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Waste Management and Critical Raw Materials – Life Cycle Assessment methodologies

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T.5.1.7. Waste Management and Critical Raw Materials – Life Cycle Assessment methodologies.
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Content:

- Introduction of water, soil and waste sampling principles in mining and industry areas.
- Examples of the sampling methods at the site.
- Description of the soil and waste sample preparation.
- Methods and techniques for samples analysing.

Introduction of water, soil and waste sampling principles in mining and industry areas

Evaluation of the distribution of toxic substances into soil, waste and waters. Samples of waste, soil from the coastal area with content of the tailing, agricultural soil wetted with surface water, agricultural soil without influence of surface wate, surface water samples.

Creation of map of studied areas, influence of mining activities and distribution of pollutants

Examples of the sampling methods at the site

1. Soil/Flotation tailing ISO 18400-102; ISO 10381-8; ISO 18400-101 Samples of soil or flotation tailing 0 - 0.2 m deep below the surface, hand-sampled (ace / shovel)
2. Waste SRPS CEN/TR 15310-1/2/3/4/5/:2009
3. River Sediments EPA 5035, Samples of river sediments sampled by hand sampled (ace / shovel).

Examples of the sampling methods at the site

1. Surface Water Samples, SRPS EN ISO 5667- 1; SRPS EN ISO 5667- 3; SRPS ISO 5667-4; SRPS ISO 5667-6, Surface water samples (river water, accumulation, leaks, streams) sampled by hand tools.
2. Groundwater Samples, SRPS EN ISO 5667- 1; SRPS EN ISO 5667-3; SRPS ISO 5667-11, Groundwater samples from wells sampled by a underwater pump

Examples of the sampling methods at the site

SAMPLING PROTOCOL FOR WATER SAMPLES
SAMPLING PROTOCOL FOR WATER SAMPLES –WELLS
SAMPLING PROTOCOL FOR SOIL SAMPLES
SAMPLING PROTOCOL FOR SEDIMENTS SAMPLES
SAMPLING PROTOCOL FOR WASTE

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Examples of the sampling methods at the site

SAMPLING PROTOCOL FOR WATER SAMPLES

SAMPLING PROTOCOL FOR WATER SAMPLES –WELLS

Sampling Protocol - Water samples /
Протокол Узорковања - Узорци Вода

Project / Пројекат:		Name and identification of location/ Назив и ознака локације: _____		
Sampling date / Датум узорковања:		Sampling point identification / Идентификација тачке узорковања:		
GPS reading / ГПС позиција		N:	E:	Elev (m asl):
Type of sample / Врста узорка	□ Surfacewater / Површинске воде		□ other / друго:	
Sampling method / Метода узорковања:		Sampling equipment / опрема за узорковање:		
Color / Боја				
Odor / Мирис				
Air temperature / Температура ваздуха [°C]				
Water temperature / Температура воде [°C]				
Redox potential / Редокс потенцијал [mV]				
pH-value / pH вредност				
DO (dissolved oxygen)/Растворни кисеоник				
Electric conductivity / Електопроводљивост [mS/m]				
Parameter for flow rate measurement	L (m)	D1 (m)	D2 (m)	D3 (m)
	W (m)	T1 (s)	T2 (s)	T3 (s)
	Dav (m)	Tav (s)	Flow rate (L/min)	
Preparation sample vessel / Припрема посуда за узорак	□ No / не	□ Acid/Киселина: ml □ H2SO4 □ HNO3 □ HCl	□ Bipyridine Solution	□ Base/База: ml □ NaOH
Remarks / Напомена				
Name of sampler / Име узорковача:			Photodocumnentation/Фотодокументација: Y/N	

Examples of the sampling methods at the site

SAMPLING PROTOCOL FOR SOIL SAMPLES
SAMPLING PROTOCOL FOR SEDIMENTS SAMPLES
SAMPLING PROTOCOL FOR WASTE

Sampling Protocol - Sediments / Waste
Протокол узорковања - Седименти / Отпад

Project / Пројекат:	Name and identification of location/ Назив и ознака локације: _____		
Sampling point / Тачке узорковања			
Sample Identifikation / Идентификација узорка			
Coordinates / Координате	N:	E:	Elev. (m asl):
Sampling date / Датум узорковања:			
Depth / Дубина [m from to] (м. од ...до)			
Sediments characterisation / Карактеризација седимената			
Colour / Боја			
Volume of Sample for Chemical Analysis / Волумен узорка на хемиску анализу	□ 1 L □ 2 L□		
Remarks / Напомене			
Name of sampler / Име узорковача:		Photodocumnentation/Фотодокументација:Y/N	

Examples of the sampling methods at the site

Preparing the bottles for storing samples for water samples
Before first use, it is necessary preparation of bottles in accordance with the further procedure:

✓ Prepare 3% HNO3
✓ In each bottle pour 30-40 ml of a 3% HNO3,
✓ Close the bottle and leave it in this position for 3 days,
✓ After 3 days, turn them upside down and leave the next 3 days in this position,
✓ After a total of 6 days of preparation, bottles are ready for further use, and 3% acid from each of bottles can be transferred into new bottles for the preparation (the same acid can be used up to a month).

