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Texas Commission on Environmental Quality
Protecting Texas by Reducing and Preventing Pollution

May 28, 2014

RECEIVED
JUN 04 2014

BY:

Mr. Aldo Sotelo, P.E.
Bury and Partners, Inc.
221 West Sixth Street, Suite 600
Austin, Texas 78701

Re: Falling Water Subdivision Public Water System (PWS ID No. 1330154)
Exception Request to Use Innovative/Alternate Treatment
Pilot Study Report for Radium Removal
Kerr County, Texas
RN 102678950 | CN 602787509

Dear Mr. Sotelo,

We have reviewed your pilot study report, with cover letter dated February 12, 2014, demonstrating radium removal using Water Remediation Technology's (WRT) Z-88™ Radium Removal System. Under the Federal Safe Drinking Water Act (SDWA), the maximum contaminant level (MCL) for *Combined Radium 226/228* in drinking water is set at 5.0 picocuries per liter (pCi/L). Our rules and regulations consider the proposed radium removal process to be an innovative/alternative treatment. The Texas Commission on Environmental Quality (TCEQ) requires the pilot study for innovative/alternative treatment processes to be conducted in accordance with Title 30 of the Texas Administrative Code (30 TAC) §290.42(g) and §290.39(l). The results of the site-specific pilot test must demonstrate that the treated water complies with the minimum drinking water standards found in 30 TAC Chapter 290, Subchapter F. Based on our review of the submitted pilot study report, we are **granting** your request for the use of the WRT Z-88™ Radium Removal System at the Falling Water Subdivision public water system (PWS ID No. 1330154) under the conditions outlined in this letter.

The source waters for the pilot testing and for the proposed treatment processes are Well Nos. 1 and 2 (G1330154A and G1330154B, respectively).

The granted exception is contingent on the following conditions:

Approved Radium Removal Processes at Well Site 1 and Well Site 2

- 1) The proposed radium removal system must be designed to have:
 - a) A maximum hydraulic loading rate of **8.6** gallons per minute per square-foot (gpm/sf);
 - b) A minimum empty bed contact time (EBCT) of **7.5** minutes; and
 - c) Ten media vessels operated in five parallel trains of two vessels each with 50 inches of WRT Z-88™ media per vessel.

The same type of media, WRT Z-88™ filtration and adsorption media, as used during the pilot studies must be used for both full-scale radium adsorption treatment plants and may not be substituted for another media type. If the public water system (PWS) desires to use another type of media in the future, either a site-specific pilot study for that media, or full-scale data from an alternative site with similar or worse water qualities must be submitted for TCEQ review and approval.

Process Control

- 2) To operate these facilities, the PWS must have a TCEQ licensed groundwater operator with at least a Class D license as specified in 30 TAC §290.46(e)(4)(B). The licensed operator(s) for the PWS will be required to perform the following operations and maintenance tasks (O&M) as a condition of approval to use the WRT Z-88™ Radium Removal System:
 - a) Monitor daily flow rates;
 - b) Monitor operating pressures daily; and
 - c) Perform operational checks and inspection of valves, instrumentation, chemical injection equipment, strainers, filters, and the piping upstream and downstream of the radium removal equipment.
- 3) Sample taps must be provided on the raw water lines from the wells, on the effluent of each filter, and on the water line entering the distribution as required by 30 TAC §290.42(b)(6).
- 4) Water Remediation Technologies, LLC will be responsible for:
 - a) Maintenance, repair, and/or replacement of components of the Radium Removal System containing licensed material;
 - b) Monitoring operating data and performance of the Radium Removal System;
 - c) Monitoring performance and useful life of treatment media;
 - d) Installing replacement treatment media;
 - e) Performing media exchanges to replace spent media, by the following steps:
 - i) Prepare and package the spent media for transport; and
 - ii) Arrange for transportation of spent media.
- 5) All WRT Z-88™ replacement media must conform to American National Standards Institute/National Sanitation Foundation (ANSI/NSF) Standard 61 and must be certified by an organization accredited by ANSI as specified in 30 TAC §290.42(j).
- 6) Any chemicals used in the treatment of the water must conform to ANSI/NSF Standard 60 and must be certified by an organization accredited by ANSI as specified in 30 TAC §290.42(j).
- 7) Water Remediation Technologies, LLC will be responsible for conducting visual inspections of the filter media annually as specified in 30 TAC §290.46(m)(2). The PWS will need to replace any media lost as determined by the inspection. The records of any media addition or replacement need to be maintained and made available to TCEQ staff upon request.

