040-R
Components	Unit	Concentration	
Fluoranthene	µg/kg	84	54
Benzo(b)fluoranthene	µg/kg	90	89
Benzo(k)fluoranthene	µg/kg	50	47
Benzo(a)pyrene	µg/kg	59	57
Indeno(1,2,3)pyrene	µg/kg	49	102
Benzo(g,h,i)perylene	µg/kg	24	49
PCB-28	µg/kg	<1	<1
PCB-52	µg/kg	<1	<1
PCB-101	µg/kg	<1	<1
PCB-118	µg/kg	<1	<1
PCB-138	µg/kg	<1	<1
PCB-153	µg/kg	<1	<1
PCB-180	µg/kg	<1	<1
Aldrin	µg/kg	< 1	< 1
Dieldrin	µg/kg	< 1	< 1
Endrin	µg/kg	< 1	< 1
DDT	µg/kg	1	1,4
Lindane	µg/kg	< 1	< 1
Octylphenol	µg/kg	<5	<5
Nonyphenol	µg/kg	60	120
Pentachlorphenol	µg/kg	<5	<5
TPH	mg/kg	29	23
DEHP	mg/kg	0,29	0,46
Mercury	mg/kg	0,21	0,31
Arsenic	mg/kg	32,0	20,5
Cadmium	mg/kg	2,9	3,4
Lead	mg/kg	67	80
Copper	mg/kg	377	64
Zinc	mg/kg	279	326
Chromium	mg/kg	60	94
Nickel	mg/kg	59	104
Total phosphorus	mg/kg	1193	1283
Organic nitrogen	mg/kg	1431	2208

Sample code		6-1022-L	6-1022-R
Components	Unit	Concentration	
Fluoranthene	µg/kg	39	60
Benzo(b)fluoranthene	µg/kg	57	98
Benzo(k)fluoranthene	µg/kg	36	62
Benzo(a)pyrene	µg/kg	39	65
Indeno(1,2,3)pyrene	µg/kg	31	46
Benzo(g,h,i)perylene	µg/kg	11	17
PCB-28	µg/kg	<1	<1
PCB-52	µg/kg	<1	<1
PCB-101	µg/kg	<1	<1
PCB-118	µg/kg	<1	<1
PCB-138	µg/kg	<1	<1
PCB-153	µg/kg	<1	<1
PCB-180	µg/kg	<1	<1
Aldrin	µg/kg	<1	<1
Dieldrin	µg/kg	<1	<1
Endrin	µg/kg	<1	<1
DDT	µg/kg	1,6	1,2
Lindane	µg/kg	<1	<1
Octylphenol	µg/kg	<5	<5
Nonyphenol	µg/kg	48	93
Pentachlorphenol	µg/kg	<5	<5
TPH	mg/kg	34	25
DEHP	mg/kg	0,11	0,16
Mercury	mg/kg	0,17	0,28
Arsenic	mg/kg	12,5	16,7
Cadmium	mg/kg	2,3	3,0
Lead	mg/kg	53	68
Copper	mg/kg	70	71
Zinc	mg/kg	211	290
Chromium	mg/kg	60	81
Nickel	mg/kg	55	75
Total phosphorus	mg/kg	1343	1245
Organic nitrogen	mg/kg	2313	2308

Sample code		7-990-L	7-990-R
Components	Unit	Concentration	
Fluoranthene	µg/kg	77	112
Benzo(b)fluoranthene	µg/kg	301	359
Benzo(k)fluoranthene	µg/kg	150	173
Benzo(a)pyrene	µg/kg	198	243
Indeno(1,2,3)pyrene	µg/kg	105	111
Benzo(g,h,i)perylene	µg/kg	50	53
PCB-28	µg/kg	<1	<1
PCB-52	µg/kg	<1	<1
PCB-101	µg/kg	<1	<1
PCB-118	µg/kg	<1	<1
PCB-138	µg/kg	<1	<1
PCB-153	µg/kg	<1	<1
PCB-180	µg/kg	<1	<1
Aldrin	µg/kg	< 1	< 1
Dieldrin	µg/kg	< 1	< 1
Endrin	µg/kg	< 1	< 1
DDT	µg/kg	1,6	1,1
Lindane	µg/kg	< 1	< 1
Octylphenol	µg/kg	<5	<5
Nonyphenol	µg/kg	57	90
Pentachlorphenol	µg/kg	<5	<5
TPH	mg/kg	15	6,4
DEHP	mg/kg	0,28	0,53
Mercury	mg/kg	0,27	0,32
Arsenic	mg/kg	17,7	16,8
Cadmium	mg/kg	2,7	3,1
Lead	mg/kg	69	75
Copper	mg/kg	75	79
Zinc	mg/kg	293	316
Chromium	mg/kg	75	109
Nickel	mg/kg	91	104
Total phosphorus	mg/kg	1315	1219
Organic nitrogen	mg/kg	1972	1873

Sample code		8-971 R
Components	Unit	Concentration
Fluoranthene	µg/kg	72
Benzo(b)fluoranthene	µg/kg	355
Benzo(k)fluoranthene	µg/kg	165
Benzo(a)pyrene	µg/kg	226
Indeno(1,2,3)pyrene	µg/kg	104
Benzo(g,h,i)perylene	µg/kg	47
PCB-28	µg/kg	<1
PCB-52	µg/kg	<1
PCB-101	µg/kg	<1
PCB-118	µg/kg	<1
PCB-138	µg/kg	<1
PCB-153	µg/kg	<1
PCB-180	µg/kg	<1
Aldrin	µg/kg	< 1
Dieldrin	µg/kg	< 1
Endrin	µg/kg	< 1
DDT	µg/kg	1,6
Lindane	µg/kg	< 1
Octylphenol	µg/kg	<5
Nonyphenol	µg/kg	150
Pentachlorphenol	µg/kg	<5
TPH	mg/kg	65
DEHP	mg/kg	0,48
Mercury	mg/kg	0,31
Arsenic	mg/kg	18,4
Cadmium	mg/kg	3,4
Lead	mg/kg	76
Copper	mg/kg	86
Zinc	mg/kg	317
Chromium	mg/kg	77
Nickel	mg/kg	81
Total phosphorus	mg/kg	1384
Organic nitrogen	mg/kg	1863

Sample code		9-956-L	9-956-R
Components	Unit	Concentration	
Fluoranthene	µg/kg	75	92
Benzo(b)fluoranthene	µg/kg	132	177
Benzo(k)fluoranthene	µg/kg	85	115
Benzo(a)pyrene	µg/kg	96	124
Indeno(1,2,3)pyrene	µg/kg	69	96
Benzo(g,h,i)perylene	µg/kg	25	34
PCB-28	µg/kg	<1	<1
PCB-52	µg/kg	<1	<1
PCB-101	µg/kg	<1	<1
PCB-118	µg/kg	<1	<1
PCB-138	µg/kg	<1	<1
PCB-153	µg/kg	<1	<1
PCB-180	µg/kg	<1	<1
Aldrin	µg/kg	<1	<1
Dieldrin	µg/kg	<1	<1
Endrin	µg/kg	<1	<1
DDT	µg/kg	1,4	1,6
Lindane	µg/kg	<1	<1
Octylphenol	µg/kg	<5	<5
Nonyphenol	µg/kg	140	130
Pentachlorphenol	µg/kg	<5	<5
TPH	mg/kg	25	31
DEHP	mg/kg	0,2	<0,1
Mercury	mg/kg	0,27	0,35
Arsenic	mg/kg	17,3	16,2
Cadmium	mg/kg	3,2	3,3
Lead	mg/kg	72	80
Copper	mg/kg	75	86
Zinc	mg/kg	315	334
Chromium	mg/kg	103	87
Nickel	mg/kg	94	98
Total phosphorus	mg/kg	1240	1163
Organic nitrogen	mg/kg	2229	1957

Sample code		10-924-L	10-924-R
Components	Unit	Concentration	
Fluoranthene	µg/kg	35	63
Benzo(b)fluoranthene	µg/kg	52	115
Benzo(k)fluoranthene	µg/kg	29	74
Benzo(a)pyrene	µg/kg	40	95
Indeno(1,2,3)pyrene	µg/kg	29	75
Benzo(g,h,i)perylene	µg/kg	13	29
PCB-28	µg/kg	1,2	<1
PCB-52	µg/kg	<1	<1
PCB-101	µg/kg	<1	<1
PCB-118	µg/kg	<1	<1
PCB-138	µg/kg	<1	<1
PCB-153	µg/kg	<1	<1
PCB-180	µg/kg	<1	<1
Aldrin	µg/kg	<1	<1
Dieldrin	µg/kg	<1	<1
Endrin	µg/kg	<1	<1
DDT	µg/kg	1,2	1,3
Lindane	µg/kg	<1	<1
Octylphenol	µg/kg	<5	<5
Nonyphenol	µg/kg	98	110
Pentachlorphenol	µg/kg	<5	<5
TPH	mg/kg	40	<1
DEHP	mg/kg	0,75	0,1
Mercury	mg/kg	0,22	0,32
Arsenic	mg/kg	10,6	13,4
Cadmium	mg/kg	1,9	3,1
Lead	mg/kg	49	71
Copper	mg/kg	44	86
Zinc	mg/kg	139	294
Chromium	mg/kg	55	85
Nickel	mg/kg	64	80
Total phosphorus	mg/kg	914	1156
Organic nitrogen	mg/kg	1524	2637

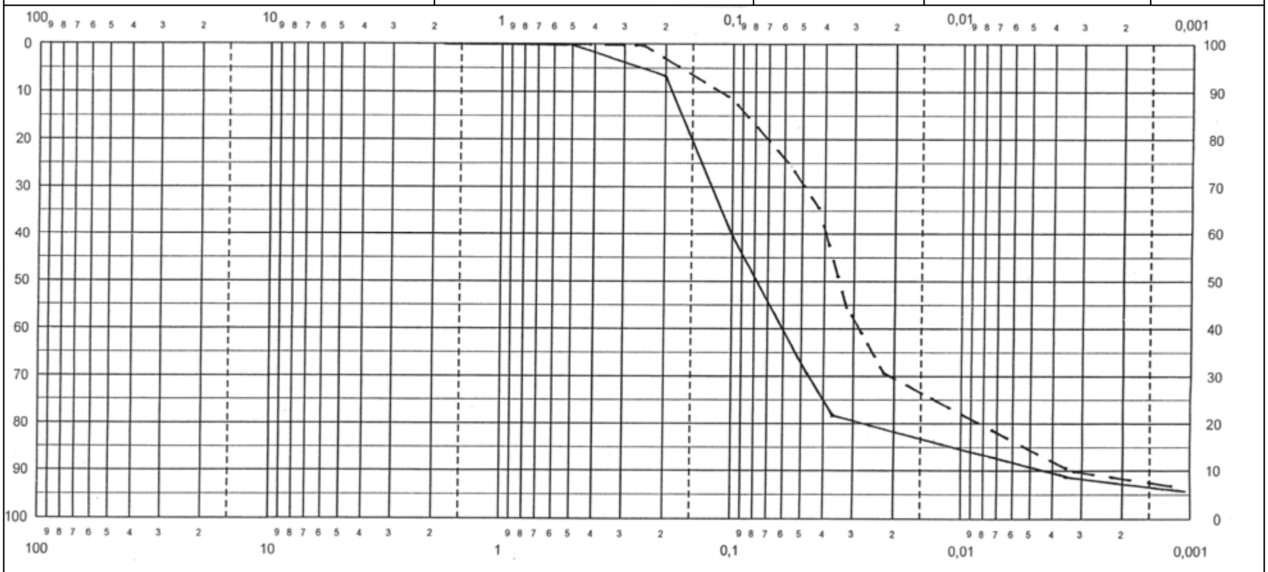
Sample code		1077-R							
	Core	0-10 cm	10-20 cm	20-30 cm	30-40 cm	40-50 cm	50-60 cm	60-70 cm	70-77 cm
Components	Unit	Concentration							
Fluoranthene	µg/kg	127	105	136	169	348	395	339	269
Benzo(b)fluoranthene	µg/kg	221	135	195	444	602	1075	605	756
Benzo(k)fluoranthene	µg/kg	129	81	120	287	324	553	323	390
Benzo(a)pyrene	µg/kg	166	90	137	317	429	746	429	521
Indeno(1,2,3)pyrene	µg/kg	111	65	103	244	283	579	296	368
Benzo(g,h,i)perylene	µg/kg	39	23	35	84	93	188	94	116
PCB-28	µg/kg	<1	<1	<1	<1	1,0	1,6	1,6	2,7
PCB-52	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1
PCB-101	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1
PCB-118	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1
PCB-138	µg/kg	<1	<1	<1	<1	1,3	1,2	1,4	1,7
PCB-153	µg/kg	<1	<1	<1	<1	1,6	1,5	2,0	1,7
PCB-180	µg/kg	<1	<1	<1	<1	1,7	2,0	1,8	1,7
Aldrin	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1
Dieldrin	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1
Endrin	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1
DDT	µg/kg	1,1	<1	1,1	1,3	1,1	1,6	1,4	2,1
Lindane	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1
Octylphenol	µg/kg	<5	<5	<5	<5	<5	19	7,2	8,8
Nonyphenol	µg/kg	300	140	580	1600	4800	11000	5400	3600
Pentachlorphenol	µg/kg	<5	<5	<5	<5	<5	<5	<5	<5
TPH	mg/kg	68	49	108	49	123	220	197	76
DEHP	mg/kg	0,47	0,27	0,45	0,49	0,74	0,84	0,47	0,56
Mercury	mg/kg	0,36	0,35	0,49	0,64	1,05	1,46	1,50	1,36
Arsenic	mg/kg	16,7	18,6	18,7	19,7	27,6	33,3	36,1	58,1
Cadmium	mg/kg	3,1	3,4	4,0	4,6	6,7	9,1	7,1	6,1
Lead	mg/kg	74	77	85	109	151	197	176	168
Copper	mg/kg	54	51	56	65	80	84	72	68
Zinc	mg/kg	292	309	349	446	619	727	682	589
Chromium	mg/kg	89	122	101	105	138	151	174	126
Nickel	mg/kg	105	121	106	104	116	113	133	110
Total phosphorus	mg/kg	1149	1117	1245	1247	1453	1497	1505	1315
Organic nitrogen	mg/kg	2065	1675	1952	1987	2301	2121	2165	2407

Sample code		991-R					
	Core	0-10 cm	20-30 cm	30-40 cm	40-50 cm	50-60 cm	60-67 cm
Components	Unit	Concentration					
Fluoranthene	µg/kg	44	82	171	157	209	121
Benzo(b)fluoranthene	µg/kg	62	124	226	273	363	170
Benzo(k)fluoranthene	µg/kg	36	63	128	151	187	82
Benzo(a)pyrene	µg/kg	45	89	167	194	232	114
Indeno(1,2,3)pyrene	µg/kg	52	93	212	202	146	115
Benzo(g,h,i)perylene	µg/kg	25	45	96	92	72	56
PCB-28	µg/kg	<1	<1	<1	<1	<1	<1
PCB-52	µg/kg	<1	<1	<1	<1	<1	<1
PCB-101	µg/kg	<1	<1	<1	<1	<1	<1
PCB-118	µg/kg	<1	<1	<1	<1	<1	<1
PCB-138	µg/kg	<1	<1	<1	<1	<1	<1
PCB-153	µg/kg	<1	<1	<1	<1	<1	<1
PCB-180	µg/kg	<1	<1	<1	<1	<1	<1
Aldrin	µg/kg	< 1	< 1	< 1	< 1	< 1	< 1
Dieldrin	µg/kg	< 1	< 1	< 1	< 1	< 1	< 1
Endrin	µg/kg	< 1	< 1	< 1	< 1	< 1	< 1
DDT	µg/kg	< 1	< 1	1,1	1,2	1,9	< 1
Lindane	µg/kg	< 1	< 1	< 1	< 1	< 1	< 1
Octylphenol	µg/kg	<5	<5	<5	<5	<5	<5
Nonyphenol	µg/kg	40	330	450	400	920	1300
Pentachlorphenol	µg/kg	<5	<5	<5	<5	<5	<5
TPH	mg/kg	6,9	38	48	56	46	41
DEHP	mg/kg	<0,1	0,24	0,55	0,37	0,37	0,41
Mercury	mg/kg	0,15	0,33	0,67	0,66	0,77	0,50
Arsenic	mg/kg	12,2	13,4	19,8	20,8	24,2	22,2
Cadmium	mg/kg	2,0	3,0	4,7	4,3	4,5	3,1
Lead	mg/kg	45	70	121	125	128	80
Copper	mg/kg	54	83	137	143	157	123
Zinc	mg/kg	173	258	457	437	484	295
Chromium	mg/kg	110	107	125	106	119	117
Nickel	mg/kg	93	92	90	93	98	105
Total phosphorus	mg/kg	935	1030	1318	1233	1220	1021
Organic nitrogen	mg/kg	1011	1297	1977	1946	2040	983

Sample code		956-L							
	Core	0-10 cm	10-20 cm	20-30 cm	30-40 cm	40-50 cm	50-60 cm	60-70 cm	70-78 cm
Components	Unit	Concentration							
Fluoranthene	µg/kg	90	117	141	138	123	121	130	141
Benzo(b)fluoranthene	µg/kg	196	356	149	188	259	190	408	225
Benzo(k)fluoranthene	µg/kg	103	196	85	100	132	103	187	111
Benzo(a)pyrene	µg/kg	131	243	112	133	177	137	280	150
Indeno(1,2,3)pyrene	µg/kg	121	222	110	173	196	126	235	212
Benzo(g,h,i)perylene	µg/kg	41	75	60	84	92	63	115	96
PCB-28	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1
PCB-52	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1
PCB-101	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1
PCB-118	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1
PCB-138	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1
PCB-153	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1
PCB-180	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1
Aldrin	µg/kg	<1	<1	<1	< 1	< 1	< 1	< 1	< 1
Dieldrin	µg/kg	<1	<1	<1	< 1	< 1	< 1	< 1	< 1
Endrin	µg/kg	<1	<1	<1	< 1	< 1	< 1	< 1	< 1
DDT	µg/kg	1,5	1,4	1,3	1,5	1,3	1,3	1,3	1,2
Lindane	µg/kg	<1	<1	<1	< 1	< 1	< 1	< 1	< 1
Octylphenol	µg/kg	<5	<5	<5	<5	<5	<5	<5	<5
Nonyphenol	µg/kg	120	280	260	310	320	240	680	370
Pentachlorphenol	µg/kg	<5	<5	<5	<5	<5	<5	<5	<5
TPH	mg/kg	52	49	22	36	54	76	58	31
DEHP	mg/kg	0,45	0,4	0,32	0,32	0,27	0,5	0,17	0,23
Mercury	mg/kg	0,33	0,40	0,46	0,46	0,60	0,57	0,69	0,65
Arsenic	mg/kg	18,8	18,4	19,9	19,1	21,3	21,7	23,2	19,7
Cadmium	mg/kg	3,5	3,5	3,9	4,0	4,5	3,9	4,7	4,8
Lead	mg/kg	80	90	103	95	112	113	123	115
Copper	mg/kg	82	87	97	99	113	115	136	122
Zinc	mg/kg	350	365	391	376	416	392	466	437
Chromium	mg/kg	103	97	117	102	100	122	117	97
Nickel	mg/kg	97	95	94	88	98	100	91	90
Total phosphorus	mg/kg	1286	1582	1365	1470	1313	1332	1503	1387
Organic nitrogen	mg/kg	2321	2309	2305	2274	1986	2318	2297	2306

