



European Union Network for the Implementation and Enforcement of Environmental Law

Management of Mining Waste Project



Project Report - Phase 1



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Executive Summary The Mine Waste Directive (2006/21/EC) aims at the correct management of extractive waste and indicates the Management Plan (Article 5) as a useful tool to monitor them from "birth" to "death", which however applies to industries in operation, with a lack of advices about the management of historical ones. The project therefore tries to represent how the other Member States are behaving in relation to historical extractive waste and tries to identify or document case studies on their management, also in relation to the circular economy to evaluate their possible recovery as raw materials.	
Disclaimer This report is the result of the Mine Waste Management project within the IMPEL network. The content does not necessarily represent the view of the national administrations or the Commission.	



Introduction to IMPEL

The European Union Network for the Implementation and Enforcement of Environmental Law (IMPEL) is an international non-profit association of the environmental authorities of the EU Member States, acceding and candidate countries of the European Union and EEA countries. The association is registered in Belgium and its legal seat is in Brussels, Belgium.

IMPEL was set up in 1992 as an informal Network of European regulators and authorities concerned with the implementation and enforcement of environmental law. The Network's objective is to create the necessary impetus in the European Community to make progress on ensuring a more effective application of environmental legislation. The core of the IMPEL activities concerns awareness raising, capacity building and exchange of information and experiences on implementation, enforcement and international enforcement collaboration as well as promoting and supporting the practicability and enforceability of European environmental legislation.

During the previous years IMPEL has developed into a considerable, widely known organisation, being mentioned in a number of EU legislative and policy documents, e.g. the 7th Environment Action Programme and the Recommendation on Minimum Criteria for Environmental Inspections.

The expertise and experience of the participants within IMPEL make the network uniquely qualified to work on both technical and regulatory aspects of EU environmental legislation.

Information on the IMPEL Network is also available through its website at: www.impel.eu



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Premise

This document represents the partial report of a project which during its development was reorganized into two work phases: the first was concluded with the web meeting of 27 April 2020, while the second will take place in the year 2021, due to of the necessary postponement for problems related to the Covid-19 pandemic, which would not have allowed the "complete" conduct of the meetings. In fact, in this project it is often necessary to associate the conferences with study visits, to observe directly in the field the reality of the problems associated with extractive waste storage facilities.

Therefore the objectives of the entire project will be achieved with the conclusion of the second phase, by December 2021, therefore this report represents the first results based on the conclusion of phase 1, sometimes deduced from the answers of the partners and sometimes from official data from the network .

To complete the present and for greater clarity, some contributions presented in the various meetings are attached, sometimes including eventual field trips.



Introduction

Nowadays, after numerous accidents involving mining activities (Val di Stava, Prestavel, Italy 1985, Baia Borsa and Baia Mare, Romania 2000, Aznalcollar, Spain 1998 and many others), the European Commission adopts the Directive 2006/21/EC of 15 March 2006 on the management of waste from extractive industries (known as Mining Waste Directive) and amending Directive 2004/35/EC.

This Directive provides for measures, procedures and guidance to prevent or reduce as far as possible any adverse effects on the environment, in particular water, air, soil, fauna and flora and landscape, and any resultant risks to human health, brought about as a result of the wrong management of waste from the extractive industries in order to better manage the problem. Subsequently, each Member State shall ensure that the mining companies design a waste management plan for the minimisation, treatment, recovery and disposal of extractive waste, taking into account of the principle of sustainable development.

The plan objectives are aimed to:

- prevent or reduce waste production and its harmfulness,
- encourage the recovery of extractive waste by means of recycling, reusing or reclaiming such waste, where this is environmentally sound in accordance with existing environmental standards at Community level and with the requirements of this Directive where relevant,
- ensure short and long-term safe disposal of the extractive waste, in particular by foreseeing, in the design phase, their management during the operation and after closure.

But historical extractive waste does not fall under management through the Extractive Waste Management plans (EWMPs), therefore we would like to find a way to subject it through a procedure that allows it to be managed correctly also with a view to their possible recovery as secondary raw materials.



1. Aims of the Mine Waste Management Project

The DIRECTIVE 2006/21/EC of the European Parliament and of the Council of 15 March 2006 (on the management of waste from extractive industries and amending Directive 2004/35/EC), is aimed at the management of **waste generated by the active mining industries**; the attention to the management of waste from closed activities, disposed of in ponds or heaps, now closed or abandoned, is limited to two articles: art. 20, which provide for the inventory of storage facilities, that represent or could pose a risk to human health or the environment, and art. 21 that encourages the exchange of information between Member States.

