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Extractive waste exploitation towards the natural resource preservation: two Italian case studies

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In 2012 the extractive industry represented the second most important sector in terms of waste quantities produced in the EU-27 (29% or 734 million tons). Italy was and still is one of the most important countries as for quarry and mine exploitation, with a consequent huge production of extractive waste (EW; represented by rock waste, operating residues and tailings), which are present in mining dumps (EW facilities).
The EU guidelines about waste management aim to the exploitation, based on environmental protection, of any kind of material which can be recovered and recycled, with a consequent natural resources preservation. The decision n. 1600/2002/CE, establishing the VI Environment Action Program, pushes to the revision of the legislation on waste and to the development of specific actions for waste prevention and management. The decisive factors to achieve these results are the minimization of waste production and the recovery of as much waste as possible from the different productive cycles and from landfills, including EW facilities. According to this approach, “WASTE” must be considered as a “RESOURCE”, and “LANDFILLS” as “NEW ORE BODIES”. In the recent years several projects investigate the recovery of Critical Raw Materials (CRM) and SRM from landfills (Smart Ground, Prosum, etc.).
The main objective of the present research, which is one of the activities linked to Smart Ground project (Grant Agreement No 641988), is the estimation of the SRM and CRM present in two selected Italian EW facilities:
- Campello Monti mining site (NE Piedmont Region), important for Ni exploitation. The area is characterized by the presence of EW facilities, mainly represented by rock waste and operating residues.
- Gorno mining site (N Lombardy Region), famous for Zn exploitation. The area is characterized by the presence of several EW facility areas, mainly represented by rock waste dumps and tailing basins.
To appreciate if an EW facility can be considered as an “ore body” to exploit, it is necessary to follow several operative steps, which include:
- characterization of the area and of the EW;
- evaluation of dumps volume;
- SRM estimation, on the basis of EW characterisation and evaluation of dumps volume, and after dressing activities in lab and in pilot plants;
- determination of impacts connected to EW management and potential recovery. The comparison of different scenarios (landfilling activity Vs EW exploitation), together with characterisation phases, is useful to evaluate if waste exploitation is profitable or not.
At present (December 2016) the phases connected to characterisation of the areas and of the EW have been completed. The first results arising from the sampling activities in Campello Monti show that operating residues are strongly enriched in Ni, Cu, Co; waste rocks in some areas are enriched in the same metals. PGE and Au analysis on the most enriched samples are in progress; the very first results show scattered Pd and Pt enrichments. As for Gorno, the first results arising from rock waste samples show a high content in Zn, often associated to Cd.