Ohio Environmental Protection Agency

Re: Michindoh Aquifer
General
Correspondence
Drinking Water Program
Fulton County

Memo to File

Received email from Todd Feenstra of Tritium, Inc. on August 29, 2018 with the following message:

Taylor,

I have attached the preliminary work plan for test drilling and aquifer performance testing in northwest Fulton County. The document includes a figure with the location of the proposed test sites. The parcel numbers for the sites are presented in both the document and the figure.

Please review the attached document and let me know if we need to provide additional information that would be helpful regarding the work. We will bring hard copies of the work plan with us to the site visit.

Regarding the site visits, please let me know when you would be available to conduct the site visits. I am hopeful that we can schedule all of the sites in one afternoon. We will bring copies of the lease/access/purchase agreements to the site visits if necessary, and we will do our best to answer any additional questions you may have regarding the parcels. I am planning to meet you on the roads in front of each parcel for the site visits, but please let me know if you need additional information to locate, or to get directions, to each site.

Given the amount of interest in this project, we would appreciate scheduling the site visits at the earliest opportunity to begin the testing and collection of factual data regarding the aquifer(s).

Best regards.

Tritium & Inc.
The Higher Standard

1789 East Bristol Street, Suite B
Elkhart, Indiana 46514
Phone: 574.266.5300
Fax: 574.266.1795

August 29, 2018

Ms. Taylor Browning
Northwest District Office
347 North Dunbridge Road
Bowling Green, OH 43402-9398

RE: Work Plan for Fulton County Wellfield Development

Ms. Browning,

Artesian of Pioneer is considering development of one or more wellfields in the vicinity of Fayette, Ohio to supply drinking water to multiple communities currently on the Toledo surface water system. After review of the revised Ohio Administrative Code and a conversation with Ralph Baker of the OEPA, we have assembled a proposed plan of work for the initial hydrogeologic investigation of up to five properties.

The properties were selected based on a review of the local well logs, construction of generalized geologic cross-sections, and agreements with the property owners. The property agreements include access and permission to conduct initial drilling and aquifer testing, and to potentially develop high-capacity wellfields. The three phases of work detailed below represent the exploratory drilling, well construction, and aquifer testing proposed for each of the potential wellfields. The work will conform to, and satisfy the requirements of, the Ohio Administrative Code 3745-9.

Phase I

The initial phase would include drilling and construction of a test well to verify the lithology at the site. The borehole would be drilled using mud-rotary techniques and would extend to the top of the bedrock to examine the entire unconsolidated sediment package for potential aquifers. During the drilling sediment samples of the encountered formations will be collected and logged by a professional geologist. A Mount Sopris down-hole geophysical logger will be used to record a gamma log of the lithology. A well log will be submitted to the ODNR.

A monitoring well will be constructed within the borehole. The well materials will consist of solvent-welded, 5-inch diameter, SDR 21, PVC casing coupled with at least 5 feet of 18-slot, stainless-steel wire-wound screen. The screen will be set at the bottom of the selected aquifer, and the top of the casing will extend at least 2 feet above grade. A silica filter pack will be poured into the annulus around the well screen. The pack will be between 3 inches to 8 inches thick and will extend vertically from the bottom of the screen to a level of at least 4 feet above the top of the screen. The remainder of the annulus will be pressure-grouted with bentonite slurry from the top of the gravel pack to the ground surface using the tremmie method. The well

screen and filter pack will be developed using a combination of air-lift techniques and jetting with water until discharge is clear of drilling mud and fine sediments.

Phase II

The second phase of the wellfield investigation will commence if the site is determined to likely support a high-capacity wellfield. The OEPA will be notified of the project progress and results. A second monitoring well and a large-diameter, test production well will be installed.

The large-diameter well will be sited to allow for a sanitary isolation radius of at least 300 feet as required for a public water supply well (OAC 3745-9-04). The wellfield layout will be such that the two monitoring wells are located at approximately a right angle from each other relative to the test production well. The radial distances from the test production well to the monitoring wells will variable and will be within 2 times to 5 times the aquifer thickness.

Drilling of both boreholes will be performed using mud-rotary techniques. Sediment samples will be logged and collected by a professional geologist during the drilling of the boreholes for both wells. Mount Sopris equipment will be used to record gamma logs of the lithology. The well logs will be submitted to the ODNR.

The second monitoring well construction and well screen development will be the same as the first monitoring well with the well screen set at the bottom of the aquifer. The test production well will be constructed using double-pass welded, 0.375 inch wall, beveled steel casing (ASTM A53/A53M-01 or ASTM A589-96) with at least 20 feet of stainless-steel, wire-wound screen equipped with borehole centralizers. The well screen will be designed for entrance velocities of less than 0.1 feet per second and will conform to the AWWA A100-97 standards.

The well screen slot size will be pre-determined based on a grain size analyses of sediment samples collected from the aquifer formation. The well screen will be designed to hold back 90 percent of the filter pack, and the filter pack will be selected such that the pack will retain at least 70 percent of the aquifer formation. The uniformity coefficient of the filter pack will not exceed 2.5 and the filter pack composition will be at least 95% siliceous material. The filter pack will be placed in the annulus from the bottom of the screen to a level of at least 4 feet above the top of the well screen. The remainder of the annulus will be pressure-grouted with bentonite slurry using the tremmie method from the top of the filter pack to the ground surface.