Figure 8. Particle size distribution of sediment samples

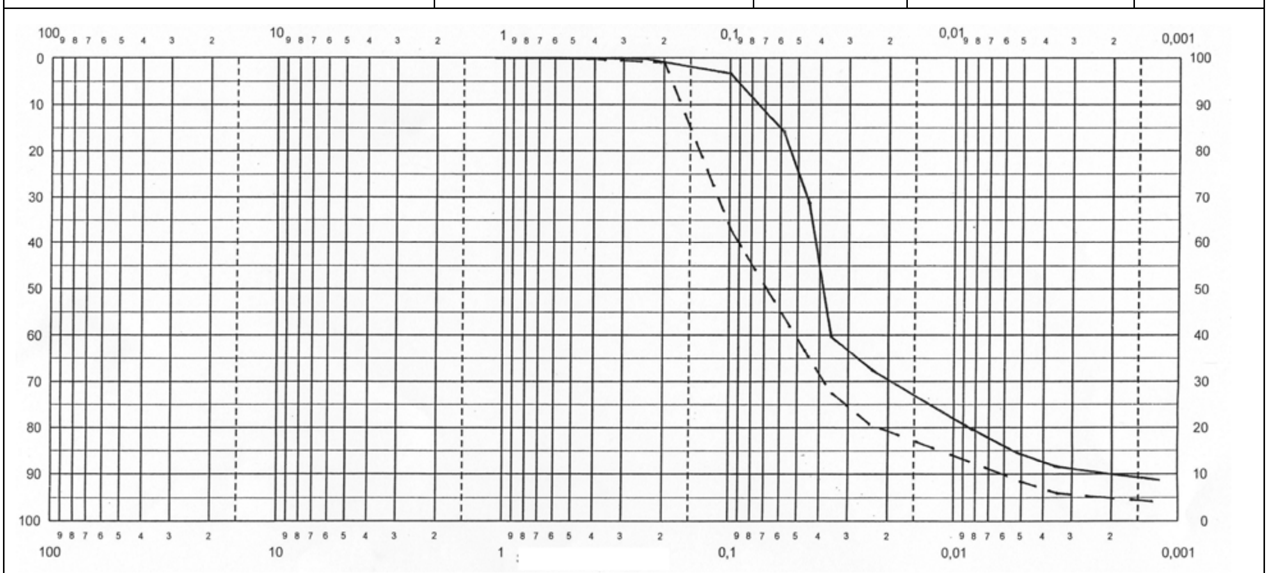
Crude	Tiny	Crude	Middle	Fine	Sandflour	Silt	Loam
Gravel		Sand					



grain size d(mm)

Sample code	D_{60}	D_{10}	U	Marking
1-1107 R-HU	0,1	0,0043	23,3	————————
L-HU	0,040	0,0034	11,8	- - - - - - - - - - - - - - - -

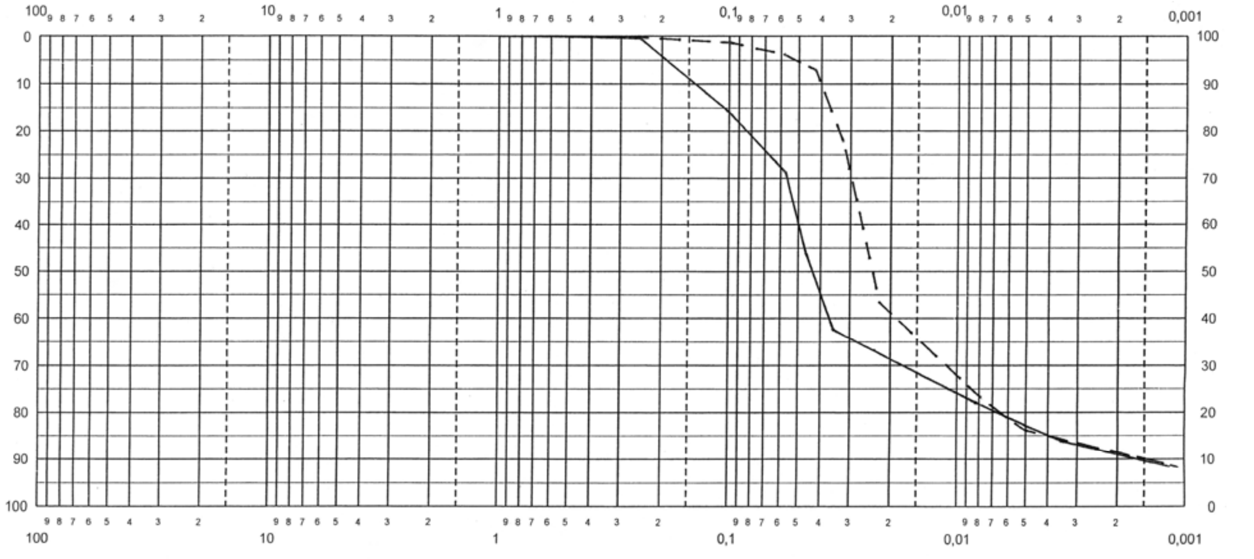
Crude	Tiny	Crude	Middle	Fine	Sandflour	Silt	Loam
Gravel		Sand					



grain size d(mm)

Sample code	D_{60}	D_{10}	U	Marking
2-1097 R-HU	0,041	0,0020	20,5	————————
L-HU	0,090	0,0060	15,0	- - - - - - - - - - - - - - - -

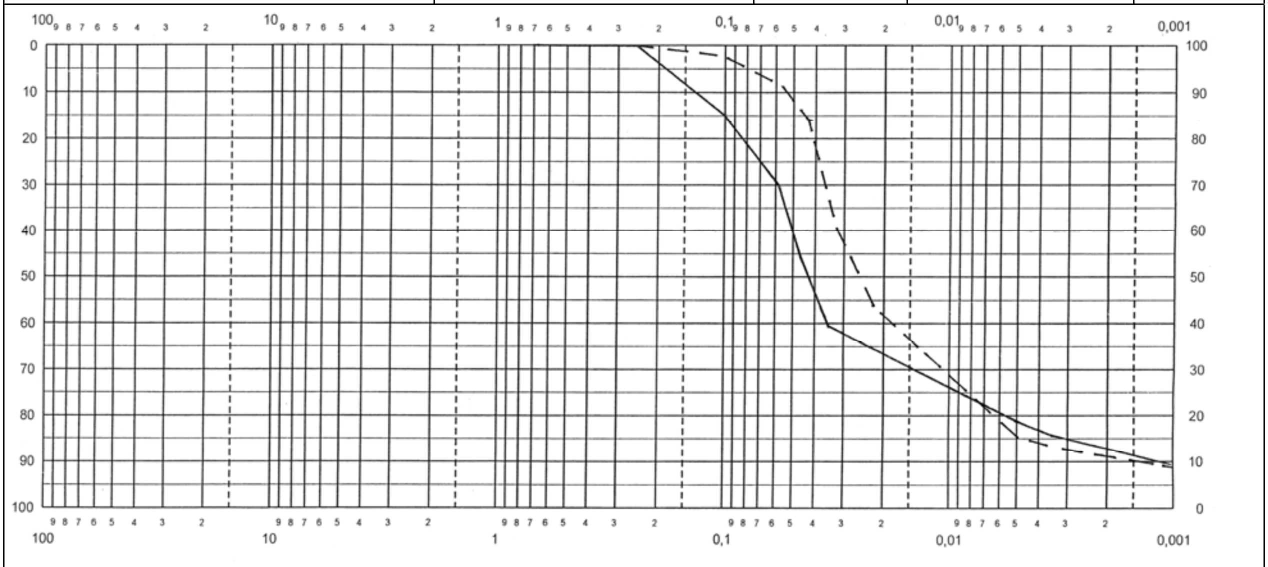
Crude	Tiny	Crude	Middle	Fine	Sandflour	Silt	Loam
Gravel		Sand					



grain size d(mm)

Sample code	D_{60}	D_{10}	U	Marking
3-1072 R-HU	0,050	0,0016	31,3	———————
L-HU	0,026	0,0015	17,3	- - - - - - - - - - - - - - - -

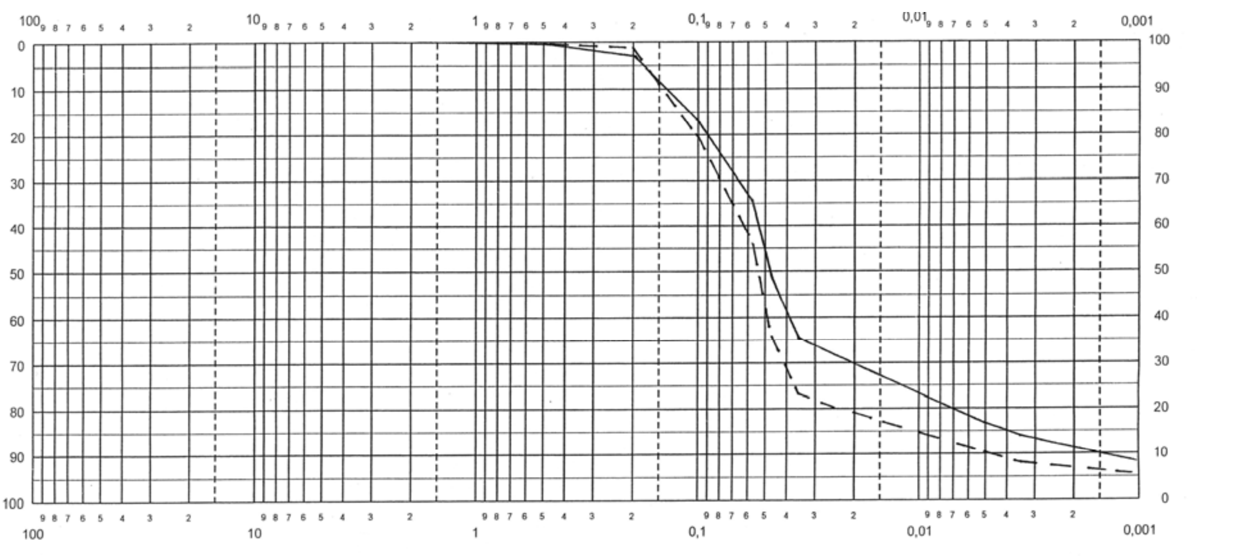
Crude	Tiny	Crude	Middle	Fine	Sandflour	Silt	Loam
Gravel		Sand					



grain size d(mm)

Sample code	D_{60}	D_{10}	U	Marking
4-1061 R-HU	0,050	0,0012	41,7	———————
L-HU	0,032	0,0014	22,9	- - - - - - - - - - - - - - - -

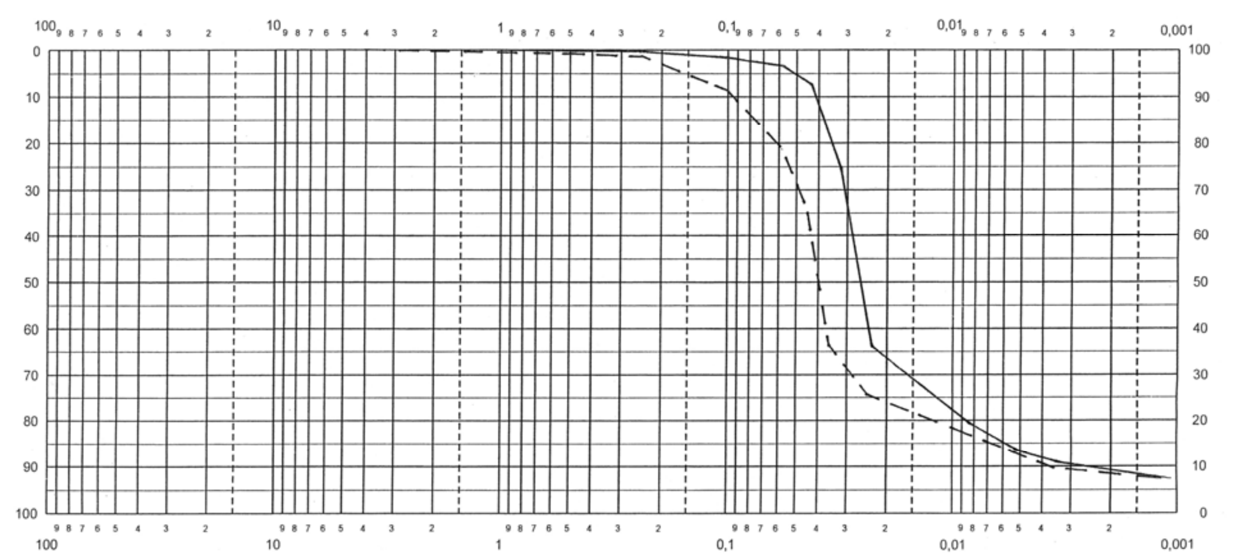
Crude	Tiny	Crude	Middle	Fine	Sandflour	Silt	Loam
Gravel		Sand					



grain size d(mm)

Sample code	D_{60}	D_{10}	U	Marking
5-1040 R-HU	0,053	0,0015	35,3	———————
L-HU	0,062	0,0048	12,9	- - - - - - - - - -

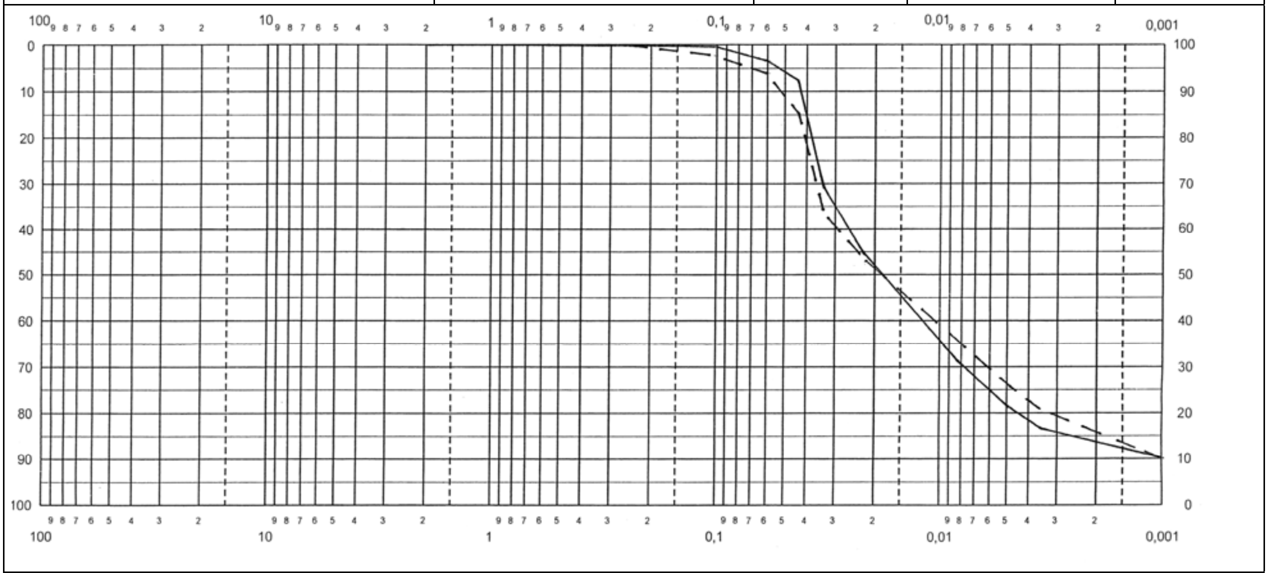
Crude	Tiny	Crude	Middle	Fine	Sandflour	Silt	Loam
Gravel		Sand					



grain size d(mm)

Sample code	D_{60}	D_{10}	U	Marking
6-1022 R-HU	0,028	0,0026	10,8	———————
L-HU	0,043	0,0037	11,6	- - - - - - - - - -

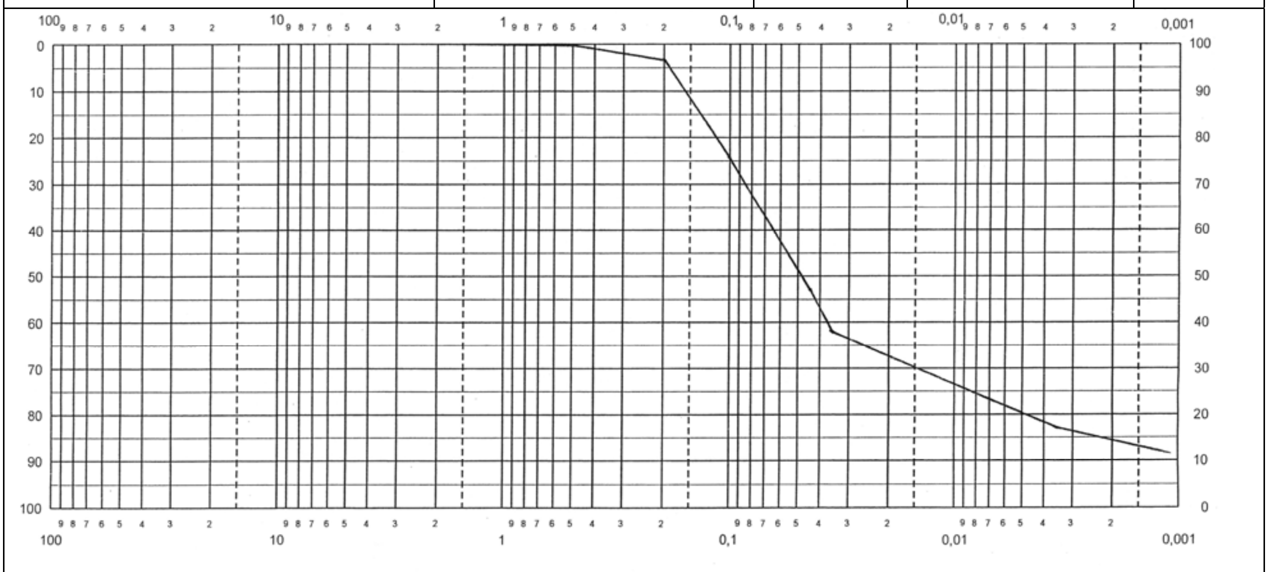
Crude	Tiny	Crude	Middle	Fine	Sandflour	Silt	Loam
Gravel		Sand					



grain size d(mm)

Sample code	D_{60}	D_{10}	U	Marking
7-990 R-HU	0,026	0,0010	26,0	————————
L-HU	0,030	0,0010	30,0	- - - - - - - - - - - - - - - -

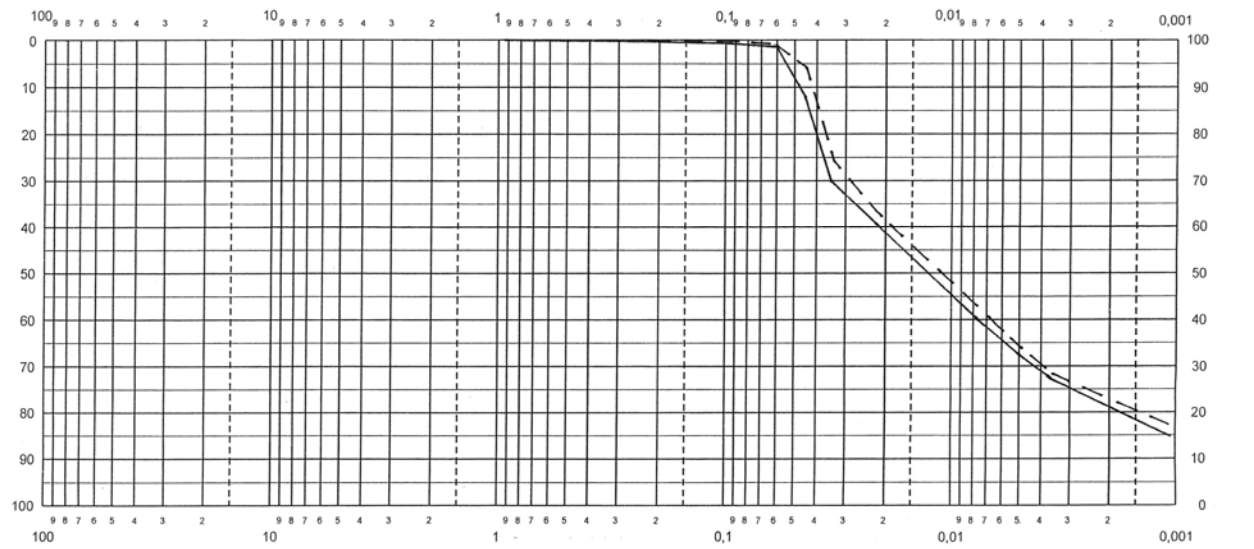
Crude	Tiny	Crude	Middle	Fine	Sandflour	Silt	Loam
Gravel		Sand					



grain size d(mm)

