We present field ORNL IFRC hydrogeophysical-geophysical (seismic reflection, seismic refraction, and electrical conductivity) datasets and the analysis of these datasets using joint inversion and coupled modeling approaches. The study is leading to new hydrogeophysical monitoring methods and approaches to integrate multi-scale, disparate datasets and insights about recharge processes and aquifer structure that may impact assessment of natural attenuation across plume-scale regions. We review the ORNL datasets and inversion approaches used to:

1. Quantify subsurface architecture that may influence flow at the plume scale at the NT-2 and the S-3 Areas.
2. Remotely monitor subsurface hydrogeophysical processes induced by recharge, initially at the S-3 source area.