Ore Knob Mine NPL Site
Health Consultation
April 13, 2016

Background
The Ore Knob Mine National Priorities List ("Superfund") site is located in Ashe County, North Carolina, eight miles east of the town of Jefferson.

Copper mining occurred intermittently at the Ore Knob Mine from the 1850s through 1962. The site consists of three principal areas; the 19th century operations area, the 1950s mine and mill area, and a 20-acre tailings impoundment. Waste from site operations contaminated surface water, groundwater, sediment and soil. Surface soil and water runoff from the site have also affected downstream surface water, sediment, and floodplain soil.

Prior site investigations have identified metal contamination in surface water, groundwater, sediment, and soil that could potentially harm people in the area. In 2011 the NC Department of Health and Human Services completed a Public Health Assessment report for the site. Groundwater contamination is considered the primary threat to public health. In addition, residences in the area do not have access to a public water supply.

Since 2010, the U.S. Environmental Protection Agency (EPA) has provided some households in the area water treatment systems. The EPA has collected well water samples since then to see if contamination might be affecting other wells and to make sure that the water treatment systems are working properly. The EPA is trying to determine if it is possible to provide an alternative water source to the homes affected by the groundwater contamination from the site.

Purpose of the Health Consultation
To evaluate if contact with groundwater from the site presents a current health hazard to the community.

How was the Health Consultation conducted?
We evaluated untreated and treated drinking water samples collected by the Environmental Protection Agency and their contractors at nearby private homes from 2010 to 2013.

Conclusion
- Drinking water from groundwater near the mine could harm the residents if drinking the water daily over many years.

  Reason: Concentrations of manganese, iron, cadmium, cobalt, and copper were elevated in several untreated and treated water samples.

- Drinking water from a well maintained treatment system could harm the health of people on a sodium restricted diet.

  Reason: Ion exchange water treatment systems produced high concentrations of sodium in treated drinking water. This is not expected to harm people who are not on a restricted sodium diet.

Chemicals associated with this site and potential health effects

Cadmium: Long-term exposure to low levels in air, food, or water may lead to kidney disease, lung damage and fragile bones. Eating food or drinking water with very high levels severely irritates the stomach, leading to vomiting and diarrhea.

Cobalt is essential to our diet but at high levels it can affect the blood, liver, kidneys, and heart.

Copper is essential to our diet, but ingesting high levels can cause nausea, vomiting, and diarrhea. Very high doses of copper can cause damage to the liver and kidneys, and can even cause death. There are a very small percentage of infants and children who are unusually sensitive to copper.

Iron is essential to our diet, but eating large amounts of iron in a short period, or lower amounts over long periods, may result in abdominal pain, diarrhea and vomiting and ultimately damage the heart, pancreas, liver, kidneys and the immune system, reducing the body's ability to fight off infections. People with the liver disease hemochromatosis are at increased risk of adverse effects from iron ingestion.

Manganese is essential to our diet, but people who are exposed to high levels may experience nervous system effects including behavioral changes and slow or clumsy movement. Brain development may be affected in children exposed to high levels, resulting in behavior changes and a decrease in the ability to learn and remember.

Sodium is essential to our diet but at high levels it can severely irritate the stomach and cause vomiting, muscular twitching, convulsions and possibly death. Lower levels for a long time can cause high blood pressure. African-Americans and people with decreased kidney function and infants and children who still have an immature kidney system are at higher risk of sodium adverse health effects.

Zinc is essential to our diet, but eating or drinking large amounts in a short time can cause stomach cramps, nausea and vomiting. Eating or drinking large amounts for a longer time can cause anemia and negative changes in blood cholesterol.

The NC Division of Public Health recommends that:

- the homes with elevated metal concentrations identified in this health assessment continue to use the treatment systems and continue to monitor its effectiveness until they are able to connect to a different water source.
- the EPA continues to monitor residential wells at least once per year.
- the residents are connected to water lines from a nearby municipality to eliminate the risk from water system failure or improper maintenance, and to protect individuals on a sodium restricted diet.

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Additional Information
N.C. Public Health: Health Assessment, Consultation and Education Program http://epi.publichealth.nc.gov/oee/hace/by_site.html#O (A full report is available under Ashe County).