Sample code	D_{60}	D_{10}	U	Marking
8-971 R-HU	0,064	< 0,0010	> 64,0	————————

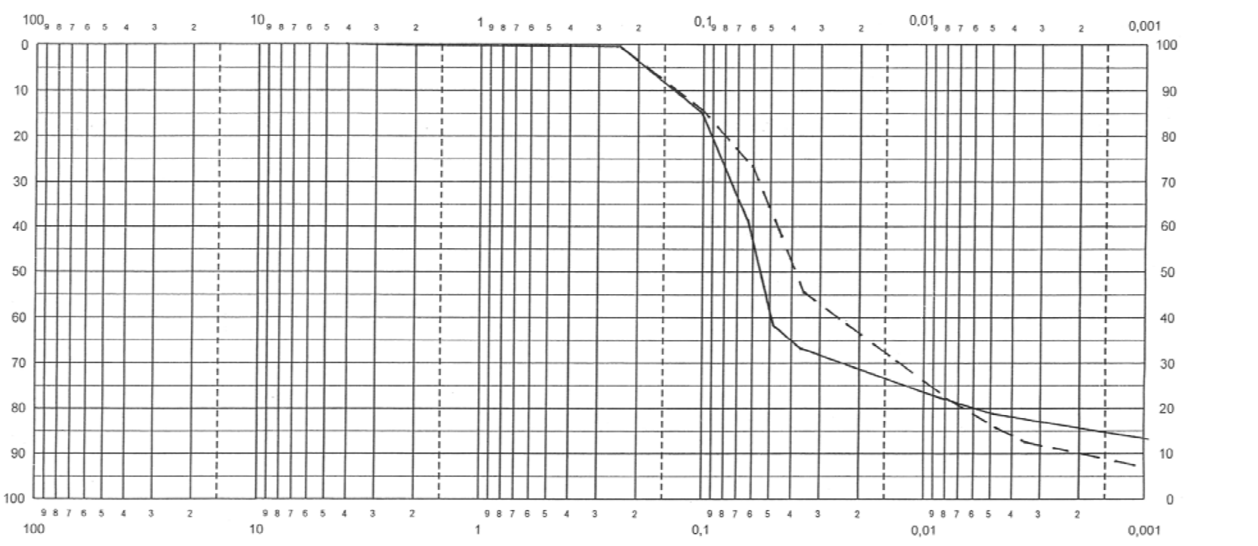
Crude	Tiny	Crude	Middle	Fine	Sandflour	Silt	Loam
Gravel		Sand					



grain size d(mm)

Sample code	D_{60}	D_{10}	U	Marking
9-956 R-HU	0,021	< 0,0010	> 21,0	———————
L-HU	0,018	< 0,0010	> 18,0	- - - - - - - - - - - - - - -

Crude	Tiny	Crude	Middle	Fine	Sandflour	Silt	Loam
Gravel		Sand					



grain size d(mm)

Sample code	D_{60}	D_{10}	U	Marking
10-924 R-HU	0,061	< 0,0010	> 61,0	———————
L-HU	0,046	0,0020	23,0	- - - - - - - - - - - - - - -

Table 5 Analytical results of the sediment investigation in September 2006 ICIM Organic N and total P

No.	Sample code	Location	Organic Nitrogen	Total Phosphorous
			mg/kg	
1	3-1072-L-RO	Bazias	3037	1106
2	3-1072-R-RO	Bazias	2859	1218
3	4-1061-L-RO	Veliko Gradiste / Belobresca	2898	1080
4	4-1061-R-RO	Veliko Gradiste / Belobresca	2769	985
5	5-1040-L-RO	Golubac / Koronin	2154	985
6	5-1040-R-RO	Golubac / Koronin	3067	1095
7	6-1022-L-RO	Dobra Lubcova	2968	1012
8	6-1022-R-RO	Dobra Lubcova	2988	893
9	7-991-L-RO	Donji Milanovac	2720	980
10	7-991-R-RO	Donji Milanovac	2670	1289
11	core-991-L 0-10 cm - RO	Donji Milanovac - L	2710	1124
12	core-991-L 10-20 cm - RO		2888	1067
13	core-991-L 20-30 cm - RO		2362	893
14	core-991-L 30-40 cm - RO		1806	980
15	core-991-L 40-50 cm - RO		2303	1289
16	core-991-L 50-60 cm - RO		2998	948
17	core-991-L 60-70 cm - RO		2521	913
18	core-991-L 70-74 cm - RO		3643	1043
19	core-991-R 0-10 cm - RO	Donji Milanovac - R	2660	1084
20	core-991-R 10-20 cm - RO		2739	960
21	core-991-R 20-30 cm - RO		4040	1003
22	core-991-R 30-40 cm - RO		2670	1078
23	core-991-R 40-50 cm - RO		2462	1049
24	core-991-R 50-60 cm - RO		1171	719
25	core-991-R 60-67 cm - RO		1925	709
26	8-971-R-RO	Dubova	1737	715
27	9-956-L-RO	Tekija / Orsova	2511	996
28	9-956-R-RO	Tekija / Orsova	2372	928
29	core-956-L 0-10 cm - RO	Tekija / Orsova - L	2332	926
30	core-956-L 10-20 cm - RO		1667	753
31	core-956-L 20-30 cm - RO		2591	1059
32	core-956-L 30-40 cm - RO		2809	1065
33	core-956-L 40-50 cm - RO		2749	1126
34	core-956-L 50-60 cm - RO		2670	1116
35	core-956-L 60-70 cm - RO		2759	1222
36	core-956-L 70-78 cm - RO		2323	932
37	core-956-R 0-10 cm - RO	Tekija / Orsova - R	2561	1149
38	core-956-R 10-20 cm - RO		2918	1017
39	core-956-R 20-30 cm - RO		2362	928
40	core-956-R 30-40 cm - RO		2720	1142
41	core-956-R 40-50 cm - RO		3037	1059
42	core-956-R 50-60 cm - RO		2700	1045
43	core-956-R 60-70 cm - RO		2988	1177

No.	Sample code	Location	Organic Nitrogen	Total Phosphorous
			mg / kg	
44	Core-956-R 70-82 cm - RO		2809	1161
45	10-924-L-RO	Mala Vrbica / Simian	2938	1021
46	10-924-R-RO	Mala Vrbica / Simian	2759	1088
47	Core-924-R 0-10 cm - RO	Mala Vrbica / Simian - R	2789	923
48	Core-924-R 10-20 cm - RO		3414	1037
49	Core-924-R 20-30 cm - RO		3067	940
50	Core-924-R 30-40 cm - RO		2759	1110
51	Core-924-R 40-50 cm - RO		4953	1098
52	Core-924-R 50-60 cm - RO		3732	1142
53	Core-924-R 60-70 cm - RO		3980	1183
54	Core-924-R 70-80 cm - RO		2928	1471

Results of analysis: Heavy metals

No.	Sample code	Location	Hg	Cr	Pb	Ni	Cu	Cd	Zn	As
			mg/kg				mg/kg			
1	3-1072-L-RO	Bazias	0.671	88.86	192.77	41.11	88.36	0.652	226.30	17.52
2	3-1072-R-RO	Bazias	0.400	111.70	148.35	70.19	103.29	1.161	289.78	7.78
3	4-1061-L-RO	Veliko Gradiste / Belobresca	5.567	94.65	358.46	61.83	76.09	0.723	269.72	5.66
4	4-1061-R-RO	Veliko Gradiste / Belobresca	0.517	154.98	276.42	116.07	88.13	1.327	309.96	8.06
5	5-1040-L-RO	Golubac / Koronin	0.357	78.08	195.50	59.52	335.96	0.736	281.12	15.67
6	5-1040-R-RO	Golubac / Koronin	0.423	125.22	279.62	80.78	85.99	1.356	325.26	10.57
7	6-1022-L-RO	Dobra Lubcova	0.456	142.12	319.83	52.81	72.49	1.208	310.26	8.08
8	6-1022-R-RO	Dobra Lubcova	0.533	91.58	199.24	67.15	103.26	0.652	238.84	6.17
9	7-991-L-RO	Donji Milanovac	4.703	114.85	221.12	88.09	99.56	0.722	304.00	8.12
10	7-991-R-RO	Donji Milanovac	0.402	92.18	184.80	51.16	55.10	1.313	311.52	6.33
11	core-991-L 0-10 cm - RO	Donji Milanovac - L	0.372	107.07	125.87	63.15	99.16	1.193	313.09	7.39
12	core-991-L 10-20 cm - RO		0.382	167.28	240.16	77.36	92.52	1.165	301.97	7.38
13	core-991-L 20-30 cm - RO		1.151	115.08	215.17	89.83	117.23	4.864	310.81	8.42
14	core-991-L 30-40 cm - RO		0.462	70.72	399.32	67.54	95.26	1.196	291.58	12.54
15	core-991-L 40-50 cm - RO		0.390	75.26	174.60	59.87	77.67	1.459	336.78	15.71
16	core-991-L 50-60 cm - RO		0.427	73.90	161.32	94.85	109.40	1.108	282.26	11.73
17	core-991-L 60-70 cm - RO		0.418	120.48	320.40	124.10	186.01	1.444	355.77	13.53
18	core-991-L 70-74 cm - RO		0.441	102.99	221.04	64.79	164.61	1.468	363.51	16.08
19	core-991-R 0-10 cm - RO	Donji Milanovac - R	0.201	152.45	169.19	68.21	62.46	0.559	204.11	5.24
20	core-991-R 10-20 cm - RO		0.365	213.31	168.69	83.77	143.03	1.074	269.28	6.58
21	core-991-R 20-30 cm - RO		0.427	96.38	473.40	87.49	107.61	1.267	337.95	13.40
22	core-991-R 30-40 cm - RO		0.887	204.21	201.03	111.49	181.21	1.949	542.27	31.42
23	core-991-R 40-50 cm - RO		0.864	160.44	277.32	136.96	158.55	1.796	469.72	24.37
24	core-991-R 50-60 cm - RO		1.108	158.39	213.48	83.21	171.18	1.916	562.29	25.73
25	core-991-R 60-67 cm - RO		0.467	177.29	223.71	98.21	133.51	1.187	315.14	23.11
26	8-971-R-RO	Dubova	0.405	103.30	395.06	71.77	145.33	1.247	338.40	5.78
27	9-956-L-RO	Tekija / Orsova	0.366	109.22	204.46	92.24	90.13	1.326	336.10	7.40

No.	Sample code	Location	Hg	Cr	Pb	Ni	Cu	Cd	Zn	As
			mg/kg				mg/kg			
28	9-956-R-RO	Tekija / Orsova	0.403	130.11	623.09	85.72	126.49	1.423	341.34	7.09
29	core-956-L 0-10 cm - RO	Tekija / Orsova - L	0.451	158.82	142.22	86.51	84.68	1.316	356.14	23.74
30	core-956-L 10-20 cm - RO		0.785	150.69	335.71	89.58	130.64	1.967	519.72	24.04
31	core-956-L 20-30 cm - RO		0.410	143.29	531.45	87.97	179.87	1.557	370.72	30.44
32	core-956-L 30-40 cm - RO		0.556	153.76	381.74	81.59	104.25	1.641	376.14	23.04
33	core-956-L 40-50 cm - RO		0.500	173.90	171.26	102.22	98.80	1.323	371.90	11.50
34	core-956-L 50-60 cm - RO		0.406	108.60	265.37	63.22	104.35	1.398	336.49	11.94
35	core-956-L 60-70 cm - RO		0.858	163.58	511.58	98.74	143.83	1.797	520.17	27.14
36	core-956-L 70-78 cm - RO		0.717	168.48	488.59	111.21	154.47	1.666	418.30	29.02
37	core-956-R 0-10 cm - RO	Tekija / Orsova - R	0.356	397.00	315.12	96.46	116.90	0.753	346.55	18.18
38	core-956-R 10-20 cm - RO		0.444	146.79	271.62	102.47	195.44	1.339	407.33	24.76
39	core-956-R 20-30 cm - RO		0.440	224.22	668.31	181.68	167.92	1.401	358.11	18.66
40	core-956-R 30-40 cm - RO		0.513	147.60	279.98	104.53	132.17	1.450	382.76	22.39
41	core-956-R 40-50 cm - RO		0.461	129.84	294.23	94.10	138.79	1.873	539.76	21.11
42	core-956-R 50-60 cm - RO		0.725	190.07	420.91	95.92	154.87	2.176	523.78	18.28
43	core-956-R 60-70 cm - RO		0.651	106.88	337.16	104.31	185.52	1.361	500.48	19.40
44	core-956-R 70-82 cm - RO		1.086	174.68	214.41	120.47	178.34	1.943	622.20	24.31
45	10-924-L-RO	Mala Vrbica / Simian	0.465	127.37	224.39	87.67	211.37	1.357	332.54	7.37
46	10-924-R-RO	Mala Vrbica / Simian	0.479	123.50	116.43	62.98	58.11	0.478	164.27	6.97
47	core-924-R 0-10 cm - RO	Mala Vrbica / Simian - R	0.375	138.29	382.10	155.81	125.61	1.146	323.30	16.61
48	core-924-R 10-20 cm - RO		0.375	129.80	262.68	96.80	103.22	1.152	314.22	12.09
49	core-924-R 20-30 cm - RO		0.290	409.24	262.52	116.20	114.85	1.177	318.00	12.00
50	core-924-R 30-40 cm - RO		0.462	145.72	222.50	160.10	391.52	1.548	371.28	7.35
51	core-924-R 40-50 cm - RO		0.516	146.81	423.30	81.68	155.82	1.207	326.26	14.07
52	core-924-R 50-60 cm - RO		0.445	167.65	238.18	111.39	460.91	1.103	364.02	15.90
53	core-924-R 60-70 cm - RO		0.569	106.84	572.92	87.43	124.75	0.626	285.82	13.80
54	core-924-R 70-80 cm - RO		0.622	124.35	357.02	345.99	141.93	1.125	353.10	14.35

Results of analysis: Organic micropollutants (Pesticides & PCBs)

No	LOD = 0.001 mg/kg Sample code	Aldrin	Dieldrin	Endrin	pp'-DDT	PCB 28+31	PCB 52	PCB 101	PCB 118	PCB 138	PCB 153	PCB 180
		mg/kg										
1	3-1072-L-RO	0.0037	< LOD	0.0110	0.0070	< LOD	0.0018	< LOD	< LOD	< LOD	< LOD	< LOD
2	3-1072-R-RO	0.0100	< LOD	0.0050	0.0065	< LOD	0.0017	< LOD	< LOD	< LOD	< LOD	< LOD
3	4-1061-L-RO	0.0110	< LOD	0.0050	0.0080	< LOD	0.0018	< LOD	< LOD	< LOD	< LOD	< LOD
4	4-1061-R-RO	0.0080	< LOD	0.0120	0.0045	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
5	5-1040-L-RO	0.0110	< LOD	0.0030	0.0049	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
6	5-1040-R-RO	0.0110	< LOD	0.0160	0.0150	0.0012	< LOD	< LOD	< LOD	< LOD	< LOD	0.0016
7	6-1022-L-RO	0.0170	< LOD	0.0160	0.0100	0.0012	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
8	6-1022-R-RO	0.0120	< LOD	0.0050	0.0230	< LOD	0.0016	< LOD	< LOD	< LOD	< LOD	< LOD
9	7-991-L-RO	0.0160	< LOD	0.0120	0.0430	< LOD	0.0018	< LOD	< LOD	< LOD	< LOD	< LOD
10	7-991-R-RO	0.0130	0.0030	0.0060	0.0290	< LOD	0.0019	< LOD	< LOD	< LOD	< LOD	< LOD
11	core-991-L 0-10 cm – RO	0.0110	< LOD	0.0160	0.0140	< LOD	0.0020	< LOD	0.0012	0.0020	< LOD	< LOD
12	core-991-L 10-20 cm – RO	0.0050	< LOD	0.0160	0.0050	< LOD	0.0013	< LOD	< LOD	< LOD	< LOD	< LOD
13	core-991-L 20-30 cm – RO	0.0090	< LOD	0.0070	0.0140	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
14	core-991-L 30-40 cm – RO	0.0049	< LOD	0.0030	0.0070	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
15	core-991-L 40-50 cm – RO	0.0050	< LOD	0.0060	0.0110	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
16	core-991-L 50-60 cm – RO	0.0050	< LOD	0.0070	0.0050	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
17	core-991-L 60-70 cm – RO	0.0045	< LOD	0.0050	0.0060	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
18	core-991-L 70-74 cm – RO	0.0030	< LOD	0.0020	0.0050	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
19	core-991-R 0-10 cm – RO	0.0046	< LOD	0.0030	0.0040	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
20	core-991-R 10-20 cm – RO	0.0060	< LOD	0.0160	0.0080	< LOD	0.0017	< LOD	< LOD	< LOD	< LOD	< LOD
21	core-991-R 20-30 cm – RO	0.0090	< LOD	0.0070	0.0090	< LOD	0.0012	< LOD	< LOD	< LOD	< LOD	< LOD
22	core-991-R 30-40 cm – RO	0.0060	< LOD	< LOD	0.0040	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
23	core-991-R 40-50 cm – RO	0.0048	< LOD	0.0040	0.0080	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
24	core-991-R 50-60 cm – RO	0.0046	< LOD	0.0020	0.0070	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
25	core-991-R 60-67 cm – RO	0.0030	< LOD	0.0030	0.0060	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
26	8-971-R-RO	0.0190	0.0040	0.0290	0.0330	< LOD	0.0023	< LOD	< LOD	< LOD	< LOD	0.0020
27	9-956-L-RO	0.0056	< LOD	0.0080	0.0180	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD

	LOD = 0.001 mg/kg	Aldrin	Dieldrin	Endrin	pp'-DDT	PCB 28+31	PCB 52	PCB 101	PCB 118	PCB 138	PCB 153	PCB 180
No	Sample code	mg/kg										
28	9-956-R-RO	0.0130	< LOD	0.0030	0.0240	< LOD	0.0015	< LOD	< LOD	< LOD	< LOD	< LOD
29	core-956-L 0-10 cm – RO	0.0040	< LOD	0.0090	0.0070	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
30	core-956-L 10-20 cm – RO	0.0040	< LOD	0.0080	0.0070	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
31	core-956-L 20-30 cm – RO	0.0070	< LOD	0.0050	0.0110	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
32	core-956-L 30-40 cm – RO	0.0080	< LOD	0.0070	0.0070	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
33	core-956-L 40-50 cm – RO	0.0030	< LOD	0.0070	0.0050	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
34	core-956-L 50-60 cm – RO	0.0080	< LOD	0.0050	0.0090	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
35	core-956-L 60-70 cm – RO	0.0050	< LOD	0.0070	0.0100	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
36	core-956-L 70-78 cm – RO	0.0040	< LOD	0.0080	0.0070	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
37	core-956-R 0-10 cm – RO	0.0060	< LOD	0.0060	0.0070	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD	< LOD
38	core-956-R 10-20 cm – RO	0.0060	< LOD	0.0070	0.0060	< LOD	< LOD	< LOD	< LOD	0.0018	< LOD	< LOD
39	core-956-R 20-30 cm – RO	0.0060	< LOD	0.0080	0.0090	< LOD	< LOD	< LOD	< LOD	0.0015	< LOD	< LOD
40	core-956-R 30-40 cm – RO	0.0050	< LOD	0.0130	0.0120	< LOD	< LOD	< LOD	< LOD	0.0018	< LOD	< LOD
41	core-956-R 40-50 cm – RO	0.0160	< LOD	0.0040	0.0100	< LOD	< LOD	< LOD	< LOD	0.0020	< LOD	< LOD
42	core-956-R 50-60 cm – RO	0.0050	< LOD	0.0040	0.0080	< LOD	< LOD	< LOD	< LOD	0.0015	< LOD	< LOD
43	core-956-R 60-70 cm – RO	0.0060	< LOD	0.0080	0.0120	< LOD	< LOD	< LOD	< LOD	0.0020	< LOD	< LOD
44	core-956-R 70-82 cm – RO	0.0080	< LOD	0.0100	0.0080	< LOD	< LOD	< LOD	< LOD	0.0020	< LOD	< LOD
45	10-924-L-RO	0.0120	< LOD	0.0120	0.0460	< LOD	0.0020	< LOD	< LOD	0.0028	< LOD	< LOD
46	10-924-R-RO	0.0048	< LOD	0.0110	0.0330	< LOD	< LOD	< LOD	< LOD	0.0020	< LOD	< LOD
47	core-924-R 0-10 cm – RO	0.0050	< LOD	0.0120	0.0110	< LOD	< LOD	< LOD	< LOD	0.0014	< LOD	< LOD
48	core-924-R 10-20 cm – RO	0.0030	< LOD	0.0100	0.0090	< LOD	< LOD	< LOD	< LOD	0.0017	< LOD	< LOD
49	core-924-R 20-30 cm – RO	0.0030	< LOD	0.0080	0.0060	< LOD	< LOD	< LOD	< LOD	0.0020	< LOD	< LOD
50	core-924-R 30-40 cm – RO	0.0040	< LOD	0.0070	0.0040	< LOD	< LOD	< LOD	< LOD	0.0013	< LOD	< LOD
51	core-924-R 40-50 cm – RO	0.0050	< LOD	0.0070	0.0040	< LOD	< LOD	< LOD	< LOD	0.0020	< LOD	< LOD
52	core-924-R 50-60 cm – RO	0.0030	< LOD	0.0070	0.0080	< LOD	< LOD	< LOD	< LOD	0.0030	< LOD	< LOD
53	core-924-R 60-70 cm – RO	0.0030	< LOD	0.0050	0.0060	< LOD	< LOD	< LOD	< LOD	0.0013	< LOD	< LOD
54	core-924-R 70-80 cm – RO	0.0020	< LOD	0.0030	0.0030	< LOD	< LOD	< LOD	< LOD	0.0015	< LOD	< LOD

