State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
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April 12, 2024

Michael Cardiff
Dept. of Geoscience, UW-Madison
1215 W. Dayton Street, Room 412
Madison, WI 53706

SUBJECT: ch. NR 141, Wis. Admin. Code, Well Construction Variance
Town of Campbell PFAS Investigation, 2548 Lakeshore Drive, Town of Campbell, WI
DNR BRRTS Activity #: 02-32-587311

Dear Mr. Cardiff:

On March 1, 2024, the Department of Natural Resources (DNR) received a variance request from ch. NR 141, Wis. Admin. Code, for groundwater monitoring well construction of sentinel wells at the Campbell Town Hall property located at 2219 Bainbridge Street, La Crosse, WI. The purpose of the request is to address the installation of two monitoring points within one drilled borehole. These sentinel wells are part of a larger effort to better characterize the aquifers beneath French Island, WI and how to best ensure a safe, long term drinking water supply for the Town of Campbell.

The DNR has reviewed your variance request titled "Plan for Installation of "Sentinel" Wells in Town of Campbell, WI and request for variance in well construction method". The DNR approves the construction of multiple monitoring points within a single borehole as described in the variance request document. Any changes to the construction of this sentinel well must be approved by DNR. All other construction procedures and specifications shall be as specified by ch. NR 141, Wis. Admin. Code.

This well construction variance will be included in the Bureau for Remediation and Redevelopment Tracking System (BRRTS) on the Web (BOTW). Find BOTW at dnr.wi.gov, search "BOTW." An online map view of the site can also be found on the RR Sites Map (RRSM) at dnr.wi.gov, search "RRSM."

Thank you for your efforts to protect Wisconsin's environment. If you have any questions regarding this letter, please contact me at 715-492-2304 or MatthewA.Thompson@wisconsin.gov.

Sincerely,

Matt Thompson
Team Supervisor
West Central Region
Remediation and Redevelopment Program

Attachments:
Plan for Installation of "Sentinel" Wells in Town of Campbell, WI And request for variance in well construction method

cc: Lee Donahue, Supervisor 2, Town of Campbell (via email)
Tim Zeichert, Remediation and Redevelopment Program (via email)

Plan for Installation of "Sentinel" Wells in Town of Campbell, WI
And request for variance in well construction method

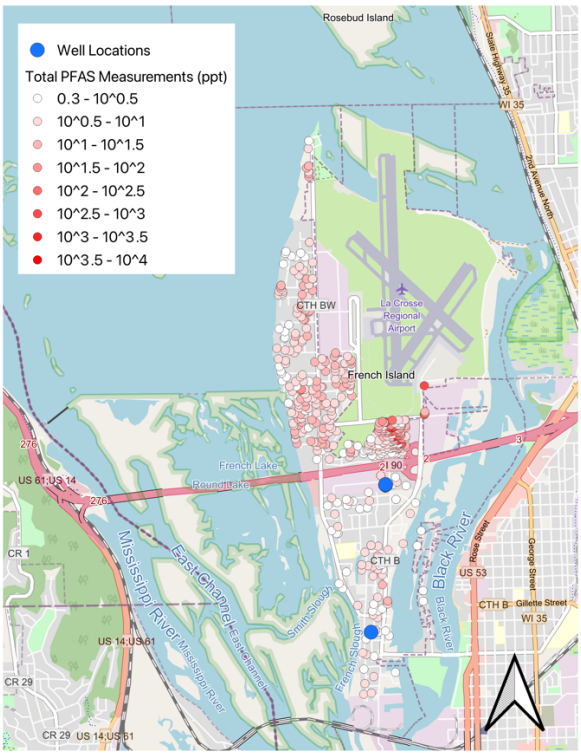

Figure 1: PFAS observations from shallow private wells in unconsolidated aquifer (red dots), and location of existing / planned deep wells (blue). Test Well #1 is to far south on island. Planned sentinel well locations are immediately south of I-90.

Background

The shallow alluvial aquifer underlying French Island, WI contains several PFAS plumes that represent a legacy of operations at the La Crosse Regional Airport including firefighting drills and crash responses. Due to groundwater flow gradients, groundwater is transporting these PFAS plumes offsite such that it is now present beneath Town of Campbell property. As all residents of Campbell rely on self-supplied groundwater from this shallow alluvial aquifer, the migration of PFAS plumes throughout this shallow aquifer is currently impacting residents. PFAS migration can impact other regional water supplies.

