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Mine waste reuse and reprocessing: an important step for the implementation of the circular economy in Europe

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Whereas there are growing needs for mineral resources (metals for the energy and digital transitions and construction materials), the mining industry must produce them from poorer, more heterogeneous and more complex deposits. Therefore, volumes of mine waste produced (including tailings) are also increasing and add up to waste from mining legacy. For example in Europe (x27): 732 Mtons of extractive waste are generated per year and more than 1.2 Btons of legacy waste are stored all over the European territory. The localisation (and potential hazards) are well known and covered by the inventories carried out in EU countries under the Mining Waste Directive. At the same time, Europe is implementing the circular economy approach and put a lot of emphasis on the resource efficiency concept. In this context, reprocessing operation to recover both metals and mineral fraction is studied with the objective of combing waste management (reducing final waste storage and long-term impact) and material production from secondary resources. Numerous industrial experiences of reprocessing of mine waste and tailings exist all over the world to recover metals such as copper, gold or critical raw materials - CRM They concern mainly active mine where both primary and secondary resources are considered in profitable operations; for example in Chile, South Africa, Australia. Mineral fraction recovery is often not considered which still leaves the industry with a high volume of residual minerals to store and manage. In addition, legacy mining waste are potentially available for reprocessing. In this case, numerous mining liabilities issues need to be managed. Some of the European legacy mining waste have residual valuable metals that could be recovered but some of them have very low metal contents. In Europe,

classical rehabilitation operations – usually at the charge of member states and local authorities – is the priority and concern the reduction of instabilities and impacts to the environment including heap remodelling, covering and water management with long-term treatment. Completing this risk management approach by a circular economy one is a very active R&D subject in EU27. This presentation will give an overview of EU research projects which tackled the legacy mining waste challenge from inventory to process development. Several process flowsheets to recover metals were designed and tested on several case studies with CRM – REE, Co, W, Sb, etc. Initiatives to reuse mineral fraction are also underway and should be ready for commercialisation in the coming years. Resources efficiency concept and the circular economy implementation starts on mining sites. In order to facilitate the implementation of this approach, the technical solutions will need to be included in innovative global initiatives covering also legal (liability management), environmental (Life Cycle Analysis approaches) and social (acceptance) questions.