Results of analysis: Organic micropollutants (PAHs – part 1)

	LOD = 0.001 mg/kg	Naphtalene	Acenapthylene	Acenaphthene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene
No.	Sample code	*mg/kg*							
1	3-1072-L-RO	0.003	0.003	< LOD	0.023	0.002	0.030	0.033	0.018
2	3-1072-R-RO	0.003	0.003	< LOD	0.020	0.002	0.024	0.028	0.017
3	4-1061-L-RO	0.007	0.003	0.002	0.016	0.002	0.028	0.032	0.015
4	4-1061-R-RO	0.004	0.002	< LOD	0.012	0.002	0.023	0.029	0.012
5	5-1040-L-RO	0.003	0.003	< LOD	0.017	< LOD	0.029	0.034	0.014
6	5-1040-R-RO	0.003	0.002	< LOD	0.013	< LOD	0.027	0.031	0.014
7	6-1022-L-RO	0.003	0.003	< LOD	0.020	< LOD	0.050	0.077	0.015
8	6-1022-R-RO	0.004	0.003	< LOD	0.022	0.003	0.048	0.071	0.017
9	7-991-L-RO	0.003	0.003	< LOD	0.023	0.003	0.040	0.053	0.020
10	7-991-R-RO	0.006	0.002	0.002	0.015	0.003	0.035	0.036	0.016
11	core-991-L 0-10 cm - RO	0.002	0.004	< LOD	0.038	0.006	0.061	0.086	0.022
12	core-991-L 10-20 cm - RO	0.002	0.004	< LOD	0.034	0.003	0.063	0.089	0.024
13	core-991-L 20-30 cm - RO	0.003	0.005	0.002	0.028	0.003	0.067	0.093	0.026
14	core-991-L 30-40 cm - RO	0.005	0.006	0.002	0.029	0.002	0.074	0.108	0.028
15	core-991-L 40-50 cm - RO	0.005	0.007	0.003	0.038	0.004	0.083	0.112	0.032
16	core-991-L 50-60 cm - RO	0.004	0.008	0.003	0.047	0.006	0.091	0.122	0.034
17	core-991-L 60-70 cm - RO	0.002	0.008	0.004	0.063	0.011	0.116	0.136	0.041
18	core-991-L 70-74 cm - RO	0.003	0.008	0.005	0.065	0.011	0.119	0.138	0.041
19	core-991-R 0-10 cm - RO	< LOD	0.002	< LOD	0.016	0.002	0.031	0.041	0.008
20	core-991-R 10-20 cm - RO	0.002	0.003	< LOD	0.016	0.003	0.036	0.048	0.009
21	core-991-R 20-30 cm - RO	0.002	0.003	0.002	0.018	0.004	0.036	0.050	0.011
22	core-991-R 30-40 cm - RO	0.003	0.004	0.002	0.019	0.004	0.047	0.062	0.016
23	core-991-R 40-50 cm - RO	0.007	0.006	0.003	0.023	0.007	0.067	0.088	0.024
24	core-991-R 50-60 cm - RO	0.004	0.008	0.003	0.022	0.002	0.078	0.096	0.031
25	core-991-R 60-67 cm - RO	0.003	0.008	0.004	0.024	< LOD	0.098	0.113	0.039
26	8-971-R-RO	0.007	0.005	< LOD	0.024	0.006	0.053	0.077	0.010
27	9-956-L-RO	0.002	0.003	< LOD	0.028	0.005	0.045	0.068	0.013

	LOD = 0.001 mg/kg	Naphtalene	Acenapthylene	Acenaphthene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene
No.	Sample code	*mg/kg*							
28	9-956-R-RO	0.007	0.005	0.002	0.032	0.007	0.051	0.101	0.013
29	core-956-L 0-10 cm - RO	0.010	0.006	0.002	0.024	0.003	0.083	0.110	0.018
30	core-956-L 10-20 cm - RO	0.016	0.006	0.003	0.027	0.003	0.092	0.131	0.019
31	core-956-L 20-30 cm - RO	0.028	0.007	0.003	0.030	0.002	0.106	0.153	0.022
32	core-956-L 30-40 cm - RO	0.024	0.007	0.004	0.035	0.006	0.102	0.159	0.020
33	core-956-L 40-50 cm - RO	0.016	0.008	0.004	0.043	0.012	0.101	0.168	0.019
34	core-956-L 50-60 cm - RO	0.016	0.008	0.005	0.044	0.013	0.093	0.133	0.018
35	core-956-L 60-70 cm - RO	0.017	0.009	0.005	0.042	0.008	0.096	0.126	0.022
36	core-956-L 70-78 cm - RO	0.019	0.009	0.006	0.038	0.005	0.095	0.117	0.024
37	core-956-R 0-10 cm - RO	0.004	0.006	0.004	0.031	0.002	0.074	0.119	0.015
38	core-956-R 10-20 cm - RO	0.003	0.006	0.004	0.031	0.003	0.082	0.120	0.013
39	core-956-R 20-30 cm - RO	0.020	0.006	0.004	0.033	0.006	0.091	0.123	0.011
40	core-956-R 30-40 cm - RO	0.020	0.006	0.003	0.038	0.006	0.099	0.131	0.014
41	core-956-R 40-50 cm - RO	0.022	0.007	0.003	0.052	0.008	0.127	0.148	0.022
42	core-956-R 50-60 cm - RO	0.021	0.007	0.004	0.048	0.006	0.116	0.142	0.021
43	core-956-R 60-70 cm - RO	0.015	0.008	0.006	0.049	0.006	0.109	0.144	0.027
44	core-956-R 70-82 cm - RO	0.011	0.012	0.009	0.055	0.007	0.112	0.148	0.036
45	10-924-L-RO	0.005	0.005	0.002	0.031	0.003	0.028	0.082	0.007
46	10-924-R-RO	0.004	0.002	< LOD	0.022	0.003	0.034	0.047	0.006
47	core-924-R 0-10 cm - RO	0.009	0.008	0.003	0.038	0.004	0.044	0.083	0.015
48	core-924-R 10-20 cm - RO	0.006	0.007	0.003	0.033	< LOD	0.042	0.052	0.018
49	core-924-R 20-30 cm - RO	0.008	0.007	0.003	0.030	< LOD	0.045	0.059	0.018
50	core-924-R 30-40 cm - RO	0.012	0.007	0.003	0.031	0.002	0.052	0.071	0.019
51	core-924-R 40-50 cm - RO	0.013	0.006	0.004	0.029	0.002	0.044	0.068	0.020
52	core-924-R 50-60 cm - RO	0.016	0.007	0.004	0.032	0.002	0.052	0.081	0.023
53	core-924-R 60-70 cm - RO	0.021	0.013	0.004	0.041	0.004	0.077	0.119	0.019
54	core-924-R 70-80 cm - RO	0.014	0.018	0.006	0.058	0.003	0.086	0.106	0.029

Results of analysis: Organic Micropollutants (PAHs – part 2)

	LOD = 0.001 mg/kg	Chrysene	Benzo(b) fluoranthene	Benzo(k) fluoranthene	Benzo(a)pyrene	Indeno (1,2,3-c,d)pyrene	Dibenz (a,h)anthracene	Benzo (g,h,i)perylene
No.	Sample code	*mg/kg*						
1	3-1072-L-RO	0.022	0.026	0.006	0.009	0.019	0.003	0.012
2	3-1072-R-RO	0.022	0.024	0.005	0.010	0.016	< LOD	0.011
3	4-1061-L-RO	0.022	0.021	0.008	0.009	0.018	0.002	0.010
4	4-1061-R-RO	0.021	0.018	0.007	0.007	0.018	< LOD	0.010
5	5-1040-L-RO	0.019	0.020	0.005	0.008	0.019	0.002	0.010
6	5-1040-R-RO	0.025	0.015	0.005	0.006	0.014	< LOD	0.009
7	6-1022-L-RO	0.02	0.034	0.009	0.012	0.022	0.002	0.013
8	6-1022-R-RO	0.016	0.026	0.010	0.011	0.025	0.002	0.014
9	7-991-L-RO	0.033	0.036	0.004	0.009	0.031	0.002	0.015
10	7-991-R-RO	0.023	0.034	0.008	0.011	0.037	0.005	0.019
11	core-991-L 0-10 cm - RO	0.033	0.035	0.011	0.024	0.044	0.003	0.022
12	core-991-L 10-20 cm - RO	0.041	0.039	0.006	0.013	0.048	0.003	0.024
13	core-991-L 20-30 cm - RO	0.041	0.040	0.008	0.017	0.032	0.003	0.019
14	core-991-L 30-40 cm - RO	0.043	0.040	0.008	0.020	0.023	0.004	0.018
15	core-991-L 40-50 cm - RO	0.048	0.046	0.011	0.021	0.029	0.004	0.022
16	core-991-L 50-60 cm - RO	0.057	0.051	0.016	0.024	0.037	0.006	0.028
17	core-991-L 60-70 cm - RO	0.062	0.058	0.021	0.028	0.046	0.008	0.033
18	core-991-L 70-74 cm - RO	0.062	0.057	0.019	0.026	0.042	0.008	0.032
19	core-991-R 0-10 cm - RO	0.015	0.020	0.003	0.007	0.017	< LOD	0.009
20	core-991-R 10-20 cm - RO	0.018	0.024	0.003	0.009	0.023	0.002	0.012
21	core-991-R 20-30 cm - RO	0.021	0.019	0.007	0.011	0.024	0.002	0.013
22	core-991-R 30-40 cm - RO	0.029	0.023	0.009	0.016	0.022	0.003	0.015
23	core-991-R 40-50 cm - RO	0.041	0.031	0.013	0.021	0.021	0.003	0.018
24	core-991-R 50-60 cm - RO	0.047	0.036	0.016	0.022	0.026	0.004	0.021
25	core-991-R 60-67 cm - RO	0.051	0.043	0.019	0.025	0.031	0.007	0.028
26	8-971-R-RO	0.019	0.035	0.010	0.013	0.025	0.002	0.012
27	9-956-L-RO	0.024	0.033	0.008	0.020	0.026	< LOD	0.018

	LOD = 0.001 mg/kg	Chrysene	Benzo(b) fluoranthene	Benzo(k) fluoranthene	Benzo(a)pyrene	Indeno (1,2,3-c,d)pyrene	Dibenz (a,h)anthracene	Benzo (g,h,i)perylene
No.	Sample code	*mg/kg*						
28	9-956-R-RO	0.023	0.044	0.015	0.018	0.044	< LOD.	0.026
29	core-956-L 0-10 cm - RO	0.024	0.030	0.014	0.021	0.044	0.006	0.027
30	core-956-L 10-20 cm - RO	0.028	0.039	0.017	0.033	0.048	0.060	0.032
31	core-956-L 20-30 cm - RO	0.034	0.056	0.024	0.040	0.059	0.007	0.037
32	core-956-L 30-40 cm - RO	0.03	0.052	0.020	0.019	0.057	0.003	0.036
33	core-956-L 40-50 cm - RO	0.027	0.048	0.019	0.034	0.056	0.002	0.034
34	core-956-L 50-60 cm - RO	0.03	0.054	0.021	0.037	0.062	0.004	0.041
35	core-956-L 60-70 cm - RO	0.32	0.056	0.022	0.033	0.057	0.002	0.036
36	core-956-L 70-78 cm - RO	0.035	0.063	0.024	0.031	0.054	0.002	0.034
37	core-956-R 0-10 cm - RO	0.026	0.034	0.015	0.021	0.044	0.003	0.032
38	core-956-R 10-20 cm - RO	0.019	0.034	0.009	0.018	0.038	0.004	0.023
39	core-956-R 20-30 cm - RO	0.015	0.036	0.008	0.014	0.034	0.004	0.022
40	core-956-R 30-40 cm - RO	0.021	0.042	0.013	0.036	0.040	0.002	0.027
41	core-956-R 40-50 cm - RO	0.034	0.048	0.021	0.027	0.050	0.002	0.033
42	core-956-R 50-60 cm - RO	0.032	0.044	0.019	0.023	0.046	0.002	0.032
43	core-956-R 60-70 cm - RO	0.037	0.051	0.018	0.026	0.049	0.002	0.032
44	core-956-R 70-82 cm - RO	0.048	0.068	0.018	0.034	0.057	0.003	0.035
45	10-924-L-RO	0.021	0.019	0.004	0.008	0.019	0.002	0.011
46	10-924-R-RO	0.012	0.013	0.003	0.007	0.011	< LOD	0.007
47	core-924-R 0-10 cm - RO	0.026	0.021	0.007	0.010	0.022	< LOD	0.016
48	core-924-R 10-20 cm - RO	0.029	0.028	0.014	0.013	0.022	< LOD	0.015
49	core-924-R 20-30 cm - RO	0.028	0.033	0.016	0.015	0.027	< LOD	0.017
50	core-924-R 30-40 cm - RO	0.032	0.039	0.019	0.019	0.032	< LOD	0.023
51	core-924-R 40-50 cm - RO	0.034	0.037	0.015	0.012	0.027	< LOD	0.019
52	core-924-R 50-60 cm - RO	0.038	0.038	0.012	0.010	0.026	< LOD	0.018
53	core-924-R 60-70 cm - RO	0.036	0.043	0.019	0.014	0.033	< LOD	0.015
54	core-924-R 70-80 cm - RO	0.049	0.063	0.018	0.027	0.049	0.003	0.028

Results of analysis: Organic micropollutants (Octylphenol and Nonylphenol)

	LOD = 0.001 mg/kg		Nonylphenol	Octylphenol
No	Sample code	Location	mg/kg	
1	3-1072-L-RO	Bazias	< LOD	< LOD
2	3-1072-R-RO	Bazias	< LOD	< LOD
3	4-1061-L-RO	Veliko Gradiste / Belobresca	< LOD	< LOD
4	4-1061-R-RO	Veliko Gradiste / Belobresca	< LOD	< LOD
5	5-1040-L-RO	Golubac / Koronin	< LOD	< LOD
6	5-1040-R-RO	Golubac / Koronin	< LOD	< LOD
7	6-1022-L-RO	Dobra Lubcova	< LOD	< LOD
8	6-1022-R-RO	Dobra Lubcova	< LOD	< LOD
9	7-991-L-RO	Donji Milanovac	< LOD	< LOD
10	7-991-R-RO	Donji Milanovac	< LOD	< LOD
11	core-991-L 0-10 cm - RO	Donji Milanovac - L	< LOD	< LOD
12	core-991-L 10-20 cm - RO		< LOD	< LOD
13	core-991-L 20-30 cm - RO		< LOD	< LOD
14	core-991-L 30-40 cm - RO		< LOD	< LOD
15	core-991-L 40-50 cm - RO		< LOD	< LOD
16	core-991-L 50-60 cm - RO		< LOD	< LOD
17	core-991-L 60-70 cm - RO		< LOD	< LOD
18	core-991-L 70-74 cm - RO		< LOD	< LOD
19	core-991-R 0-10 cm - RO	Donji Milanovac - R	< LOD	< LOD
20	core-991-R 10-20 cm - RO		< LOD	< LOD
21	core-991-R 20-30 cm - RO		< LOD	< LOD
22	core-991-R 30-40 cm - RO		< LOD	< LOD
23	core-991-R 40-50 cm - RO		< LOD	< LOD
24	core-991-R 50-60 cm - RO		< LOD	< LOD
25	core-991-R 60-67 cm - RO		< LOD	< LOD
26	8-971-R-RO	Dubova	< LOD	< LOD
27	9-956-L-RO	Tekija / Orsova	< LOD	< LOD
28	9-956-R-RO	Tekija / Orsova	< LOD	< LOD
29	core-956-L 0-10 cm - RO	Tekija / Orsova - L	< LOD	< LOD
30	core-956-L 10-20 cm - RO		< LOD	< LOD
31	core-956-L 20-30 cm - RO		< LOD	< LOD
32	core-956-L 30-40 cm - RO		< LOD	< LOD
33	core-956-L 40-50 cm - RO		< LOD	< LOD
34	core-956-L 50-60 cm - RO		< LOD	< LOD
35	core-956-L 60-70 cm - RO		< LOD	< LOD
36	core-956-L 70-78 cm - RO		< LOD	< LOD
37	core-956-R 0-10 cm - RO	Tekija / Orsova - R	< LOD	< LOD
38	core-956-R 10-20 cm - RO		< LOD	< LOD
39	core-956-R 20-30 cm - RO		< LOD	< LOD
40	core-956-R 30-40 cm - RO		< LOD	< LOD
41	core-956-R 40-50 cm - RO		< LOD	< LOD
42	core-956-R 50-60 cm - RO		< LOD	< LOD
43	core-956-R 60-70 cm - RO		< LOD	< LOD
44	core-956-R 70-82 cm - RO		< LOD	< LOD
45	10-924-L-RO	Mala Vrbica / Simian	< LOD	< LOD
46	10-924-R-RO	Mala Vrbica / Simian	< LOD	< LOD

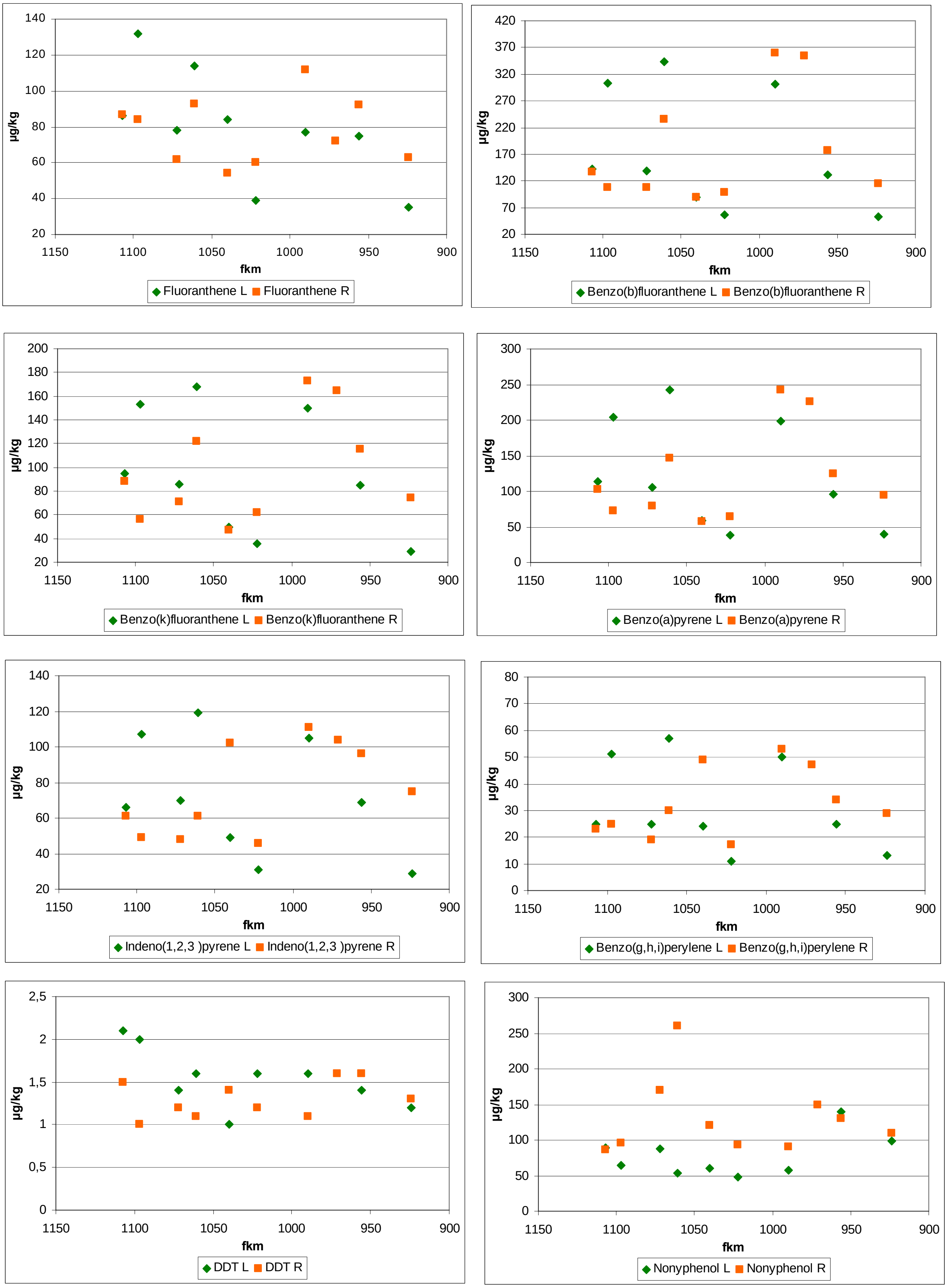
No	LOD = 0.001 mg/kg	Location	Nonylphenol	Octylphenol
	Sample code		**mg/kg**	
47	core-924-R 0-10 cm - RO	Mala Vrbica / Simian - R	< LOD	< LOD
48	core-924-R 10-20 cm - RO		< LOD	< LOD
49	core-924-R 20-30 cm - RO		< LOD	< LOD
50	core-924-R 30-40 cm - RO		< LOD	< LOD
51	core-924-R 40-50 cm - RO		< LOD	< LOD
52	core-924-R 50-60 cm - RO		< LOD	< LOD
53	core-924-R 60-70 cm - RO		< LOD	< LOD
54	core-924-R 70-80 cm - RO		< LOD	< LOD

