

## QUESTIONNAIRE FOR EXISTING SAMPLING, LABORATORY AND EVALUATION METHODS

### 0.0. State your institution and country.

Geological Survey of Austria  
Austrian Institute of Technology

### 0.1. State institution(s) from which you got data to fill this questionnaire.

Geological Survey of Austria  
Austrian Institute of Technology  
Environment Agency Austria

## I. LEGISLATIVE FRAMEWORK

**I.1 Enumeration of national or European legislation (laws, governmental orders, emergency ordinances) that regulates the concentrations of dangerous substances posing a risk to the health of the population or aquatic life, in soils, surface waters, drinking water, river sediments, marine sediments, sewage, therapeutic sludge, air and biota.**  
**[PLEASE, SUPPORT YOUR ANSWERS WITH REFERENCES (NATIONAL LEGISLATIVE DOCUMENTS AND/OR WEB LINKS)]**

No	Title (in national language)	Title (in English)	Link	Country
1	Wasser-rahmenrichtlinie	Water Framework Directive	<a href="https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013L0039&amp;from=EN">https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013L0039&amp;from=EN</a>	EU
2	Grundwasser-richtlinie	Groundwater Directive	<a href="https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32006L0118&amp;rid=8">https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32006L0118&amp;rid=8</a>	EU
3	Wasserrechtsgesetz	Water Rights Act	<a href="https://www.bmnt.gv.at/dam/jcr:5614b40b-dc4b-4c2c-a03d-3676537b7d4e/WRG%201959%20zgd%20BGBl.%20I%20Nr%2061/2018.pdf">https://www.bmnt.gv.at/dam/jcr:5614b40b-dc4b-4c2c-a03d-3676537b7d4e/WRG%201959%20zgd%20BGBl.%20I%20Nr%2061/2018.pdf</a>	AT
4	Qualitätszielverordnung Chemie Grundwasser + Oberflächen-gewässer + Ökologie Oberflächen-gewässer	Quality Ordinance for the Chemistry of Groundwater and the Chemistry and Ecology of Surface Water	<a href="https://www.ris.bka.gv.at/Dokumente/BgblAuth/BGBLA_2016_II_363/BGBLA_2016_II_363.pdf">https://www.ris.bka.gv.at/Dokumente/BgblAuth/BGBLA_2016_II_363/BGBLA_2016_II_363.pdf</a>	AT

5	Trinkwasser- verordnung	Quality Ordinance for Drinking water	<a href="https://www.ris.bka.gv.at/Dokumente/BgblAuth/BGBLA_2017_II_362/BGBLA_2017_II_362.pdf">https://www.ris.bka.gv.at/Dokumente/BgblAuth/BGBLA_2017_II_362/BGBLA_2017_II_362.pdf</a>	AT
6	Abwasser- emissions- verordnung	Ordinance for Emission of Sewage water	<a href="https://www.ris.bka.gv.at/GeltendeFassung/Bundesnormen/10010977/AAEV%2c%20Fassung%20vom%2005.11.2018.pdf">https://www.ris.bka.gv.at/GeltendeFassung/Bundesnormen/10010977/AAEV%2c%20Fassung%20vom%2005.11.2018.pdf</a>	AT
7	Immissions- schutzgesetz – Luft	Air Pollution Control Act	<a href="http://www.ris.bka.gv.at/GeltendeFassung/Bundesnormen/10011027/IG-L%2c%20Fassung%20vom%2008.11.2018.pdf">http://www.ris.bka.gv.at/GeltendeFassung/Bundesnormen/10011027/IG-L%2c%20Fassung%20vom%2008.11.2018.pdf</a>	AT
8	Gewässer- zustands- überwachungs- verordnung		<a href="https://www.ris.bka.gv.at/Dokumente/BgblAuth/BGBLA_2006_II_479/BGBLA_2006_II_479.pdf">https://www.ris.bka.gv.at/Dokumente/BgblAuth/BGBLA_2006_II_479/BGBLA_2006_II_479.pdf</a>	AT
9	Industrie- emissions- Richtlinie		<a href="https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32010L0075&amp;from=EN">https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32010L0075&amp;from=EN</a>	EU

In Austria, there are currently no legally binding regulations regarding the quality of river sediments, marine sediments or soils. No information could be found on quality regulations regarding therapeutic sludge (=medicinal mud?).

**I.2 List of dangerous (hazardous) substances (metals, non-metals, PAHs, PCBs, other parameters) concentration levels, their significance (*definition of terms used for thresholds*) in waters, solids or biota, in accordance with the national legislative framework.**

**Alert threshold** = concentrations of pollutants in air, water, soil or in emissions/discharges, which, when reached, warn the competent authorities on a potential impact on the environment and trigger additional monitoring and/or reduction of pollutant concentrations in emissions/discharges.

**Intervention threshold** = concentrations of pollutants in air, water, soil or in emissions/discharges, which, when reached, require the competent authorities to order risk assessment studies and reduction of pollutant emissions from emissions/discharges.

Each country, please deliver the definition of specific terms in the respective law.

*Table 1 Metal trace elements in soils*

Trace Element	Levels in soils(mg/kg)					
	A) normal values* (ÖNORM L 1075)** <b>orientation values for agricultural soils</b>		B) alert threshold (ÖNORM S 2088-1) <b>only relevant for contaminated sites</b>		C) intervention threshold	
Values based on use category	A1	A2	Sensitive B1	Less sensitive B2	Sensitive C1	Less sensitive C2
Mercury (Hg)	1		1	5		
As	20		50	200		
Cd	1 (0,50)		2	10		
Cr	100		100	500		
Cu	100		100	500		
Ni	60		100	500		
Pb	100		100	500		
Zn	300		500	1500		
Sb	2					
Co	50					
Tl	1					
V	50					

\*Referring to Normal values, for example, in Romania, there is a single set of **normal** values for all types of soils (probably an average value). Taking into account that some other countries could have more sets of normal values (depending on soil type, region etc.), more columns can be added in the table by the respective country.

