

Dynamic Adsorbents

Removal of Radioactive Effluent Waste from Uranium Enrichments Plants

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In an effort to reduce greenhouse emissions many nations and multi-national corporations are once again focusing on the development of safe radioactive sources for energy generation. After a hiatus of some 20 years commercial nuclear power plants are being developed globally to satisfy increasing global energy demands.

Whether for generation of electrical power or in the production of fission material there is a dire need to enable cost efficient and effective cleanup of nuclear generated waste. Effective chemical adsorption of effluent waste using specially designed activated alumina successfully binds and disposes of many radioactive laden materials. In the processing of radioactive chemicals, enrichment methodology leads to the contamination of many heavy metals. Included in these are molybdenum, vanadium, radium, thorium and uranium. Cleaning up this radioactive waste has become an environmental nightmare.

Indeed, the greatest use of stimulus money to jump start environmental cleanup and create new jobs has been the issuance of stimulus funds through the American Recovery and Reinvestment Act by the Department of Energy. Included in the first tranche of \$ 6 billion USD contracts have been awarded for \$775 million to Oak Ridge National Laboratory, \$1.6 billion to Hanford Operations in Richland, Washington, \$ 1.6 billion for Savannah River, South Carolina, and \$468 for Idaho National Laboratory. Some of this cleanup stems from nuclear projects which go back to World War II military needs. It is anticipated that it will take until 2040 to complete the uranium cleanup at our national facilities at a cost of \$ 40 billion.

The projects are being managed by the Department of Energy Office of Environmental Management, which is responsible for the risk reduction and cleanup of the environmental impact from the nuclear weapons program.

The Department of Energy Office of Oversight has identified improper disposal of hazardous and radioactive materials on and off site and the release of contaminated water into streams and drainage ditches. Radioactive waste from uranium enrichment plants are governed by two federal environmental statutes-the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, and the Resource Conservation and Recovery Act of 1976, as amended. These statutes provide broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment and to regulate the safe management and disposal of hazardous and other solid wastes.

The cleanup of uranium enrichment sites includes the following sites:

1. Groundwater – billions of gallons of groundwater are contaminated with radioactive and hazardous materials
2. Surface water – a principal source of this contamination is rain runoff from the thousands of tons of contaminated scrap metal located at each of the enrichment sites

3. Surface soils – both on and off site soils and sediments are contaminated by water runoff, spills and buried waste
4. Legacy waste
5. DOE material storage areas
6. Burial grounds – containing barrels of chemicals with low levels of radioactivity and hazardous chemicals

Removal of radioactive containing heavy metals at uranium enrichment sites may be achieved through the usage of activated alumina. Spherules of activated alumina with defined pore sizes adsorb heavy metals from effluent discharge and provide the vehicle for binding to these radioactive materials. Clean up of this radioactive effluent is a final polishing step in the process of decontamination in order to allow the environment to once again become "safe".

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