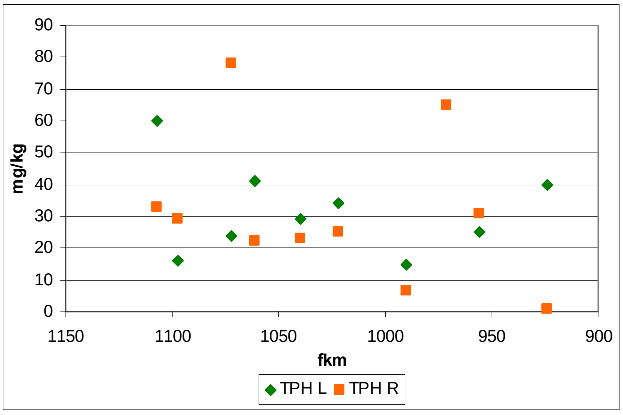
Results of analysis: Extractable Petroleum Hydrocarbons

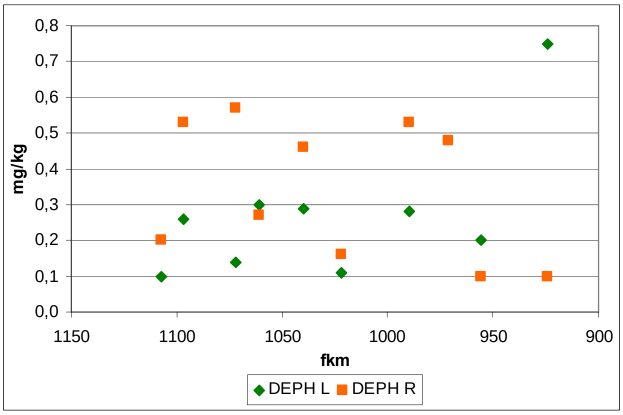
No	Sample code	Location	Petroleum Hydrocarbons mg/kg
1	3-1072-L-RO	Bazias	3.673
2	3-1072-R-RO	Bazias	3.916
3	4-1061-L-RO	Veliko Gradiste / Belobresca	3.462
4	4-1061-R-RO	Veliko Gradiste / Belobresca	4.013
5	5-1040-L-RO	Golubac / Koronin	4.192
6	5-1040-R-RO	Golubac / Koronin	3.279
7	6-1022-L-RO	Dobra Lubcova	10.650
8	6-1022-R-RO	Dobra Lubcova	4.235
9	7-991-L-RO	Donji Milanovac	2.530
10	7-991-R-RO	Donji Milanovac	4.706
11	core-991-L 0-10 cm - RO	Donji Milanovac - L	2.576
12	core-991-L 10-20 cm - RO		2.944
13	core-991-L 20-30 cm - RO		3.603
14	core-991-L 30-40 cm - RO		5.941
15	core-991-L 40-50 cm - RO		12.050
16	core-991-L 50-60 cm - RO		3.679
17	core-991-L 60-70 cm - RO		3.018
18	core-991-L 70-74 cm - RO		5.476
19	core-991-R 0-10 cm - RO	Donji Milanovac - R	5.802
20	core-991-R 10-20 cm - RO		7.914
21	core-991-R 20-30 cm - RO		12.099
22	core-991-R 30-40 cm - RO		6.645
23	core-991-R 40-50 cm - RO		5.328
24	core-991-R 50-60 cm - RO		5.837
25	core-991-R 60-67 cm - RO		4.293
26	8-971-R-RO	Dubova	4.865
27	9-956-L-RO	Tekija / Orsova	10.812
28	9-956-R-RO	Tekija / Orsova	11.393
29	core-956-L 0-10 cm - RO	Tekija / Orsova - L	16.824
30	core-956-L 10-20 cm - RO		11.696
31	core-956-L 20-30 cm - RO		9.519
32	core-956-L 30-40 cm - RO		5.701
33	core-956-L 40-50 cm - RO		11.584
34	core-956-L 50-60 cm - RO		9.425
35	core-956-L 60-70 cm - RO		9.202
36	core-956-L 70-78 cm - RO		10.367
37	core-956-R 0-10 cm - RO	Tekija / Orsova - R	7.920
38	core-956-R 10-20 cm - RO		11.577
39	core-956-R 20-30 cm - RO		6.322
40	core-956-R 30-40 cm - RO		4.727
41	core-956-R 40-50 cm - RO		7.186
42	core-956-R 50-60 cm - RO		5.614
43	core-956-R 60-70 cm - RO		5.552
44	core-956-R 70-82 cm - RO		10.876
45	10-924-L-RO	Mala Vrbica / Simian	10.778
46	10-924-R-RO	Mala Vrbica / Simian	9.171

No	Sample code	Location	Petroleum Hydrocarbons mg/kg
47	core-924-R 0-10 cm - RO	Mala Vrbica / Simian - R	3.216
48	core-924-R 10-20 cm - RO		7.629
49	core-924-R 20-30 cm - RO		18.339
50	core-924-R 30-40 cm - RO		16.378
51	core-924-R 40-50 cm - RO		10.005
52	core-924-R 50-60 cm - RO		20.011
53	core-924-R 60-70 cm - RO		18.046
54	core-924-R 70-80 cm - RO		25.092

Figure 9: Longitudinal concentration distribution of different components in grab samples (surface sediment samples)




mg/kg
fkm
1150 1100 1050 1000 950 900
TPH L TPH R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fkm
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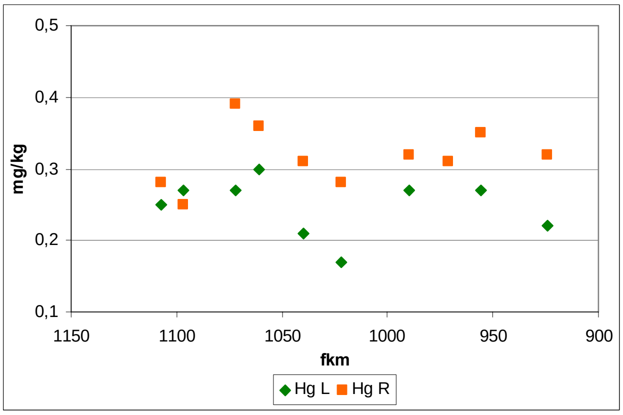
DEPH L DEPH R


mg/kg
fkm
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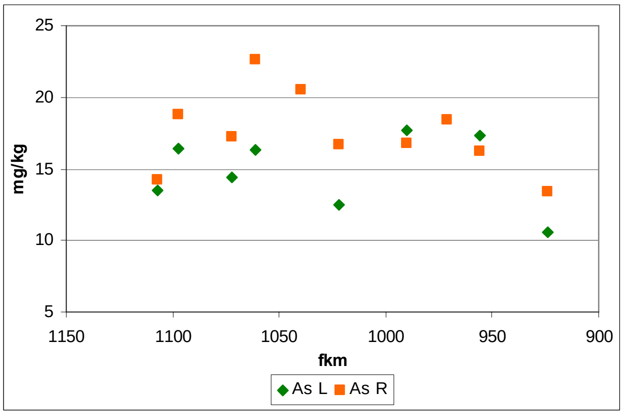
Hg L Hg R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fkm
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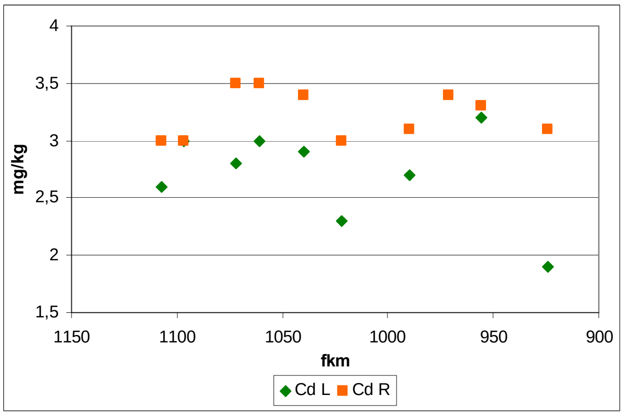
As L As R


mg/kg
fkm
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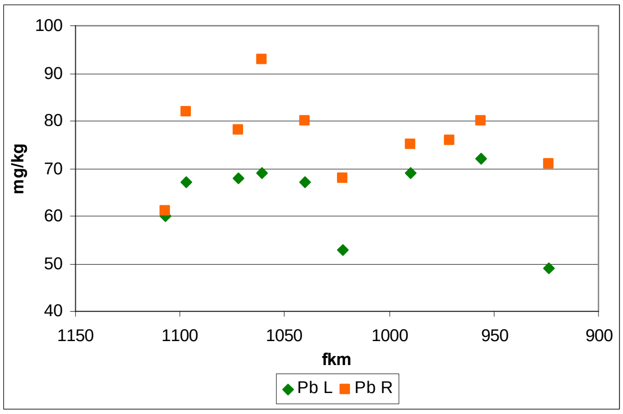
Cd L Cd R


mg/kg
fkm
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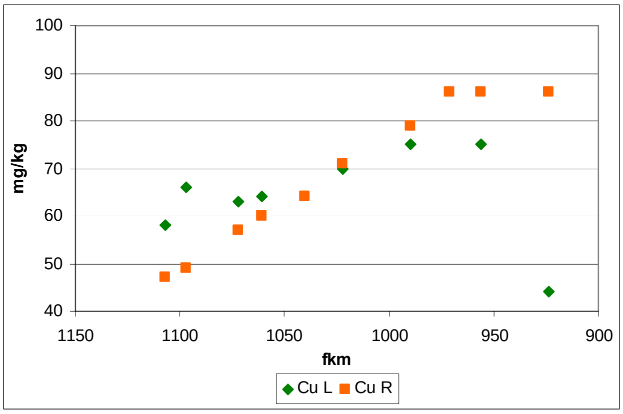
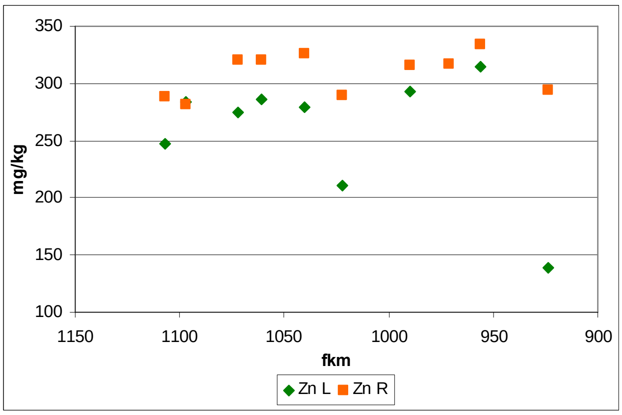
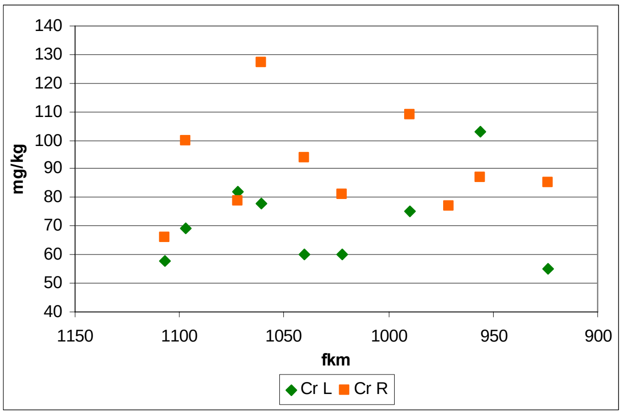
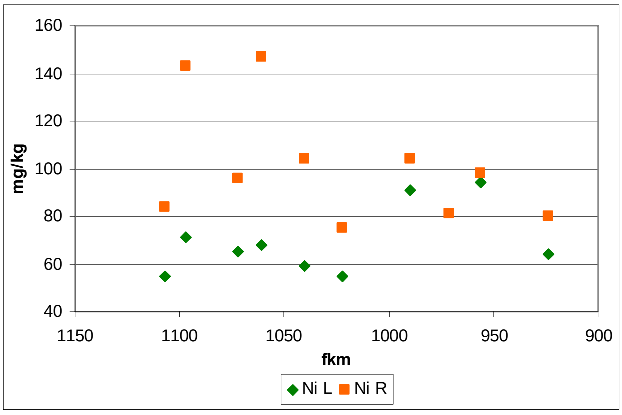
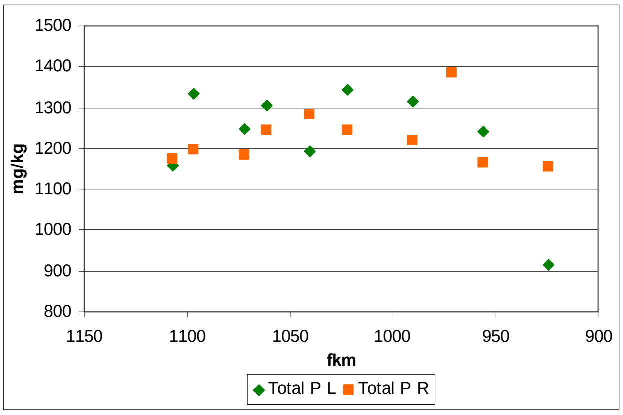
Pb L Pb R


mg/kg
fkm
1150 1100 1050 1000 950 900
Cu L Cu R


mg/kg
fkm
1150 1100 1050 1000 950 900
Zn L Zn R


mg/kg
fkm
Cr L
Cr R


mg/kg
fkm
Ni L
Ni R


mg/kg
fkm
Total P L
Total P R

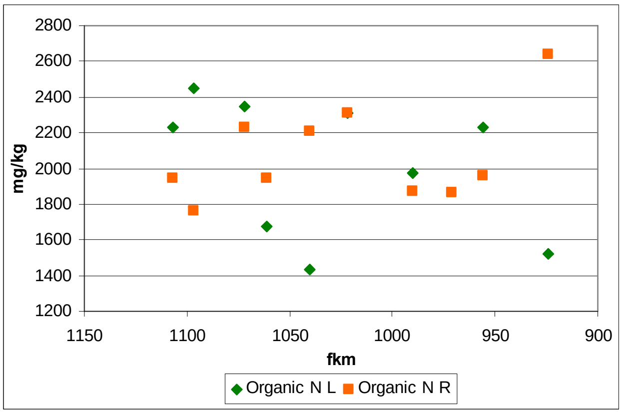
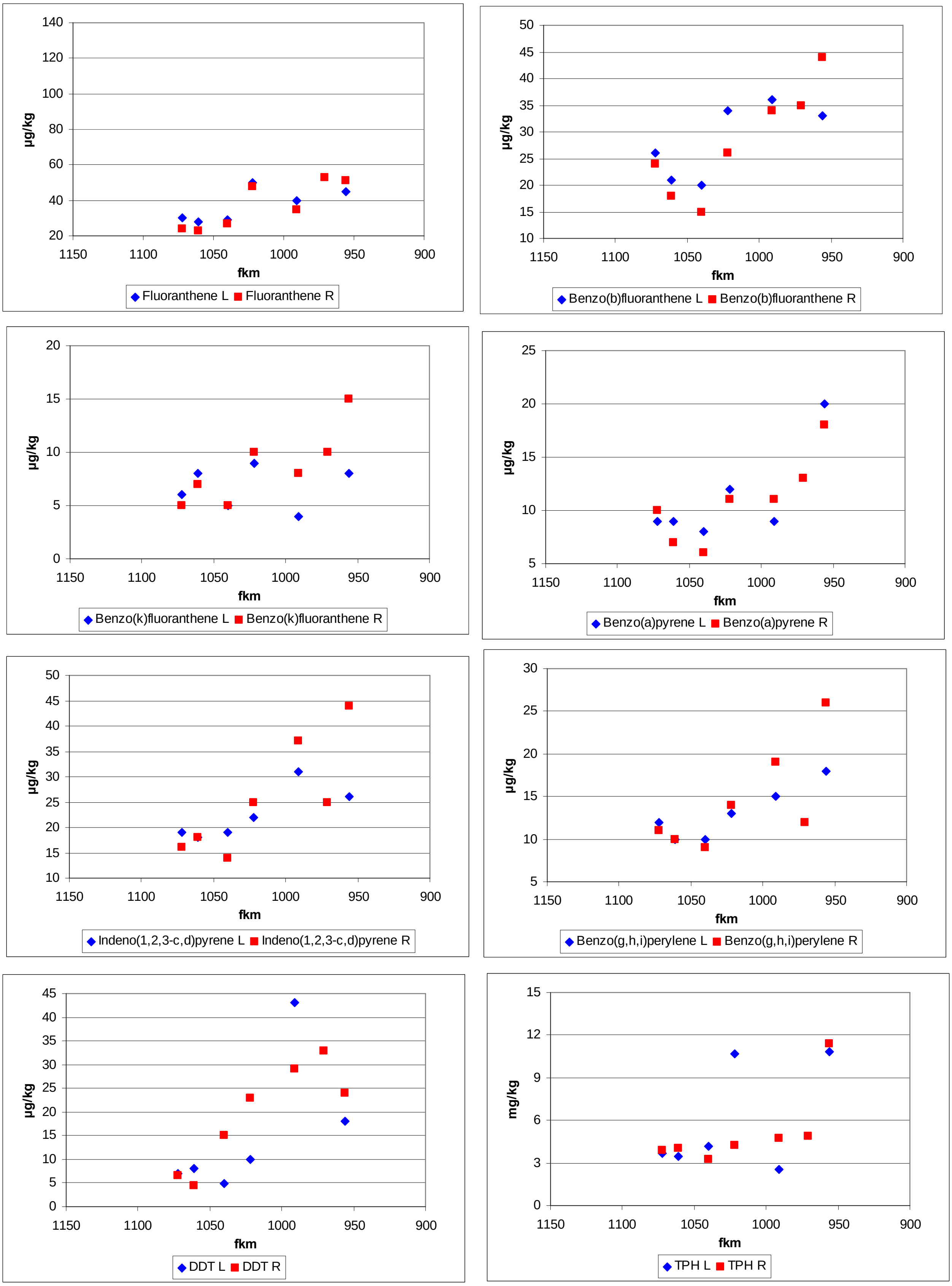
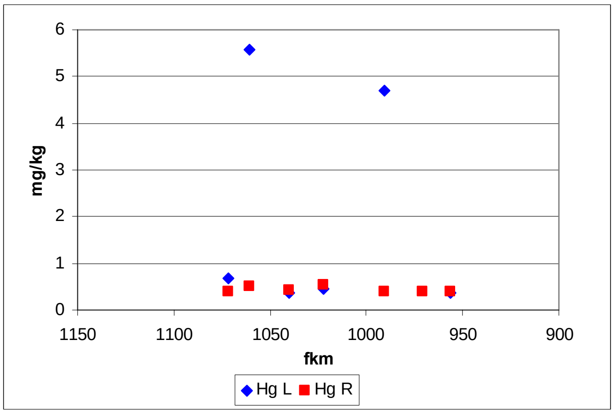
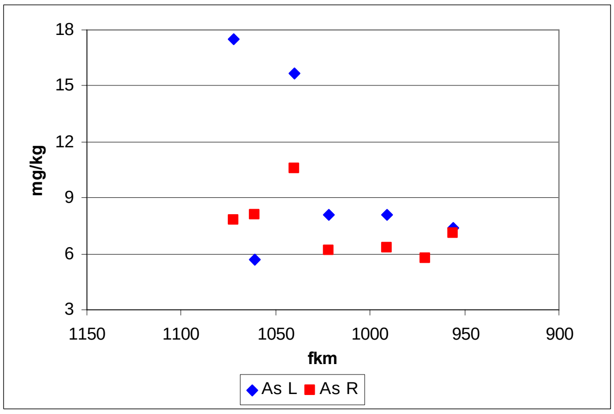
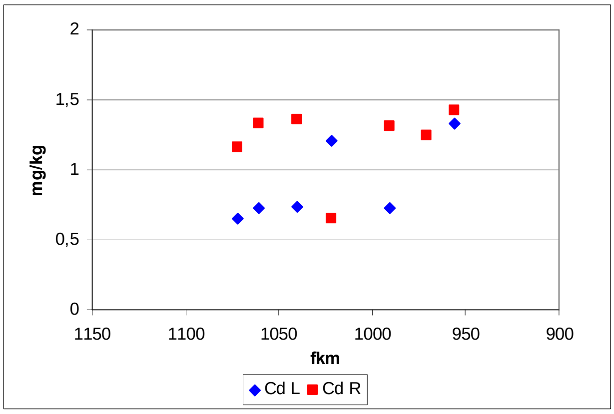

mg/kg
fkm
Organic N L
Organic N R

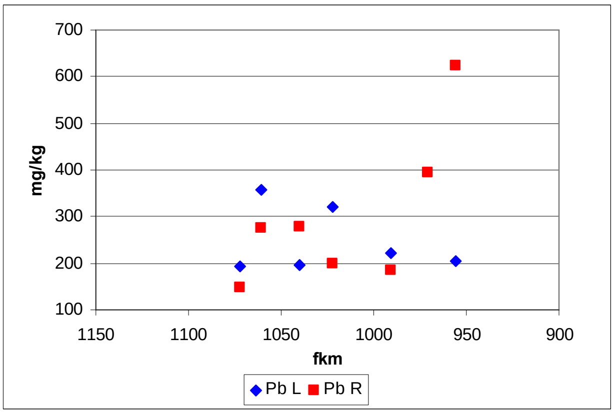
Figure 10: Longitudinal concentration distribution of different components in grab samples (surface sediment samples)