\*\*According to: „Österreichische Orientierungswerte für Schadstoffgehalte im Oberboden (0-20cm) für landwirtschaftliche oder gärtnerische Nutzung (ÖNORM L 1075)“

Table 2 Metal trace elements in river water

Trace Element	Levels in river water(µg/l)					
	A) normal values		B) alert threshold		C) intervention threshold	
Values based on use category	A1 QZV- Chemistry-OG  Background- concentration (µg/l)	A2	Sensitive B1  QZV- Chemistry-OG  <b>Acceptable supplement- concentration</b>	Less sensitive B2  QZV- Chemistry-OG  ZHK-UQN <b>Thresholds for annual maximum concentrations</b>	Sensitive C1	Less sensitive C2
Arsenic	0,0		24			
Lead			1,2	14		
Cadmium	0,01		<0,08-0,25	<0,45-1,5		
Chromium	0,05		8,85			
Copper	0,05		1,1-8,8			
Nickel			4	34		
Selenium			5,3			
Silver			0,1			
Zinc	1,0		7,8-52			
Mercury				0,07		

Table 3 Metal trace elements in drinking water

Trace Element	Levels in drinking water(µg/l)					
	A)normal values		B>alert threshold		C)intervention threshold	
metals			QZV-Chemistry-GW  threshold value  <b>Applicable for groundwater / bodies of groundwater</b>		<b>Drinking Water Ordinance (no differentiation between sensitive and less sensitive)</b>	
Values based on use category	A1	A2	Sensitive B1	Less sensitive B2	Sensitive C1	Less sensitive C2
Arsenic			9	7,5	10	10
Lead			9	7,5	10	10
Cadmium			4,5	3,75	5	5
Chromium			45	37,5	50	50
Copper			1800	1500	2000	2000
Nickel			18	15	20	20
Mercury			0,9	0,75	1	1
Uranium					15	15

Ad A) normal values

- data are available in the report „Hydrochemie und Hydrogeologie der österreichischen Grundwässer und deren natürliche Metall- und Nährstoffgehalte (Update GeoHint 2018)“ – focus on natural metal and nutrient content of groundwater in Austria
- water inspections of the water suppliers (official requirements)

Table 4 Non-metal trace elements in soils

Non-metals	Levels in soils (mg/kg)					
	A) normal values Quality class A1 (agrarian tillage) after „Bundesabfallwirtschaftsplan 2017 – Tab. 80”  <b>applicable for excavated soil</b>		B) alert threshold ÖNORM S 2088-1  <b>applicable for contaminated sites</b>		C) intervention threshold ÖNORM S 2088-1  <b>applicable for contaminated sites</b>	
Values based on use category	A1	A2	Sensitive B1	Less sensitive B2	Sensitive C1	Less sensitive C2
BTEX	0,5		6	6		
KW-Index	50/100/200		100	100	500/1000	
PAK (16 compounds)	2		4	10		
PAK (Benz[a]pyrene)	0,2		4	10	100	
PCB (7 compounds)	0,1					
Benzol			1	1		
Naphtaline			1	5		

Table 5 Non-metal trace elements in river water

Trace Element	Levels in river water(µg/l)					
	A)normal values		B>alert threshold QZV-Chemistry-OG JD-UQN <b>Thresholds for annual average concentrations</b>		C)intervention threshold QZV-Chemistry-OG ZHK-UQN <b>Thresholds for maximum concentrations</b>	
Values based on use category	A1	A2	Sensitive B1	Less sensitive B2	Sensitive C1	Less sensitive C2
Ammonium				Based on calculations		
AOX				50		
Benzidine				0,1		
Benzyl chloride				10		
Bisphenole A				1,6		
Chlordane				0,002		
Chloroacetic acid				0,6		
Cyanide				5		
Dibutyltincompounds				0,01		
1,2-Dichlorethene				10		
2,4-Dichlorphenole				2		
2,5-Dichlorphenole				20		
1,3-Dichlor-2-propanole				10		
Dimethylamine				10		
EDTA				50		
Ethylbenzole				10		
Fluoride				1000		
Isopropyl benzole				22		
LAS (Linear Alkylbenzol sulfonate)				270		
Mevinphos				0,01		
Nitrite						
Nitilotriacetic acid				50		
Omethoate				0,01		
Pentachlornitrobenzole				0,4		
Phosalone				0,1		
Sebuthylazin				0,01		
Trichlorfone				0,01		
Xylole				10		
Alachlore				0,3		0,7
Aldrine				Σ 0,01		n. a.
Anthracene				0,1		0,1
Atrazine				0,6		2
Benzole				10		50
Brominated diphenyl ether						0,14
C10-13 Chloralkane				0,4		1,4
Chlorfenvinphos				0,1		0,3
Chlorpyrifos				0,03		0,1
p,p'-DDT				0,01		n. a.
DDT total				0,025		n. a.

1,2-Dichlorethane				10		n. a.
Dichlormethane				20		n. a.
Dieldrine				Σ 0,01		n. a.
Di-(2-ethyl-hexyl)phthalat (DEHP)				1,3		n. a.
Diuron				0,2		1,8
Endosulfan				0,005		0,01
Endrin				Σ 0,01		n. a.
Fluoranthen				0,0063		0,12
Hexachlorbenzol						0,05
Hexachlorbutadien						0,6
Hexachlorcyclohexan				0,02		0,04
Isodrin				Σ 0,01		n. a.
Isoproturon				0,3		1
Naphthalin				2		130
Nonylphenol (4-Nonylphenol)				0,3		2
Octylphenol ((4-(1,1',3,3'-Tetramethylbutyl)phenol))				0,1		n. a.
Pentachlorbenzol				0,007		n. a.
Pentachlorphenol				0,4		1
Polycyclic aromatic hydrocarbons (PAK)						
Benzo(a)pyrene				0,00017		0,27
Benzo(b)fluoranthene				10)		0,017
Benzo(k)fluoranthene				10)		0,017
Benzo(g,h,i)-perylene				10)		0,0082
Indeno(1,2,3-c,d)pyrene				10)		n. a.
Simazin				1		4
Tetrachlorethene				10		n. a.
Tetrachlormethane				12		n. a.
Tributyltincompounds (Tributyltin-Kation)				0,0002		0,0015
Trichlorbenzole				0,4		n. a.
Trichlorethen				10		n. a.
Trichlormethan				2,5		n. a.
Trifluralin				0,03		n. a.
Dicofol				0,0013		n.a.
Perfluoroktansulfonacid and Derivate (PFOS)				0,00065		36
Quinoxifen				0,15		2,7
Perfluoroktansulfonacid and derivative						n.a.
Aclonifene				0,12		0,12
Bifenox				0,012		0,04
Cybutryne				0,0025		0,016
Cypermethrine				0,00008		0,0006
Dichlorvos				0,0006		0,0007
Hexabromcyclododecan (HBCDD)				0,0016		0,5
Heptachlor und Heptachlorepoxid				0,0000002		0,0003
Terbutryn				0,065		0,34

