After Action Following the 2014 Elk River Chemical Spill

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October 18, 2016
Counties served by the water utility that were impacted by the spill are indicated in red.
The Event - January 9, 2014

• Late morning, a licorice smell in/around Charleston reported to West Virginia Division of Environmental Protection
• Odor traced back to a leak of 4-Methylcyclohexanemethanol (MCHM)
• Unknown amount of MCHM released
• Apparent spill reported to water system, and other state agencies notified
• Water utility begins additional treatment with activated carbon
• Late afternoon, the Office of Environmental Health Services is notified that measures were not effective, and chemical is in water distribution side of water treatment plant
• Preparedness Director notified; Health Command initiated
• By early evening, “Do Not Use” order issued by water utility
• State of Emergency issued by the Governor for all or part of nine counties
4-Methylcyclohexanemethanol (MCHM)

- Coal processing
- Licorice-like odor
- Few studies on health effects
- Limited toxicological data
- Predicted human health effects*
  - Acute: skin, eye, and respiratory irritation
  - Long-term health effects unknown

* National Library of Medicine Toxicology Data Network

Photo by David Zucchino
The Response

- State Emergency Operations Center
- DHHR Leadership
- Local Emergency Operations Center
- Local Health Department
- Local Hospital
- Joint Information Center
- Media
The Response (con’t)

- Notification of the public through multiple media outlets and social media
- Bottled water and bulk drinking water quickly deployed and made available to county residents

Photo Courtesy of West Virginia Public Broadcasting
The Response (con’t)

• A screening level of 1 part per million (PPM) established for MCHM by the Centers for Disease Control and Prevention (CDC)
• Sampling and testing from all sections of the distribution system and the Elk River to assess chemical concentration
• Methods for flushing of water lines within homes established and implemented by zones once testing indicated levels below 1 PPM
• “Do Not Use” order lifted for all counties by January 19, 2014
Communication

• Leadership from the Governor and top government officials
• Public Health involved
• Inclusion of local health departments
• Joint Information Center established
• Involvement of multiple experts
• Frequent news conferences/press releases/web posting of sampling data
• Involvement of drinking water utility
• Water sampling data made available daily
• West Virginia Poison Center served as call center for the public
Approximately 10,000 gallons of MCHM (4-METHYLCYCLOHEXANEMETHANOL) released

300,000 persons without potable water in nine counties

Businesses and schools closed

Hospitals taking emergency measures

West Virginia Poison Center recorded 2,000 persons with reported chemical exposure

Increased emergency department (ED) visits
MCHM Exposure

Symptoms vs. Routes of Exposure

Skin symptoms

Gastrointestinal symptoms

Respiratory symptoms

Source: WVDHHR/CDC medical chart review
ED Visits Related To The Elk River Chemical Spill

Source: WVDHHR/CDC medical chart review

Admitted (n=13)
Treated and released (n=356)

Spill
"Do Not Use" Order Lifted

Taylor
Most Commonly Reported Symptoms (n=369)

Source: WVDHHR/CDC medical chart review
Community Assessment - Demographics

- Conducted a Community Assessment for Public Health Emergency Response (CASPER) across affected counties April 8-10, 2014

- Household demographics include:
  - 18 assessment teams
  - 171 households surveyed
  - 79.7% single family homes
  - 99% self identified ethnicity as not Hispanic/Latino
  - 93.6% self identified as white
  - 4.8% self identified as African-American
  - Greater than 45% reported average annual salary of $49,999 or less
  - 35.7% reported some college and 33.7% reported a bachelor’s or advanced degree
  - 62.1% reported having at least one pet

Source: CDC Disaster Response and recovery needs of communities affected by the Elk River Chemical Spill, West Virginia, April 2014
• Focus on TV for public messages during disasters when communication infrastructure remains intact – also use multiple supplemental methods
• Encourage households to have a three day water supply
• Identify additional methods for providing alternative water
• Promote availability of health and mental health resources to help affected community members access needed services
• Increase community education on current water safety (i.e., drinking water)

Source: CDC Disaster Response and recovery needs of communities affected by the Elk River Chemical Spill, West Virginia, April 2014
Challenges

