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EPA Region 8
Underground Injection Control Program
Summary of Changes to the Permit and Response to Public Comments

Class V Area Permit No. CO52409-00000
Aquifer Storage and Recovery Wells

Issued to:

Town of Castle Rock Utilities Department
175 Kellogg Court
Castle Rock, Colorado 80109

Final Permit issuance date: September 29, 2020

Background

EPA issued a draft Underground Injection Control (UIC) Class V area permit to the Town of Castle Rock Water District to inject treated drinking water from alluvium, and the Dawson, Denver and Arapahoe Aquifers. The injectate will be treated to drinking water standards at the Plum Creek Water Purification Facility (PCWPF). Water will be stored in the Denver and Arapahoe Aquifers in the south Denver area for purposes of aquifer storage and recovery (ASR).

EPA issued its draft permit decision on July 17, 2020 and requested public comment by August 16, 2020. In response to a request from the Town of Castle Rock, an extension was granted to allow the submittal of comments until August 17, 2020. A public notice of the comment period was published in the Denver Post and posted on EPA Region 8's website. Three parties provided written comments, including the permit applicant. All comments are included in the administrative record for EPA's final permit decision.

EPA also met with the applicant on August 26, 2020. During this meeting, the applicant provided clarification of its comments previously provided in writing. A summary of this meeting has also been included as part of the administrative record. While EPA does not have to accept public comments outside of the comment period, it decided to do so in this case to better understand the applicant's concerns regarding the draft permit conditions. Accordingly, these meeting results

are also included as part of EPA's responsiveness summary below. A summary of changes which have been made to the Permit as a result of further discussions has also been included below.

CHANGES TO THE PERMIT

1. ***Part I, Paragraph 2 of Page 4 of the Draft Permit***
   Draft Permit: The Permittee shall not construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of a fluid containing any contaminant into USDWs, except as authorized by 40 CFR part 146.

   Final Permit: The Permittee shall not construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of fluids containing any contaminant into USDWs, if the presence of that contaminant may cause a violation of any primary drinking water regulation or may otherwise adversely affect the health of persons.

   Justification of Change: A commenter expressed concern about the original language. Therefore, EPA changed it to be consistent with the UIC regulations at 40 CFR § 144.12.

2. ***Part 2, Page 10, Section C.8 Alterations, Workover, and Well Stimulation***
   Draft Permit Language: Prior to beginning any addition or physical alteration to an injection well's construction or injection formation, the Permittee shall give advanced notice to the Director. Additionally, the Director's written approval must be obtained if the addition or physical alteration to the injection well modifies the approved well construction. Substantial alterations or additions may be cause for modification to the Permit and may include additional testing or monitoring requirements.

   Final Permit Language: Prior to beginning any addition or physical alteration to an injection well's construction or injection formation, the Permittee shall give advanced notice to the Director. Substantial alterations or additions may be cause for modification to the Permit and may include additional testing or monitoring requirements.

   Justification of Change: Removed the requirement to seek Director's approval before starting work on the well to ensure the Permittee is able to timely complete routine maintenance on, or minor physical alterations to, the well.

3. ***Part II, Page 12, Section E.2 Monitoring Methods***
   Draft Permit Language:
   Monitoring Methods
   Observations, measurements, and samples taken for the purpose of monitoring shall be representative of the monitored activity and include:

   (d) Fluid volumes are to be measured in standard oil field barrels (bbl) or thousands of

cubic feet (MCF); and
(e) Injection rates are to be measured in barrels per day (bbl/day) or thousands of cubic feet per day (MCF/day).

Final Permit Language:
Monitoring Methods
Observations, measurements, and samples taken for the purpose of monitoring shall be representative of the monitored activity and include:

(d) Fluid volumes are to be measured in gallons
(e) Injection rates are to be measured in gallons

Justification of Change: Most water districts collect water information in gallons rather than barrels. Therefore, units in the permit have been changed to allow operators to record data in gallons. Consequently, operators should edit the required 7520 reporting forms to identify gallons as the units of the recorded data.