*n.a. not applicable*



Table 6 Non-metal trace elements in drinking water

Trace Element	Levels in drinking water(µg/l)					
	A)normal values		B) alert threshold QZV-Chemistry-GW <b>Applicable for groundwater / bodies of groundwater</b>		C) threshold for drinking water <b>Drinking Water Ordinance (no differentiation between sensitive and less sensitive)</b>	
Values based on use category	A1	A2	Sensitive B1  thresh old value	Less sensitive B2  Initial point of reversal of the trend	Sensitive C1	Less sensitive C2
Fluoride					1500	1500
Selenium					10	10
Cyanide					50	50
Boron			900	750	1000	1000
Acrylamide					0,1	0,1
Antimony					5	5
Benzol			0,9	0,75	1	1
Benzo-(a)-pyren					0,01	0,01
Bromate					10	10
1,2-Dichlorethan			2,7	2,25	3	3
Epichlorohydrine					0,1	0,1
Nitrate			45.000	37.5000	50.000	50.000
Nitrite			90	75	100	100
Pesticide			0,1	0,075	0,1	0,1
Aldrin			0,03	0,0225	0,03	0,03
Dieldrin			0,03	0,0225	0,03	0,03
Heptachlor			0,03	0,0225	0,03	0,03
Heptachlorepoxid			0,03	0,0225	0,03	0,03
Pesticide total			0,5	0,375	0,5	0,5
Polycyclic aromatic hydrocarbons			0,09	0,075	0,1	0,1
Tetrachlorethen und Trichlorethen			9	7,5	10	10
Trihalomethane total			27	22,5	30	30
Vinyl chloride					0,5	0,5
Conductibility (20°C)		µS/cm	2250	1875	2500	2500
Sulfate			225.000	187.500	250.000	250.000
Orthophosphate			300	225		
Ammonium			450	375	500	500
Chloride			180.000	150.000	200.000	200.000
Hydrocarbon-Index			100	75		

Ad A) normal values:

- data are available in the report „Hydrochemie und Hydrogeologie der österreichischen Grundwässer und deren natürliche Metall- und Nährstoffgehalte (Update GeoHint 2018)“ – focus on natural metal and nutrient content of groundwater in Austria
- water inspections of the water suppliers (official requirements)

Please complete the list of HSs according to national documents with:

- Table of Polycyclic Aromatic Hydrocarbons –PAHs,
- Table of Polychlorinated Biphenyls-PCBs,
- Table of microbiological parameters, as well as other parameters that are provided in national legislations

Drinking Water Ordinance: Microbiological parameters

Indication parameter	Value	Unit
KBE 22 (colony forming unit at 22 °C Incubation temperature)	100	Quantity/ml
KBE 37 (colony forming unit at 37 °C Incubation temperature)	20	Quantity/ml
coliform bacteria	0	Quantity/100 ml
Escherichia coli	0	Quantity/100 ml
enterococci	0	Quantity/100 ml
Clostridium perfringens (including spores)	0	Quantity/100 ml
Pseudomonas aeruginosa	0	Quantity/100 ml

**I.3 Quality objectives for hazardous substances (please complete the tables of HSs according to national documents)**

Dangerous substance (HS)	Water quality objective (µg/l) QZV-Chemistry-OG ZHK-UQN <b>Thresholds for maximum concentrations</b>	Quality target for sediment (mg/kg)	Quality objective for biocenosis (mg/kg) µg/kg weight in wet conditions QZV-Chemistry-OG  UQN <b>(environmental quality standard)</b>
Brominated diphenyl ether	0,14		0,0085
Fluoranthene	0,12		30
Hexachlorbenzole	0,05		10
Hexachlorbutadien	0,6		55
Benzo(a)pyrene			5
Benzo(b)fluoranthene			
Benzo(k)fluoranthene			
Benzo(g,h,i)-perylene			
Indeno(1,2,3-c,d)pyrene			
Dicofol	n.a.		33
Perfluoroktansulfonacid and derivative (PFOS)	36		9,1
Dioxine and dioxinlike compounds	n.a.		Summe PCDD+PCDF+PCB-DL 0,0065 µg/kg TEQ (14)
Hexabromcyclododecane (HBCDD)	0,5		167
Heptachlore and Heptachlorepoxyde	0,0003		0,0067
Quicksilver und Quicksilvercompounds	0,07		20

**I.4 Listing of analytical standards (national analytics and international e.g. USEPA, ASTM, etc.) recommended in documents for chemical, physical, microbiological analyzes of samples**

Element	National analytical standards					International analytical standards					“in-house” developed methods”		
Mercury in drinking water						USEPA-Method 245.1.							
Mercury (Hg) in solids samples (sediments)						-EPA Method 7473  -U.S. EPA Method 245.5(CVAAS)  -ASTM D6722 - thermal decomposition *  -ASTM D6414-99 (wet digestion)							
Etc.													

\*ASTM=American Society for Testing and Materials

**I.5. List of chronic or acute toxicity tests and determination of bioaccumulation or persistence in biota according to the specificity of the dangerous substance in the trophic chain (Ex: Microtox test - The potential ecological impacts of anaerobic degradation of vegetable oil on freshwater sediments; Hyalella Azteca etc).**

Links for toxicological data:

- Priority Compound dossiers:
  - o Dossiers 2012: <https://circabc.europa.eu/w/browse/2266abad-7e2f-4380-83b8-623c5526d3f6>
  - o Dossiers 2006: <https://circabc.europa.eu/w/browse/8d2c7c28-358e-4ddf-8a0e-149f6667c19f>
- Priority Draft Dossiers: <https://circabc.europa.eu/w/browse/83a33797-b5fe-47ea-810a-a98ce3f12146>
- Data Base UBA-DE ETOX: <https://webetox.uba.de/webETOX/public/search/ziel/open.do>
- Registration REACH ECHA-DB: <https://echa.europa.eu/de/information-on-chemicals/registered-substances>
- Dossiers after PSM and Biocide-Products VO: <https://efsa.onlinelibrary.wiley.com/#>

