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Monitoring Environmental Impact of Mining Waste: Heavy Metal Contamination with Arsenic (As) and Selenium (Se) at the Angren Gold Processing Plant

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Uzbekistan's industry has grown fast lately, especially with mining and all that, which means more waste from pulling out minerals. That waste contains hazardous contaminants, such as toxic metals, which degrade the surrounding soil and even harm nearby plants. This paper looks at the chemicals in the waste from the Angren Gold Processing Factory, or AGPF for short, and how it affects the environment.They took samples of soil and plants right near the factory and were analyzed using Inductively Coupled Plasma Mass Spectrometry (ICP-MS) and the JEOL Superprobe. The numbers came back showing heavy metals in the soil significantly higher than background levels, exceeding background concentrations by 50-100%, especially for lead, zinc, copper, cadmium, and manganese. Plants picked up multiple elements, with arsenic at 4.46 grams per ton, selenium 0.53, antimony 0.11, cadmium 0.03, lead 3.47, zinc 36.21, copper 14.69, nickel 2.80, and vanadium 0.80. When they ran correlations, it seemed like some metals showed strong correlations, arsenic with cadmium, lead, and cobalt having r values from 0.62 to 0.82, selenium with lead at 0.69, and antimony linked to lead and uranium around 0.63 to 0.80. All this indicates the factory waste being a rmajor source of ecological risk, since those toxins like arsenic, selenium, antimony, and cadmium could hurt the local plants and soil substantially. To reduce metal mobility, they suggest using plants for cleanup, phytoremediation I guess its called. Things like Salix babylonica, Salix coerulea, Salix nigra, and Phragmites communis can handle the metals and soak them up well. Then you harvest the plants and use the stuff for making energy or getting the metals back out, which reprrsents a promising approach for both the environment and maybe cost-effective. The whole thing helps to assess these heavy metals migrate and impact areas in Uzbekistans industrial spots. It gives some ideas on cutting down risks, making soil better, supporting ecological integrity, but the sustainable part for mining, that requires further investigation to really pull off. Mining activities at Angren factory significantly contaminate soils and vegetation; identified plants show strong potential for cost-effective, sustainable phytoremediation.