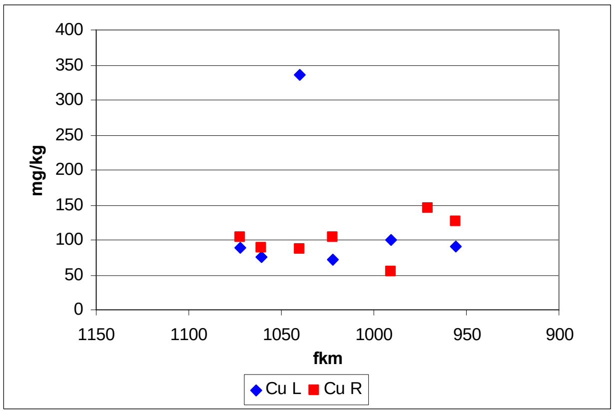


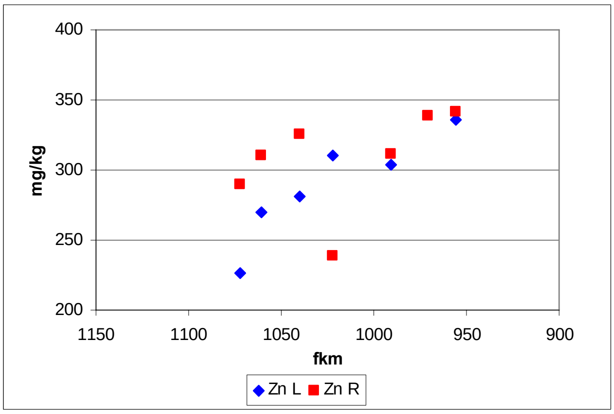

mg/kg
fkm
Hg L
Hg R

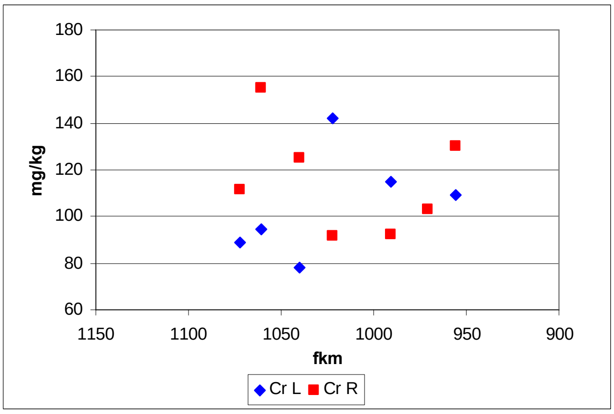

mg/kg
fkm
As L
As R

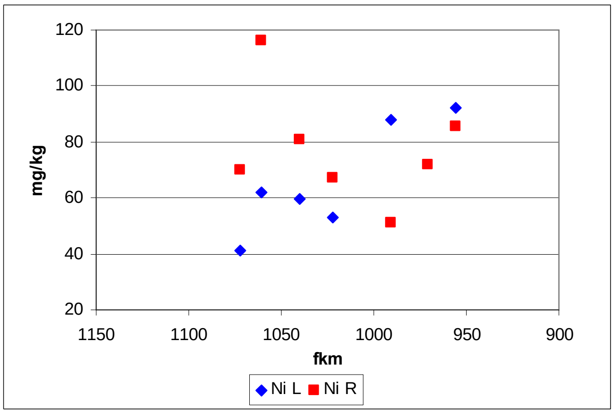

mg/kg
fkm
Cd L
Cd R

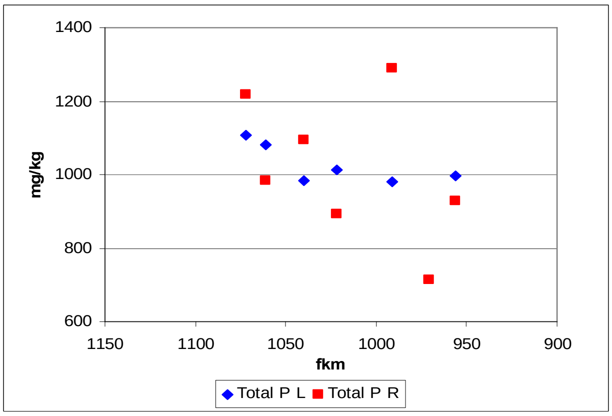

mg/kg
fkm
Pb L
Pb R


mg/kg
fkm
Cu L
Cu R


mg/kg
fkm
Zn L
Zn R


mg/kg
fkm
Cr L
Cr R


mg/kg
fkm
Ni L
Ni R


1400
1200
1000
800
600
mg/kg
1150
1100
1050
1000
950
900
fkm
Total P L
Total P R

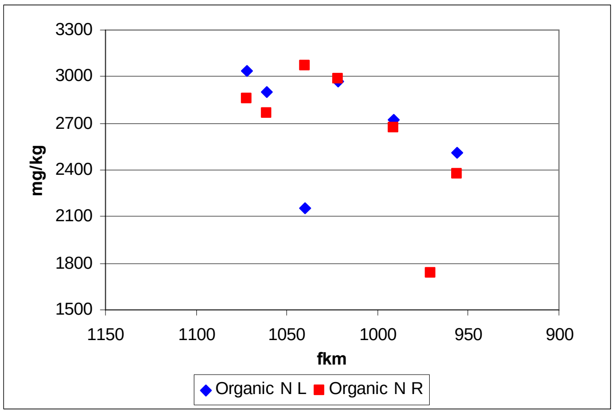
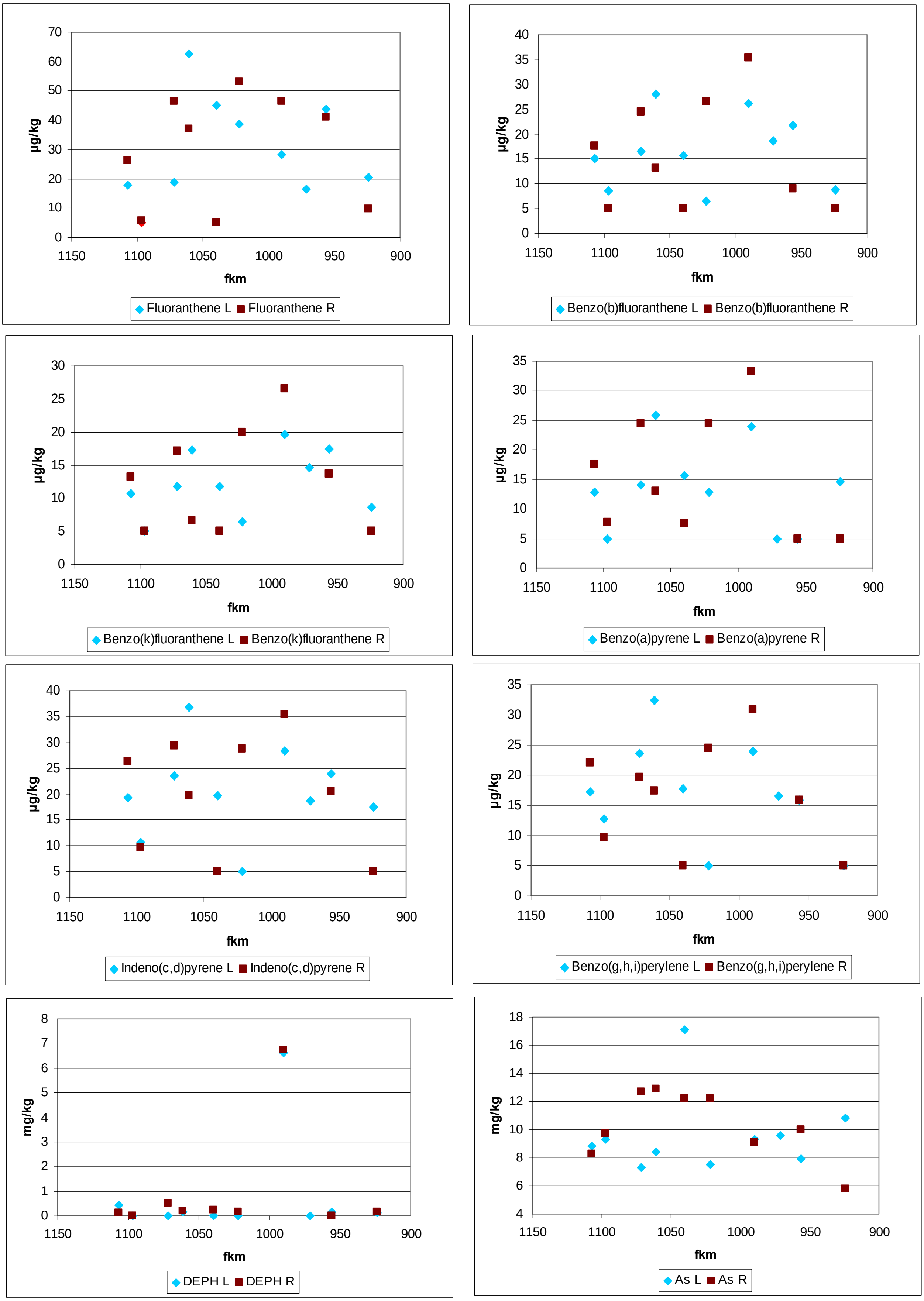
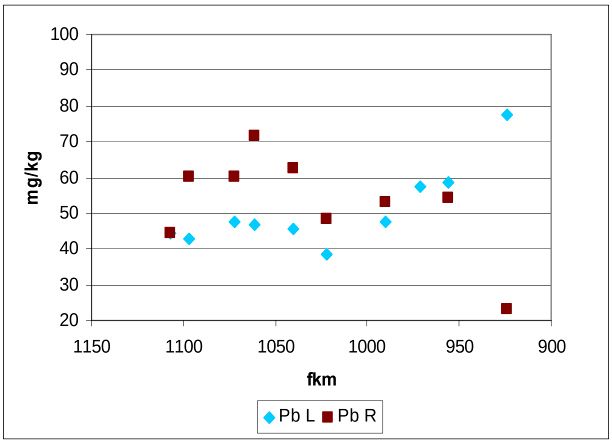
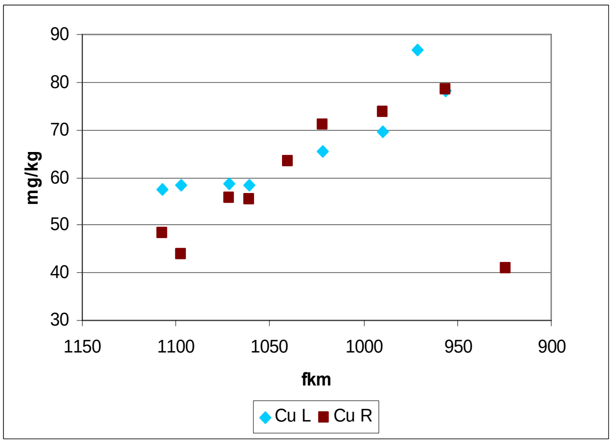
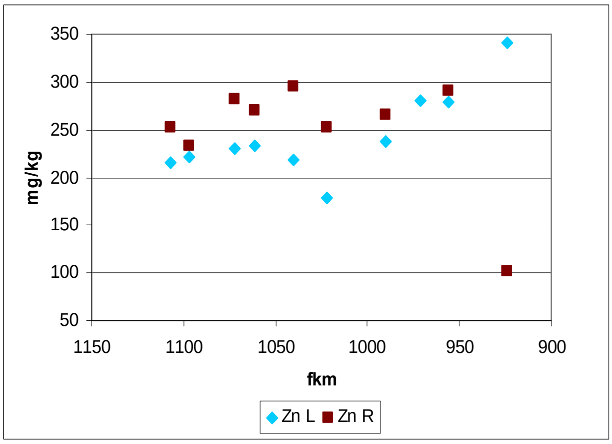

3300
3000
2700
2400
2100
1800
1500
mg/kg
1150
1100
1050
1000
950
900
fkm
Organic N L
Organic N R

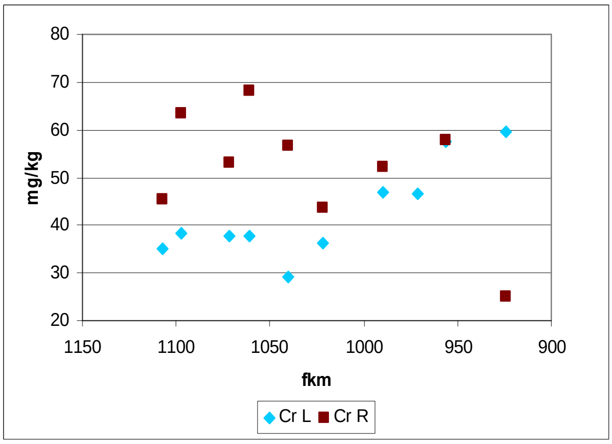
Figure 11: Longitudinal concentration distribution of different components in grab samples (surface sediment samples)

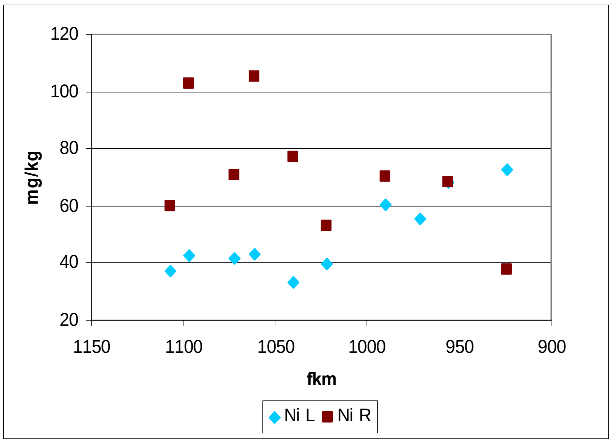


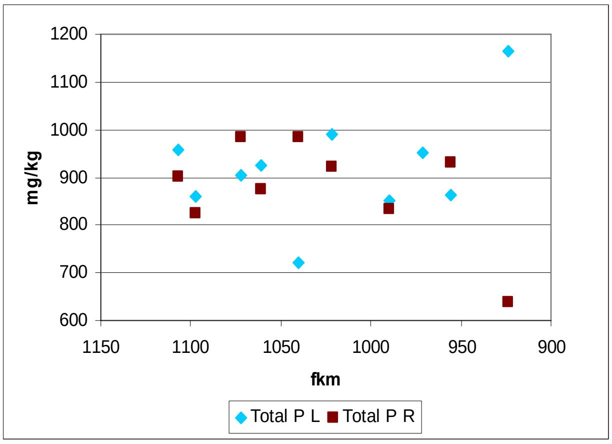

mg/kg
fkm
Pb L
Pb R


mg/kg
fkm
Cu L
Cu R


mg/kg
fkm
Zn L
Zn R


mg/kg
fkm
Cr L
Cr R


mg/kg
fkm
Ni L
Ni R


mg/kg
fkm
Total P L
Total P R

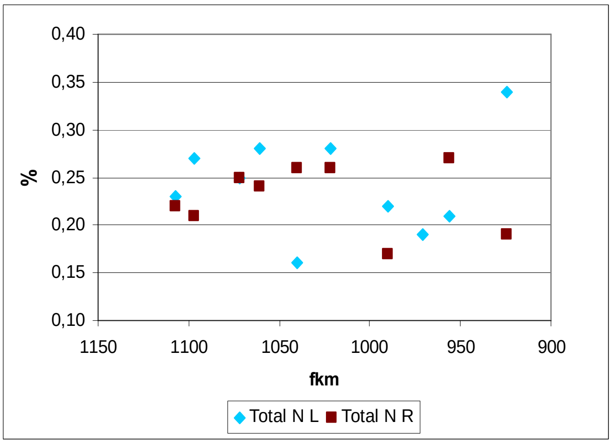
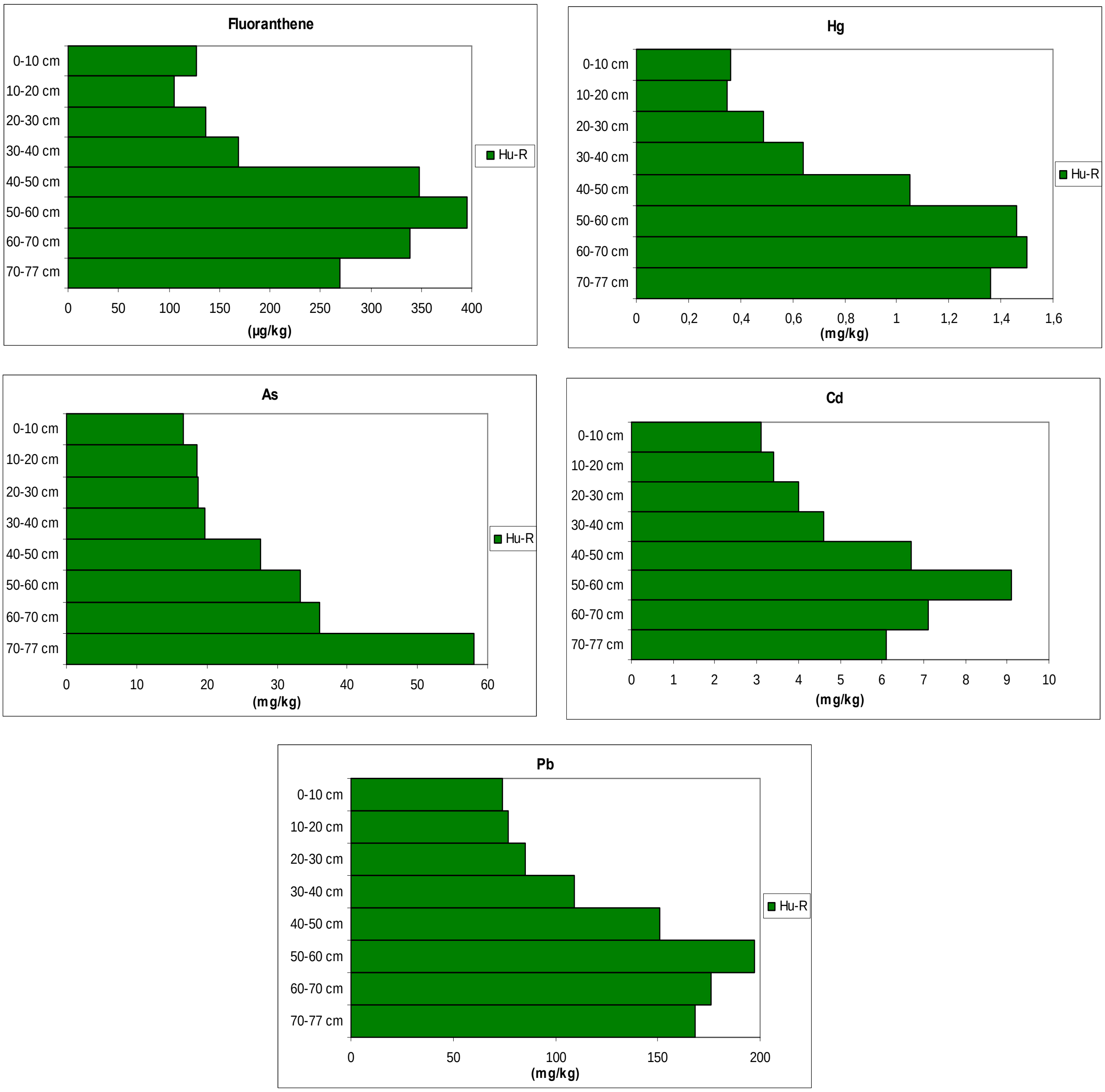
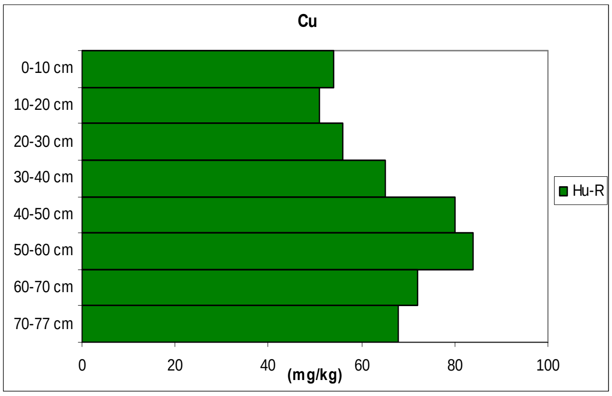
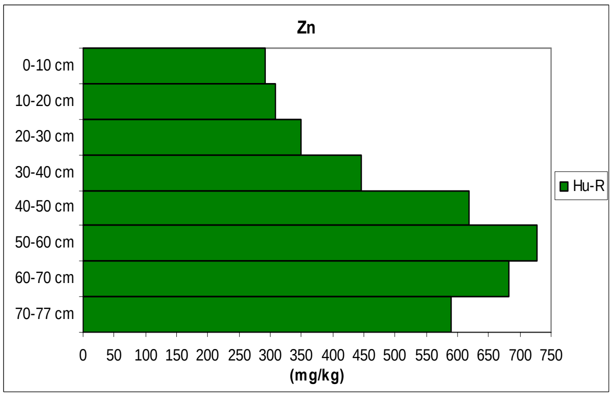
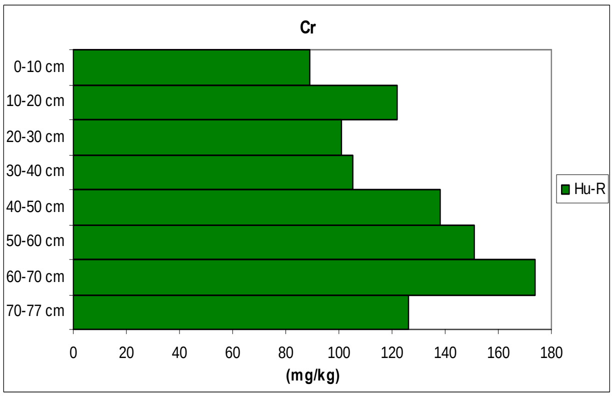

