

State of Wisconsin  
DEPARTMENT OF NATURAL RESOURCES  
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Madison WI 53707-7921

Tony Evers, Governor  
Preston D. Cole, Secretary  
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January 29, 2019

KELLY MICHAELS CLERK  
CITY OF BROOKFIELD  
CITY HALL  
2000 N CALHOUN RD  
BROOKFIELD WI 53005

Project Number: W-2018-0938  
PWSID#: 26802534  
DNR Region: SER  
County: WAUKESHA

**SUBJECT: WATER SYSTEM FACILITIES PLAN AND SPECIFICATION APPROVAL**

Dear Ms. Michaels:

The Wisconsin Department of Natural Resources, Division of Environmental Management, Bureau of Drinking Water and Groundwater, is conditionally approving plans and specifications for the following project. An engineering report or information of sufficient detail to meet the requirements of s. NR 811.09(3), Wis. Adm. Code, was submitted along with the plans and specifications.

**Water system name:** Brookfield Water Utility

**Date received:** 10/15/2018

**Length of Time Extension:** 21 days

**Engineering firm:** Municipal Well & Pump

**Professional Engineer:** Richard Milaeger

**Regional DNR Contact:** Thanintr (Tony) Ratarasarn, Department of Natural Resource, 141 NW Barstow Street Room 180, Waukesha, WI 53188, (262) 574-2134, thanintr.ratarasarn@wisconsin.gov

**Project description:** The City of Brookfield has submitted plans and specifications for the installation of an inflatable packer in Well #22 (Bishops Woods). In addition, a well rehabilitation using impulse generation is proposed. The Department is conditionally approving the installation of the inflatable packer for a period of up to three years from the date of installation. After three years, the City of Brookfield may submit a proposal to the Department to continue the use of the inflatable packer. If the results of the three year trial show reliable compliance with the combined radium and other primary drinking water standards, the Department intends to approve the continued use of the packer. See the **Discussion** paragraph below for additional information. The Department does not object to the well rehabilitation work as proposed, subject to the conditions below.

Well No. 22 has exceeded the maximum contamination level (MCL) for combined radium. Based on information in a report titled, "Well 22 Down-Hole Geophysical Logging Results and Recommendations", authored by Collier Consulting, Inc., the City proposes to install an inflatable packer in the well at a depth of approximately 1,300 feet. The packer will be used to seal off the upper portion of the well borehole in an effort to reduce the combined radium concentration. In addition, the City proposes to lower the submersible well pump to a depth of approximately 1,300 feet, just below the inflatable packer. The pump will continue to discharge at a rate of 400 gallons per minute. The packer will be a Lansas model No. 999-16 MWP 16-inch well packer. When inflated, the packer will contact the open borehole wall for a length of 82 inches. The packer will be provided with a high

pressure air line for inflation and pressure maintenance purposes. A pressure regulator on a nitrogen tank will keep the pressure constant in the packer. In addition, airlines will be installed for recording the water level above and below the packer. A vent line will be installed to vent below the packer. The pressure in the packer and the level in the nitrogen tank will be manually checked and recorded approximately 3 times per week. This information, along with any other dated notes on operation, maintenance or repair must be provided to the Department as part of any request to allow the packer to remain in service beyond the initial three years.

**Discussion:** The well may not be placed in service until RAD and IOC samples are collected and analyzed, with the results reported to the Department, that show the well water meets the primary drinking water standards of ch. NR809, Wis. Adm. Code. If data collected initially and over the entire three year packer installation period demonstrates that the well can continuously produce water quality meeting all Safe Drinking Water requirements, the Department intends to approve the packer installation to remain in service until it fails or until the well pump would need to be pulled (the Department recommends pulling the pump for inspection every ten years (s. NR810.13(1)(a), Wis. Adm. Code)), whichever comes first. At that time, or earlier, if sealing off the upper portion of the well borehole is successful in reducing the combined radium to meet the primary drinking water standards, the Department expects the City to permanently grout a Department approved liner casing into the well to replace the packer installation. Note: a submittal for the installation of the liner casing must be sent to the Department for review and approval prior to installation. If for whatever reason, code complaint finished water quality cannot be reliably maintained with the packer in place, the Department will require that the well be taken off line and the well filled and sealed or other Department approved permanent improvements constructed to provide ch. NR 809 compliant water quality.