<i>Article 20</i>	<i>Article 21</i>
<p data-bbox="370 961 683 989">Inventory of closed waste facilities</p> <p data-bbox="277 1024 776 1220">Member States shall ensure that an inventory of closed waste facilities, including abandoned waste facilities, located on their territory which cause serious negative environmental impacts or have the potential of becoming in the medium or short term a serious threat to human health or the environment is drawn up and periodically updated. Such an inventory, to be made available to the public, shall be carried out by 1 May 2012, taking into account the methodologies as referred to in Article 21, if available.</p>	<p data-bbox="967 894 1187 921">Exchange of information</p> <p data-bbox="829 953 1328 1045">1. The Commission, assisted by the Committee referred to in Article 23, shall ensure that there is an appropriate exchange of technical and scientific information between Member States, with a view to developing methodologies relating to:</p> <ul data-bbox="829 1077 1328 1289" style="list-style-type: none"><li data-bbox="829 1077 1146 1104">(a) the implementation of Article 20;<li data-bbox="829 1136 1328 1289">(b) the rehabilitation of those closed waste facilities identified under Article 20 in order to satisfy the requirements of Article 4. Such methodologies shall allow for the establishment of the most appropriate risk assessment procedures and remedial actions having regard to the variation of geological, hydrogeological and climatological characteristics across Europe. <p data-bbox="829 1325 1328 1394">2. Member States shall ensure that the competent authority follows or is informed of developments in best available techniques.</p> <p data-bbox="829 1430 1328 1541">3. The Commission shall organise an exchange of information between Member States and the organisations concerned on best available techniques, associated monitoring and developments in them. The Commission shall publish the results of the exchange of information.</p>

The project was born with the specific aim of answering the question: is it possible to recover historical extractive waste and what procedure to follow to avoid negative environmental and health impacts?

To achieve this important and ambitious goal it is necessary to refer to the specific legislation (2006/21/EC) and compare the transposition of the same by the Member States: from this comparison, guidelines can emerge with the common objective of enhancing extractive waste,



converting them into secondary raw materials, also on the basis of the experiences already matured in different countries.

But what is extractive waste and how is it considered by the various Member States?

Sometimes the problem arises that extractive waste are considered differently according to local regulations (es Spain ...), in fact what a Member State considers extractive waste may not be for another country. Therefore it is necessary to identify guidelines inspired by the recovery experiences already in progress, which will allow a possible enhancement of these materials.

This would have positive implications in the environmental (eliminating or reducing polluting sources), territorial (freeing up spaces to be reused), employment (mining activities are decreasing) and would embrace the concept of circularity. However, it should not be forgotten that there would always remain waste, residues of the recovery activity and that, in any case, would be made safe or destined for specific landfills but certainly in limited quantities compared to the current ones.



2. Legal Framework and current tendencies

La documentazione normativa utilizzata per il progetto è composta da quella specifica sui rifiuti estrattivi ma anche dalle indicazioni/suggerimenti dettati da altri atti europei, nonché dai riferimenti alle norme nazionali dei Partner di progetto.

- **The Mine Waste Directive (2006/21/EC) provides** for measures, procedures and guidelines to prevent or reduce as far as possible any negative effects on the environment and risks to human health and indicates the waste management plan as a useful tool for achieving these aims. However, this management plan refers to the industries in operation ...

How can we manage extractive waste located in closed or abandoned storage facilities?

- **The opinion of the European Economic and Social Committee on ‘The processing and exploitation, for economic and environmental purposes, of industrial and mining waste deposits in the European Union’ (own-initiative opinion) (2012/C 24/03)¹**, recommends to Member States to promote initiatives for the exploitation and use of "new fields" of raw materials, such as extractive waste. The same opinion suggests to improve recycling and to reduce waste produced by the rock mining, quarrying and metallurgical industries, favoring their recovery and marketing. In any case, treat this type of waste for recovery purposes:
 - can improve the environment and the landscape,
 - can create more suitable jobs and social conditions for the communities concerned,
 - can eliminate/reduce the risk of pollution for people and the environment, which means improving the living conditions in the regions concerned, to the benefit of all.

Simply abandoning these wastes without any additional treatment because it is cheaper is no longer an option, when we are aware of the cost to the environment, human health and society...

