

12.1 **3D Geologic modeling of the Piceance Basin in support of dynamic systems and groundwater modeling for oil shale development**

Matthew Minnick, Wendy Zhou

Colorado School of Mines, Golden, CO, United States

This three year project to address water quantity and quality funded by the DOE focuses on a Geographic Information Systems (GIS) based regional water resource infrastructure for Piceance Basin oil shale data. A three dimensional (3D) geologic framework of the basin is being built in Mining Visualization Systems (MVS) by C-TECH and exported to a 3D geodatabase for visualization distributed via Arc Server. The 3D geologic model is critical for understanding water quantity issues in the basin and to support Dynamic Systems modeling of retort water usage and groundwater modeling. The model includes the Tertiary Uinta, Green River and Wasatch Formations as well as Cretaceous Mesaverde Group and Mancos Shale Formations. The extent of the model ranges from the Grand Hogback to the east and the Douglas Arch to west and from the White River to the north and Colorado River to the south. The model grid will be built based on two resolutions: a coarse resolution for web-based visualization and fine resolution of one foot node intervals in the Z axis over the Green River Formation. The fine resolution Green River model framework will be used to support interpolation of over 300,000 Fischer Assay data points, fracture distribution, and hydrogeologic parameters. Retorts of varying dimensions can be extracted from the 3D geologic model and consequently volumetric parameters can be input to a Systems Dynamic model to generate estimates of spatial and temporal water usage. A MODFLOW based groundwater model will be built based on the geologic framework and interpolated hydrogeologic parameters.