Subsurface Stewardship Sciences
Oak Ridge National Laboratory

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DOE/Office of Science/Biological & Environmental Research

- The goal of the project is to provide an improved fundamental understanding of the long-term fate and transport of contaminants and an improved ability to predict system response to remedial actions for addressing DOE's long-term stewardship responsibilities.
- Massive RCRA caps have decreased the groundwater hydraulic head and gradient suggesting local scale cap effects; however, large increases in the water table continue to occur during storm events despite the presence of a cap. This is suggestive of the continued upward surge of regional scale groundwater.
- The project will have a significant impact on assessment, cleanup, and stewardship issues associated with capped contaminated sites in humid environments which will ensure the effectiveness of remediation and/or natural attenuation processes.

How will the new system evolve?

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The ORNL Waste Area Groups (WAGs) contain thousands of unconfined pits and trenches containing low level radioactive and organic waste. Remediation strategies have chosen to leave contaminants in-place and site managers have constructed massive RCRA caps with the primary objective of controlling the infiltration of storm water into the waste trenches. The site now offers a unique scientific opportunity to track the evolution of post-cap processes influencing contaminant migration and immobilization, because we have many years of pre-cap coupled processes information and knowledge. The objectives of the research are to quantify the influence of post-cap hydrological, geochemical, and microbial processes on contaminant discharge as a function of scale and time in an effort to assess local-scale cap influences (ha scale) versus un-capped regional-scale groundwater flow influences (km scale) on contaminant discharge. Initial results suggest the caps have decreased the groundwater hydraulic head and gradient suggesting local scale cap effects; however, large increases in the water table continue to occur during storm events despite the presence of a cap. This is suggestive of the continued upward surge of regional scale groundwater. Nevertheless, post cap contaminant discharge in perennial streams decreased, rather than increased, for the first time in 10 y since stream monitoring was initiated. Continued monitoring of coupled processes with determine if this is the Influence of remediation or yearly climatic variations. The project will have a significant impact on assessment, cleanup, and stewardship issues associated with capped contaminated sites in humid environments which will ensure the effectiveness of remediation and/or natural attenuation processes.

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