Chronicle und acute assesement criteria for water:

- NL: <https://rvszoekstelsysteem.rivm.nl/>
- CH: <https://www.oekotoxzentrum.ch/expertenservice/qualitaetskriterien/qualitaetskriterienvorschlaege-oekotoxzentrum/>

DE: <https://webetox.uba.de/webETOX/public/search/ziel/open.do>

**I.6 List of national, and international guides of techniques on the design of sampling, transport, storage, samples preparation (sieving, fraction extraction, separation, etc.) recommended in documents**

Nr		sediment	soil	water
1	sampling	ISO 5667-12:20017 (bottom sediments) <a href="https://www.iso.org/standard/59903.html">https://www.iso.org/standard/59903.html</a>  ISO 5667-17:2008 (bulk suspended solids) <a href="https://www.iso.org/standard/42891.html">https://www.iso.org/standard/42891.html</a>	ISO 18400-102:2017 <a href="https://www.iso.org/standard/62843.html">https://www.iso.org/standard/62843.html</a>	ISO 5667-1:2006 (water in general) <a href="https://www.iso.org/standard/36693.html">https://www.iso.org/standard/36693.html</a>  ISO 5667-6:2014 (rivers and streams) <a href="https://www.iso.org/standard/55451.html">https://www.iso.org/standard/55451.html</a>  ISO 5556-11:2009 (groundwater) <a href="https://www.iso.org/standard/42990.html">https://www.iso.org/standard/42990.html</a>  ISO 5667-4:2016 (lakes) <a href="https://www.iso.org/standard/55450.html">https://www.iso.org/standard/55450.html</a>  ISO 19458:2006 (sampling for microbiological analysis) <a href="https://www.iso.org/standard/33845.html">https://www.iso.org/standard/33845.html</a>
2	Transport, storage			ISO 5667-3:2018

				<a href="https://www.iso.org/standard/72370.html">https://www.iso.org/standard/72370.html</a>  ISO 5667-4:2016 (lakes) <a href="https://www.iso.org/standard/55450.html">https://www.iso.org/standard/55450.html</a>
3	Soil quality. Pedology		ISO 13.080 <a href="https://www.iso.org/ics/13.080/x/">https://www.iso.org/ics/13.080/x/</a>	
4	Soil quality -- Measurement of the stability of soil aggregates subjected to the action of water		ISO 10930:2012 <a href="https://www.iso.org/standard/46433.html">https://www.iso.org/standard/46433.html</a>	
5	Soil quality -- Pretreatment of samples for physico-chemical analysis		ISO 11464:2006 <a href="https://www.iso.org/standard/37718.html">https://www.iso.org/standard/37718.html</a>	

## **I.7 Specify the recommended remedy measures associated with the contents of the hazardous substances (alert threshold, intervention threshold)**

There are no fundamental countrywide strategies (z.B. 4. scavenge for purification plants) in Austria (for example in Swiss there is one). If monitored substances in of the purification plants outgo the limit of the content, actions has to be made.

<https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=20004638>

### **Abschnitt II**

#### **Vergleich mit der JD-UQN**

(Liegt ein arithmetischer Mittelwert unter der Bestimmungsgrenze, so wird dieser Wert als „unter der Bestimmungsgrenze“ liegend bezeichnet. Für den Fall, dass die in den Anlagen A und B genannte JD-UQN kleiner oder gleich der Bestimmungsgrenze ist, wird ein als „unter der Bestimmungsgrenze“ liegend bezeichneter arithmetischer Mittelwert nicht für die Beurteilung der Einhaltung der JD-UQN herangezogen.

Bei den Parametern der Anlage A, Tabelle A.2, Nummer 2, Anlage B, Tabelle B.1, Nummer 1 und Nummer 22 und Tabelle B.2, Nummer 3 und 6 ist der Wert der JD-UQN von physikalisch-chemischen Hilfsparametern abhängig. Die JD-UQN ist dann überschritten, wenn der arithmetische Mittelwert aller in einem Kalenderjahr ermittelten Konzentrationsquotienten größer ist als eins. Die Konzentrationsquotienten ergeben sich aus dem Verhältnis der gemessenen Konzentration des Parameters und dem maßgeblichen Wert der JD-UQN bei den gleichzeitig gemessenen Konzentrationen der physikalisch-chemischen Hilfsparameter gemäß Anlage A und B (Wasserhärte, pH-Wert, Temperatur bzw. Chlorid). Bei der Berechnung der Konzentrationsquotienten sind die Konventionen gemäß Abschnitt I anzuwenden.)

während die ZHK-UQN die akute Toxizität anzeigt – und daher grundsätzlich nicht übertroffen werden sollen – hier gilt aber in AT:

### **Abschnitt III**

#### **Vergleich mit der ZHK-UQN**

(Beim Parameter der Anlage A, Tabelle A.2, Nummer 2, ist der Wert der ZHK-UQN von einem physikalisch-chemischen Hilfsparameter abhängig. Die ZHK-UQN ist dann überschritten, wenn der 90-Perzentil-Wert der in einem Kalenderjahr ermittelten Konzentrationsquotienten größer ist als eins. Die Konzentrationsquotienten ergeben sich aus dem Verhältnis der gemessenen Konzentration des Parameters und dem maßgeblichen Wert der ZHK-UQN bei der gleichzeitig gemessenen Konzentration des physikalisch-chemischen Hilfsparameters gemäß Anlage A (Wasserhärte). Bei der Berechnung der Konzentrationsquotienten sind die Konventionen gemäß Abschnitt I anzuwenden.)