The well screen and filter pack will be developed immediately after well construction to remove drilling mud and fine sediments. Development will consist of a combination of air lifting and jetting with both air and water until the discharge is clear and free of fine sediments. A secondary purpose of the development is to align the filter pack particles to maximize the pumping efficiency of the test production well. After completion of the well screen development, a down-hole camera will be used to conduct a post-construction inspection and verify the well construction and development.

Phase III

Two types of pumping tests will be performed utilizing the test production well as the pumping center and the two monitoring wells as observation wells. The first test will be a stepped rate test to verify the well efficiency and project the maximum capacity of the test production well. During this test the test production well will be continuously pumped, but the pumping rate will be incrementally increased in a series of 4 time steps. Each step will last at least 60 minutes, and the pumping rate for each step will be set equal to approximately 25%, 50%, 75%, and 100% of the maximum estimated pumping rate of the test production well. The test will be evaluated using the Eden and Hazel solution in the AquiferWin32 software. The test results will be used to estimate the maximum production rate of the well, the aquifer transmissivity, and the efficiency losses due to the well construction and the aquifer.

The second test will be an aquifer performance test utilizing the test production well as the pumping center. The test will consist of three phases: a background phase of at least 24 hours following the stepped-rate test to establish steady-state conditions prior to pumping, a pumping phase with the test production well continuously pumped at the maximum pumping rate for a period of 72 hours, and a recovery phase to monitor the recovery of the aquifer system after cessation of pumping. The recovery phase will be extended until the groundwater level in each of the three wells has recovered to the pre-pumping level.

A Rossum Sand Tester will be installed on the discharge head to test for sand content in the discharged water and ensure that the test production well screen and the filter pack do not allow fines to pass during pumping. To avoid recirculation effects, the discharged water will be directed through a discharge line and into a nearby surface drainage way to move the discharged water away from the wellfield. The discharge rate will be measured within an accuracy of 1 percent using a Fuji Electric Porta-Flow C ultra-sonic flow meter strapped to the discharge line.

The water levels within all three wells will be measured during both the stepped-rate test and the 72-hour test using pressure transducers equipped with data loggers. The pressure transducer readings are accurate to within 0.03 feet. The data loggers will be programmed to collect and record water level and water temperature measurements every minute for the background, pumping, and recovery phases of both tests.

Tritium, Inc. will have personnel on-site for the duration of the pumping periods for both the stepped-rate test and the constant-rate pumping test to oversee the pumping equipment, maintain the integrity of the tests, and collect quality control measurements. The personnel will measure the water level within each of the three wells at least once an hour using a Heron electric tape meter accurate to 0.01 feet.

The data from the second test will be analyzed using AquiferWin32 or AQTESOLV software to determine the hydraulic characteristics of the aquifer system, predict interference effects, and establish the maximum production capacity of the test production well. The anticipated methodology will include a Distance-Drawdown analysis and either a Theis type-curve analysis (confined conditions) or a Hantush-

Jacob type-curve analysis (leaky-confined) or a Neuman type-curve analysis (unconfined). Predicted drawdown will be compared to the measured drawdown to verify the applicability of the selected analysis methods. Predictive simulations will also be performed to evaluate interference effects due to pumping at various distances from the wellfield and the sustainability of the wellfield under drought conditions.

The analyses results and all accompanying site research will be provided in a written summary report. The report will detail the local and regional hydrogeology, the new well construction and well logs, the pumping test data and analyses from both pumping tests, evaluation of the predicted interference effects, and a thorough discussion of all the results. The accompanying documents will include electronic copies of all figures, GIS files, well logs, AQTESOLV and AquiferWin files, and the pumping test data.

All of the above work, analyses, and conclusions detailing the wellfield capacity and sustainability will be provided in summary report to Artesian of Pioneer and submitted to the OEPA upon request.

We are requesting your review of the work plan and scheduling of a site visit to the six properties listed below, if necessary. We have also attached a figure with the property locations and would be pleased to provide additional directions to each site if needed. Due to the large size of the properties at this time specific well locations have not been selected. We anticipate specific well locations to be determined at, or immediately after, the site visits with your office personnel. If you have any questions, or need clarification of the above information please do not hesitate to call me at our office (574) 266-5300. I am also available by e-mail at Todd@tritiuminc.net.

Sincerely,

Todd Feenstra
President, LPG
Tritium, Inc.

Parcel ID

[redacted]

Reply email from Taylor Browning to Todd Feenstra sent on August 31, 2018 with the following message:

Good afternoon Mr. Feenstra,

Thank you for giving Paul and me a call this afternoon regarding the preliminary work plan.

Further review of the plan will be coming, however, a well site application will be required prior to moving forward with a site visit.

I've attached the application to this email. Please review this and feel free to contact me with any questions. Once it is completed, please send it back to me.

Thank you!

Received email from Ed Kidston of Artesian of Pioneer, Inc. on September 5, 2018 with the following message:

Good Morning Ms. Browning,

I'm responding to your previous email because AOP and Tritium Inc have only been contracted to do a study of specific sites of the aquifer.

We have no contract to develop and or construct production wells and therefore at this time have no intention of doing so.

I'm not sure how we would legally apply for an event we have not been contracted to pursue.

Further, we are not privy to most of the information required in a new well application, beginning with question one. "Who is the owner?"

Our goal and only contracted responsibility at this point is to confirm the data of specific sites.

Our findings will ultimately determine whether additional contracts will materialize for AOP or some other contracted firm, or whether the project will be abandoned in part or in its entirety.

At this point, we simply want to proceed as expeditious as possible to determine for all involved the viability of a "possible" future project.

Taylor Browning
Ohio EPA: Northwest District Office
Division of Drinking and Ground Waters