%
fkm
Total N L
Total N R

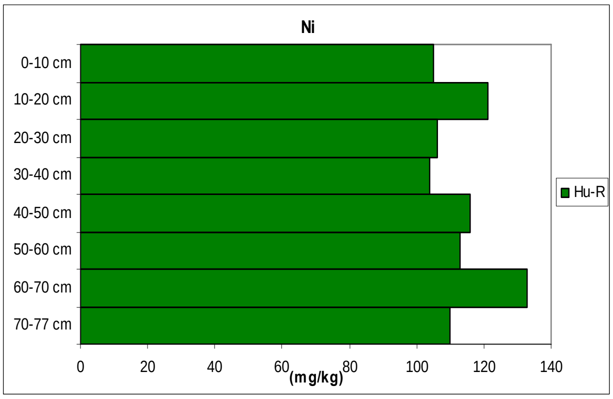
Figure 12: Vertical concentration distribution of different components in core sample 1077 rkm




Cu
0-10 cm
10-20 cm
20-30 cm
30-40 cm
40-50 cm
50-60 cm
60-70 cm
70-77 cm
0 20 40 60 80 100
(mg/kg)
Hu-R


Zn
0-10 cm
10-20 cm
20-30 cm
30-40 cm
40-50 cm
50-60 cm
60-70 cm
70-77 cm
0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750
(mg/kg)
Hu-R


Cr
0-10 cm
10-20 cm
20-30 cm
30-40 cm
40-50 cm
50-60 cm
60-70 cm
70-77 cm
0 20 40 60 80 100 120 140 160 180
(mg/kg)
Hu-R


Ni
0-10 cm
10-20 cm
20-30 cm
30-40 cm
40-50 cm
50-60 cm
60-70 cm
70-77 cm
0 20 40 60 80 100 120 140
(mg/kg)
Hu-R

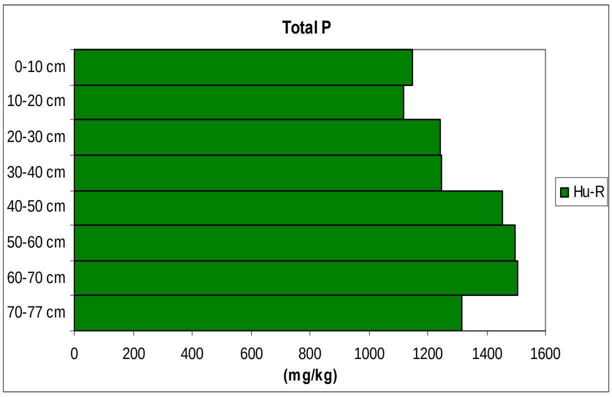
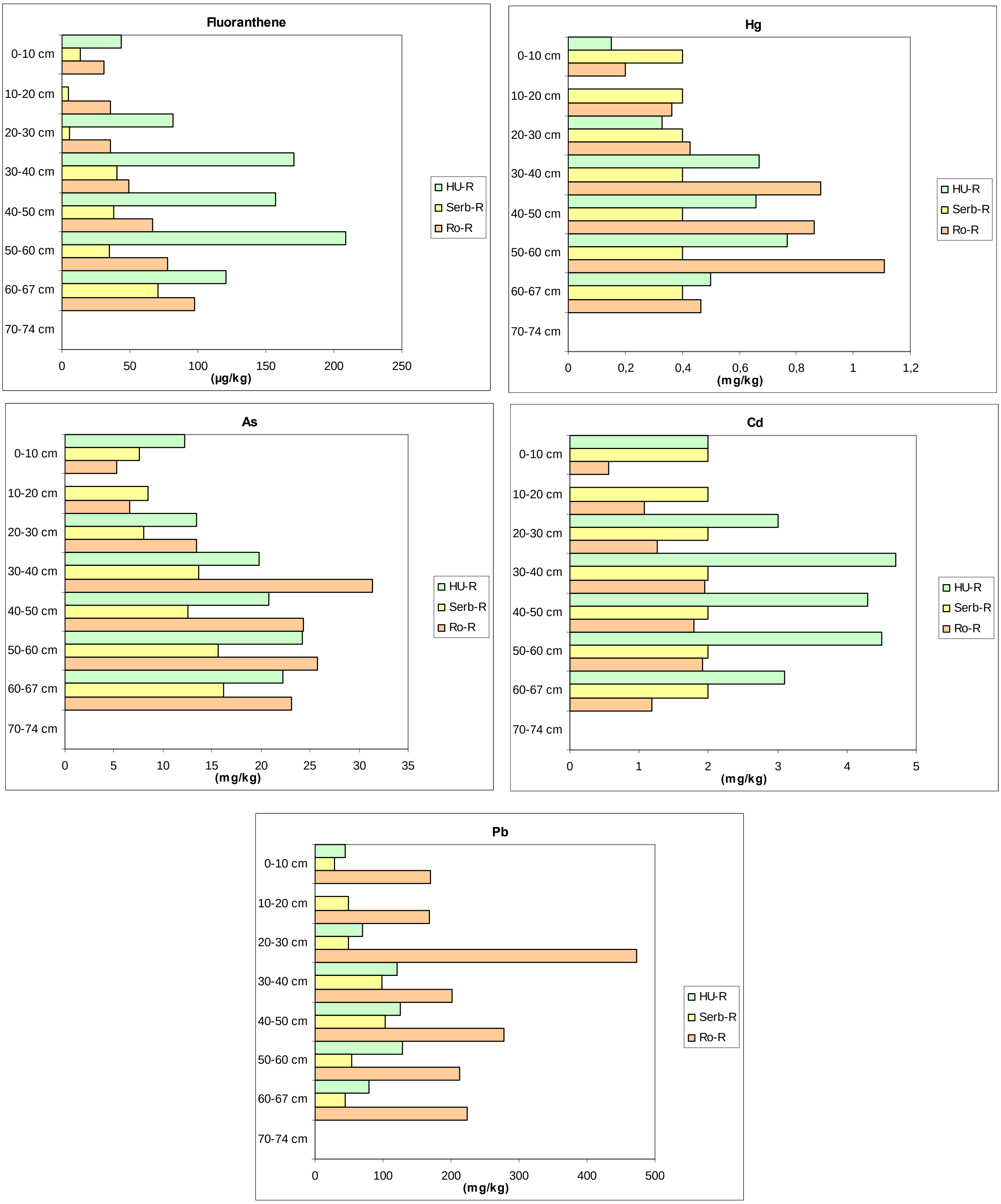
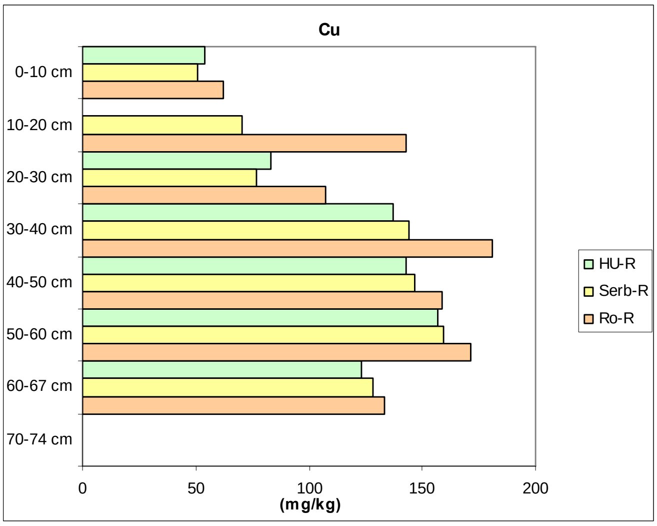
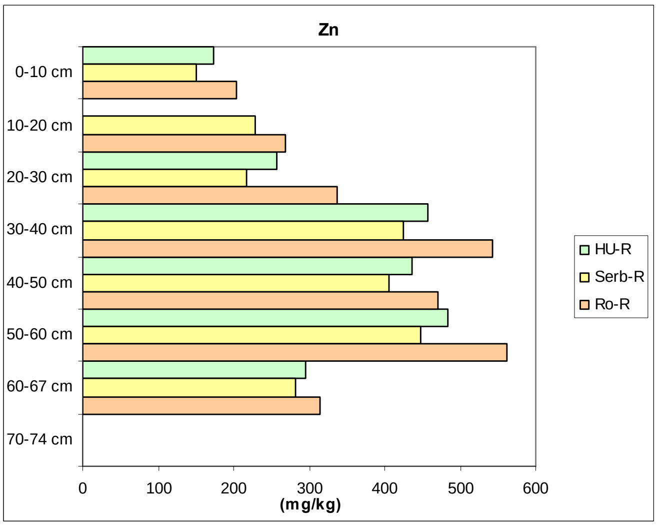
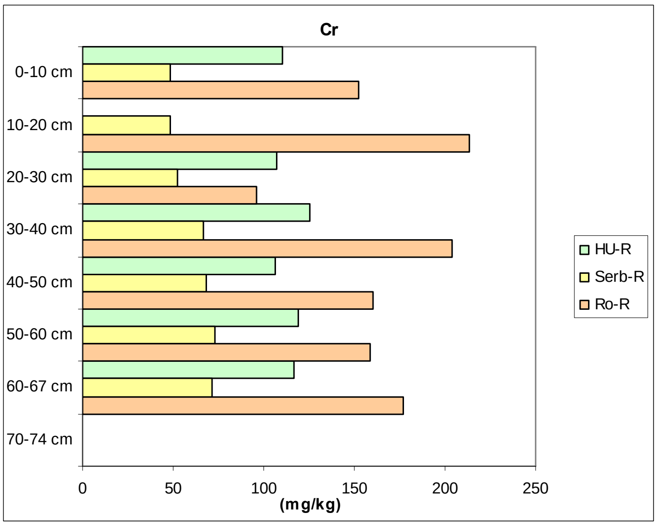

Total P
0-10 cm
10-20 cm
20-30 cm
30-40 cm
40-50 cm
50-60 cm
60-70 cm
70-77 cm
0 200 400 600 800 1000 1200 1400 1600
(mg/kg)
Hu-R

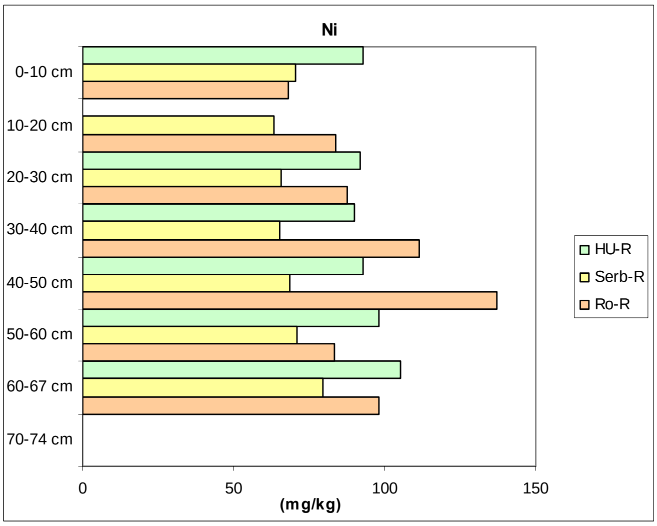
Figure 13: Vertical concentration distribution of different components in core sample 991 rkm




Cu
0-10 cm
10-20 cm
20-30 cm
30-40 cm
40-50 cm
50-60 cm
60-67 cm
70-74 cm
0
50
100
150
200
(mg/kg)
HU-R
Serb-R
Ro-R


Zn
0-10 cm
10-20 cm
20-30 cm
30-40 cm
40-50 cm
50-60 cm
60-67 cm
70-74 cm
0
100
200
300
400
500
600
(mg/kg)
HU-R
Serb-R
Ro-R


Cr
0-10 cm
10-20 cm
20-30 cm
30-40 cm
40-50 cm
50-60 cm
60-67 cm
70-74 cm
0
50
100
150
200
250
(mg/kg)
HU-R
Serb-R
Ro-R


Ni
0-10 cm
10-20 cm
20-30 cm
30-40 cm
40-50 cm
50-60 cm
60-67 cm
70-74 cm
0
50
100
150
(mg/kg)
HU-R
Serb-R
Ro-R

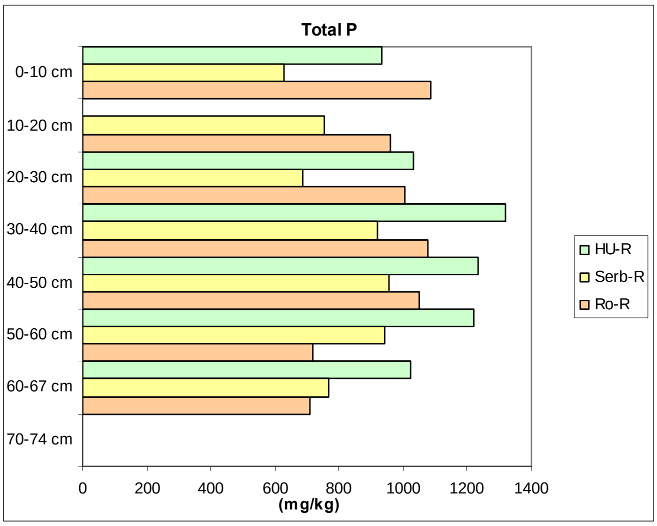

Total P
0-10 cm
10-20 cm
20-30 cm
30-40 cm
40-50 cm
50-60 cm
60-67 cm
70-74 cm
0
200
400
600
800
1000
1200
1400
(mg/kg)
HU-R
Serb-R
Ro-R

Table 6 Analytical results of the sediment investigation in September 2006 Jaroslav Cerni

		1-1107 L	1-1107 R	2-1097 L	2-1097 R	3-1072 L	3-1072 R	4-1061 L	4-1061 R
location		**V. Morava - upstr**	**V. Morava - upstr**	**V. Morava - downstr**	**V. Morava - downstr**	**Ram**	**Ram**	**V. Gradiste**	**V. Gradiste**
Parameter	**Unit**								
Fluoranthene	µg/kg	17,9	26,3	<5,0	5,8	18,9	46,5	62,7	37,1
Benzo(b)fluoranthene	µg/kg	15,0	17,6	8,5	<5,0	16,5	24,5	28,1	13,1
Benzo(k)fluoranthene	µg/kg	10,7	13,2	<5,0	<5,0	11,8	17,1	17,3	6,6
Benzo(a)pyrene	µg/kg	12,9	17,6	<5,0	7,8	14,1	24,5	25,9	13,1
Indeno(c,d)pyrene	µg/kg	19,3	26,3	10,6	9,7	23,6	29,4	36,7	19,7
Benzo(g,h,i)perylene	µg/kg	17,2	22,0	12,7	9,7	23,6	19,6	32,4	17,5
PCB 28	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 52	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 101	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 118	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 138	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 152	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 180	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
Aldrin	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
Dieldrin	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0

		1-1107 L	1-1107 R	2-1097 L	2-1097 R	3-1072 L	3-1072 R	4-1061 L	4-1061 R
location		**V. Morava - upstr**	**V. Morava - upstr**	**V. Morava - downstr**	**V. Morava - downstr**	**Ram**	**Ram**	**V. Gradiste**	**V. Gradiste**
Endrin	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
DDT (DDE+DDD)	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
Lindane	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
Octylphenol	µg/kg	+	+	+	+	+	+	+	+
Nonylphenol	µg/kg	+	+	+	+	+	+	+	+
Pentachlorphenol	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
TPH	µg/kg								
Di(2-ethyl-hexyl) phtalate	µg/kg	416,0	99,7	<10,0	<10,0	<10,0	495,6	143,5	179,9
Hg	mg/kg	<0,4	<0,4	<0,4	<0,4	<0,4	<0,4	<0,4	<0,4
As	mg/kg	8,8	8,3	9,3	9,7	7,3	12,7	8,4	12,9
Cd	mg/kg	<2,0	<2,0	<2,0	<2,0	<2,0	<2,0	<2,0	<2,0
Pb	mg/kg	44,5	44,6	42,9	60,2	47,6	60,2	46,7	71,8
Cu	mg/kg	57,4	48,3	58,3	44,0	58,7	55,8	58,3	55,5
Zn	mg/kg	214,9	252,5	221,8	232,9	229,8	281,3	233,4	270,7
Cr-tot.	mg/kg	35,2	45,4	38,2	63,5	37,7	53,1	37,6	68,3
Ni	mg/kg	37,0	60,0	42,7	103,0	41,5	70,9	43,2	105,2
total P	mg/kg	958,3	900,1	859,9	824,8	905,0	983,4	924,8	873,4
Organic N									
moisture, %		53,5	54,5	52,7	48,5	57,6	59,1	53,7	56,2

		1-1107 L	1-1107 R	2-1097 L	2-1097 R	3-1072 L	3-1072 R	4-1061 L	4-1061 R
location		**V. Morava - upstr**	**V. Morava - upstr**	**V. Morava - downstr**	**V. Morava - downstr**	**Ram**	**Ram**	**V. Gradiste**	**V. Gradiste**
total N, %		0,23	0,22	0,27	0,21	0,25	0,25	0,28	0,24
PAHs									
Total	µg/kg	163,8	206,3	57,0	56,4	163,1	288,8	425,7	257,7
Naphtalene	µg/kg	<5,0	<5,0	<5,0	<5,0	<5,0	9,8	6,5	<5,0
Acenaphthylene	µg/kg	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0
Acenaphthene	µg/kg	8,6	13,2	6,3	7,8	11,8	22,0	25,9	24,0
Fluorene	µg/kg	12,9	<5,0	<5,0	<5,0	<5,0	<5,0	34,5	30,6
Phenantrene	µg/kg	12,9	21,9	<5,0	7,8	16,5	48,9	69,1	48,0
Anthracene	µg/kg	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0
Pyrene	µg/kg	15,0	21,9	6,3	7,8	18,9	36,7	45,4	28,4
Chryzene	µg/kg	6,4	8,8	4,2	<5,0	7,1	9,8	17,3	6,5
Benzo(a)anthracene	µg/kg	15,0	17,5	8,4	<5,0	<5,0	<5,0	23,8	13,1
Dibenzo(a,h)anthracene	µg/kg	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0
THC (C_{10} - C_{40}) ug/kg	µg/kg	49,4	82,5	47,7	21,7	26,9	35,7	20,5	32,3