## **II PRACTICES, EXPERIENCES**

Information on surface water and groundwater (typology, state, hydrochemistry, isotopes, quality, contamination, risks, measuring stations, protection zones) in Austria is publicly available via the Water Information System Austria: <https://maps.wisa.bmnt.gv.at/gewaesserbewirtschaftungsplan-2015>

**II.1. Significant national, European, finalized or ongoing projects related to geochemistry of waters, soils, sediments in the Danube basin**

No.	Project title (national language, if available)	Project Title (EN)	Year	Country	Project coordinators, Partners
1	Geochemischer Atlas von Österreich	Geochemical Atlas of Austria	2015	AT	Pirkl, H., Schedl, A. & Pfeleiderer, S.
2	Hydrochemie und Hydrogeologie der österreichischen Grundwässer und deren natürliche Metall- und Nährstoffgehalte (Update GeoHint 2018)	Hydrochemistry and hydrogeology of Austrian groundwaters and their natural metal and nutrient content	2018	AT	Philippitsch, R. & Humer, F.
3	Referenzwerte für Schwermetalle in Oberböden	Guideline values for heavy metals in top soils	2004	AT	Schwarz, S. & Freudenschuss, A.
4	EUWI+East	European Water Initiative for Eastern Partnership	2020	EU	

1 – finalized national project on stream sediment quality

2 – finalized national project on groundwater quality

3 – finalized national project on soil quality

4 – ongoing EU project for sustainable management of water resources



## II.2. Significant scientific papers, books, related to geochemistry of waters, soils, sediments in the Danube basin

No.	Paper title (national language, if available)	Title (EN)	Year	Country	Authors
1		Guidance document No. 25 on chemical monitoring of sediment and biota under the water framework directive	2010	EU	Dulio, V., Carere, M., Hanke, G., Polesello, S., David, M. & Sollazzo, C.
2		Intercalibration of Methods for Analysis of Biological Quality Elements (BEC) for Surface Water Types in Bulgaria, Corresponding to Common European Types in Geographical Intercalibration Groups	2016	AT/BG	
3		HESTIA – Harmonisation and Evaluation of Sampling Techniques in the Aquatic Environment	2013	AT/SK	
4		Statistical aspects of the identification of groundwater pollution trends, and aggregation of monitoring results	2001	AT/EU	

### II.3 Existent waterbodies and sampling sites (Ramsar, Natura2000 etc.) and current quality monitoring stations of the Danube River

Danube River Quality Monitoring Stations can be viewed via the water information system Austria (Wisa):

<https://maps.wisa.bmnt.gv.at/gewaesserbewirtschaftungsplan-2015>

Name	Latitude N (WGS84)	Longitude E (WGS84)
Wolfsthal	48,14031136340	17,04749894210
Hainburg	48,16261283060	16,99068398000
Wildungsmauer	48,11647690420	16,80318319650
Donaustadt	48,15941662830	16,51785343710
Mannswörth	48,15682908060	16,51579988430
Wien-Nußdorf	48,26250773990	16,37073919290
Langenzersdorf	48,30646351220	16,34478456660
Theiß	48,38740544490	15,69095615750
Oberloiben	48,38861764830	15,52347751430
Schönbühel	48,24921867020	15,35934159870
Ybbs-Persenbeug	48,19111531070	15,06536531700
Enghagen	48,23936158860	14,51117985550
Enghagen-Kronau	48,23526924370	14,46732691890
Abwinden/Asten	48,24794642490	14,42757013580
Linz-St.Margareten	48,30816020050	14,24794176120
Felsenhütt	48,55069840590	13,64147010620
Hinding	48,58468214940	13,52764414530

### II.4.Data and metadata availability (including information on ambient or natural concentrations of HSs for establishing intervention measures)

Chemical analyses can be downloaded from the Austrian water quality database via

<https://wasser.umweltbundesamt.at/h2odb/fivestep/abfrageQdPublic.xhtml>

In the data base, only one of the 17 above-mentioned stations (Hainburg) contains recent sediment analyses (concentrations of organic compounds in 2014).

**The list of past or current economic polluters referring to the direct effect on the quality of sediment in the Danube (the HSs whose possible concentrations are likely to be exceeded), information on the HSs biological effects, evidence of impact of anthropogenic activities.**

See ICPDR-data base “Accident risk sites” and “Contaminated sites”

### II.5.Problems of current monitoring procedures in DRB

Monitoring in Austria is carried out in accordance with the WFD.

### III. INVENTORY OF SAMPLING METHODOLOGIES

#### III.1. Water

III.1.1. Sampling design strategy. How do you choose sampling locations, number of sites, sampling position within the national Danube sector, distance from confluence points, distance from point industry/agriculture polluters, distance from big cities, sampling depth, distance from the water course/bodies banks? How do you decide about temporal frequency of collecting samples?

Water sampling, transport and conservation are standardized by the Austrian norm ÖNORM EN ISO 5667.

Sampling by the Federal Environment Agency Austria (UBA) follows a fixed design of location and number of sampling sites. Sampling frequency of water at risk is 4 times per year. Surface water sampling frequency is 1 time per month, additional sampling is carried out sporadically depending on governmental contract or running project.

III.1.2. Which parameters of water **quality/quantity** are measured *in situ*?

electrical conductivity, water temperature, pH, redox potential, oxygen content, discharge

III.1.3. Which **instruments** are used for *in situ* measurements (include manufacturer and type)?

electrical conductivity, water temperature: WTW Type 3320 with sensor Tetra Con 325

pH: Type 3320 with sensor SenTix 41 (WTW)

oxygen content: Type Multi 3630 IDS with sensor FDO® 925 (WTW)

redox potential: Type pH 330 with sensor SenTix ORP (WTW)

discharge: WTW Type 3320 with sensor Tetra Con 325;

MRS-4 Trace (Sommer)

Unversal Current Meter F1 (SEBA)

Starflow Model 6526 (Unidata)

III.1.4. Please, describe **methodology** for *in situ* measurements.

electrical conductivity, water temperature, pH, redox potential, oxygen content:

multi-parameter portable meters

calibration of instruments prior to measurement campaign (for pH every morning, for oxygen before each measurement)

discharge:

bucket-and-stop-watch

salt tracer dilution

stream gauges + rating curves (water level / discharge)

V-notch weirs

hydrological impeller current meter

ultrasonic Doppler instrument (Starflow)

III.1.5. Which **tools** are used for collecting samples for **laboratory** measurements (include manufacturer and type)?

pumps, syringes, filters (0.45 µm), disposable (one-way) plastic bottles

III.1.6 Sample preservation (samples chemical preservation according to their type and used analysis method).

acidification with nitric acid (0.5 ml for 50 ml sample volume)

III.1.7 Please, describe a **methodology** for collecting samples

pre-rinsing of bottles, filtration of water before filling bottles, acidification of sample, cooling during transport, lab analysis max 1-2 days after sampling

### III.2 Sediment

Sampling of stream sediments is standardized by the Austrian norm ÖNORM G 1031

III.2.1. Which type(s) of sediment do you sample/measure **bottom**, **suspended**, **floodplain**?