4. **APPENDIX A, Page A-1, paragraph 1**
Draft Permit: These requirements represent the approved minimum construction standards for the CR-223 and CR-224 wells and all new well casing and cement well head configurations, and injection tubing. Deviation from the approved construction standards without prior approval from the Director is prohibited. Requirements for obtaining samples during or prior to well construction are described below. A description for the construction of the CR-223 and CR-224 wells are provided below.

Final Permit: These requirements represent the approved minimum construction standards for the CR-223 and CR-224 wells and all new well casing and cement well head configurations, and injection tubing. Requirements for obtaining samples during or prior to well construction are described below. A description for the construction of the CR-223 and CR-224 wells are provided below.

Justification of Change: Conditions which may include additional approval of deviations from the well's approved construction standards has been removed to ensure the Permittee is able to timely complete routine maintenance on, or minor physical alterations to, the well.

5. ***Appendix A - Well Construction Requirements, Page A-1, paragraph 3***
Draft Permit: none
Final Permit:
Well Construction Maintenance and Alterations

The wellbore diagrams shown below for the CR-223 and CR-224 wells are general representations of each well's expected construction prior to injection. Routine

maintenance and/or minor physical alterations to, constructed wells are within the scope of these wells' approved construction. Prior to beginning any routine maintenance of, or physical alteration to, an injection well's construction the Permittee shall give advanced notice to the Director. Upon such notification by the Permittee, the Director may impose additional requirements, if necessary, to ensure USDW protection. The Permittee must continue to report, cease operations, and repair the well in accordance with conditions included in this Permit. (See Part II. Sections C.8; Section D; and Part III. Sections A and E.11)

Justification of Change: This language has been incorporated into APPENDIX A to require that the operator notify EPA of any potential well rework activities that may occur as a result of a loss of mechanical integrity or other well construction-related issues. Operators may proceed with such activities unless the Director, upon being notified, prescribes otherwise.

6. ***Appendix B – Logging and Testing Requirements, Page B-2***
Draft Permit Language: none

Final Permit: Cyanide - Collect a representative fluid sample and analyze for cyanide of the injectate prior to receiving authorization to inject.

Justification of Change: Cyanide was inadvertently left off the original baseline parameter list in the draft Permit. The Permittee has agreed to sample, analyze, and report cyanide data to EPA prior to being granted authorization to inject.

7. ***Appendix D – Monitoring and Reporting Parameters, Observe Weekly and Record Monthly Table***
Draft Permit Language:

OBSERVE WEEKLY AND RECORD MONTHLY
Cumulative Fluid Volume Injected (since injection began) (bbls)
Cumulative Fluid Volume Recovered (since injection began) (bbls)
Injection Pressure (measured at the injection or pump house) versus Wellhead Injection Pressure
Injection Rate (bbls/day) Note: measured near the point of injection
Injection Volume (bbl)
Injection and Recovery Volume (bbl)
Recovery Rate (bbls/day) Note: measured near the point of injection
Wellhead Injection Pressure (psig)

Final Permit Language:

OBSERVE WEEKLY AND RECORD MONTHLY	
	Cumulative Fluid Volume Injected (since injection began) gallons
	Cumulative Fluid Volume Recovered (since injection began) gallons
	Injection Pressure (measured at the injection or pump house) versus Wellhead Injection Pressure
	Injection Rate gallons/min or gallons/day Note: measured near the point of injection
	Injection Volume gallons
	Injection and Recovery Volume gallons
	Recovery Rate gallons/min or gallons/day Note: measured near the point of injection
	Wellhead Injection Pressure (psig)

Justification of Change: Injection volumes and recovery rates may be recorded in gallons rather than barrels.