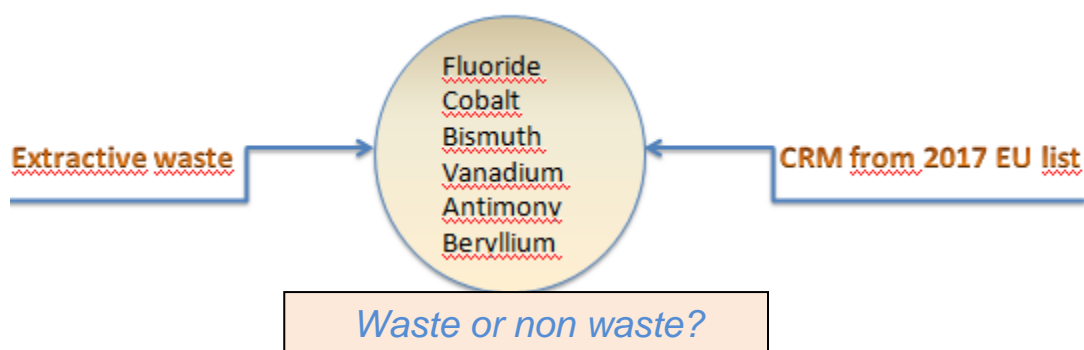
The same opinion suggests to improve recycling and to reduce waste produced by the rock mining, quarrying and metallurgical industries, favoring their recovery and marketing.

¹ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52011IE1597&from=IT>



- **The European Critical Raw Materials review list (2017)²**: the list is a central element of the "raw materials" initiative, created in 2008, with the aim of guaranteeing the safe, sustainable and accessible supply of raw materials for Europe, while limiting imports from abroad .

The latest update of the list (which is reviewed every three years) identified 27 raw materials considered critical for Europe and, comparing the latter with some characterization data carried out on extractive waste, similar elements emerged, as in the case of : Fluorides, Cobalt, Bismuth, Vanadium, Antimony, Beryllium. Sometimes, therefore, we find ourselves in a situation in which the same element is considered on the one hand "extractive waste" and on the other "critical raw material"; therefore the need arises to clarify how to consider these materials:



In the next days will be published the CRM list 2020: it'll be described in the phase 2 final report.

- **Best Available Techniques (BAT) Reference Document for the Management of Waste from Extractive Industries - BREF 2018³**, that excludes from its scope *abandoned extractive waste facilities left by the operator and not properly closed* (pag.2 - Scope). However the document, trying to reflect the scope of application of the Mine Waste Directive and its objectives, encourages re-processing of extractive waste in order to recover valuable resources and reports the following statement (pag.212):

Techniques for the recovery of extractive waste is consider as a BAT and in some cases, re-processing of extractive waste can be seen as an opportunity to properly remediate and rehabilitate an old extractive waste management site...

² <https://ec.europa.eu/transparency/regdoc/rep/1/2017/IT/COM-2017-490-F1-IT-MAIN-PART-1.PDF>

³ <https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/best-available-techniques-bat-reference-document-management-waste-extractive-industries>



- **Development of a guidance document on best practices in the Extractive Waste Management Plans/Circular Economy Action** (January 2019)⁴, and **Study supporting the elaboration of guidance on best practices in the Extractive Waste Management Plans - Final Report** (September 2019)⁵.



In those recent documents, the extractive waste management plans are introduced as good practice in the management of historical extractive waste and some case studies are cited which are already proceeding in this direction. It is not clear, however, whether this plan is part of a larger environmental redevelopment project for closed/abandoned mining sites or a new extractive project that reevaluates waste as a new field to be exploited.

In particular the second one (September 2019) introduces the important concept of the **Circular Economy** aspects in the mining sector and considers the *re-processing of historical extractive waste as a long-standing practice that is adopted for all kinds of minerals... Technological advances make it economically feasible to use historical extractive waste as a resource – especially in combination with newly discovered ore-bodies and/or site clean-up and river restoration projects.* (pag.44). In the same document there is an important image in page 13, in which we can image the mining life cycle also

⁴ https://ec.europa.eu/environment/waste/mining/pdf/guidance_extractive_waste.pdf

⁵ <https://op.europa.eu/en/publication-detail/-/publication/5a29b5e3-df3e-11e9-9c4e-01aa75ed71a1/language-en/format-PDF/source-121013852>



after the 7. point (*Closure/aftercare*), with another one that could be 8. point *mine waste recovery/recycling procedures*.