Geological Survey of Austria: bottom and floodplain.

Environment Agency Austria: bottom, floodplain and suspended

III.2.2. Sampling design strategy. How do you choose sampling locations?  
How do you decide about temporal frequency of collecting samples?

one sampling site per 10 km<sup>2</sup>, at least on site per catchment (up to highest order) no mayor rivers except downstream of emitters (settlements, industrial sites, treatment plants etc.), only sites with active sediment (for river beds), double sampling for quality control every 50th sample

III.2.3. Which parameters of sediment **quality/quantity** are measured *in situ*?

electrical conductivity, pH, redox potential (in water saturated sediment)

III.2.4. Which appropriate sampling devices (e.g. GRAIFER, CAROTIER etc.) and instruments are used for *in situ* measurements (include manufacturer and type)?

devices for sampling: stainless steel shovels and sieves (according to DIN 4188)

instruments for in-situ measurements: see III.1.3.

III.2.5. Please, describe **methodology** for *in situ* measurements.

multi-parameter portable meters

calibration of instruments prior to measurement campaign (for pH every morning)

III.2.6. Which **tools** are used for collecting samples for **laboratory** measurements (include manufacturer and type)?

stainless steel shovels and sieves (according to DIN 4188), paper bags

III.2.7. Please, describe a **methodology** for collecting samples for **laboratory** measurements.

in-situ sieving to <180µm and <40µm grain size (two samples per site!)

drying of sample at ambient temperature (<30°C) until water content <2 mass-%

crushing of components which agglomerated during drying using porcelain mortar

filling sample in polyethylene bottles (2 bottles per sample, one for analysis, one retention sample)

III.2.8. Please, describe a **transport** methodology for samples intended for laboratory measurements.

no specific methodology

III.2.9. Do you **archive** samples? If yes, please describe how.

retention samples kept in dry, dark room until project completion

### III.3 . Biota

Biota are not sampled by the Geological Survey of Austria. The Environment Agency Austria collects biota samples according to the GZÜV-monitoring network. Detailed information on sampling/measuring/analysing is not available.

III.3.1. Which type(s) of **biota** do you sample/measure: **flora, fauna** (name species)?

III.3.2. Sampling design strategy. How do you choose sampling locations? How do you decide about temporal frequency of collecting samples?

III.3.3. Which parameters of biota **quality/quantity** are measured *in situ*?

III.3.4. Which **instruments** are used for *in situ* measurements (include manufacturer and type)?

III.3.5. Please, describe **methodology** for *in situ* measurements.

III.3.6. Which **tools** are used for collecting samples for **laboratory** measurements (include manufacturer and type)?

III.3.7. Please, describe a **methodology** for collecting samples for **laboratory** measurements.

III.3.8. Please, describe a **transport** methodology for samples intended for laboratory measurements.

III.3.9. Do you **archive** samples? If yes, please describe how.

**[PLEASE, SUPPORT YOUR ANSWERS WITH REFERENCES (NATIONAL LEGISLATIVE DOCUMENTS AND/OR WEB LINKS)]**

## IV. INVENTORY OF LABORATORY METHODOLOGIES

Hydrochemical analyses are standardized by Austrian / international norms:

- ÖNORM M 6616 (Determination of temperature)
- DIN 38404 (physical and physico-chemical parameters)
- DIN 38409 (parameters characterizing effects and substances)
- DIN EN ISO 17294 (Application of inductively coupled plasma mass spectrometry (ICP-MS))
- DIN EN ISO 10304 (Determination of dissolved anions by liquid chromatography of ions)

Laboratory requirements are prescribed by the ordinance for the qualification of chemical laboratories (“Chemische Laboratorien-Verordnung”) [https://www.ris.bka.gv.at/Dokumente/BgblPdf/2003\\_36\\_2/2003\\_36\\_2.pdf](https://www.ris.bka.gv.at/Dokumente/BgblPdf/2003_36_2/2003_36_2.pdf)

The following sections (IV.1. – IV.2.1-8) describe the laboratory methodologies used by the Department of Geochemistry of the Geological Survey of Austria.

**IV.1.** How do you **mechanically prepare samples** for measurement (drying, sieving, grinding, homogenization, etc.)?

- a) Water – filtration (0,45 µm)

- b) sediment  
sample preparation according to standard methods involving crushing, grinding, sieving (disk mill) (grain size <60 µm).
- in-situ sieving to <180µm and <40µm grain size (two samples per site!)
  - drying of sample at ambient temperature (<30°C) until water content <2 mass %
  - crushing of components which agglomerated during drying using porcelain mortar
  - filling sample in polyethylene bottles (2 bottles per sample, one for analysis, one retention sample)
- c) biota – The Geological Survey of Austria does not analyse biota.

## IV.2 Chemical analysis systems

Granulometric analysis (information on the correlation of particle sizes and the absorption of toxic metals or metal compounds in sediments).

Analytical methods (including sample preparation: e.g. acid digestion, etc.) for the hazardous substance analyzed in agreement with the matrix in which it is being analyzed (water, sediment, sludge).

Type of analytical equipments.

Description of internal procedures

**IV.2.1. Organic matter.** What is the **procedure** for **organic matter** content determination in water and sediment?

The Geological Survey of Austria does not analyse organic matter.

### IV.2.2. ICP-MS, ICP-AES systems

IV.2.2.1. Which system of analysis do you use (ICP-MS, ICP-AES, etc.)? Please, include manufacturer and type.

ICP-MS 7500 Agilent, manufacturer, Mettler Toledo T 70 (for HCO<sub>3</sub>) manufacturer, ICS-2000 Dionex (for Cl<sup>-</sup>, SO<sub>4</sub><sup>-2</sup>, NO<sub>3</sub><sup>-</sup>, F<sup>-</sup>) manufacturer.

IV.2.2.2. Which **elements (HSs)** do you measure by this system? Please, state **detection limits** for measured elements (HSs).

