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Comparative Analysis of the Biohazard Risk Management challenges for Nuclear and Electronic Waste

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The continuing evolution of global energy systems and electronic technology markets have resulted in the effective toxic volume of the combined electronics and battery waste [“e-waste”] stream becoming comparable to that of the nuclear industry. Both nuclear waste and e-waste contain significant quantities of toxics such as cadmium, chromium, lead, arsenic and mercury that do not decay, implying important similarities in the associated long-term disposal challenges. Furthermore, both of these waste streams include solid, liquid and gaseous elements with a wide variety of chemical properties; each poses a varied array of short- medium- as well as long-term disposal challenges; each needs to be addressed by applying a diverse set of geochemical and geophysical techniques for assessing and monitoring stability (e.g. containment breach) and mobility (e.g. metal liberation); and each demands further investment in refining current recycling and remediation strategies. Systematic comparison of these aspects of the two problems enable the identification of disposal solutions from each that may be applicable to the other. Additionally, because growth in battery usage is considered essential to increased reliance on solar and wind energy, this comparison allows for a more complete assessment of the relative long-term costs and benefits of different alternatives to fossil fuel energy production.