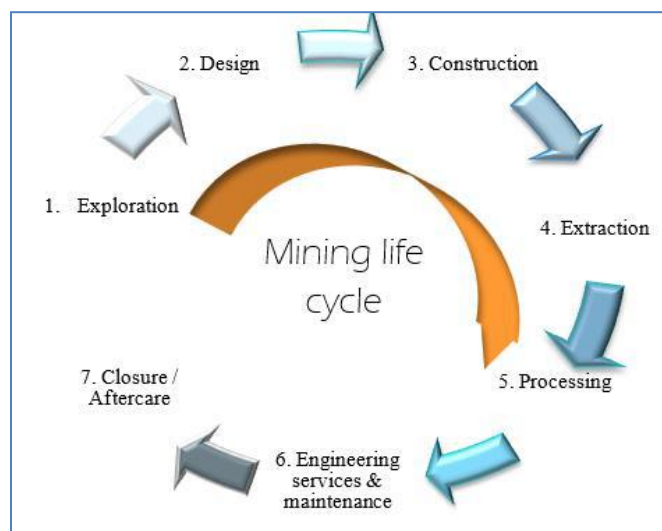


Image from *Study supporting the elaboration of guidance on best practices in the Extractive Waste Management Plans - Final Report (page.13)*

Therefore it would seem possible to recover raw materials also from historical extractive waste as already happens in some European countries such as Spain and Greece: this aspect will be further investigated in the second phase of the project, in order to write a procedure for the reuse of historical extractive waste.



3. Project Partners and activities

The project, approved in April 2019, expected to close in March 2020 but, due to the pandemic, it was extended by three months with conclusion in June 2020 for phase 1 (phase 2 is scheduled for the year 2021) .



Figura 1 Project Partners - phase 1

The partners who participated in the first phase of the project are:

- the Italian Institute for Environmental Protection and Research (ISPRA) - Geological Survey Department (team leader),
- Dutch Environmental Ministry,
- Environmental Inspectorate of Kosovo,
- English Environmental Agency,
- Spanish Geological Survey,
- French Geologic Survey (BRGM),



- Slovenian Environmental Ministry,
- Albanian Environmental Inspectorate,
- Latvian Environmental Ministry,
- Croatian Environmental Ministry,
- Polish Geological Survey.

Other partners will participate in the second phase of the project, that will start next year.

The activities were structured and carried out as described below:

- ✓ between May and July 2019, 2 questionnaires were sent on the implementation of directive 2006/21 / EC in the various project partners: this allowed a first survey on the state of implementation of the directive in various PM (annex 1),
- ✓ 3 project meetings were held:
 - the first took place in Rome in October 2019 at the ISPRA headquarters, on the occasion of the IMPEL - Water and Land Conference;
 - the second took place in Iglesias (Sardinia) on 3 and 4 February 2020, one day for the meeting and one day for the field trip in closed mining sites (24 participants);
 - the third, carried out via the web (22 participants -annex 2).



4. Difficulties



Figura 2 Monteponi red mud heaps (Sardinia)

The particular topic dealt with "management of extractive waste and related problems" aroused a lot of interest from the project partners, who participated with the aim of learning and enriching their background on the topic but, due to the lack of experience and limited number of examples already adopted, the project required an extension of the timing and was reorganized into two main

phases: the first of acquiring legislation and possible example cases (2019-2020), the second of drafting guidelines for the management of extractive waste (2021). In fact, the project concerns the management / recovery of raw materials from historical extractive waste, therefore probably, being oriented to that specific type of waste with the aim of circularity, it is certainly current but probably still does not have a vast and widespread experience in this field. . The various case studies that have emerged are in fact limited to the evaluation of the possibility of such a recovery and we can consider them almost "pilot" cases, created to test this recovery activity.

Another difficulty in the progress of the project can be traced back to the meaning of extractive waste that the directive defines as "waste deriving from the activities of prospecting, extraction, treatment and storage of mineral resources and from the exploitation of quarries" (Directive 2006/21 / EC, art .2) but which each member state then interprets in a subjective way, sometimes considering these



Figura 3 Acid Mine Drainage (AMD) in Rio Piscinas, Sardinia

RAEs as recoverable materials, other times leaving them at their original definition and disposing of them in landfills, other times leaving them in situ under the effect of atmospheric agents. Two examples are the acid drainage in Rio Piscinas (West Sardinia), on the left and the red mud (tailings) of Monteponi, on the right.

In any case, there is no common guideline which, while considering the various ways of defining this type of waste, allows for reasonable management in respect of the environment and human health.



5. First results and case studies

On the basis of the activities described, the following first considerations can be drawn:

- the Partners have implemented the Mine Waste Directive and made the inventory of the extractive waste storage facilities (art.20),
- no Member State has yet launched investigations or other activities to evaluate the recovery of such waste on a large scale (except for a few cases), although there are different case studies on their possible conversion to secondary raw materials,
- there is a general interest in the problems faced by the project, which have high expectations.

A diversity of historical extractive waste management emerged and only a few cases of management aimed at recovery (only from bibliographic documentation available on the internet) and a general interest in knowing the results of the project, deemed of interest for the recovery of raw materials.