Given the elevated radium and other elevated water quality parameters of concern, such as arsenic and strontium, the Department recommends that the City plan to treat this water at an off-site water treatment plant (WTP) if it is desired to keep the well in service for the long term. A WTP would also allow for any physical and/or chemical treatment necessary to provide a stable water quality that would minimize distribution system lead and copper concentrations. A WTP could also improve the aesthetic water quality such as lowering iron and manganese concentrations as applicable.

Based on the October 17, 2018 submittal, the Department understands the approach to rehabilitation work to be as follows:

1. Remove well pump and motor equipment.
2. Brush casing and borehole.
3. Treat well with a minimum of two passes of AirShock® equipment using compressed nitrogen (from approximately 1,305 to 1,600 ft. bgs with an air impulse gun pressure of approximately 3,000-3,500 psi, and a total of 4 blasts per foot.
4. Bail fill from well.
5. Install permanent pumping equipment and packer after disinfecting it with a 200 ppm chlorine solution.
6. Treat the water in the well with a 12.5% sodium hypochlorite solution to achieve a chlorine residual of 50 mg/L.
7. Surge the well at least three times to an above ground tank.
8. Let solution stand in well for a minimum of 12 hours.

9. Pump spent solution to a neutralization tank. Neutralize chlorine solution prior to discharging to the sanitary sewer. Document new well hydraulic parameters.
10. After there is no detectable chlorine residual measured, the well will continue to be pumped to waste for at least 15 minutes. Collect two (2) bacteriological safe samples a minimum of 8-hours.

**Sampling Requirements:** The Department will inform the City of all the required post start-up sampling for bacteriological, inorganic compounds (IOC's), volatile organic compounds (VOC's), synthetic organic compounds (SOC's), radionuclide parameters (RAD's), lead and copper, and any other water quality parameters in separate, written correspondence.

**Approval conditions related to Chapters NR 810 and NR 811, Wis. Adm. Code:**

1. A preconstruction conference shall be held to ensure the understanding of, and compliance with, the approved plans and specifications, the proposed method of erosion control, the duties of the resident project representative, the disinfection and bacteriological sampling requirements of s. NR 810.09(4), Wis. Adm. Code and any special conditions listed below.
2. Well water samples shall be collected and analyzed at a state approved laboratory for all the bacteriological, inorganic, and radionuclide parameters as noted on the attached lab forms and the results reviewed and approved by the Department prior to placing the well back in service. (ss. NR 809.09 & NR 811.12 (19) & (20), Wis. Adm. Code)
3. Finished water sampling and testing for gross alpha, radium 226, radium 228, and uranium shall be performed at least quarterly and submitted to the Department as required. (s. NR 811.55(1)(c), Wis. Adm. Code)
4. An operational log for the packer assembly shall be maintained as discussed in the body of this letter. (ss. NR 811.04 & NR 810.06, Wis. Adm. Code)
5. Tony Ratarasarn shall be notified of the date and time of the start of the well rehabilitation work in case he deems it necessary to be present during any of the work and to grant approval to place the well back in service. (s. NR 811.12(13)(b)1., Wis. Adm. Code)
6. All chemical products shall be ANSI/NSF 60 certified. (s. NR 811.12(12)(c), Wis. Adm. Code)
7. This office and Tony Ratarasarn shall be notified in writing within 30 days of completing the well work of the final gallon per minute pump production rate, the specific capacity of the well before and following completion of the well rehabilitation work. (s. NR 811.12(12)(g), Wis. Adm. Code)
8. Tony Ratarasarn shall be informed when the project is completed so he can inspect the installation as he deems it necessary, and to grant approval to place the well in service. (s. NR 810.26(1), Wis. Adm. Code)

**Approval conditions related to other Department requirements:** None.

**Approval constraints:** The project was reviewed in accordance with ss. 281.34 and 281.41, Wis. Stats. for compliance with Chapters NR 108, NR 810, NR 811 and NR 820, Wis. Adm. Code and is hereby approved in accordance with ss. 281.34 and 281.41, Wis. Stats. subject to the conditions listed above. This approval is valid for two years from the date of approval. If construction or installation of the improvements has not commenced within two years the approval shall become void and a new application must be made and approval obtained prior to commencing construction or installation.

This approval is based upon the representation that the plans submitted to the Department are complete and accurately represent the project being approved. Any approval of plans that do not fairly represent the project because they are incomplete, inaccurate, or of insufficient scope and detail is voidable at the option of the Department.

