State of Utah

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06/05/2025

Jerry Postema
Hildale – Colorado City
PO BOX 840490
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Subject: Approval, Combined Radium Blending & MCL Compliance Plan for Hildale-Colorado City; UTAH27006

This is not a plan approval for construction.

Jerry Postema:

On April 17, 2025, the Arizona Department of Environmental Quality (ADEQ) issued an Approval of Construction (AOC) permit for a blending plan intended to reduce combined radium and gross alpha particle levels in the wells serving the Hildale-Colorado City (the Supplier) drinking water system. The Utah Division of Drinking Water (the Division) concurs with this plan. This letter acts as the Division's Plan Approval (PA) for the Combined Radium Blending & MCL compliance plan for the Supplier.

The Division is the regulatory authority responsible for ensuring compliance with maximum contaminant levels, as well as monitoring and reporting requirements outlined in the Utah Administrative Code. It is the Supplier's responsibility to collect and submit all required samples to the Division.

The following sections outline the blending plan along with the corresponding monitoring and reporting requirements. For questions related to the system's source chemical requirements, please contact David Kruse at dbkruse@utah.gov or 385-566-7789.

Background

It is the Division's understanding that currently eleven wells and two springs supply the Hildale-Colorado City public water system (the System). All eleven wells feed into a common transmission line before undergoing treatment at the Wells Chlorinator & Filter Plant (identified as TP003) prior to the first service connection.

Of these wells, five of them exceed the combined radium maximum contaminant level (MCL) of 5 pCi/L. These wells include the Academy Well (WS015), Well No. 19 (WS009), Well No. 21 (WS010), Well No. 22 (WS011) and Well No. 17 (WS008).

In the absence of an approved treatment process for combined radium at the Wells Chlorinator & Filter Plant (TP003), the combined radium blending and compliance plan utilizes the most recent radionuclide data collected from each involved source on August 1, 2024 to outline an operational strategy which will allow the System to utilize all eleven wells while reducing combined radium levels to below the MCL at the entry point to the distribution system.

Blending will be achieved by running only selected wells within calendar quarters, as well as sequencing selected wells on and off. Quarterly operational strategies are described below. The System is not equipped with SCADA and only four wells (Well No. 17 (WS008), Well No. 19 (WS009), Well No. 21 (WS010) and Well No. 22 (WS011)) have variable frequency drives. Therefore, flow contributions (pumping rates) from the remaining seven wells are expected to remain consistent. Well sequencing will be completed manually.

First Quarter Winter Operational Strategy

The primary wells in use during the first quarter will be Well No. 11 (WS006), Well No. 17 (WS008), Well 4A (WS003), and Well 4B (WS013). The pumping rates will be 70 gallons per minute (gpm), 125 gpm, 95 gpm, and 12 gpm respectively. The estimated blended concentration for combined radium in the first quarter is expected to be 3.4pCi/L according to the calculation listed below.

$$\text{Blended Concentration} = ((Q_1 \cdot C_2) + (Q_2 \cdot C_2)) / (Q_1 + Q_2)$$

Where: C_1 = Flowrate of Source 1
C_2 = Flowrate of Source 2
Q_1 = Contaminant concentration of Source 1
Q_2 = Contaminant concentration of Source 2

$$3.4 \text{ pCi/L} = ((0.46 \cdot 70) + (7.5 \cdot 125) + (0.4 \cdot 95) + (0.29 \cdot 12)) / (302)$$

Second Quarter Spring Operational Strategy

The primary wells in use during the second quarter will be Well No. 10 (WS005), Well No. 11 (WS006), Well No. 19 (WS009), Well 24 (WS014), Well 4A (WS003), Well 4B (WS013) and Well 8 (WS004). The pumping rates will be 36 gpm, 70 gpm, 110 gpm, 60 gpm, 95 gpm, 12 gpm and 60 gpm respectively. The estimated blended concentration for combined radium in the second quarter is expected to be 3.9 pCi/L according to the calculation listed below.