Spanish case study

Among the cases of recovery of the RAE, the contribution of the Spanish colleagues concerning the Penouta mine emerged as an example of good management of extractive waste as secondary raw materials. The Spanish approach is certainly a good example in the recovery started for many years, even before the specific European legislation on extractive waste. In fact, the Spanish mining law (law 22/1973) in article 3, classifies geological and mineral resources into four types or sections:

- *Section A resources.* In this section, the resources that are low value and limited geographic commercialisation are described. This section also includes the resources for which the unique objective of the exploitation is to obtain fragments with the proper size and shape for their direct use in construction.
- ***Section B resources.*** This section includes mineral waters, thermal springs, underground structures and **deposits formed by accumulation of wastes from activities regulated by this Law** (mining wastes).
- *Section C resources.* Mineral deposits and geological resources not included in the previous sections. This is the commonest category for mining operations.
- *Section D resources.* Coal, radioactive minerals, geothermal resources, bituminous rocks and other mineral deposits or geological resources of energy interest.

The PENOUTA MINE was closed in 1985 without any rehabilitation of the site. Strategic Minerals Spain reprocesses the tailings and gets tantalum and niobium. The processing of tailings from the old



Penouta mine produces around 1% of tin, tantalum and niobium metals and 99% remain tailings. The latter are mainly composed of silicate minerals that can be reprocessed, obtaining around 70% of industrial minerals, namely quartz, mica, feldspar and Kaolin. The overall process aims to achieve a reduction of mining wastes by around 80%. The final residue will be used as material for environmental rehabilitation

(https://ec.europa/environment/waste/mining/pdf/guidance_extractive_waste.pdf)

Other case studies

- **SMART GROUND**

Smart Ground is a project that has received funding from the European Union's Horizon 2020 research and innovation program. The main objective of this project is to address the issue of waste management and resource recovery from industrial, mining and municipal landfills, improving the availability and accessibility of data and information on Secondary Raw Materials in EU.

It's based on the innovative Landfill Mining (LFM) concept: “a process for extracting minerals or other solid natural resources from waste materials that previously have been disposed of by burying them in the ground”. It describes the emerging field of exploring and extracting disposed material.

http://www.smart-ground.eu/download/LFM%20toolkit_pdf_final.pdf

- **AVOCA HISTORIC MINE SITE**

The Avoca is a case study from Ireland. Avoca site was designed to verify the mineral content present in the waste heaps, for reclamation through the recovery of such metals that may be present.

The large volumes of waste present on the site have high concentrations of Pb, Cu, Zn and As; consequently also the river sediments downstream of the site have similar concentrations, even at 10km away.

The different heaps of waste were sampled and analyzed with reasonable low costs regarding the extraction of mineral resources. The site is located near centers with large populations, which can provide an adequate workforce for earthmoving and mineral processing. Energy and water are connected to the site. The material of the loot pile is a free excavation and therefore no drilling and bursting activities are necessary.

- **THE OLD MINING DISTRICTS OF SARDINIA**

In several ancient mining areas of Europe, where old deposits have been mined for centuries, new activities have begun to assess their residual potential in terms of CRM resources.



Sardinian island, the most important mining district in Italy, is one of these and still has a high residual potential of mining districts and a large amount of waste that can represent new deposits to be exploited in terms of raw materials. The University of Cagliari has presented two interesting contributions on different mining districts of the island, :

Recovery of critical metals from industrial waste and reclamation of mining area : a study on Su Suergiu mine,

The metallogenic potential of an old mining district: the case of Sardinia.

- **MINING WASTE MANAGEMENT – SWEDISH PERSPECTIVE**

An overview of Swedish mining sites and an analysis on the management of extractive waste from the active mine phase, to landfilling, the closure of the activity, with references also to the methods of reclamation.



6. Future improvement and goals

The second phase of the project will be carried out in the year 2021 with additional partners divided into the three levels of participation provided by IMPEL:

- 1) project team core group and management,
- 2) participation just in meetings, workshops, conferences,
- 3) just following progress of project only via Basecamp.

Therefore we are very confident about the important contribution that could derive from the experience of the partners through whose collaboration it is hoped the achievement of the set objective, namely the drafting of reference guidelines for the management of historical extractive waste, also with possible recovery of secondary raw materials but, where deemed unsustainable, also with appropriate indications in order to reduce environmental impacts and on human health and, of course, with the principles of the circular economy.