Be advised that this project may require permits or approvals from other federal, state or local authorities. For example, a certificate of authority from the Public Service Commission of Wisconsin may be required per s. 196.49, Wis. Stats. and ch. PSC 184, Wis. Adm. Code.

**Appeal rights:** If you believe that you have a right to challenge this decision, you should know that the Wisconsin Statutes and administrative rules establish time periods within which requests to review Department decisions must be filed. To request a contested case hearing pursuant to s. 227.42, Wis. Stats., you have 30 days after the decision is mailed, or otherwise served by the Department, to serve a petition for hearing on the Secretary of the Department of Natural Resources. Requests for contested case hearings must be made in accordance with ch. NR 2, Wis. Adm. Code. Filing a request for a contested case hearing does not extend the 30 day period for filing a petition for judicial review. For judicial review of a decision pursuant to ss. 227.52 and 227.53, Wis. Stats., you must file your petition with the appropriate circuit court and serve the petition on the Department within 30 days after the decision is mailed. A petition for judicial review must name the Department of Natural Resources as the respondent.

**Recommendations:** The following recommendations are based on staff review of the project. The owner is not required to implement the recommendations in order to comply with the approval.

1. Given the elevated radium and other elevated water quality parameters of concern, such as arsenic and strontium, the Department recommends that the City plan to treat this water at an off-site water treatment plant (WTP) if it is desired to keep the well in service for the long term. A WTP would also allow for any physical and/or chemical treatment necessary to provide a stable water quality that would minimize distribution system lead and copper concentrations. A WTP could also improve the aesthetic water quality such as lowering iron and manganese concentrations as applicable.

STATE OF WISCONSIN  
DEPARTMENT OF NATURAL RESOURCES  
For the Secretary



Florence A. Olson, P.E.  
Public Water Engineering Section  
Bureau of Drinking Water and Groundwater  
(608) 266-8470

Enclosures: Inorganics Lab Form  
Radioactivity Lab Form

cc: Tom Grisa – City of Brookfield (by email)  
John Carlson – City of Brookfield (by email)  
Dick Mileager – Municipal Well & Pump (by email)  
Tony Ratarasarn – DNR, Waukesha (by email)  
Sadie Derouin – DNR, Fitchburg (by email)  
Beth Goldowitz – DNR, Madison (by email)

Jesse Jensen – DNR, Milwaukee (by email)

Cathrine Wunderlich – DNR, Madison (by email)

Norm Hahn – DNR, Madison (by email)

PSC – Madison (by email)

Florence Olson – DNR, Plan Reviewer (by email and copy to the file)

# INORGANIC ANALYSES

**(ENCLOSE FORM WHEN SENDING SAMPLE TO LAB)**

09/16

**Section I: To be completed by the Department of Natural Resources/SAMPLER**

System Name: BROOKFIELD WATER UTILITY

System Type:  
(Check one) MC  NN  OC  TN

System Address: 19700 RIVERVIEW DRIVE

City: BROOKFIELD

County: 68 - Waukesha

Region Code: 2

Pws Id#: 26802534 Entry Point  WI Unique

ID: 22

Well No: \_\_\_\_\_

DNR Contact: Thanintr Ratarasarn (262) 574-2134

Sampler Phone/Name/Address (Notify DNR Contact of Corrections)  
(262) 787-3783  
WATER UTILITY SUPERINTENDENT JOHN CARLSON  
19700 RIVERVIEW DRIVE  
BROOKFIELD WI 53045

Sampler: Provide information to have results faxed or e-mailed or to change a billing address, if your lab offers these services (leave blank if you don't use these services).

Fax number: \_\_\_\_\_

E-mail: \_\_\_\_\_

Billing address: \_\_\_\_\_

**Sample Source:**

W Well

E Entry Point

D Distribution System

**Sample Type:**

D Compliance Sample

C Confirmation Sample

I Investigation Sample

W Raw Water Sample

Special Instructions: Collect sample prior to placing the well in service.

Collect sample between:    /   /    and    /   /   

**Section II: To be completed by SAMPLER -- ALL ITEMS REQUIRED**

Sample Collection Date    /   /    Time:    :   :     a.m.  
mm/dd/yyyy  p.m.

Address where sample was collected: \_\_\_\_\_

Monitoring Point ID: \_\_\_\_\_ Sample Point Description: \_\_\_\_\_

First Initial and

Last Name of Sampler: \_\_\_\_\_ Sampler Phone: \_\_\_\_\_

**Section III: To be completed by LAB. Report test results on back for PWS and electronically to DNR within 10 days per NR 809.80**

Check here if some or all of the parameters were analyzed by a subcontracted lab.

