

PADUCAH GASEOUS DIFFUSION PLANT: A CHALLENGE IN PROGRESS

Groundwater Cleanup Activities

The U.S. Department of Energy's (DOE) Paducah Gaseous Diffusion Plant (PGDP), located 10 miles west of Paducah, is the last active uranium enrichment facility in the country. Plant enrichment operations began in the early 1950's as the initial uranium enrichment stage for Cold War weapons development and a growing nuclear power industry. The now-antiquated gaseous diffusion process is used for uranium enrichment at the PGDP and requires extensive power, water, and cooling infrastructure. Site gaseous diffusion process operations utilize 11 million gallons of water per day and are reported to consume as much electricity as the city of St. Louis. The uranium feedstock stored at the PGDP for enrichment and recycling comprises the largest stockpile of mined uranium in the world.

Plant operations, maintenance, and process up-grades generated waste materials disposed in site landfills and burial grounds as well as waste fluids released to site waste & water systems, treatment lagoons and drainage ditches. Leaking and leaching of disposed materials contaminated site soil and groundwater resulting in the largest documented Trichloroethene (TCE) and Technetium-99 groundwater plumes in the DOE complex and the world. The number of source areas contributing to soil, surface water and groundwater contamination and the depth, contaminants and geochemistry of the sites groundwater plumes pose world-class technical, management and regulatory challenges for compliance and cleanup.

For over 6 decades, the PGDP has contributed billions of dollars to the local economy through employment and local business. During the 1950's as many as 20,000 construction workers and tradesmen were employed in the construction of the PGDP facilities. More than 1,700 skilled workers and scientists continue to be employed at the PGDP to manage, run and maintain the enrichment operations, implement plant facility decontamination & demolition, and conduct environmental restoration activities. And the largest employer in the region is now slated for shut-down and decommissioning leaving local communities with the challenges of re-thinking and sustaining a thriving economy.

The PHYSICAL MODELS of the site and its environs provide a frame of reference for the PGDP industrial site and the spatial extents of impacts on the local environment. The largest model consists of interchangeable layers of information related to the physical facilities on the industrial site, historical through present TCE and Technetium-99 plume extents, and the locations of monitoring wells and borings utilized to define the nature and extent of the site's impacts on groundwater. The double-decker model relates surface features with the underlying aquifer and groundwater plumes and the smallest model zooms in on industrial site features. The four largest buildings on the models are Process buildings where uranium enrichment occurs and were among the largest buildings in the world when constructed in the 1950's.

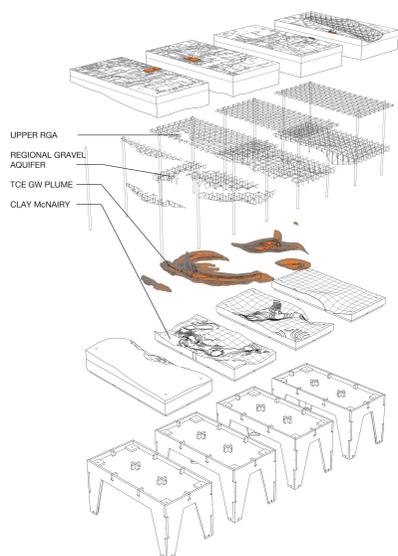
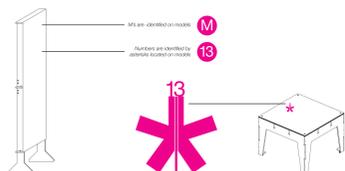
The DISPLAY BOARDS sequentially document site activities undertaken by DOE, contractors, and regulators to address the plants groundwater contamination. Those activities began in 1988 and continue today.

The University of Kentucky - Kentucky Research Consortium for Energy and Environment (KRCEE) collaborated with the UK College of Design to develop models and displays to facilitate the understanding of the challenges facing the DOE, scientists, community, and stakeholders charged with the environmental clean-up and economic re-use of the PGDP facility. The groundwater display boards accompanying the models were developed for the PGDP Citizens Advisory Board (CAB) and display content was completed with support from DOE and DOE site contractor LATA KY.

The Kentucky Research Consortium for Energy and Environment (KRCEE) was created to offer innovative & technically sound solutions to problems facing the environmental restoration and continued economic use of the PGDP and its surrounding areas. KRCEE is administered by the University of Kentucky Center for Applied Energy Research (CAER) and managed by professional staff and faculty at the University of Kentucky

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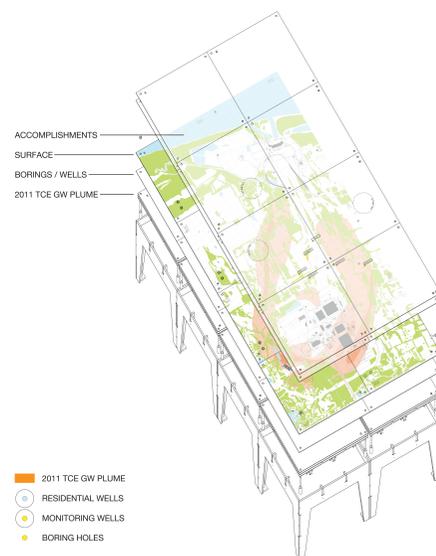
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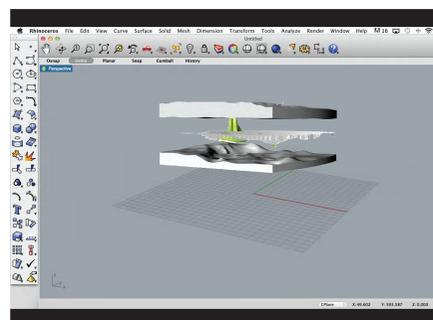
1:350 GROUNDWATER STRATIGRAPHY MODEL



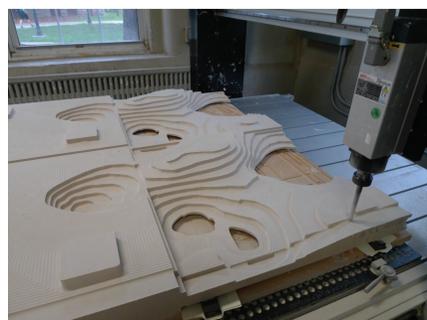
1:150 PGDP SITE MODEL



1:160 PGDP SITE MODEL



DIGITAL MODEL



CNC ROUTER



STORAGE UNIT



INTERACTIVE TOOL



MODEL AS TOOL TO FACILITATE INFORMED DISCUSSION



INTERCHANGEABLE INFORMATION LAYERS



INTERNATIONAL ARCHITECTURE BIENNIAL, ROTTERDAM



UK/CoD PGDP "FUTURE USE" STUDIO



UK/CoD PGDP "FUTURE USE" EXHIBITION, CAER

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