Thanks to funding from the County of La Crosse, researchers from UW-Madison, USGS, and the Wisconsin Geological and Natural History Survey (WGNHS) are pursuing efforts to better characterize the aquifers beneath French Island, WI and to best ensure a safe, long-term drinking water supply for the Town of Campbell (ToC), which occupies the western and southern portions of the island. As part of these efforts, the project team plans to install a set of "sentinel" monitoring wells near the Campbell Town Hall (2219 Bainbridge St, La Crosse, WI 54603), south of I-90, which will extend to a depth of 400' below land surface (bls) – see Figure 1. The instrumentation installed in these wells will be used as a monitoring location upgradient of Test Well #1, which was drilled under the direction of Davy Engineering in 2023 into the deep Mt. Simon aquifer. The well was terminated in the underlying granite. The bottom few feet of the hole were subsequently backfilled to isolate the granite from the well bore.

Local Hydrogeologic Understanding

French Island is underlain by a shallow, unconsolidated sand and gravel alluvial aquifer. Based on recent drilling evidence and geophysical logging from Test Well #1 (Well ID AAV287, approximate location 43.843803°, -91.263059°), this alluvial aquifer extends to approximately 140' depth below land surface. Beneath this surficial aquifer, gamma geophysical logs from Test Well #1 indicate that a thin Eau Claire shale layer of ~5' may be present. Beneath the Eau Claire shale, the Mt. Simon sandstone aquifer is present with a thickness > 300'. Gamma logs from this interval also indicate shalier deposits of unknown lateral extent. An upward vertical gradient –

as indicated by changes in borehole flow with depth – is present within the Mt. Simon suggesting that some of these shalier intervals act as local confining units. Only one other well on French Island (Well ID WR972, on USGS property is deeper than 140’ and accesses the underlying Mt. Simon sandstone. Logs are not available for this well, and it is used as a current water supply thus preventing instrumentation.

While significant PFAS plumes are present within the upper unconsolidated aquifer, water quality data from Test Well #1 has not detected any PFAS.. In order to obtain a safe, long-term source for drinking water, ToC is evaluating the use Test Well #1 or other deep wells drilled in the vicinity to target the Mt. Simon aquifer as a municipal water supply.

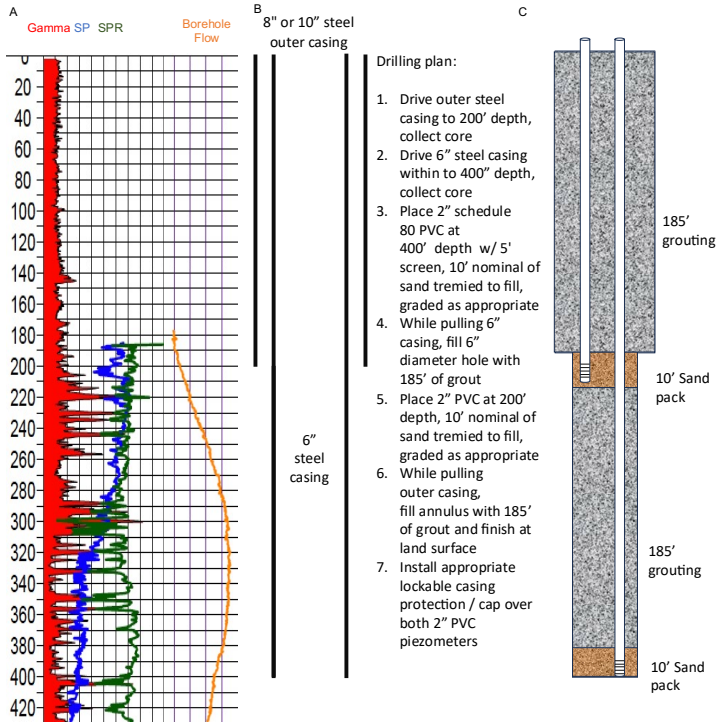

Figure 2: Data on deep Mt. Simon aquifer beneath French Island and associated drilling plan for the two deeper (rotosonic drilled) piezometer installations. (A) Geophysical log from Test Well #1 with gamma log indicating thin Eau Claire shale at ~140’ depth and other shaley intervals within the Mt. Simon sandstone (> 200’ depth). (B) Plan for casing at completion of rotosonic drilling. (C) Plan for final assembly of 2 piezometer installations within rotosonic borehole

Plan for additional Sentinel Monitoring Wells

We plan to install three monitoring wells on ToC Town Hall property, at the approximate location 43.858383, -91.260480. The individual monitoring wells will be installed as piezometers with 5’ screens and filter packs. We propose that the piezometers terminate at the following depths: 400’ bgs, 200’ bgs, and 85’ bgs. The piezometers will be constructed with 2” flush-threaded schedule 80 PVC. The assembly for the 200’ and 400’ depth piezometers is detailed in Figure 2. These piezometers will be installed in the deep borehole drilled with the rotosonic method. A third piezometer will be installed in the sand and gravel aquifer to a depth of 85’ bgs using a separate borehole, also drilled using rotosonic method.