Containers for water sampling is essential before sampling, rinse three times in the river or water that will be sampling.

Examples of the sampling methods at the site

SAMPLING OF WATER SAMPLES, WATER SAMPLES –WELLS

Examples of the sampling methods at the site

SAMPLING OF SOIL SAMPLES, SEDIMENTS SAMPLES AND WASTE SAMPLES

Examples of the sampling methods at the site

SAMPLING OF MINNING WASTE AND WASTE SAMPLES

Description of the soil and waste sample preparation

Soil – sieving, drying, milling

Waste – drying and milling

Mill

Draying Owen

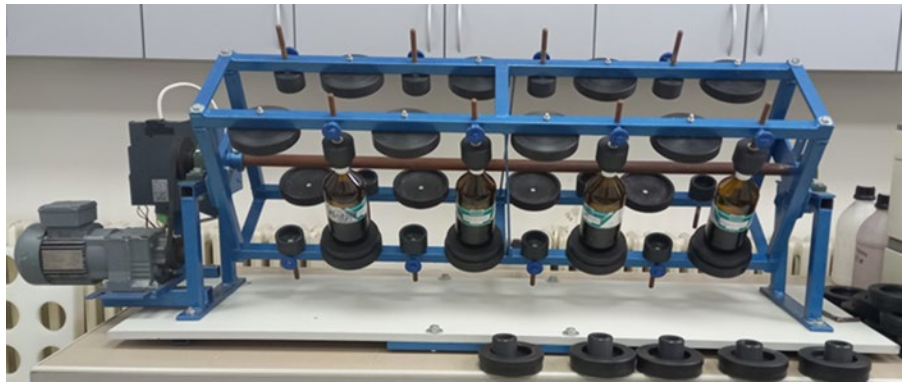
Description of the soil and waste sample preparation

1. Preparation of the Soil samples – digestion in Microwave Owen EPA 3051A

2. Preparation of Waste:
- preparation of leaching solution SRPS EN 12457-2, EPA 1311
- digestion in Microwave Owen or classical chemical methods SRPS EN 13657, SRPS EN 13656

Description of the soil and waste sample preparation

Microwave



Shaker

Air chamber for Humidity test

Methods and techniques for samples analysing

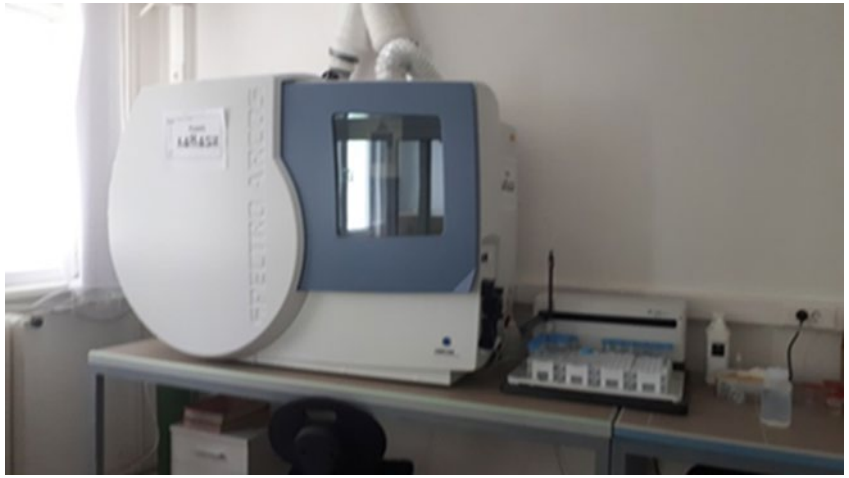
Techniques for soil and waste testing:
- AAS
- GF AAS
- AAS for Hg
- ICPAES
- ICPMS
- XRF
- XRD

Techniques for soil and waste testing:
- GCMS
- GCFID
- GCMS with head spaces
- TOC
- Elemental analyser
- ABA, NAG test for mining waste

Methods and techniques for samples analysing

GF AAS

ICPMS



ICPAES

Description of the soil and waste sample preparation

AAS

AAS for Hg

TOC

Methods and techniques for samples analysing

Elemental analyser CHN

Elemental analyser CS

ABA test, NAG test

Methods and techniques for samples analysing

XRF

XRD

Methods and techniques for samples analysing

GCMS

GCFID

GCMS with head spaces