EXECUTIVE SUMMARY

BACKGROUND

Historically, the 72-mile segment (Zone 1) of the Kanawha River that runs from Diamond, West Virginia to its confluence with the Ohio River at Point Pleasant, West Virginia has been exempt from the West Virginia Public Water Supply (Category A) water quality standards. Category A standards establish discharge limits considered to protect waters that are used for human consumption following conventional treatment and have not been applied to this stretch of the river for many years due to concerns over the quality of the water, particularly due to industrial discharges.

In 2014, the West Virginia Legislature passed Senate Bill 373 requiring water utilities to evaluate alternate water sources of supply for each of their water treatment facilities. The Legislature also removed the Category A exemption for Zone 1 of the Kanawha River, as recommended by the West Virginia Department of Environmental Protection (WVDEP).[1] The re-designation establishes protection of this river segment for drinking water, but that alone is not sufficient for determining suitability for a water supply source. West Virginia American Water (WVAW) determined that, in order to include the Kanawha River near Charleston in its evaluation of potential alternate sources for its Kanawha Valley Water Treatment Plant (KVWTP), it would need additional information regarding the water quality for that section of the Kanawha River.

This study, just one of a number of considerations, provides raw water quality and sediment data to assist WVAW in evaluating whether this section of the Kanawha River is of such a quality that it could be considered suitable to serve as a drinking water source of supply. WVAW worked closely with state regulators to ensure the work completed was comprehensive, such that the company could rely on the final data - see methodology section below. WVAW intends to provide the study to the West Virginia Department of Health and Human Resources (WVDHHR) as a supplement to its recently submitted Source Water Protection Plan (SWPP), share the study data with WVDEP and WVDHHR, and make information on the study available to the public via WVAW's website.

[1] In 2015, WVDEP indicated that Zone 1 of the Kanawha River is suitable for drinking water use and has modified the Water Quality Standards (WQS) to remove the Category A exemption. The West Virginia Legislature approved the modification to the WQS on March 12, 2015 via House Bill 2283 and the Governor approved the bill on March 18, 2015. Changes to West Virginia's WQS still have to be approved by the United States Environmental Protection Agency (USEPA) before the WQS can be used in permitting actions; however, it is anticipated that the USEPA will approve the Category A change.

METHODOLOGY

Potesta & Associates, Inc. (POTESTA) and WVAW developed a study plan that was presented to the WVDHHR and WVDEP prior to its implementation to get their input and agreement on the approach. The plan generally consisted of sampling Kanawha River water and sediment for an extensive list of parameters at locations between Charleston and Montgomery. The study plan was revised to address comments from the agencies and the study commenced in June 2015. WVAW, POTESTA, WVDEP and WVDHHR met twice during the course of the work to discuss the study and its findings.

Water Quality Sampling

Water quality samples were collected during 24 sampling events over a 12-month period from four different locations. There were three locations in the Charleston area: near the Moose Lodge, close to Elizabeth Street and near Court Street. The fourth location was upstream of the former WVAW intake at Montgomery. At each of these sample locations, a transect was established, with sampling points located at positions 20 feet and 60 feet from the bank. Two sampling points were established at different depths of approximately 1 foot and 10 feet from the stream bottom for each of these two points, resulting in four sampling points for each location. Samples were collected from the four points along each transect and mixed as a composite sample in a decontaminated stainless steel bucket prior to being placed into lab containers. Samples specifically for volatile parameters were collected as individual grab samples at each of the four points on each transect to minimize the potential for evaporative loss.

Additional samples were collected over the course of the study for quality control purposes. These included field blank samples prepared from ultra-pure reagent water and duplicate samples collected in the field at the same time the original samples were collected. Both the field blanks and the field duplicates were submitted to the laboratories for blind analysis, meaning that the labs were not told that the samples were blanks or duplicates. Field blanks are used to determine if samples have been contaminated during collection or handling and analysis, while field duplicates are used to check the laboratory's accuracy.

Samples were collected across a range of flow conditions and analyzed by certified or approved laboratories for more than 150 parameters. The parameters included the Federal Safe Drinking Water Act (SDWA) primary and secondary drinking water standards, West Virginia's Category A Water Quality Standards (WQS), several general chemistry parameters, and parameters on the Unregulated Contaminant Monitoring Rule 3 (UCMR3) list. The UCMR list is a group of unregulated contaminants selected by the USEPA to be measured in public water systems once every five years to provide a basis for future regulatory action to protect public health. These parameters are intended to be measured in finished drinking water, which is water that has been treated and is ready for distribution and human consumption rather than raw water, which is untreated water like the water collected from the river. Because the water analyzed throughout this study was raw water, it is likely to contain materials, like dirt or plant matter, that could affect the laboratory analysis. Thus, the results reported are not suitable for UCMR3 compliance

purposes, but may provide some indication of whether or not these contaminants could be present in the Kanawha River.

