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INTERNATIONAL ENVIRONMENTAL ASSESSMENT/ JCCEM CONTAMINANT TRANSPORT STUDIES

TECHNOLOGY NEED

Validation of existing DOE contaminant transport models through exchange of contaminant-migration data and joint U.S.-Russian modeling of well characterized contaminated Former Soviet Union (FSU) sites will help site managers obtain approval from regulators for fewer samples, analyses, wells, and stronger cases for No Further Action (NFA) at many DOE sites.

TECHNOLOGY DESCRIPTION

Nuclear fuel cycle activities of the FSU have resulted in significant contamination of the environment in western Siberia. The West Siberian Basin contains the largest amounts of surface and subsurface radioactive contaminants on earth. PNNL is developing, jointly with their Russian counterparts in the Ministry of Atomic Energy of the Russian Federation (MINATOM), three-dimensional numerical models of the hydrogeology and potential contaminant migration in the West Siberian Basin to verify and validate DOE models and modeling strategies using decades of data from measured contaminant migration at the Mayak, Tomsk-7, and Krasnoyarsk-26 sites. These joint models will also be used in designing mitigation strategies for the sites. DOE uses such models to evaluate the potential for risk from contaminated U.S. sites, and will benefit both from model validation and from technologies transferred from Russian site remediation work.

The long-term goal of this work is to determine and improve the capability of DOE's contaminant transport models to predict future environmental and human impacts of radioactive contaminant releases, such as those that have occurred to date in the West Siberian Basin. Our objectives for FY95-96 are to: 1) document results of the regional hydrogeologic model of the West Siberian Basin; 2) develop and document the spatially registered, digital geologic and hydrologic databases derived from open-literature sources and direct interactions and subcontracting with MINATOM, that will provide a common database for joint U.S.-Russian modeling in geographic information system format; 3) implement the conceptual and computer models of the hydrogeology of Tomsk; and 4) perform preliminary joint U.S.-Russian hydrogeologic contaminant-transport model inter-comparison studies for Mayak.

BENEFITS

- Technical collaboration with FSU states and scientists on large-scale groundwater contaminant migration
- Validation of groundwater transport models of DOE scientists with decades of Russian groundwater sampling data

COLLABORATION/TECHNOLOGY TRANSFER

Technical expertise from the United States, including joint activities by PNNL and Savannah River Technology Center, is being brought to bear on large-scale groundwater contaminant migration.

ACCOMPLISHMENTS

- Completed the regional hydrogeologic model for the West Siberian Basin and published a definitive PNNL report and an open-literature synopsis in May 1995. This is, to our knowledge, one of the largest geographic areas ever attempted for modeling, and is the proof-of-principle for the systematic approach to remote/local site characterization and analysis that is the basis of our technology.
- Completed a joint U.S.-Russian workshop on hydrogeologic modeling of the West Siberian Basin and Mayak, Tomsk-7, and Krasnoyarsk-26 sites at PNNL in August 1995. This workshop provided Russian peer review of PNNL's site characterization and modeling efforts to date (positive feedback), and formalized plans for FY96 and outyear cooperative U.S.-Russian site, characterization database development and contaminant-transport modeling.
- Completed the remote characterizations for the Mayak and Tomsk sites and published letter reports in September 1995. These two databases form the framework for FY96 and outyear joint databases incorporating Russian site characterization data, which will be one of the principal joint U.S.-Russian project activities.
- Completed the computer implementation for the Tomsk intermediate-scale hydrogeologic model using remote characterization data. Refinement of this model in FY96 and outyears using Russian site characterization data will be one of the principal joint U.S.-Russian project activities.

TTP INFORMATION

International Environmental Assessment and the Joint Coordinating Committee on Environmental Management (JCCEM) Contaminant Transport Studies technology development activities are funded under the following Technical Task Plan (TTP):

TTP No. RL34C221 "International Environmental Assessment"

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