NOTE: A separate form must be completed by each lab with data for only the parameters which that lab analyzed.

Laboratory ID Number: \_\_\_\_\_ Laboratory Name: \_\_\_\_\_

Date Sample Received:    /   /    Time Sample Received:    :   :    Laboratory Sample ID: \_\_\_\_\_

Signature of Receiving Lab Official: \_\_\_\_\_ Date Reported to PWS:    /   /   

Condition of Sample Upon Receipt: \_\_\_\_\_

Notice: This form must be submitted with laboratory samples analyzed to determine compliance with ch. NR 809, Wis. Adm. Code, Safe Drinking Water. Completion of this form or a similar form approved by the Department is mandatory. Failure to submit a completed form to the Department is a violation punishable by a forfeiture of no less than \$10 nor more than \$5000, or by a fine of not less than \$10 nor more than \$100 or imprisonment of not less than 30 days, or both. Each day of continued violation is a separate offense (ss. 144.99, Wis. Stats.). Authorization for these requirement is under s. 280.13(d), Wis. Stats. and ch. NR 809.80. Personally identifiable information on this form will be used for no other purpose.

**INORGANIC ANALYSES**

System Name: BROOKFIELD WATER UTILITY

PWS ID: 26802534

This page to be completed by the laboratory performing analysis.

Lab Sample ID: \_\_\_\_\_

Storet Code		Parameter	SDWA Method	MDL	Results	MCL	Units
410	X	ALKALINITY TOTAL CaCO3					MG/L
1105	X	ALUMINUM TOTAL					MG/L
1097	X	ANTIMONY TOTAL				0.006	MG/L
1002	X	ARSENIC TOTAL				0.010	MG/L
34225	X	ASBESTOS				7 Mill	FIB/L
1007	X	BARIUM TOTAL				2	MG/L
1012	X	BERYLLIUM TOTAL				0.004	MG/L
1027	X	CADMIUM TOTAL				0.005	MG/L
916	X	CALCIUM TOTAL					MG/L
940	X	CHLORIDE					MG/L
50060		CHLORINE TOTAL RESIDUAL FIELD					MG/L
1034	X	CHROMIUM TOTAL				0.1	MG/L
1037		COBALT TOTAL					
80		COLOR					
1042	X	COPPER TOTAL					UG/L
720	X	CYANIDE				0.2	MG/L
951	X	FLUORIDE TOTAL				4	MG/L
900	X	HARDNESS TOTAL CaCO3					MG/L
74010	X	IRON					MG/L
1051	X	LEAD TOTAL					UG/L
927	X	MAGNESIUM TOTAL					MG/L
1055	X	MANGANESE					MG/L
71900	X	MERCURY TOTAL				0.002	MG/L
1067	X	NICKEL TOTAL				0.1	MG/L
620	X	NITRATE AS N				10	MG/L
630	X	NITRATE+NITRITE				10	MG/L
615	X	NITRITE (NO2-N) TOTAL				1	MG/L
403	X	PH LAB					SU
70300	X	RESIDUE DISS 180C (TDS)					MG/L
1147	X	SELENIUM TOTAL				0.05	MG/L
1077	X	SILVER TOTAL					MG/L
929	X	SODIUM TOTAL					MG/L
1084		STRONTIUM TOTAL REC					UG/L
945	X	SULFATE TOTAL					MG/L
1059	X	THALLIUM TOTAL				0.002	MG/L
76		TURBIDITY					NTU
1087		VANADIUM ICP					
1092		ZINC TOTAL					MG/L

Approved By: QA Officer: \_\_\_\_\_

Date: \_\_\_\_\_

Laboratory Manager: \_\_\_\_\_

Date: \_\_\_\_\_

Comments: \_\_\_\_\_

# RADIOACTIVITY ANALYSES

**(ENCLOSE FORM WHEN SENDING SAMPLE TO LAB)**

09/16

**Section I: To be completed by the Department of Natural Resources/SAMPLER**

System Name: BROOKFIELD WATER UTILITY

System Type: (Check one) MC  NN  OC  TN

System Address: 19700 RIVERVIEW DRIVE

City: BROOKFIELD

County: 68 - Waukesha

Region Code: 2

Pws Id#: 26802534

Entry Point ID: 22 WI Unique Well No: \_\_\_\_\_

DNR Contact: Thanintr Ratarasarn (262) 574-2134

Sampler Phone/Name/Address (Notify DNR Contact of Corrections)  
(262) 787-3783  
**WATER UTILITY SUPERINTENDENT JOHN CARLSON**  
**19700 RIVERVIEW DRIVE**  
**BROOKFIELD WI 53045**

Sampler: Provide information to have results faxed or e-mailed or to change a billing address, if your lab offers these services (leave blank if you don't use these services).