Annexes

Annex I

- First questionnaire
- Second questionnaire

Annex II

- The presentation of phase 1 final meeting



Annex Ia - A general knowledge of the implementation of the directive in the project partner countries

Project: Management of Mining Waste – MIW <i>First questionnaire</i>	
Partner:	Date:
1. Transposition data of the 2006/21/EC Directive	
Legislative act implementing the European Directive on extractive waste: positive and negative aspects of this transposition	
2. Inventory of closed or abandoned waste facilities (art.20 2006/21/EC Directive)	
Which data compare in the inventory (typology and number of type A facilities, extractive waste characterization, ...)	
3. Waste facilities and environmental problems	
Environmental problems (related to the presence of extractive waste), as environmental pollution, impact towards water and soils,... and security works carried out or planned to reduce environmental impact	
4. Extractive waste and raw materials	
Check extractive waste composition in order to consider them as potential deposits of raw materials with examples and/or case studies	



Annex Ib- Real cases of recovery of raw materials from extractive waste

Project: Management of Mining Waste – MIW	
<i>Second questionnaire</i>	
Partner:	Date:
Country, Site name and map	
Brief history of mining	
Principal raw materials extracted	
Potential content of RM in extractive waste (based on previous activities or on characterization data)	
Real cases of recovery already occurred?	
If yes, describe it and the RM recovered	
Procedures or regulations applied	



Annex II- *Final meeting presentation*

Among the activities envisaged by the project, three meetings were held: the presentation of the last one is attached in the following pages, as a summary of the activities carried out in the phase 1 of the project.

Mine Waste Management Project Final meeting – phase 1



Today's meeting agenda 11.00-13.00

- **Why a Project on the Management of mining waste**
- **Impel and its role**
- **Project partners, activities and first results**
- **Upcoming activities**
- **Round table (slide 23)**
- **Any other issues**

Why Mine Waste Project?

The project responds to the need to find answers/solutions to problems related to the implementation of the Mine Waste Directive (2006/21 / CE) in Italy

Which problems?

There are legislative gaps in the directive, including understanding how to manage historical extractive waste, for which the directive provides for the creation of the inventory but does not indicate specific addresses for their possible recovery, reuse

IMPEL - European Union Network for the Implementation and Enforcement of Environmental Law

So it could have an important role in finding solutions and answers in this project

- **Mine Waste Management - MIW Project** was approved and started in April 2019
- **General objective:** to compare the transposition of the 2006/21/EC Directive by Member States in order to assess any critical issues to be improved and to find the better management for extractive waste of closed or abandoned facilities
- **Specific objective:** identify guidelines common to MS in the management of historical extractive waste, also to evaluate them as new sources of raw materials.



Legal Framework

- DIRECTIVE 2006/21/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 15 March 2006 on the management of waste from extractive industries and amending Directive 2004/35/EC
- The European Critical Raw Materials review list (2017)
- Development of a guidance document on best practices in the Extractive Waste Management Plans/Circular Economy Action (January 2019)



And for Italy

- Legislative Decree 30 May 2008, n. 117 "Implementation of the directive 2006/21/CE concerning the management of waste from extractive industries and amending Directive 2004/35/EC "

***Mine waste Directive** provides for measures, procedures and guidance to prevent or reduce as far as possible any adverse effects on the environment, in particular water, air, soil, fauna, flora, landscape and any resultant risks to human health, brought about as a result of the management of waste from the extractive industries in order to better manage the problem.*



To achieve minimising waste generation and encouraging waste recovery, the Directive requires the **Waste Management Plan** (Article 5)

However, *waste management plan* is valid for storage facilities in activity, not for abandoned or closed storage facilities.

So, how can we manage these latest landfills?

The legislation settles (art.20 of 2006/21/EC), for each Member State, the creation of a **national inventory** (by 01 May 2012) **of closed waste facilities** which cause serious negative environmental impacts or have the potential of becoming in the medium or short term a serious threat to human health or the environment



but **NO** other indications on the management of closed waste facilities...

The latest update of the Italian inventory dates back to May 2017

([http://www.isprambiente.gov.it/files/miniere/Inventario Aggiornamento 2017.pdf](http://www.isprambiente.gov.it/files/miniere/Inventario_Aggiornamento_2017.pdf)) and it shows, with regard to structural risk, no landfills with high or medium high risk, but only few cases of landfills with medium risk.

With regard to the environmental health aspect, things are different because of the widespread presence of polluting extractive waste, therefore medium and medium-high risk indices have been found in many cases.

