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EU Critical Raw Materials in the Czech Republic - Competence Centre for Effective and Ecological Mining of Mineral Resources (CEEMIR)

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The project "Competence Centre for Effective and Ecological Mining of Mineral Resources" (CEEMIR) started in 2014 and will be finished in 2019. The project is funded by the Technology Agency of the Czech Republic (TA ČR) under the leadership of the Technical University of Ostrava. The aim of the project is to study critical raw materials (CRM) of the EU, assess the suitable resources of CRM in the Czech Republic and propose a possible efficient and environment-friendly way of their mining and processing. The main task of the Czech Geological Survey is a collection of the current knowledge, provision of the knowledge and mineralogical and geochemical characterization of selected mineral deposits and prospective resources. The list of CRM includes 21 non-energy and non-agricultural raw materials: antimony (Sb), beryllium (Be), borates, chromium (Cr), cobalt (Co), coking coal, fluorspar, gallium (Ga), germanium (Ge), indium (In), magnesite, magnesium (Mg), natural graphite, niobium (Nb), platinum group metals (PGM), phosphate rock, rare earth elements (REE), silicon metal and tungsten (W). Further lithium (Li) and kaolin were also assigned as important priority commodities on a national scale, listed among EU non-critical raw materials (NCRM). Raw materials used for the production of metallic silicon and coke coal were excluded from studied CRM although there are their deposits and resources in the Czech Republic.

The area of the Czech Republic (CZ) was divided into four districts and accordingly in four tasks of the project. Each area/district follows the regional geological units and also comprises approximately resembling number of deposits and potential resources. Small and mostly low-grade deposits of fluorspar, graphite and W are registered on the territory of the CZ. In addition to these three CRM, further potentially prospective resources of Sb, Ge, In and Nb have been defined. The area of the eastern Erzgebirge (NW part of CZ) was classified as promising in terms of occurrences of W and Nb ores. Besides this, among NCRM, the deposits and resources of Sn, Li, Rb, Ta and Cs were defined.

The most promising part related to the Task 1 is the Czech part of the Zinnwald ore district, with active mining until 1990. In the meantime mines are not accessible and the only material available to study is archive samples and cores. The unique object of studies became the structural core CS-1, 1596 m depth, drilled in 1961-63 in Cinovec village. The core covers the full lithological sequence of granitic rocks including vein and greisen Sn-W-Li (Nb, Ta, Rb, Cs) mineralization. Subsequent petrological, litho-geochemical and mineralogical classification of 254 studied samples enable to construct the schematic genetic model of the evolution of the host granitic intrusion and related mineralization, applicable to other granitic domes in the area. The study of ores has shown the variability in the distribution of ore elements: Li (avg. 1300 ppm) and Rb (avg. 1650 ppm) within greisens; Rb reaches the highest average

values (1300-1700 ppm) in the Zinnwald microgranite and granite. Slightly enriched average contents of W (93 ppm) and Sn (29 ppm) are related to greisens. Enriched average values of Nb (96 ppm) and Ta (39 ppm) are associated with upper altered granites. The content of Ta is relatively low in Zinnwald granites whereas Nb content varies between 66 to 84 ppm on average.