System Operations and Records

- 8) Disposal of all waste shall be in accordance with all applicable state and federal regulations in accordance with 30 TAC §290.42(i).

- Inorganic raw water quality analyses by A&B Labs, on May 20, 2013 and June 10, 2013, for alkalinity, antimony, arsenic, barium, beryllium, calcium, chloride, chromium, copper, fluoride, hardness, iron, lead, magnesium, manganese, mercury, nickel, nitrate, nitrite, phosphate, phosphorous, potassium, selenium, silica, sodium, strontium, sulfate, thallium, total dissolved solids, total organic carbon, uranium, vanadium, and zinc;
- NSF/ANSI Standard 61 certification for WRT Z-88™ filtration and adsorption media; and
- Operator's daily log with daily flow measurements and pressure differentials.

The submitted pilot study report for Well Site 2 included:

- Pilot data for the period from May 20, 2013 through June 30, 2013;
 - Ten 16 inch diameter vessels in five parallel trains of two vessels each;
 - Filtration/adsorption media – WRT Z-88™;
 - Media depth – 50 inches in each 65 inch tall vessel;
 - Pilot feed flow rate (full-scale) – 18-68 gpm;
 - Design Hydraulic Loading Rate – 8.6 gpm/ft²; and
 - EBCT – 7.5 minutes.
- Source water for pilot– Well No. 2 (G1330154B);
- Factory calibration records for the Signet Rotor-X (P51530-PO) Flow Meter;
- NELAP certified laboratory for radium analysis, UL LLC, South Bend, Indiana;
 - Methods 7500-Ra B for Radium 226 and 7500-Ra D for Radium 228;
 - 5/20/2013 - Combined Radium 226/228 (Well Site 2)
 - Feed water: **5.8 pCi**
 - Filtrate water: **1.5 pCi/L**
 - 6/3/2013 – Combined Radium 226/228 (Well Site 2)
 - Feed water: **1.3 pCi/L**
 - Filtrate water: **0.8 pCi/L**
 - 6/10/2013 – Combined Radium 226/228 (Well Site 2)
 - Feed water: **4.8 pCi/L**
 - Filtrate water: **0.6 pCi/L**
 - 6/17/2013 – Combined Radium 226/228 (Well Site 2)
 - Feed water: **4.3 pCi/L**
 - Filtrate water: **1.1 pCi/L**
 - 6/24/2013 – Combined Radium 226/228 (Well Site 2)
 - Feed water: **6.4 pCi/L**
 - Filtrate water: **1.0 pCi/L**
 - 7/1/2013 – Combined Radium 226/228 (Well Site 2)
 - Feed water: **11.2 pCi/L**
 - Filtrate water: **1.1 pCi/L**
- Inorganic raw water quality analyses by A&B Labs, on May 20, 2013 and June 10, 2013, for alkalinity, antimony, arsenic, barium, beryllium, calcium, chloride, chromium, copper, fluoride, hardness, iron, lead, magnesium, manganese, mercury, nickel, nitrate, nitrite, phosphate, phosphorous, potassium, selenium, silica, sodium, strontium, sulfate, thallium, total dissolved solids, total organic carbon, uranium, vanadium, and zinc;
- NSF/ANSI Standard 61 certification for WRT Z-88™ filtration and adsorption media; and
- Operator's daily log with daily flow measurements and pressure differentials.

- 9) A new plant O&M Manual must be compiled, updated, and maintained at the plant facilities as specified in 30 TAC §290.42(l) and must be made available to TCEQ staff upon request.
- 10) Flow-measuring devices must be installed on the treatment trains at both well sites in accordance with the manufacturer's specifications and calibrated upon installation. These devices are to be **calibrated at least once every 12 months** to maintain the operation of the filtration systems within the conditions allowed by this exception. The calibration records for the flow-indicating devices are to be maintained for as long as the treatment facilities are in operation as required by 30 TAC §290.46(f)(3)(F).
- 11) Refer to 30 TAC §290.46(s) for minimum frequency of calibration for all on-site analytical equipment.