<b>Element</b>	<b>System</b>	<b>Method</b>	<b>Detection limit</b>
pH	TA 20 plus + N62 (Schott)	DIN 38404-C5 (DEV)	-
el. conductivity - $\mu\text{S/cm}$	WTW Cond 330i + TetraCon 325	DIN 38404-C8 (DEV)	-
Calcium ( $\text{Ca}^{2+}$ ) – mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,01
Magnesium ( $\text{Mg}^{2+}$ ) – mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,001
Sodium ( $\text{Na}^+$ ) – mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,01
Potassium ( $\text{K}^+$ ) – mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,05
Strontium ( $\text{Sr}^{2+}$ ) – mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,001
Barium ( $\text{Ba}^{2+}$ ) mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,0001
Lithium ( $\text{Li}^+$ ) – mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,0001
Rubidium ( $\text{Rb}^+$ ) – mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,0001
Caesium ( $\text{Cs}^+$ ) – mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,0001
Iron ( $\text{Fe}^{2+}$ ) – mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,001
Manganese ( $\text{Mn}^{2+}$ ) – mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,0001
Aluminium (Al) – mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,0001
Arsenic (As) – mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,001
Cadmium (Cd) – mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,0001
Cobalt (Co) – mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,0001
Chromium (Cr) – mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,0001
Copper (Cu) – mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,0001
Mercury (Hg) – mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,0001
Molybdenum (Mo) – mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,0001
Nickel (Ni) – mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,0001
Lead (Pb) – mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,0001
Antimony (Sb) – mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,0001



Silicon (Si) - mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,0001
Uranium (U) – mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,0001
Vanadium (V) – mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,0001
Zinc (Zn) – mg/l	ICP – MS 7500 (Agilent)	DIN EN ISO 17294-2	0,001
Alkalinity(mmol/l)	TA 20 plus + N62 (Schott)	ÖNORM EN ISO 9963-1 (mod.)	0,4
Hydrogen carbonate (HCO <sub>3</sub> <sup>-</sup> ) –mg/l	-	calculated according to ÖNORM EN ISO 9963-1	25
Chlorine (Cl <sup>-</sup> ) – mg/l	IC DX 100 (Dionex)	DIN EN ISO 10304-1	0,5
Sulphate (SO <sub>4</sub> <sup>2-</sup> ) – mg/l	IC DX 100 (Dionex)	DIN EN ISO 10304-1	0,5
Nitrate (NO <sub>3</sub> <sup>-</sup> ) – mg/l	IC DX 100 (Dionex)	DIN EN ISO 10304-1	0,5
o-Phosphate (PO <sub>4</sub> <sup>3-</sup> ) – mg/l	IC DX 100 (Dionex)	DIN EN ISO 10304-1	1
Fluorine (F <sup>-</sup> ) – mg/l	IC DX 100 (Dionex)	DIN EN ISO 10304-1	0,05
Ammonium (NH <sub>4</sub> <sup>+</sup> ) – mg/l	Universal photometer NANOCOLOR 400 D (Machery-Nagel)	Mod. DIN 38 406-E5-1	0,01
Nitrite (NO <sub>2</sub> <sup>-</sup> ) – mg/l	Universal photometer NANOCOLOR 400 D (Machery-Nagel)	Mod. DIN EN 26 777-D10	0,005

IV.2.2.3. Please, describe **sample preparation and procedure** for these measurements (microwave acid digestion, another disintegration procedure, gas velocity, temperature of atomization, mirrors position, nebulizer type, excitation power, wavelengths etc.).

100 mg of the sample is transferred to a Pt-dish, mixed with 2.5 ml HNO<sub>3</sub> (65%), 2.5 ml HClO<sub>4</sub> (60%) and 5 ml HF (40%). This solution is concentrated to near dryness. Then 5 ml HNO<sub>3</sub> (65%) is added to the residue and the solution is heated two times until all fumes evaporate. Finally, the residue is mixed with 0.5 ml HNO<sub>3</sub> (65%) and diluted with 50 ml H<sub>2</sub>O. This dilution is analysed using the ICM-MS 7500 ce (Agilent). The following elements are measured: Li, Be, V, Cr, Co, Ni, Cu, Zn, Ga, Ge, As, Rb, Sr, Nb, Mo, Ag, Cd, In, Sn, Sb, Cs, Ba, Hf, Ta, W, Pb, Bi, U.

To guarantee the quality of measurement some control standard are also measured.

IV.2.2.4. How do you calculate **accuracy and precision** (references)?

With certified standards and repeat determination

### IV.2.3. AAS systems

The Geological Survey of Austria has no AAS system.

### IV.2.4. XRF

IV.2.4.1. Please, state manufacturer and type of XRF(EDXRF,WDXRF) instrument you use.

Epsilon 5, manufacturer PANAnalytical, C/S analyzer LECO CS-200, manufacturer LECO (for total carbon and total sulphur)

IV.2.4.2. Which **elements and/or compounds** (HSs) do you measure by **XRF**?

Al<sub>2</sub>O<sub>3</sub>, As, Ba, CaO, Cr, FeO, K<sub>2</sub>O, MgO, MnO, Na<sub>2</sub>O, Ni, P<sub>2</sub>O<sub>5</sub>, Pb, Rb, SiO<sub>2</sub>, Sr, V, Y, Zn und Zr

Please, state **detection limits** for measured elements and/or compounds (HSs).

For Epsilon 5

Element	Detection limit	Element	Detection limit
SiO <sub>2</sub>	1 %	Na <sub>2</sub> O	0.1 %
TiO <sub>2</sub>	0.01 %	K <sub>2</sub> O	0.01 %
Al <sub>2</sub> O <sub>3</sub>	0.01 %	P <sub>2</sub> O <sub>5</sub>	0.01 %
FeO	0.01 %		
MnO	0.01 %		
MgO	0.1 %		
CaO	0.05 %		

Element	Detection limit	Element	Detection limit
As	1 ppm	Nd	1 ppm
Ba	1 ppm	Ni	1 ppm
Cd	1 ppm	Pb	1 ppm
Ce	1 ppm	Pr	1 ppm
Co	1 ppm	Rb	1 ppm
Cr	1 ppm	Sr	1 ppm
Cs	1 ppm	V	1 ppm
Cu	1 ppm	Y	1 ppm
La	1 ppm	Zn	1 ppm
Nb	1 ppm	Zr	1 ppm

For LECO C/S 200

Element detection limit

C<sub>Tot</sub> 0,002 %

S<sub>Tot</sub> 0,002 %

IV.2.4.3.