Fax number: \_\_\_\_\_

E-mail: \_\_\_\_\_

Billing address: \_\_\_\_\_

**Sample Source:**

- W Well
- E Entry Point
- D Distribution System

**Sample Type:**

- G Grab Sample
- C Confirmation Sample
- I Investigation Sample
- W Raw Water Sample
- D Composite Sample (collect over 4 quarters)

Special Instructions: Collect sample prior to placing well in service

Collect sample between:    /   /    and    /   /   

**Section II: To be completed by SAMPLER -- ALL ITEMS REQUIRED**

Sample Collection Date(s):

Grab or Composite 1st Qtr:    /   /    Time:    :   :     a.m.  p.m. Composite 2nd Qtr:    /   /    Time:    :   :     a.m.  p.m.

Composite 3rd Qtr:    /   /    Time:    :   :     a.m.  p.m. Composite 4th Qtr:    /   /    Time:    :   :     a.m.  p.m.

Address where sample was collected: \_\_\_\_\_

Monitoring Point ID: \_\_\_\_\_ Sample Point Description: \_\_\_\_\_

First Initial and Last Name of Sampler: \_\_\_\_\_ Sampler Phone: \_\_\_\_\_

**Section III: To be completed by LAB. Report test results on back for PWS and electronically to DNR within 10 days per NR 809.80**

Check here if some or all of the parameters were analyzed by a subcontracted lab.

NOTE: A separate form must be completed by each lab with data for only the parameters which that lab analyzed.

Laboratory ID Number: \_\_\_\_\_ Laboratory Name: \_\_\_\_\_

Date Sample Received:    /   /    Time Sample Received:    :   :    Laboratory Sample ID: \_\_\_\_\_

Signature of Receiving Lab Official: \_\_\_\_\_ Date Reported to PWS:    /   /   

Condition of Sample Upon Receipt: \_\_\_\_\_

Notice: This form must be submitted with laboratory samples analyzed to determine compliance with ch. NR 809, Wis. Adm. Code, Safe Drinking Water. Completion of this form or a similar form approved by the Department is mandatory. Failure to submit a completed form to the Department is a violation punishable by a forfeiture of no less than \$10 nor more than \$5000, or by a fine of not less than \$10 nor more than \$100 or imprisonment of not less than 30 days, or both. Each day of continued violation is a separate offense (ss. 144.99, Wis. Stats.). Authorization for these requirement is under s. 280.13(d), Wis. Stats. and ch. NR 809.80. Personally identifiable information on this form will be used for no other purpose.



**RADIOACTIVITY ANALYSES**

System Name: BROOKFIELD WATER UTILITY

PWS ID: 26802534

This page to be completed by the laboratory performing analysis.

Lab Sample ID: \_\_\_\_\_

Storet Code		Parameter	SDWA Method	MDL	Results	MCL	Units
99971	X	GROSS ALPHA, EXCLUDING URANIUM & RADON				15	PCl/L
* 1501		GROSS ALPHA, INCLUDING URANIUM & RADON					PCl/L
3501		GROSS BETA				50.0	PCl/L
9501	X	RADIUM 226				5	PCl/L
11501	X	RADIUM-228, TOTAL				5	PCl/L
11503		RADIUM 226 + 228 TOTAL				5	PCl/L
82303	X	RADON-222, TOTAL IN WATER					PCl/L
13501		STRONTIUM 90, TOTAL				8.0	PCl/L
7005		TRITIUM DISS PCl/L				20000	PCl/L
22706	X	URANIUM TOTAL				30	UG/L

\* If Gross Alpha Including Uranium & Radon > 5 pCi/L, Radium-226 must also be reported.

If Gross Alpha Including Uranium & Radon > 15 pCi/L, Uranium must also be reported.

Approved By: QA Officer: \_\_\_\_\_

Date: \_\_\_\_\_

Laboratory Manager: \_\_\_\_\_

Date: \_\_\_\_\_

Comments: \_\_\_\_\_