		5-1040 L	5-1040 R	6-1022 L	6-1022 R	7-990 L	7-990 R	8-971 R	9-956 L	9-956 R	10-924 L	10-924 R
location		**Golubac**	**Golubac**	**Dobra**	**Dobra**	**D. Milanovac**	**D. Milanovac**	**Dubova**	**Tekija**	**Tekija**	**M. Vrbica**	**M. Vrbica**
Parameter	**Unit**											
Fluoranthene	µg/kg	45,2	<5,0	38,7	53,2	28,4	46,4	16,6	40,9	43,6	9,7	20,4
Benzo(b)fluoranthene	µg/kg	15,7	5,0	6,5	26,6	26,2	35,4	18,7	9,1	21,8	<5,0	8,7
Benzo(k)fluoranthene	µg/kg	11,8	<5,0	6,5	20,0	19,6	26,5	14,6	13,6	17,5	<5,0	8,7
Benzo(a)pyrene	µg/kg	15,7	7,5	12,9	24,4	24,0	33,2	<5,0	<5,0	<5,0	<5,0	14,6
Indeno(c,d)pyrene	µg/kg	19,7	<5,0	<5,0	28,8	28,4	35,4	18,7	20,5	24,0	<5,0	17,5
Benzo(g,h,i)perylene	µg/kg	17,7	<5,0	<5,0	24,4	24,0	30,9	16,6	15,9	15,9	<5,0	<5,0
PCB 28	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 52	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 101	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 118	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 138	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 152	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 180	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
Aldrin	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
Dieldrin	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
Endrin	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
DDT (DDE+DDD)	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0

		5-1040 L	5-1040 R	6-1022 L	6-1022 R	7-990 L	7-990 R	8-971 R	9-956 L	9-956 R	10-924 L	10-924 R
location		**Golubac**	**Golubac**	**Dobra**	**Dobra**	**D. Milanovac**	**D. Milanovac**	**Dubova**	**Tekija**	**Tekija**	**M. Vrbica**	**M. Vrbica**
Lindane	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
Octylphenol	µg/kg	+	+	+	+	+	+	+	+	+	+	+
Nonylphenol	µg/kg	+	+	+	+	+	+	+	+	+	+	+
Pentachlorphenol	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
TPH	µg/kg											
Di(2-ethyl-hexyl) phtalate	µg/kg	<10,0	233,2	<10,0	170,4	6615,1	6732,3	<10,0	<10,0	147,7	139,9	112,7
Hg	mg/kg	<0,4	<0,4	<0,4	<0,4	<0,4	<0,4	<0,4	<0,4	<0,4	<0,4	<0,4
As	mg/kg	17,1	12,2	7,5	12,2	9,3	9,1	9,6	10,0	7,9	5,8	10,8
Cd	mg/kg	<2,0	<2,0	<2,0	<2,0	<2,0	<2,0	<2,0	<2,0	<2,0	<2,0	<2,0
Pb	mg/kg	45,8	62,4	38,5	48,4	47,6	53,0	57,6	54,1	58,5	23,2	77,6
Cu	mg/kg	310,7	63,4	65,4	71,0	69,6	73,8	86,7	78,5	78,3	40,9	104,8
Zn	mg/kg	218,3	295,8	178,3	252,9	237,9	265,2	280,8	291,1	279,3	101,1	340,7
Cr-tot.	mg/kg	29,3	56,7	36,3	43,5	46,9	52,2	46,6	57,8	57,4	25,1	59,7
Ni	mg/kg	33,4	77,3	39,8	53,2	60,2	70,1	55,7	68,2	68,3	37,8	72,9
total P	mg/kg	721,7	984,3	989,2	922,8	851,3	833,3	950,5	932,4	861,9	638,9	1164,8
Organic N												
moisture, %		49,2	59,8	53,5	54,9	54,2	54,8	51,9	56,0	54,2	48,7	65,7
total N, %		0,16	0,26	0,28	0,26	0,22	0,17	0,19	0,27	0,21	0,19	0,34

		5-1040 L	5-1040 R	6-1022 L	6-1022 R	7-990 L	7-990 R	8-971 R	9-956 L	9-956 R	10-924 L	10-924 R
location		**Golubac**	**Golubac**	**Dobra**	**Dobra**	**D. Milanovac**	**D. Milanovac**	**Dubova**	**Tekija**	**Tekija**	**M. Vrbica**	**M. Vrbica**
PAHs												
Total	µg/kg	393,1	59,8	221,5	379,3	377,6	477,5	239,2	256,9	277,7	74,3	177,6
Naphtalene	µg/kg	11,8	17,4	<5,0	<5,0	126,6	134,8	70,7	9,1	6,5	5,8	8,7
Acenaphthylene	µg/kg	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0
Acenaphthene	µg/kg	27,5	7,5	25,8	24,4	13,1	11,0	6,2	20,5	17,5	11,7	17,5
Fluorene	µg/kg	33,4	9,9	32,3	33,3	<5,0	17,7	<5,0	27,3	24,0	<5,0	23,3
Phenantrene	µg/kg	59,0	<5,0	53,8	59,9	17,5	26,5	25,0	40,9	39,3	31,2	23,3
Anthracene	µg/kg	76,7	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0
Pyrene	µg/kg	33,4	<5,0	25,8	39,9	28,4	44,2	18,7	31,8	43,9	15,6	20,4
Chryzene	µg/kg	9,8	5,0	6,4	17,8	16,3	<5,0	12,5	6,8	8,7	<5,0	5,8
Benzo(a)anthracene	µg/kg	15,7	7,5	12,9	26,6	26,2	35,4	20,8	20,5	24,0	<5,0	8,7
Dibenzo(a,h)anthracene	µg/kg	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0
THC (C_{10} - C_{40}) ug/kg	µg/kg	25,4	26,8	397,8	<5,0	27,1	14,8	27,2	26,8	15,1	61,0	33,5

		core 991-R	core 991-R	core 991-R	core 991-R	core 991-R	core 991-R	core 991-R
		10	**20**	**30**	**40**	**50**	**60**	**67**
location		**D. Milanovac**	**D. Milanovac**	**D. Milanovac**	**D. Milanovac**	**D. Milanovac**	**D. Milanovac**	**D. Milanovac**
Parameter	**Unit**							
Fluoranthene	µg/kg	13,7	<5,0	5,3	40,7	38,2	34,7	70,3
Benzo(b)fluoranthene	µg/kg	8,6	<5,0	<5,0	27,9	25,5	26,0	36,1
Benzo(k)fluoranthene	µg/kg	<5,0	<5,0	<5,0	27,9	21,3	23,9	34,3
Benzo(a)pyrene	µg/kg	8,6	7,3	7,1	25,7	25,5	15,2	34,3
Indeno(c,d)pyrene	µg/kg	6,9	7,3	5,3	21,4	23,3	21,7	32,5
Benzo(g,h,i)perylene	µg/kg	6,9	5,4	5,3	19,3	17,0	19,5	27,0
PCB 28	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 52	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 101	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 118	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 138	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 152	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 180	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
Aldrin	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
Dieldrin	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
Endrin	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0

		core 991-R	core 991-R	core 991-R	core 991-R	core 991-R	core 991-R	core 991-R
		10	**20**	**30**	**40**	**50**	**60**	**67**
location		**D. Milanovac**	**D. Milanovac**	**D. Milanovac**	**D. Milanovac**	**D. Milanovac**	**D. Milanovac**	**D. Milanovac**
DDT (DDE+DDD)	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
Lindane	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
Octylphenol	µg/kg	+	+	+	+	+	+	+
Nonylphenol	µg/kg	+	+	+	+	+	+	+
Pentachlorphenol	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
TPH	µg/kg							
Di(2-ethyl-hexyl) phtalate	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	21,5
Hg	mg/kg	<0,4	<0,4	<0,4	<0,4	<0,4	<0,4	<0,4
As	mg/kg	7,6	8,5	8,0	13,7	12,5	15,6	16,2
Cd	mg/kg	<2,0	<2,0	<2,0	<2,0	<2,0	<2,0	<2,0
Pb	mg/kg	27,8	49,6	49,2	98,6	102,5	53,9	44,5
Cu	mg/kg	50,7	70,2	77,0	143,9	146,5	159,1	128,4
Zn	mg/kg	150,5	228,7	217,3	424,5	405,4	447,1	281,3
Cr-tot.	mg/kg	48,4	48,6	52,2	66,5	68,3	73,4	71,2
Ni	mg/kg	70,4	63,5	65,6	65,0	68,5	71,0	79,3
total P, mg/kg	mg/kg	628,8	753,3	685,9	922,0	955,2	942,0	768,3
Organic N								

		core 991-R	core 991-R	core 991-R	core 991-R	core 991-R	core 991-R	core 991-R
		10	**20**	**30**	**40**	**50**	**60**	**67**
location		**D. Milanovac**	**D. Milanovac**	**D. Milanovac**	**D. Milanovac**	**D. Milanovac**	**D. Milanovac**	**D. Milanovac**
moisture, %		41,8	44,9	43,9	53,4	52,9	53,9	44,5
total N, %		0,13	0,16	0,15	0,26	0,27	0,26	0,12
PAHs								
Total	µg/kg	114,8	58,1	55,0	334,5	290,8	273,5	468,9
Naphtalene	µg/kg	5,1	<5,0	<5,0	6,4	6,4	6,5	5,4
Acenaphthylene	µg/kg	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	5,4
Acenaphthene	µg/kg	10,3	5,4	5,3	10,7	10,6	10,8	16,2
Fluorene	µg/kg	13,7	7,3	7,1	17,1	17,0	15,2	21,6
Phenantrene	µg/kg	13,7	<5,0	<5,0	40,7	21,2	13,0	41,5
Anthracene	µg/kg	<5,0	<5,0	<5,0	6,4	6,4	6,5	10,8
Pyrene	µg/kg	12,0	12,7	8,9	38,6	38,2	32,6	59,5
Chryzene	µg/kg	5,1	5,4	<5,0	21,4	10,5	19,5	28,9
Benzo(a)anthracene	µg/kg	10,3	7,3	10,7	30,0	29,7	28,2	39,7
Dibenzo(a,h)anthracene	µg/kg	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	5,4
THC (C_{10} - C_{40}) ug/kg	µg/kg	6,5	11,1	15,9	83,8	65,2	59,3	48,1

		core 956-R	core 956-R	core 956-R	core 956-R	core 956-R	core 956-R	core 956-R	core 956-R
		10	**20**	**30**	**40**	**50**	**60**	**70**	**82**
location		**Tekija**	**Tekija**	**Tekija**	**Tekija**	**Tekija**	**Tekija**	**Tekija**	**Tekija**
Parameter	**Unit**								
Fluoranthene	µg/kg	12,6	92,1	55,7	38,3	54,7	122,8	57,9	168,3
Benzo(b)fluoranthene	µg/kg	6,3	35,1	27,8	19,1	28,5	57,9	26,7	76,2
Benzo(k)fluoranthene	µg/kg	10,5	28,5	20,9	17,0	24,1	46,3	24,5	65,5
Benzo(a)pyrene	µg/kg	10,5	32,9	25,9	19,1	26,3	60,2	22,3	70,9
Indeno(c,d)pyrene	µg/kg	10,5	35,1	<5,0	19,1	21,9	44,0	20,0	51,4
Benzo(g,h,i)perylene	µg/kg	8,4	26,3	20,9	14,9	19,7	39,4	17,8	40,7
PCB 28	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 52	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 101	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 118	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 138	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 152	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 180	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
Aldrin	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
Dieldrin	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
Endrin	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0

		core 956-R	**core 956-R**	**core 956-R**	**core 956-R**	**core 956-R**	**core 956-R**	**core 956-R**	**core 956-R**
		10	**20**	**30**	**40**	**50**	**60**	**70**	**82**
location		**Tekija**	**Tekija**	**Tekija**	**Tekija**	**Tekija**	**Tekija**	**Tekija**	**Tekija**
DDT (DDE+DDD)	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
Lindane	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
Octylphenol	µg/kg	+	+	+	+	+	+	+	+
Nonylphenol	µg/kg	+	+	+	+	+	+	+	+
Pentachlorphenol	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
TPH	µg/kg								
Di(2-ethyl-hexyl) phtalate	µg/kg	<10,0	126,5	193,7	<10,0	<10,0	68,8	<10,0	298,0
Hg	mg/kg	<0,4	<0,4	<0,4	<0,4	<0,4	<0,4	<0,4	<0,4
As	mg/kg	10,1	11,6	12,5	12,8	12,1	12,5	15,4	16,6
Cd	mg/kg	<2,0	<2,0	<2,0	<2,0	<2,0	<2,0	<2,0	<2,0
Pb	mg/kg	52,4	54,4	56,9	53,0	54,3	56,8	55,1	43,5
Cu	mg/kg	81,6	82,9	94,2	102,8	117,6	131,4	151,9	153,1
Zn	mg/kg	300,7	324,4	329,4	323,5	389,8	391,6	463,3	439,3
Cr-tot.	mg/kg	52,4	53,0	54,5	57,5	58,9	63,2	68,8	74,1
Ni	mg/kg	65,8	67,1	65,6	65,1	60,0	63,9	62,8	65,4
total P, mg/kg	mg/kg	1028,4	1082,9	1039,2	974,7	1060,0	1089,0	1202,9	1158,5
Organic N									
moisture, %		52,4	54,4	56,9	53,0	54,3	56,8	55,1	43,5

		core 956-R	core 956-R	core 956-R	core 956-R	core 956-R	core 956-R	core 956-R	core 956-R
		10	**20**	**30**	**40**	**50**	**60**	**70**	**82**
location		**Tekija**	**Tekija**	**Tekija**	**Tekija**	**Tekija**	**Tekija**	**Tekija**	**Tekija**
total N, %		0,24	0,27	0,25	0,23	0,25	0,29	0,27	0,28
PAHs									
Total	µg/kg	130,4	572,1	353,1	300,1	635,7	792,4	356,4	976,0
Naphtalene	µg/kg	<5,0	15,3	9,3	6,4	6,6	13,9	6,7	8,9
Acenaphthylene	µg/kg	<5,0	<5,0	<5,0	<5,0	<5,0	6,9	<5,0	8,9
Acenaphthene	µg/kg	8,4	35,1	23,2	14,9	17,5	34,7	13,4	19,5
Fluorene	µg/kg	12,6	46,0	30,2	21,2	24,1	44,0	17,8	28,3
Phenantrene	µg/kg	12,6	83,3	51,0	53,2	43,8	101,9	31,2	95,7
Anthracene	µg/kg	<5,0	11,0	7,0	6,4	8,8	13,9	8,9	21,3
Pyrene	µg/kg	16,8	67,9	41,7	31,9	46,0	99,6	55,7	138,2
Chryzene	µg/kg	6,3	24,1	9,3	14,9	10,9	41,7	15,6	62,0
Benzo(a)anthracene	µg/kg	14,7	39,5	30,2	23,4	32,8	64,8	37,9	90,3
Dibenzo(a,h)anthracene	µg/kg	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0
THC (C_{10} - C_{40}) ug/kg	µg/kg	63,5	40,1	45,5	37	23,6	50,3	54,8	34,5

		core 924 R	core 924 R	core 924 R	core 924 R	core 924 R	core 924 R	core 924 R	core 924 R
		10	**20**	**30**	**40**	**50**	**60**	**70**	**80**
location		**M. Vrbica**	**M. Vrbica**	**M. Vrbica**	**M. Vrbica**	**M. Vrbica**	**M. Vrbica**	**M. Vrbica**	**M. Vrbica**
Parameter	**Unit**								
Fluoranthene	µg/kg	59,6	90,1	58,0	74,1	56,3	69,3	97,1	113,9
Benzo(b)fluoranthene	µg/kg	25,2	36,0	25,2	31,4	22,5	28,7	34,7	48,5
Benzo(k)fluoranthene	µg/kg	20,6	25,7	20,2	26,9	18,0	23,9	27,8	40,1
Benzo(a)pyrene	µg/kg	25,2	33,5	25,2	29,2	20,3	26,3	32,4	23,1
Indeno(c,d)pyrene	µg/kg	20,6	28,3	<5	24,7	<5	21,5	23,1	40,1
Benzo(g,h,i)perylene	µg/kg	11,4	90,1	<5,0	20,2	<5,0	16,7	23,1	33,8
PCB 28	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 52	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 101	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 118	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 138	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 152	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
PCB 180	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
Aldrin	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
Dieldrin	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
Endrin	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0

		core 924 R	core 924 R	core 924 R	core 924 R	core 924 R	core 924 R	core 924 R	core 924 R
		10	**20**	**30**	**40**	**50**	**60**	**70**	**80**
location		**M. Vrbica**	**M. Vrbica**	**M. Vrbica**	**M. Vrbica**	**M. Vrbica**	**M. Vrbica**	**M. Vrbica**	**M. Vrbica**
DDT (DDE+DDD)	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
Lindane	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
Octylphenol	µg/kg	+	+	+	+	+	+	+	+
Nonylphenol	µg/kg	+	+	+	+	+	+	+	+
Pentachlorphenol	µg/kg	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0	<10,0
TPH	µg/kg								
Di(2-ethyl-hexyl) phtalate	µg/kg	167,0	399,7	<10,0	18,2	<10,0	<10,0	<10,0	<10,0
Hg	mg/kg	<0,4	<0,4	<0,4	<0,4	<0,4	<0,4	<0,4	<0,4
As	mg/kg	9,6	6,7	7,6	9,0	8,8	9,8	10,6	8,9
Cd	mg/kg	<2,0	<2,0	<2,0	<2,0	<2,0	<2,0	<2,0	<2,0
Pb	mg/kg	56,3	50,5	57,0	65,6	60,1	73,4	63,4	64,1
Cu	mg/kg	69,2	62,6	65,3	84,5	74,5	84,6	79,6	65,8
Zn	mg/kg	247,4	252,9	262,3	301,0	270,1	294,1	268,3	278,5
Cr-tot.	mg/kg	42,6	41,5	43,6	49,2	43,9	51,2	46,3	47,0
Ni	mg/kg	55,9	50,5	50,9	51,9	45,0	55,7	50,4	52,9
total P, mg/kg	mg/kg	1081,3	1120,3	1130,8	1163,5	1215,7	1202,8	1327,8	1580,5
Organic N									
moisture, %		56,3	61,2	60,3	55,5	55,6	58,2	56,8	59,6

		core 924 R	core 924 R	core 924 R	core 924 R	core 924 R	core 924 R	core 924 R	core 924 R
		10	**20**	**30**	**40**	**50**	**60**	**70**	**80**
location		**M. Vrbica**	**M. Vrbica**	**M. Vrbica**	**M. Vrbica**	**M. Vrbica**	**M. Vrbica**	**M. Vrbica**	**M. Vrbica**
total N, %		0,30	0,30	0,30	0,25	0,29	0,30	0,27	0,25
PAHs									
Total	µg/kg	384,9	620,7	370,7	471,7	339,9	425,6	587,6	668,9
Naphtalene	µg/kg	11,4	12,9	20,2	9,0	11,3	21,5	25,4	12,7
Acenaphthylene	µg/kg	6,9	7,7	7,6	<5,0	6,7	7,2	11,6	8,4
Acenaphthene	µg/kg	16,0	28,3	22,7	20,2	20,3	23,9	25,4	23,1
Fluorene	µg/kg	22,9	38,6	27,7	29,2	27,0	<5,0	37,0	35,9
Phenantrene	µg/kg	48,1	82,4	53,0	60,6	54,0	66,9	92,5	101,3
Anthracene	µg/kg	11,4	12,9	10,1	9,0	9,0	9,6	13,9	14,8
Pyrene	µg/kg	43,5	74,7	53,0	67,4	59,5	62,2	81,0	101,3
Chryzene	µg/kg	25,2	15,4	17,6	26,9	15,8	12,0	16,2	10,5
Benzo(a)anthracene	µg/kg	36,7	43,8	30,3	42,7	29,3	35,9	46,3	61,2
Dibenzo(a,h)anthracene	µg/kg	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0
THC (C_{10} - C_{40}) ug/kg	µg/kg	10,3	<5,0	<5,0	14,8	18,2	15,5	11,8	27,2

"+" means present (by comparison with mass spectra library), not quantified due to lack of standards

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