Drinking Water Issues in the Sandusky River Watershed

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The Sandusky is important as a water resource to human settlement, including its role as a major drinking water source for humans. This presentation is a brief overview of water supply features, issues and challenges in the Sandusky watershed for water suppliers.

There is some (but not complete) difference in challenges faced by ground water- and surface water-sourced systems. Surface water systems experience episodic spikes in nitrate, herbicides, turbidity, and monitored bacteria. These are often seasonal and associated with elevated flow conditions.

Nitrates often peak in the late spring, but can peak during high-runoff events. Herbicides appear to be associated with late-spring runoff during planting season (e.g., late May). Both constituents can be traced to agricultural and horticultural activity. Agricultural land use is by far the largest category in the watershed, and systems due not have control of upstream land use. Several surface water systems manage water quality by employing off-stream reservoirs. Flow rates in channels where intakes are located can be variable, most particularly for those water systems utilizing tributaries. In recent decades, surface water users have noted an enhanced “spikiness” to flow hydrographs, again likely a consequence of agriculture due to necessary farmland drainage. Such flashiness in flow patterns can result in a condition in which contaminants (agricultural runoff or wastewater solids) settle in pools or behind obstructions such as low-head dams during low flow, and then are swept downstream during high flow. A recent and still unknown factor is the role of large animal feeding operations, and their associated manure spreading. It is obvious that community water suppliers (CWS) and agriculture must interact to preserve source water quality.

Although all use essentially conventional surface water treatment (settling, coagulation, filtration, and chlorination), each of the watershed’s surface-water-source CWS have unique features. Fremont and Tiffin (Ohio-American Water Service Co.) lack off-stream reservoirs and have to watch upstream conditions closely in order to make water adjustments to the water intake and treatment process. Excessive turbidity adversely affects filter performance. Both are vulnerable to spring peaks in source-water nitrate. Conventional treatment is ineffective in removing this soluble, oxidized ion. Tiffin is able to avoid MCL violations by blending in ground water from wells.

Upper Sandusky, Bucyrus and others benefit from having off-stream reservoirs. The intakes can be shutoff for long periods during poor-quality periods and sediment and sediment-associated contaminants (e.g., herbicides) can settle. New Washington, which utilizes a small tributary, Alum Creek, situated in agricultural land, employs reservoirs both for quality management and capacity management. Flow in the stream is relatively low and variable. Reservoirs themselves can have problems, particular when there is excessive phosphorus (P) present (also an agricultural runoff constituent). Where there is excessive P, algal blooms can occur, including some toxin- and taste-and-odor-producing cyanobacteria. Some reservoir water can contain excessive total and assimilable organic carbon, which can contribute to trihalomethane (THM) and haloacetic acid (HAA) formation when the water is chlorinated.

In general, the need to respond to poor water quality drives up costs to utilities. Land for, and the construction and maintenance of reservoirs is expensive. Fremont is anticipating a cost of $18

million to finance an upland reservoir. Surface waters are the most vulnerable to human-generated compounds, including pharmaceuticals, airborne constituents such as mercury from coal-fired power plants, etc. They are thus most affected by changes in regulatory requirements. Because treatment systems are complex, systems must hire and retain Class III/IV (top two of four classes) water operators. These individuals are in high demand at present. The financial burden of meeting the surface-water cost challenge is most strongly felt in small rural communities with relatively low industrial-institutional income bases (e.g., Attica, New Washington).

How would watershed improvement help this situation? Improved agriculture and land conservation practices, reduced N in the source water, and reduced sediment and thus turbidity, reduce difficulty and uncertainty in treatment, reducing the cost of operation and delaying the need for upgrades and filter-treatment train changes. This has been the approach that New York City has been able to use to avoid filtration up to the present time.

Ground water is also a significant part of water supply in the Sandusky River watershed. It is the source for most of our dispersed and growing rural population not served by CWS, and for most of the noncommunity public water supplies. Several sizable villages are ground-water-source CWS (e.g., Carey, Nevada, Sycamore). In addition, it should not be forgotten that the baseflow of the river is sustained by ground water (the river is ground water temporarily on the surface). Where baseflow is restricted (drained headwaters), the most extreme changes in discharge rates occur.

Carey is an example of a ground water source CWS with assets and challenges. The ground water resource available provides for an abundant, high-quality water supply. Due to the drawdown of local quarries and the effect of recharge from the adjacent karst, reefy Limestone Ridge, Carey water quality is very good mineralogically. However, due to the lack of nitrate-reducing conditions in the wellfield capture zone, elevated (sub-MCL) nitrate is now an issue that is being addressed by the village. Removing nitrate or moving the wellfield are uncertain and very costly alternatives that they plan to avoid through watershed management. This hydrogeologically complex setting will require a thorough understanding of the conditions for mitigation measures to be effective.

Karst is the watershed's other significant ground water issue (setting aside for the moment that we have no idea how much water is being used by those withdrawing less than 100,000 gal/day). The watershed encompasses large areas of carbonate karst plain. Ground water (including private water and small PW supplies) is vulnerable to contamination. There is a famous case from the 1960s in which untreated wastewater drained into the subsurface contaminated large areas north of Bellevue. The continued permitting of drainage into this valuable aquifer is one of the significant regulatory inconsistencies permitted in Ohio and poor stewardship of the resource.

In general, water supply challenges and goals are the same as those for aquatic life attainment: improving source water quality improves product and lowers costs. The way forward should include measures that help surface and vulnerable ground water supplies to see high-quality water at their intakes, so that the costs of agriculture and other human activities are not shifted to either CWS or the environment. How future changes (climatic warming, increased rural and total populations, switching to organic-based power sources) affects the watershed is yet to be determined. Charting such trends should be part of the ongoing planning process.

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