$$3.9 \text{ pCi/L} = ((0.45 \cdot 36) + (0.46 \cdot 70) + (14.7 \cdot 110) + (0.49 \cdot 60) + (0.39 \cdot 95) + (0.29 \cdot 12) + (0.16 \cdot 60)) / (443)$$

Third Quarter Summer Operational Strategy

The primary wells in use during the third quarter will be the Academy Well (WS015), Well No. 10 (WS005), Well No. 11 (WS006), Well No. 21 (WS010), Well No. 24 (WS014), Well 4A (WS003), Well 4B (WS013) and Well No. 8 (WS004). The pumping rates will be 220 gpm, 36 gpm, 70 gpm, 90 gpm (operated at 50% of safe yield), 60 gpm, 95 gpm, 12 gpm and 60 gpm respectively. The estimated blended concentration for combined radium in the third quarter is expected to be 3.9pCi/L according to the calculation listed below.

$$3.9 \text{ pCi/L} = \\ ((8.2 \cdot 220) + (0.45 \cdot 36) + (0.46 \cdot 70) + (6.8 \cdot 90) + (0.49 \cdot 60) + (0.39 \cdot 95) + (0.29 \cdot 12) + (0.16 \cdot 60)) / (643)$$

Peak Day Demand Operational Strategy

A peak day scenario was prepared in which all eleven wells would run at maximum safe yield. The table below presents the wells in operation, their pumping rates and combined radium concentrations. The estimated blended concentration for combined radium in the peak day season is expected to be 6.2 pCi/L.

Peak Day Demand Operation Strategy			
Well Name	Facility ID	Pumping Rate	Combined Radium Concentration (pCi/L)
Academy Well	WS015	220	8.2
Well No. 10	WS005	36	0.45
Well No. 11	WS006	70	0.46
Well No. 17	WS008	250	7.5
Well No. 19	WS009	110	14.7
Well No. 21	WS010	180	6.8
Well No. 22	WS011	94	7.8
Well No. 24	WS014	60	0.49
Well 4A	WS003	95	0.39
Well 4B	WS013	12	0.29
Well No. 8	WS004	60	0.16
Estimated Blended Concentration:			6.2

Fourth Quarter Fall Operational Strategy

The primary wells in use during the fourth quarter will be the Well No. 11 (WS006), Well No. 21 (WS010), Well No. 22 (WS011), Well 4A (WS003), Well 4B (WS013) and Well No. 8 (WS004). The pumping rates will be 70 gpm, 180 gpm, 94 gpm, 95 gpm, 12 gpm and 60 gpm respectively.

The estimated blended concentration for combined radium in the fourth quarter is expected to be 3.9 pCi/L according to the calculation listed below.

$$3.9\text{pCi/L} = \\ ((0.46 \cdot 70) + (6.8 \cdot 180) + (7.8 \cdot 94) + (0.39 \cdot 95) + (0.29 \cdot 12) + (0.16 \cdot 60)) / (511)$$

Compliance Calculations

Pursuant to R309-205-7, compliance with the combined radium MCL is based on the running annual average (RAA) of sample results collected from the Wells Chlorinator & Filter Plant (TP003). The RAA will be calculated each quarter using the most recent four quarters of sample results. The RAA will be rounded to the nearest whole number. If at any point the RAA exceeds the combined radium MCL of 5 pCi/L, the Supplier will be considered in violation of the combined radium standard and public notice will be required.

Using the estimated blended concentrations described above, the RAA is expected to remain below the combined radium MCL. The Division understands that additional wells are in the permitting process. **This blending plan shall be reevaluated prior to the issuance of an operating permit each time a new source which feeds Wells Chlorinator & Filter Plant (TP003) is developed.**

On this basis, **the blending plan as described above is hereby approved.**

Monitoring and Reporting Requirements

Issuance of this plan approval changes the Systems monitoring and reporting requirements. The monitoring and reporting requirements are described below.

