**Discharge of radium isotopes into to the environment as a results of dewatering of underground coal mines in Upper Silesia, Poland**

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A peculiarity of Silesian coal mines is the presence of water containing elevated concentrations of radium isotopes 226Ra and 228Ra. The ongoing mining of coal seams takes place at levels exceeding a depth of 1,000 meters, where relic water with high radium concentrations is found. These waters, often also contain barium (Ba) ions. Coal mining involves continuous discharge of water to the surface and discharge into the environment in accordance with the relevant water-legal permit. Contact of water containing radium and barium with waters containing sulfate ions results in the precipitation of deposits consisting of radium-barium sulfate.

As part of its statutory tasks, Silesian Centre for Environmental Radioactivity has been conducting comprehensive monitoring of mine discharges since 2023, including studies of water and sediments formed at the site of the water discharge. The measured concentration of radium isotopes in waters varied: 226Ra 0.07 - 1.71 Bq⸱dm-3, 228Ra 0.06 - 2.34 Bq⸱dm-3. The measured concentration of radium isotopes in sediments at the water discharge points varied: 226Ra 7.8 – 1,275 Bq⸱kg-3, 228Ra 9.5 – 3,460 Bq⸱kg-1. All sampling was carried out at the points of discharge into natural watercourses (rivers). The tests were carried out by liquid-scintillation spectrometry and gamma-ray spectrometry methods in the accredited laboratory (ISO 17025) of Silesian Centre for Environmental Radioactivity.