During the course of the study, 392 grab samples were analyzed for 32 volatile parameters, and 104 composite samples were analyzed for 121 other parameters, resulting in more than 25,000 data points. This level of sampling and analysis far exceeds the typical requirements for the evaluation of a drinking water supply. The laboratory results were then compared to the primary and secondary drinking water standards and the Category A WQS.

Sediment Sampling

Sediment from the Kanawha River was also studied due to the past industrial, chemical and mining use of the Kanawha River and its tributaries downstream of Mile Point 72. The sediment study was conducted to identify contaminants in river bottom sediments that could potentially be released back into the Kanawha River and affect water quality over time. The sediment study provided data from two sediment sampling events – one during low flow and one following a high flow event. Seven sampling sites located on the Kanawha River between Charleston and Cabin Creek were selected, including three water quality sampling locations in the Charleston area and four additional upstream locations near the major tributaries discharging into the Kanawha River. The four additional locations included the Campbell's Creek Tributary, the Rush Creek/Burning Springs Branch Tributary, the DuPont Plant/Simmons & Lens Creek Tributaries and the Cabin Creek Tributary. Detailed geophysical and bathymetric data were collected at each location to evaluate sediment accumulation, thickness, and general gradation for selecting the sediment sampling points.

POTESTA collected sediment samples from a boat deployed on the river. Samples of accumulated sediment were collected at two locations from each of the targeted sample locations (one on each side of the river) once during a normal or low flow period and a second following a high flow event. Two discreet samples were obtained from the top foot of sediment; based on a previous study of the Kanawha River in the Nitro area, it was determined that "Finest-grained deposit along both banks of the River exhibit lower resuspension rates due to lower shear stresses being generated by lower velocities of flow in those areas." (Conestoga-Rovers & Associates, 2015). This resulted in a total of 8 samples from each sampling location, for 56 total samples. Analytical laboratory and classification soils testing was completed by certified laboratories. Analytical tests included total organic carbon, metals, polychlorinated biphenyls, volatile organic compounds, semi-volatile organic compounds, and dioxin.

Currently, West Virginia does not have a screening method or regulatory standard for the evaluation of sediment with respect to a potential drinking water source. POTESTA utilized the findings and screening method in a United States Geological Survey study (Ingersoll et al., 2000) to compare the sediment analytical results to "probable effect concentrations" above which adverse aquatic toxicity effects are expected to occur.

RESULTS

The water sampling data showed no appreciable differences in the water quality between the four sampling locations. Of the more than 25,000 data points, there were 2,494 values (9.74 %) found above the laboratory minimum detection level, which is the lowest concentration at which the lab can detect a particular parameter, or the minimum reporting level, which is the lowest concentration set by the USEPA for reporting UCMR3 parameters.

The following parameters were measured at levels above the Federal SDWA primary or secondary drinking water standards:

- Bacteria (301 of 376 samples or 80 %)
- Aluminum (19 of 96 samples or 20 %)
- Iron (37 of 96 samples or 39 %)
- Manganese (18 of 96 samples or 19 %)
- Bis(2-ethylhexyl)phthalate (6 of 96 samples or 6 %)

As these results are for raw water, additional treatability studies would be necessary to determine if the water can be treated to meet the primary and secondary water quality standards for these parameters.

Of the UCMR3 parameters, only 1,4-dioxane was measured above USEPA's draft reference concentration (12 of 96 samples or 13%). As noted in the USEPA's UCMR3 Data Summary (USEPA, 2016c), "The draft reference concentration does not represent an 'action level' (EPA requires no particular action based simply on the fact that UCMR monitoring results exceed draft reference concentrations), nor should the draft reference concentration be interpreted as any indication of an Agency intent to establish a future drinking water regulation for the contaminant at this or any other level. Decisions as to whether or not to regulate the contaminant in drinking water will continue to be made following the Agency's Regulatory Determination process."

While the parameter was measured above the draft reference concentration at the three Charleston-area sampling locations, there are reasons to question the reliability of these results. First, this parameter is commonly used as a solvent and found in laboratory reagents. Further, the parameter was detected in four of the five field blank samples, which indicates that the samples may have been contaminated in the field or in the laboratory. Additionally, the analytical method for this parameter was developed for use on treated finished water and the raw water samples from the river may contain materials that could affect the analysis in unknown ways. Should WVAW pursue an alternate intake on the Kanawha River, this parameter should be included in treatability studies where it could be more appropriately analyzed in finished water following treatment.

The sediment analytical data show that the concentrations in the sediments sampled are all below the identified probable effect concentrations, except for copper and nickel at the location below the DuPont Belle Plant at Rush Creek. Additional treatability studies would be necessary to determine if the sediment can be treated to meet the water quality standards for these parameters.

Importantly copper and nickel were not detected in any of the water samples above the applicable drinking water standards.

The combined results of this study indicate that only ten (10) of over 150 parameters were detected in raw water or sediment above the associated water quality standards, UCMR3 draft reference concentrations, or probable effect concentrations. These detections represent less than 2 % of the total number of samples collected. The data obtained from this study will be provided to WVDEP and WVDHHR.