1. The Supplier shall collect quarterly radionuclide samples at the following locations. These samples shall be due only if the well provides water to the distribution system in a given quarter. It is the responsibility of the System to communicate with the Division which sources did and did not run at the end of each calendar quarter.

    a. Academy Well (WS015)
    b. Well No. 17 (WS008)
    c. Well No. 19 (WS009)
    d. Well No. 21 (WS010)
    e. Well No. 22 (WS011)

2. The Supplier shall collect a radium-226, radium-228, gross alpha particle activity and combined uranium sample at the Wells Chlorinator & Filter Plant (TP003) each calendar quarter, regardless of seasonal operations.

3. The Supplier shall maintain accurate weekly water usage records, documenting gallons produced from each well, total volume of water that passes through the Wells Chlorinator & Filter Plant (TP003) and total amount of permanganate fed (units).

4. The Supplier shall submit a quarterly combined radium blending report to the Division using the enclosed template. The quarterly report is due on the 10th day following the end of each quarter (i.e. April 10, July 10, October 10, and January 10). The report should be emailed directly to dbkruse@utah.gov and ddwreports@utah.gov. Additionally, a hard copy addressed to the Chemical Rule Manager should be sent to the Division's office.

Chemical Rule Manager
Division of Drinking water
P.O. Box 144830
Salt Lake City, Utah 84114-4830

Below are the new monitoring requirements for this system. An updated monitoring schedule can be viewed at any time at waterlink.utah.gov under the water monitoring section.

Facility with new requirements	Analyte(s) Required	#Of samples	Sampling Frequency	Next Due Date	Rule Reference
TP003 Wells Chlorinator & Filter Plant	Radium-226	1	Quarterly	07/01/2025-09/30/2025	R309-205-7(1)(b) & R309-215-6(2)(a)
	Radium-228	1	Quarterly	07/01/2025-09/30/2025	R309-205-7(1)(b) & R309-215-6(2)(a)
	Gross Alpha Particle Activity	1	Quarterly	07/01/2025-09/30/2025	R309-205-7(1)(b) & R309-215-6(2)(a)
	Combined Uranium	1	Quarterly	07/01/2025-09/30/2025	R309-205-7(1)(b) & R309-215-6(2)(a)
	Iron	1	Quarterly	07/01/2025-09/30/2025	R309-215-6(2)(a)
	Manganese	1	Quarterly	07/01/2025-09/30/2025	R309-215-6(2)(a)
	Inorganics & Metals	1	Every three years	01/01/2023-12/31/2025	R309-205-5(3)(a)
	Nitrate	1	Yearly	01/01/2025-12/31/2025	R309-205-5(4)(a)
	Sulfate, Sodium, TDS	1	Every three years	01/01/2023-12/31/2025	R309-205-5(3)(a)
	Pesticides	2	Every three years	01/01/2023-12/31/2025	R309-205-6(1)(f)
	Volatile Organic Contaminants	1	Every three years	01/01/2023-12/31/2025	R309-205-6(2)
WS015 Academy Well	Radionuclides	1	Quarterly	07/01/2025-09/30/2025	R309-205-7(1)(b) & R309-215-6(2)(a)
WS008 Well No. 17	Radionuclides	1	Quarterly	07/01/2025-09/30/2025	R309-205-7(1)(b) & R309-215-6(2)(a)

WS009 Well No. 19	Radionuclides	1	Quarterly	07/01/2025-09/30/2025	R309-205-7(1)(b) & R309-215-6(2)(a)
WS010 Well No. 21	Radionuclides	1	Quarterly	07/01/2025-09/30/2025	R309-205-7(1)(b) & R309-215-6(2)(a)
WS011 Well No. 22	Radionuclides	1	Quarterly	07/01/2025-09/30/2025	R309-205-7(1)(b) & R309-215-6(2)(a)

Please contact David Kruse at 385-566-7789 or dbkruse@utah.gov for questions regarding this approval and the monitoring and reporting requirements for this system.

Please maintain a copy of this letter with your permanent records for future reference.

Thank you for all your efforts in maintaining a clean drinking water system.

Sincerely,

Mark Berger
Monitoring and Standards Implementation Manager

cc: Jerry Postema, Hildale – Colorado City, jerryp@hildalecity.com
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