The piezometers are designed to serve two key purposes for the Town of Campbell and La Crosse County. First, the piezometers will provide access to measuring heads in both the shallow (unconsolidated) and deeper (consolidated, Mt. Simon) aquifer. Within the Mt. Simon aquifer, the separate piezometers at 200’ and 400’ depths will provide an opportunity to investigate the confining properties of shaly units between 200’ and 400’ depth. When and if test pumping occurs at Test Well #1 or other water supply wells on French Island, these “Sentinel” wells will provide the opportunity to measure head changes and infer connectivity within the aquifer. These wells will also be used as sampling locations for water quality, providing indications of

PFAS movement within the upper unconfined aquifer as well as verification that PFAS has not reached the deep Mt. Simon aquifer.

Before beginning, water needed for drilling (estimated at approximately 1000 gallons) will be obtained from Test Well #1 or another PFAS-free water source which tested non-detect within the last 12 months. We plan to complete installation of the 200' and 400' monitoring wells as follows. First, we will use rotosonic drilling to reach a depth of 200' by advancing 8 or 10" nominal steel outer casing. Within the outer casing, we will then use rotosonic drilling with a smaller diameter 6" steel casing to reach a total depth of 400'. Use of rotosonic drilling is required to extract relatively intact core samples to be analyzed for porosity, permeability, and PFAS sorption isotherms in future research. Additionally, the rotosonic drilling method double cases the drill hole minimizing the potential to pull or drag shallow PFAS impacts deeper into the aquifer. Core will be stored on-site until it can be retrieved for long-term storage at the WGNHS Core Repository in Mt. Horeb, WI. All other solid drilling waste generated, including drilling mud, will be contained to a plastic lined dumpster on-site for later disposal.

Once drilling is complete, a 400' assembly consisting of 395' of blank PVC pipe terminating in a 5' screened interval will be placed in the well. Sand will be tremied into the well to produce a 10' nominal graded filter pack that extends at least 2 feet above the screened PVC interval. Five feet of coated bentonite pellets will be emplaced on top of the filter pack and allowed to hydrate to prevent migration of the overlying grout from entering the filter pack. The 6" diameter steel casing will be slowly removed as tremied high solids bentonite grout is used to seal the well interval from 390 feet to a depth of 205 feet below grade. After the grout has been allowed to set up, 5 feet of filterpack will be tremied to separate the underlying grout from the next filter packed screen interval. Then, we will place a 200' PVC assembly consisting of 195' of blank (unscreened) PVC followed by a 5' screened interval. Sand will again be tremmied into the well such that a 10' nominal graded filter pack extends from 205' depth to at least 2 feet above the screened PVC interval. Five feet of coated bentonite pellets (100 pounds) will be emplaced on top of the graded filter pack and allowed to hydrate before the overlying grout is emplaced. Finally, the outer steel casing will be withdrawn as high solids bentonite grout is tremied to fill the remainder of the wellbore to the land surface. In all cases, volumes of material placed into the wellbore will be assessed to ensure complete filling and avoid bridging. <u>Because we will be installing two monitoring points within one drilled borehole, we request a variance from the DNR to complete this installation as described.</u>

Separately, we will drill a borehole to 85' bgs using rotosonic drilling techniques. The 85' deep well will be drilled in compliance with NR-141. This borehole will similarly consist of a 5' screened PVC interval at the bottom with 80' of blank casing above. The interval surrounding the PVC screened interval will be filled with a graded filterpack that exends to at least 2' above the screened interval. A 5' layer of chipped bentonite will seal the filter pack and the remainder of the drilled wellbore will be filled with bentonite grout to protect against unintended vertical flow. As before, drilling water will be sourced from a PFAS-free source for drilling of this well, solid waste will be managed as described above.

At the completion of each piezometer installation, we will develop each piezometer until water runs clear. Water pumped from each piezometer will be stored in an on-site tank for later filtering and disposal based on a method suggested by DNR.