8. APPENDIX D - MONITORING, AND REPORTING PARAMETERS, Quarterly Reporting Table
Draft Permit:

QUARTERLY REPORTING	
CUMULATIVE FLUID VOLUME	Monthly cumulative injected and recovered fluid volume to date. (bbls)
INJECTION FLOW RATE	Monthly average, maximum, minimum values for injection flow rate measured near the wellhead. (bbl/day)
INJECTION PRESSURE (measured from the Pump House)	Monthly average, maximum, minimum values for injection pressure measured at the pump house. (psig)
INJECTION VOLUME	Monthly average, maximum, minimum values for injection volume measured near the wellhead. (bbls)
RECOVERY VOLUME	Monthly average, maximum, minimum values for recovery volume measured near the wellhead. (bbls)
SAMPLING RESULTS	The results of any quarterly (i.e., every 90 days) sampling analysis obtained for the injectate and/or recovered waters, including for arsenic and NDMA, elevated constituents from new wells or water sources, and any other constituents required by the Director.
WELLHEAD PRESSURE (measured near the wellhead)	Monthly average, maximum, minimum values for injection pressure measured near the wellhead. (psig)

Final Permit:

QUARTERLY REPORTING	
CUMULATIVE FLUID VOLUME	Monthly cumulative injected and recovered fluid volume to date. (gallons)
INJECTION FLOW RATE	Monthly average, maximum, minimum values for injection flow rate measured near the wellhead. (gallons/min or gallons/day)
INJECTION PRESSURE (measured from the Pump House)	Monthly average, maximum, minimum values for injection pressure measured at the pump house. (psig)
INJECTION VOLUME	Monthly average, maximum, minimum values for injection volume measured near the wellhead. (gallons)
RECOVERY VOLUME	Monthly average, maximum, minimum values for recovery volume measured near the wellhead. (gallons)
SAMPLING RESULTS	The results of any quarterly (i.e., every 90 days) sampling analysis obtained for the injectate and/or recovered waters, including for arsenic and NDMA, elevated constituents from new wells or water sources, and any other constituents required by the Director.
WELLHEAD PRESSURE (measured near the wellhead)	Monthly average, maximum, minimum values for injection pressure measured near the wellhead. (psig)

Justification of Change: Most water districts collect water information in gallons rather than barrels. Therefore, units in the permit have been changed to allow operators to record data in gallons. Consequently, operators should edit the required 7520 reporting forms to identify gallons as the units of the recorded data.

9. Appendix G - ASR Baseline Constituent List

Draft Permit Language: Cyanogen Chloride is included in the parameter list for APPENDIX G.

Footnote Language

* Cyanide and Cyanogen Chloride Analysis: Testing for cyanogen chloride is tiered/triggered in this permit. If cyanide is detected in the source water and is alkalized to a pH of 8.5 or greater, then there is no need to test for cyanogen chloride in the injectate following chloramination. If cyanide is detected in the source water and not alkalized, the Permittee must find a laboratory that can test for cyanogen chloride in the chloraminated injectate or remove cyanide from the source water prior to chloramination.

Final Permit Language: Cyanogen Chloride has been removed from the parameter list.

New Footnote Language
* Cyanide: If cyanide is detected in the source water and not alkalized (pH less than 8.5), the Permittee must remove cyanide from the source water prior to chloramination.

Justification of Change: The requirement to sample for cyanogen chloride has been removed because no laboratory within the U.S. analyzing for this contaminant has been identified.

10. Appendix H – Bench Scale Water Chemistry Test Procedures for Nitrosamines, Section A. Analysis of Formation Water, Page H-1

Draft Permit Language: Section A. Analysis of the Formation Water
Prior to performing the Part I MI and Pilot Cycle Test, the Permittee shall collect four samples of sufficient size to meet the requirements for testing of the formation water from each of the proposed ASR wells. These samples shall be obtained using the volatile organic carbon (VOC) collection method and stored on a shelf at the temperature recorded for the recovered water until analyzed. The VOC collection method requires field staff to fill the bottle to the maximum level and exclude all air pockets.