Please, describe **preparation of the sample and procedure** for XRF measurements.

Sample preparation follows a standardised method involving crushing, grinding, sieving (disk mill) (grain size <60 µm) and preparation of pressed pellets.

IV.2.4.4. How do you calculate **accuracy and precision** (references)?

With certified standards and repeat determination

#### **IV.2.5 DC-arc –AES**

The Geological Survey of Austria has no DC-arc-AES.

#### **IV.2.6. Radionuclides**

The Geological Survey of Austria does not analyse radionuclides.

#### **IV.2.7. Organic compounds (HSs)**

The Geological Survey of Austria does not analyse organic compounds.

#### **IV.2.8. XRD**

IV.2.8.1. Please, state manufacturer and type of XRD instrument you use.

X-Ray diffraction: PANalytical X'Pert Pro Powder  
Measuring conditions between 3° 2 Theta to 70° 2 Theta  
Goniometer PW3050/60 (Theta/Theta)  
Cu-K $\alpha$ -radiation (40kV, 40mA)  
PIXel-detector  
Continuous scans, Step size 0.013°  
Measuring time 10 sec/step

IV.2.8.2. Do you use **XRD for sediment analysis**?

Mineral composition of sediments is determined on bulk un-oriented samples and on oriented aggregates of the < 2µm fraction.

IV.2.8.3. Please, describe **preparation of the sample and procedure** for XRD measurements

Whole rock and clay mineralogy (< 2µm fraction) is determined by XRD at the Department of Mineral Resources of the Austrian Geological Survey.

Samples for bulk mineral analysis are dried, ground and loaded into a sample holder as a randomly oriented powder. The semiquantitative mineralogical composition is obtained by the SEIFERT AutoQuan software using the Rietveld method.

Samples for clay mineral analysis are treated with 15% H<sub>2</sub>O<sub>2</sub> for 24h in order to remove organic matter and subjected to ultrasound for further disaggregation.

The <2 µm fractions are separated by centrifugation. The clay fractions are saturated with 1N KCl and MgCl solutions by shaking for 24h, and thereafter washed in distilled water. Oriented mounts of the <2µm fractions were made through the suction of 25 mg of suspended clay placed on a porous ceramic plate and left to dry at room temperature. Such oriented XRD mounts are subsequently analysed in air-dried, ethylene glycol, dimethylesulfoxide and glycerol treated states. The clay samples are run from 2 – 50 °2θ using the same measurement setup, as in the case of bulk-rock samples. Identification of clay minerals was carried out according to Moore and Reynolds (1997). The clay minerals were identified by their basal (00l) diffraction lines on glycolated specimens of the Mg-treated samples. The relative percentages of the clay minerals in the fraction < 2 µm are determined after Schultz (1964).

**IV.3 Inventory of national laboratories** where dangerous substances are analysed, specifying whether they have accreditations on the quality of analyses (certificate issued by the national body attesting the quality of the analyses), price and time of analyses.

accredited laboratories in Austria:

- MAPAG
- Porr Umwelttechnik
- Wruss
- Seibersdorf
- NUA
- CEWE

**IV.4 Description of "good practices"** in laboratory and "in situ" analysis. For example, ways to convert analytical data obtained from sediment analysis to water quality assessments (taking into account the high cost of water analysis compared to the sediment).

**IV.5 Description of protocols** for intercomparison and intercalibration between laboratories. List of national and international projects which had developed the protocols.

The chemical laboratory of the Geological Survey of Austria periodically takes part in ring trials for soil and water analyses testing the ICP-MS, ICS, photometer and titrator. Methods are described in section IV.2. Intercomparison follows the standard DIN 38402 (esp. Part 42: Interlaboratory trials for method validation, evaluation; Part 45: Interlaboratory comparisons for proficiency testing of laboratories; Part 51 Calibration of analytical methods; Part 60 Quality assurance). Up to 25 laboratories (for soil, 46 laboratories for water) from Austria, Slovenia, Italy and Germany take part in these trials.

**[PLEASE, SUPPORT YOUR ANSWERS WITH REFERENCES (NATIONAL LEGISLATIVE DOCUMENTS AND/OR WEB LINKS)]**

## V .INVENTORY OF EVALUATION METHODS

In Austria, the Environment Agency Austria is responsible for this topic and several units of this agency are involved in evaluation methods. Preliminary discussions with the agency showed, that several weeks to months would be necessary to answer the questions below. If needed, we suggest to discuss this topic again with the Environment Agency Austria.

V.1. How **threshold values** for HSs are set in each type of media (sediment, water, biota)? (e.g. average of the last measured values, average with the treatment of outliers, average of the values measured in areas without anthropogenic influence, enrichment factor, conservative **elements** for normalization, etc.).

V.2. Are **threshold values fixed or variable** and do they depend on the sample form, drainage basin lithology, time of the year, etc.?

V.3. Do you use **corrections for threshold values**? (amount of **quartz, organic matter** etc.).

V.4 The environmental quality objectives are based on measuring the total metal concentration and / or some dangerous compounds of that metal in different valence states?

V.5 How the legislation reflects the phenomenon of “bioaccumulation”? Is the type of biota correlated with the ecosystem?

V.6. Does your national legislative find **categories of environment quality** based on deviations from threshold values?

V.7. Can these categories be **defined by quality of more than one medium**?

V.8. Please, describe **algorithm** for **defining** these **categories**? (e.g. weight coefficients).

V.9. How does your legislative framework define **difference** between **contamination** and **pollution**?

V.10. Do you **relate specific HSs** with **sources of contamination and pollution** and how?

V.11. Please, describe **actions** in case of contamination and pollution.

V.12. How do you **present results** in your **reports**, e.g. do you use complex representation for scientific community or simple representation for target groups? Does the report include methodology, full results, QA/QC, models? Are these results public or can be obtained by request?

V.13. Do you have a method for **space-time risk assessment** after determination of contamination and/or pollution?

**[PLEASE, SUPPORT YOUR ANSWERS WITH REFERENCES (NATIONAL LEGISLATIVE DOCUMENTS AND/OR WEB LINKS)]**

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Maritime\PROJECTS\Coasta\DCSBGA\3.Disciplines\Environmental\ES Submission July 2007\Final ES