**RiverSpill and the Incident Command Tool for Drinking Water Protection**

**William B, Samuels, Ph.D**

**Center for Water Science and Engineering**

**Leidos, Inc.**

**Alexandria, VA**

**Abstract**

The Incident Command Tool for Drinking Water Protection (ICWater) provides real-time assessments of the time-of-travel and dispersion of contaminants in streams and rivers. It is structured around the RiverSpill model which has been enhanced to make use of the 1:100,000 scale National Hydrography Dataset Plus, (NHDPlus). NHDPlus is a hydrologically connected river network that contains over 3 million reach segments in the United States. This allows for both downstream and upstream tracing. Mean flow and velocity have been calculated by the US Geological Survey (USGS) and Environmental Protection Agency (EPA) for each reach. These mean values are updated by flow from web accessible real-time gauging stations. Navigating the river network upstream coupled with mass-balance calculations from breakthrough curves allows for backtracking of the contamination to determine the origin and source strength. On January 9, 2014, an estimated 10,000 gallons of 4-methylcyclohexane methanol (MCHM), a solvent used in coal processing, leaked from a ruptured container into the Elk River. The spill, just 1 mile upstream from a water-treatment plant, forced officials to ban residents and businesses in nine West Virginia counties from drinking the water. An estimated 300,000 West Virginia residents were affected by the spill. The NHDPlus national river network coupled with real-time streamflow and river forecasts allowed the ICWater model to simulate the leading edge, peak concentration, and trailing edge of the spill from its origin on the Elk River to intakes hundreds of miles downstream. Model runs were updated based on MCHM measurements at downstream locations on the Ohio River to provide accurate forecasts to nearby water intakes. The Greater Cincinnati Water Works, a large water utility on the Ohio River, used ICWater along with river-grab samples to determine when to close its intake to allow the spill to pass by. Data for Cincinnati showed good agreement (within several hours) between the observed peak time of arrival and the model’s estimated peak time.