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Pearce Creek Dredged Material Containment Area

Recommendation to Extend Public Water to Serve the Surrounding Communities

The Cecil County Health Department finds that there is a public health need for a public water supply to be provided to residents of the communities surrounding the Pearce Creek Dredged Material Containment Area. The Health Department was requested to sample well water in these communities after a United States Geological Survey (USGS) was released identifying chemical contamination of the aquifers used by area residents. Health Department sampling results confirmed that wells in the vicinity have an increased likelihood to exceed drinking water standards for various metals. While many residents had installed extraordinary water treatment systems, lack of regular testing and maintenance continues to put the safety of their drinking water at risk. In addition, salt backwash from many of the water treatment units has the potential to exacerbate the problem. Water sample results show that the concentration and location of elevated metals in well water has changed over time and regular monitoring of 152 private wells for potability is not practical. For these reasons, the Health Department strongly recommends a public water supply be provided to area residents.

Facts Supporting This Recommendation

Raw Groundwater Quality

A January, 2013 USGS report was released stating that the Pearce Creek Dredged Material Containment Area had degraded local groundwater. The USGS study tested both monitoring wells and domestic wells for a variety of contaminants. The USGS study found that 15% of the samples tested exceeded the Environmental Protection Agency's (EPA) maximum contaminant level for beryllium in drinking water; 2% of the samples exceeded the maximum contaminant level for arsenic, cadmium, or thallium; 69% of the samples exceeded health advisory levels for nickel or sodium; and 71% exceeded EPA secondary standards for aluminum. The study specifically reported low pH and high Total Dissolved Solids (TDS) in the interconnected aquifers. Low pH and high TDS may mobilize metals that naturally exist in the soil, bringing them into solution in the groundwater. An area around the site where wells may be at risk of contamination was identified that included 241 residences on individual drilled wells.

Between March 8 and November 5, 2013, the Health Department sampled 152 domestic drilled wells in the area of concern. The Health Department sampling results found that 13% of the samples tested exceeded the EPA's maximum contaminant level for beryllium in drinking water; 17% of the samples exceeded the maximum contaminant level for arsenic or cadmium;

54% of the samples exceeded health advisory levels for nickel or sodium; and 38% exceeded EPA secondary standards for aluminum. In addition to the contaminants tested in the USGS report, Health Department sampling added Gross Alpha Particle Activity (GAPA). A 2000 study by the Maryland Geological Survey found an association between low pH, high TDS, and mobilization of radium in groundwater. Radium is a metal which releases gross alpha radiation. Health Department sampling found that 32% of the samples tested exceeded the EPA's maximum contaminant level for GAPA in drinking water.

A strong correlation between the concentration of several dissolved metals and pH was found. Concentrations of aluminum, beryllium, cadmium, nickel, and gross alpha emitters were much more likely to exceed standards as the pH of the groundwater decreased. Sodium, manganese, and iron did not display a correlation with pH.

Household Water Treatment Systems

High concentrations of iron, manganese, and sulfate had negative observable effects by the residents on the taste and smell of the well water and created significant staining of plumbing fixtures if left untreated. Many households sampled had installed extraordinary water treatment systems consisting of ion exchange units, reverse osmosis, and/or acid neutralizers for their individual wells to reduce these aesthetic problems. While these systems were not installed to treat the metals identified above, Health Department testing of the treated well water found that they were generally effective in reducing concentrations to below the EPA standards. Several samples (7%) of treated water found contaminants above recommended drinking water standards due to water treatment units in need of service or not adequate to remove the concentrations of contaminants present.

One of the most common water treatment units installed in the communities around the Pearce Creek Dredged Material Containment Area is the ion exchange unit. Ion exchange uses a salt backwash to rejuvenate the treatment system periodically. If backwash or maintenance is not frequent enough, the contaminants will pass through the treatment system. The use of sodium chloride salt in the ion exchange units causes elevated sodium levels in treated drinking water. Treated well water had higher sodium concentrations than the untreated well water. Health Department well water testing found that 81% of the treated samples exceeded the EPA Health Advisory Level for sodium.

Besides contributing to elevated sodium levels in the residents' drinking water, the large number of ion exchange units in the community and the need for frequent backwash to treat the contaminant levels present may contribute to the aquifer contamination problem. The salt backwash from the ion exchange units is sent to a subsurface soil disposal system, either the septic system or a separate infiltrative system. The salt infiltrates the sandy soils and contributes to the TDS levels in the aquifer. Use of ion exchange systems in the area has the potential to increase the area of groundwater experiencing high TDS and therefore contributes to the risk for high gross alpha particle activity due to mobilization of radium.

Changes in Water Quality over Time

Most water samples collected in the study area capture the water quality of a well at one moment in time, and do not give any indication of what is occurring over time. The Health

Department has compared current water sample results with a limited number of water sampling results from wells in the study area collected in the mid-1990s shortly after the site was last used for dredge material disposal. Sodium is a major contributor to Total Dissolved Solids (TDS) and was tested on both sampling events. Of 13 wells sampled in the mid-1990s and in 2013, 5 are significantly higher in sodium now, 5 are significantly lower now, and 3 are virtually unchanged. Plotting these wells geographically, it appears that the area where well water exceeds drinking water standards has moved over time. Some wells that met drinking water standards 20 years ago do not now. Regular monitoring of 152 private wells for metals would exceed the manpower and financial resources of this office.

Questions about the content of this report may be directed to Fred von Staden, Environmental Health Services Division Director, Cecil County Health Department, 410-996-5160 or fred.vonstaden@maryland.gov.