Approved Pilot Study Reports

The submitted pilot study report for Well Site 1 included:

- Pilot data for the period from May 20, 2013 through July 1, 2013;
 - Ten 16 inch diameter vessels in five parallel trains of two vessels each;
 - Filtration/adsorption media – WRT Z-88™;
 - Media depth – 50 inches in each 65 inch tall vessel;
 - Pilot feed flow rate (full-scale) – 18-68 gpm;
 - Design Hydraulic Loading Rate – 8.6 gpm/ft²; and
 - EBCT – 7.5 minutes.
- Source water for pilot– Well No. 1 (G1330154A);
- Factory calibration records for the Signet Rotor-X (P51530-PO) Flow Meter;
- National Environmental Laboratory Accreditation Program (NELAP) certified laboratory for radium analysis, UL LLC, South Bend, Indiana;
 - Methods 7500-Ra B for Radium 226 and 7500-Ra D for Radium 228;
 - 5/20/2013 - Combined Radium 226/228 (Well Site 1)
 - Feed water: **6.9 pCi**
 - Filtrate water: **1.2 pCi/L**
 - 5/27/2013 – Combined Radium 226/228 (Well Site 1)
 - Feed water: **6.0 pCi/L**
 - Filtrate water: **0.7 pCi/L**
 - 6/3/2013 - Combined Radium 226/228 (Well Site 1)
 - *Results invalidated by TCEQ and not considered in approval**
 - 6/10/2013 – Combined Radium 226/228 (Well Site 1)
 - Feed water: **4.5 pCi/L**
 - Filtrate water: **0.6 pCi/L**
 - 6/17/2013 – Combined Radium 226/228 (Well Site 1)
 - Feed water: **3.9 pCi/L**
 - Filtrate water: **0.5 pCi/L**
 - 6/24/2013 – Combined Radium 226/228 (Well Site 1)
 - Feed water: **5.3 pCi/L**
 - Filtrate water: **0.5 pCi/L**
 - 7/1/2013 – Combined Radium 226/228 (Well Site 1)
 - Feed water: **6.5 pCi/L**
 - Filtrate water: **1.8 pCi/L**

*Results were reported correctly by UL LLC for Ra 226 but the Ra 228 influent and effluent results were apparently transposed.

Mr. Aldo Sotelo, P.E.

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An Engineering Report and sealed, signed and dated engineering plans and specifications for the design of the radium removal treatment plants must be submitted to the TCEQ for review and approval to construct. If you have not already done so, please complete the *TCEQ Plan Review Submittal Form* located at:

<http://www.tceq.state.tx.us/assets/public/permitting/watersupply/ud/forms/10233.pdf>

Submit the above documents to:

TCEQ Utilities Technical Review Team (MC 159)

Attn: Vera Poe, P.E.

P.O. Box 13087

Austin, Texas 78711-3087

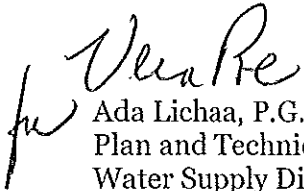
Please note that all granted exceptions are subject to periodic review and are subject to revocation or revision if evidence is found that the granting of an exception results in a degradation of the water quantity; or the potable water provided to the customers fails to meet the requirements of 30 TAC Chapter 290, Subchapter F; or the conditions under which the exception is granted have not been maintained.

If you have any questions concerning this letter or need further assistance, please contact Mr. Mark Mikol, E.I.T. of my staff by email at mark.mikol@tceq.texas.gov or by telephone at (512) 239-6187.

Sincerely,



David A. Williams, P.E.
Technical Review and Oversight Team
Plan and Technical Review Section
Water Supply Division
Texas Commission on Environmental Quality



Ada Lichaa, P.G., Manager
Plan and Technical Review Section
Water Supply Division
Texas Commission on Environmental Quality

AL/DAW/mmm

Cc: Mr. Scot W. Foltz, Compliance Manager, 1106 Clayton Ln. Ste. 400W, Austin, TX, 78723-1066