West Virginia Chemical Spill: NTP Research Response

Background
In January 2014, approximately 10,000 gallons of chemicals used to process coal spilled from a storage tank into the Elk River in West Virginia. The Elk River is a municipal water source that serves about 300,000 people in the Charleston area.

The primary spilled agent was 4-methylcyclohexanemethanol (MCHM). Other chemicals, including dipropylene glycol phenyl ether (DiPPH), and propylene glycol phenyl ether (PPH), were also present in lower amounts in the tank. Residents in the nine counties that receive their water from this particular municipal water system were advised to not use the water for drinking, bathing, cooking, or washing.

A team of local, state, and federal public health officials reviewed the limited toxicology information that was available, and developed preliminary drinking water screening levels. Scientists recommended a screening level of 1 part per million (ppm) for MCHM and 1.2 ppm for PPH. These levels were judged not likely to be associated with any long-term adverse health effects.

Determining Potential Long-term Health Effects
Since the spill occurred, federal agencies have been working to learn more about the chemicals.

Recently, the National Toxicology Program (NTP) received a nomination from the Centers for Disease Control and Prevention (CDC)/Agency for Toxic Substances and Disease Registry (ATSDR) to conduct additional toxicity studies on the predominant chemicals known to be involved in the spill. In response, a partnership was formed to conduct additional research to understand, more clearly, any potential long-term effects of these chemicals.

NTP Efforts
NTP plans to conduct a series of short-term toxicity studies. Because of public concern for the safety of pregnant women who may have been exposed to the chemicals, the first priority will be to use a variety of toxicological models to look at potential developmental outcomes in animals. Among the tests NTP plans to conduct are teratology studies, where scientists will look to see if pregnant rats, exposed to the chemical MCHM, give birth to offspring that develop birth defects or other adverse health outcomes.

NTP also plans on using other lower animal species, including zebrafish and C. elegans (roundworms), to look at effects of MCHM and some of the other spill chemicals over the lifespan of the organisms. These studies can be conducted more efficiently than studies in rats and mice, allowing more chemicals to be tested in a shorter period of time.

NTP will also look for more subtle biological changes that may occur during short-term exposures. In particular, NTP scientists will be looking at changes in the expression of genes in the liver of rats. These types of toxicogenomic studies will be conducted on four of the chemicals known to have been in the Charleston water. These short-term studies, coupled with powerful molecular analysis, will help determine what biological systems are affected, and at what dose levels no effects are seen.

Early Modeling Efforts Continue
NTP has been conducting computer modeling to predict potential adverse effects from the chemicals since the early days of the incident. This information did not suggest a significant likelihood of persistent health effects. NTP plans to continue to use this state-of-the-science approach, incorporating information from the toxicogenomic studies to refine predictions of possible toxicological outcomes that could potentially occur from exposure to these chemicals.

Time Frame and Next Steps
Results from the NTP studies should be available within a year. The information will be shared on the NTP website and with other health agencies. The studies will be useful for determining if more comprehensive health assessment studies are needed. They will also help provide both the public and scientists with more certainty and confidence about potential health outcomes from exposure to chemicals in the spill.

For more information about the chemical spill and federal health efforts, see Centers for Disease Control and Prevention http://emergency.cdc.gov/chemical/MCHM/westvirginia2014.

NTP is an interagency program that tests and evaluates chemicals in our environment.