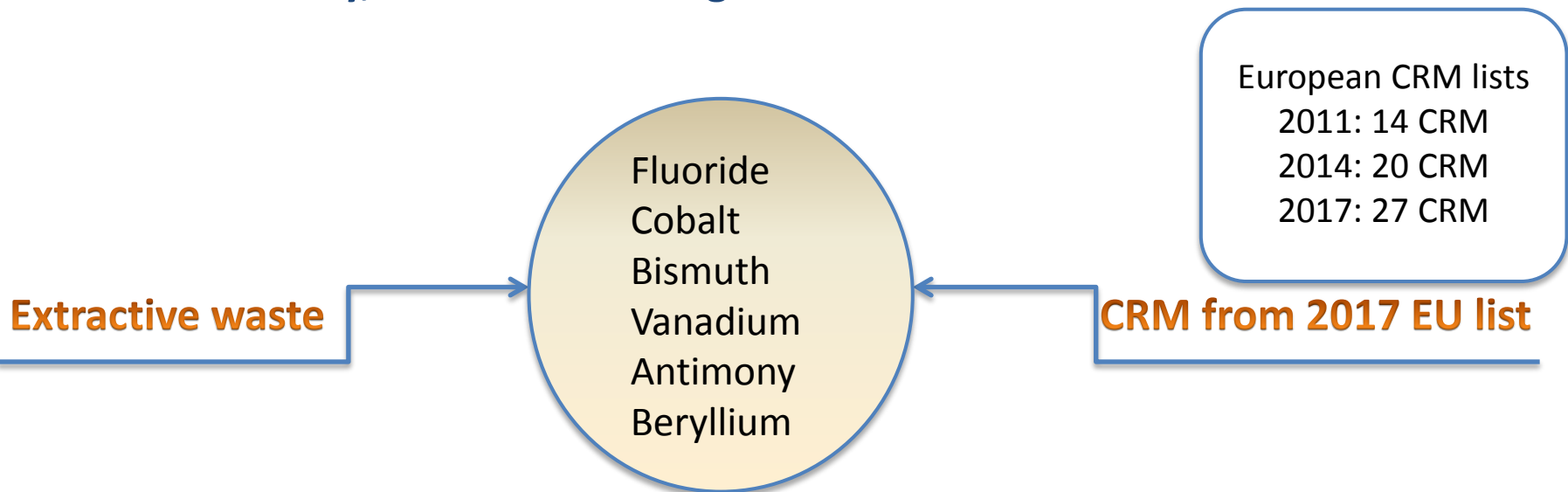
The data used to
realize the
inventory allows

to locate the dangerous structures, in
order to prevent or limit any accidents

to identify the different minerals
contained in the waste **that sometimes
coincide with some CRM of the EU lists**

Current European policy aims to encourage research and production of raw materials in Europe, through initiatives intended to limit imports from non-EU countries, and promote local research.

Comparing the last list of CRM (2017) with the extractive waste of the Italian national inventory, similarities emerge in the content of some critical elements.



So the question is: **WASTE OR NON-WASTE?**



The transition from waste to non-waste is not simple and involves a prior analysis of the economic sustainability of the extractive waste reprocessing, which is currently lacking at EU level and which, according to the European Economic and Social Committee (EESC) exploratory opinion (2012), **should be assessed on a case-by-case basis by each Member State**. The same opinion, promoting the exploitation for economic and environmental purposes of extractive waste, also proposes to improve their recycling and reduce their production.

Other more recent European documents (January 2019) indicate best practices for the recovery of raw materials from historical extractive waste , as the **Guidance document on best practices in the Extractive Waste Management Plans - Circular Economy Action**



European Commission

Development of a guidance document on best practices
in the Extractive Waste Management Plans

Circular Economy Action

Eco Efficiency Consulting and Engineering Ltd.
in collaboration with WEFalck, Pöyry Finland Oy, Botond Kertész &
CRS Ingeneria

...The Communication announced that the European Commission will develop guidance and promote **best practices in the extractive waste management plans (EWMPs)** by 2018...

The **Raw Material Initiative** in 2011 introduced the list of Critical Raw Materials (CRM) which, with the latest update of 2017, contains 27 CRM ...
...There is potential for some of these materials to be mined from historical waste ...

... After many years of experience with EWMPs it's possible **enable the identification of best practices that may provide a more widespread implementation across the extractive sector.**

So, maybe we can apply the EWMP also in other situations...!?!

4.7 Best Practice: Disposal planning and management for later recovery

Re-processing of historical extractive waste is a long-standing practice that is adopted for all kinds of minerals: energy, metal ores, industrial and construction ...
...Technological advances make it economically feasible to use historical extractive waste as a resource – especially in combination with newly discovered ore-bodies and/or site clean-up and river restoration projects.

Relevance for Circular Economy: Re-processing of historical extractive waste

The utilisation of historical waste as raw material increases the long-term value obtained from the original extraction, offsets primary production elsewhere and simultaneously contributes to site rehabilitation. Whilst this usually improves environmental conditions locally by removing non-inert components, it seldom reduces the total amount of extractive waste to be subsequently managed.

https://ec.europa.eu/environment/waste/mining/pdf/guidance_extractive_waste.pdf

Big problem



Sometimes Member States consider and manage differently mining wastes

So, it's necessary to obtain common guidelines on "how to manage" old extractive waste, also to recovering them with the goal to obtain new sources of raw materials

So...