• The event was unprecedented, affecting about one-eighth of the state’s population

• There was very little known about MCHM

• Weeks later, a second chemical, a proprietary mixture of propylene glycol phenyl ethers, referred to as PPH, was identified by the industry as part of the original release

• The odor threshold was well below the screening level established by the CDC

• The “Do Not Use” order was lifted by zones

• The CDC advisory for pregnant women was issued after the “Do Not Use” order was lifted for several zones
• Legislation submitted by the Governor and passed by the West Virginia Legislature:

  ✓ Stipulates a statewide above-ground storage tank regulatory program
  ✓ Requires inventory and permitting of above-ground tanks
  ✓ Mandates Source Water Protection Plans
  ✓ Requires opportunity for public participation in both development of Source Water Protection Plans by utility and by the Bureau of Public Health during the review process
  ✓ Creates West Virginia Public Water Supply Study Commission
• Governor conducted web-based after action forum open to all citizens and results posted online

• Local Emergency Planning Committees (LEPCs) engaged by West Virginia Homeland Security

• Development of a GIS system for tracking waterway contamination events to be used by emergency managers

• Development of a science cell concept to include in the state emergency operations plan to quickly facilitate inclusion of scientists into response decisions

• Assistance to water systems through on-site technical guidance

• Funds provided to regional councils for direct grants to public water systems for source water planning – $1.3 million in state fiscal year 2015, and $1.1 million in state fiscal year 2016
After Action – Source Water Protection Plans

• The addition of required Source Water Protection Plans make the West Virginia program among the most stringent source water protection programs in the United States

• Source Water Protection Plans **required** of 125 water utilities based on customer size

• Water utilities required to solicit citizens input into their source water planning activities

• 125 Source Water Protection Plans received for review by the Bureau for Public Health by July 2016

• As of mid-September, 114 plans have been reviewed as to required content and seven approved

• Several water systems are developing their own state of the art monitoring and protection programs
As of mid-September 2016, 19 public hearings have been held around the state to obtain comments on plans from 39 public water systems.

- 145 people in actual attendance for an average of 7.6 persons per hearing.
- Public hearings will continue through the end of December 2016.
Commission includes members representing citizens, environmental organizations, business and industry, an expert each in environmental toxicology and hydrology, municipal league and rural water, business and industry as well as state agencies of Public Health, Public Service Commission, Environmental Protection and Homeland Security.
Public Water Supply Study Commission - Charge

1. A review and assessment of the effectiveness and the quality of information contained in updated Source Water Protection Plans

2. Review and assess effectiveness of legislation enacted during 2014 as it pertains to assisting public water systems in identifying and reacting or responding to identified potential sources of significant contamination, and increasing public awareness and public participation in the emergency planning and response process

3. The extent of available financing and funding alternatives which are available to existing public water systems

4. Review and consideration of the recommendations of the U.S. Chemical Safety and Hazard Investigation Board after its investigation of the Bayer Crop Science incident of 2008

5. Recommendations or suggestions the study commission may offer to improve the infrastructure of existing public water systems, to provide safe and reliable sources of supplies, and to pursue other measures designed to protect the integrity of public water service
“The U.S. National Toxicology Program (NTP) completed a yearlong research program to evaluate the potential toxicity of chemicals spilled into the Elk River in Charleston, West Virginia. The collected findings of the NTP studies support the adequacy of the drinking water screening level concentrations recommended by the Centers for Disease Control and Prevention (CDC) at the time of the spill. Exposure at or below the screening level is considered not likely to be associated with any adverse health effects.”

Source: U.S. Department of Health and Human Services, National Toxicology Program, Final NTP Update, July 2016
Positive Outcomes

• There were no deaths attributed to the water crisis
• Improved protection of drinking water through planning and financial assistance to water systems
• New processes for monitoring spills to waterways
• Advancement in emergency operation procedures to quickly link to national experts
• Inventory of chemical storage (above 10,000 gallons in size)
• A Community Assessment for Public Health Emergency Response (CASPER) was conducted and findings released July 7, 2014
• Public Water Supply Study Commission to provide oversight and feedback to the Legislature
• Multiple studies conducted by the National Toxicology Program supported the drinking water screening level that was used
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