What are Member States doing in this field to answer the question



Maybe working together is necessary



As for Italy, ISPRA has launched several activities (as MIW project), with European and national partners

Project PARTNERS

- ✓ The Netherland
- ✓ Kosovo
- ✓ England
- ✓ Spain
- ✓ France
- ✓ Slovenia
- ✓ Albania
- ✓ Latvia
- ✓ Croatia



- Other potential Partners
 - ✓ Finland
 - ✓ Italian Environmental Ministry
 - ✓ Austria



Project ACTIVITIES

1 – Welcome communication and first questionnaire on the transposition of Mine waste directive (April 2019)

2 - Second questionnaire, specific on case studies on the recovering of raw materials from extractive waste (June 2019)

3 – Participation in the Water and Land Conference with presentation of the project (Rome, 8 October 2019)

4 - Project briefing (Rome, 10 October, 2019)

5 – Project meeting (Iglesias, Sardinia, February 2020)

6 - Meeting 31 March in Rome cancelled and rescheduled as a web meeting on 27 Of April 2020, TODAY (because of the pandemic)

7 – Project Report, phase 1 (by June 2020)

3,4 – Project briefing during water and land conference (Rome 8-10 October 2019)

Mining activity has always been a source of raw materials for man but, at the same time, it has generated many environmental problems.



Extractive waste in Masua Mine, Sardinia



AMD in Rio Piscinas, Sardinia

Huge quantities of extractive waste, often abandoned, are sources of pollution and areas of geotechnical and hydrogeological instability

5 – The last Project meeting in Iglesias, Sardinia (3,4 February 2020)

Two-days meeting, one of assembly, the second of excursion. The first one the meeting with experts in the matter and stakeholders from local Authorities that work on mining management and from Geological Survey of Sweden and Poland, for a total of 26 participants.



Some speeches covered during the previous project meeting, held in Sardinia, last February

SMART GROUND: a project that has received funding from the European Union's Horizon 2020 research and innovation programme (MG. Andrisani e M. Lucarini)

The main objective of this project is to address the issue of waste management and

AVOCA HISTORIC MINE SITE: a case study from Ireland (M. Lucarini)

The Avoca site was designed to verify the mineral content present in the waste heaps, for reclamation through the recovery of such metals that may be present.

THE OLD MINING DISTRICTS OF SARDINIA (S. Naitza and G. De Giudici)

In several ancient mining areas of Europe, where old deposits have been mined for centuries, new activities have begun to assess their residual potential in terms of CRM resources. Sardinian island, the most important mining district in Italy, is one of these.

PENOUTA MINE IN SPAIN (M. Serra). The Penouta Mine was closed in 1985 without any rehabilitation of the site. Strategic Minerals Spain reprocesses the tailings and gets tantalum and niobium. The processing of tailings from the old Penouta mine produces around 1% of tin, tantalum and niobium metals, and 99% remain tailings. The latter are mainly composed of silicate minerals that can be reprocessed, obtaining around

MINING WASTE MANAGEMENT – SWEDISH PERSPECTIVE (R. Hamberg)

An overview of Swedish mining sites and an analysis on the management of extractive waste from the active mine phase, to landfilling, the closure of the activity, with references also to the methods of reclamation.

The second day (Tuesday 4th Excursion 08:00 – 17:00) the fieldtrip, with two main stops to visit some storage facilities:

- The "*fine basin of Masua*", what remains of a "fine" settling basin, with visit to the galleries of Porto Flavia, from which the extracted materials were loaded directly onto the ships,
- The "*Monteponi red mud heaps*", consisting of mineralogical and metallurgical processed waste, with a lot of problems related to the release of pollutants and to the structural risk.



FIRST RESULTS

Based on the above activities, it appears that :

- the Partners have implemented the directive and made the inventory of the extractive waste storage facilities (art.20),***
- no Member State has yet launched investigations or other activities to evaluate the recovery of such waste on a large scale (except for a few cases), although there are different case studies on their possible conversion to secondary raw materials,***
- there is a general interest in the problems faced by the project, which have high expectations.***

ROUND TABLE



Upcoming activities

- **Final report of the first phase of the project (June 2020)**
- **Second phase of the project: (April – December 2021)**

Mine Waste Management Project

Partner collaboration and participation is essential to achieve the project objectives, so I hope that it will always be greater and constructive in the next work phases

Thanks for your attention