Final Permit Language: *Section A. Analysis of the Formation Water*
Prior to performing the Part I MI and Pilot Cycle Test, The Permittee shall collect four samples of sufficient size to meet the requirements for testing of the formation water from each of the proposed ASR wells. These samples shall be obtained using the volatile organic carbon (VOC) collection method and stored on a shelf at the temperature recorded for the recovered water until analyzed. The VOC collection method requires field staff to fill the bottle to the maximum level and exclude all air pockets to the extent possible. The laboratory will provide bottles without septa caps for sample collection according to the method and lab Standard Operating Procedure (S.O.P). According to lab protocol, air pockets in samples are acceptable if <6mm.

Justification of Change: Additional language has been included to clarify that the VOC method should be utilized to collect samples that are stored on the shelf, not samples collected for laboratory analysis. The Permittee must collect samples to store on the shelf using the VOC method, which requires the use of bottles with zero headspace. Periodically, samples must be obtained for analysis from the shelved bottles in collection vessels described in the applicable test method (e.g. method 521).

11. APPENDIX H – Bench Scale Water Chemistry Test Procedures for Nitrosamines, Section B. Analysis of Injectate Water, item #1
Draft Permit Language:
Section B. Analysis of the Injectate Water

Collect five samples of a volume needed to meet the requirements of the injectate testing on the same day within thirty (30) days following the start of the Pilot Cycle Test. These samples shall be obtained using the VOC collection method. Analyze the first sample for NDMA and NDBA.

Store the other four samples on a shelf at formation temperatures until analyzed. The sample bottles should be stored in a dark location away from light to prevent premature breakdown.

Final Permit Language:

Section B. Analysis of the Injectate Water

Collect five samples of a volume needed to meet the requirements of the injectate testing on the same day within thirty (30) days following the start of the Pilot Cycle Test. These samples shall be obtained using the VOC collection method and laboratory protocol as mentioned in Section A (above). Analyze the first sample for NDMA and NDBA.

Store the other four samples on a shelf at formation temperatures until analyzed. The sample bottles should be stored in a dark location away from light to prevent premature breakdown.

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Justification of Change: See Justification of Change for item number 10 above.

RESPONSE TO COMMENTS

COMMENT #1: *Section C. Well Operation, Number 8. Alteration, Workover, and Well Simulation* second paragraph:

Prior to beginning any addition or physical alteration to an injection well's construction or injection formation, the Permittee shall give advanced notice to the Director. Additionally, the Director's written approval must be obtained if the addition or physical alteration to the injection well modifies the approved well construction. Substantial alterations or additions may be cause for modification to the Permit and may include additional testing or monitoring requirements.

> The Town operates and maintains over 62 public water supply wells. The Town has successfully operated, maintained and repaired the wells and associated infrastructure for over 80 years without the 'EPA written approval' to maintain and repair infrastructure. The Town cannot afford to wait on approval from EPA if repairs are needed to vital infrastructure. The Town's infrastructure provides water supply to residents and critical businesses. We cannot afford to have infrastructure in limbo. If a repair is needed it is usually identified during routine infrastructure checks. A licensed well contractor is hired to complete the work per the guidelines that are outlined in the Colorado Water Well Construction Rules (CWWCR). This work is completed within a timely manner with the goal of having the infrastructure operating properly to maintain the public health and safety for our customers.

EPA RESPONSE #1: The final permit includes changes to accommodate the Town's concerns while still providing appropriate oversight to ensure protection of USDWs. First, the permit has been changed to allow some flexibility in well construction so that routine maintenance and minor alterations are within the approved well construction. Second, EPA has included language in Appendix A to allow the operator to timely construct, maintain, and operate the wells without having to wait for EPA's approval. Other conditions elsewhere in the permit requiring EPA's approval before work can commence or continue have also been removed. The Permittee must continue to report and update EPA on well construction-related activities. Upon notification, EPA retains the authority to impose additional requirements, if necessary, to ensure USDW protection.

COMMENT #2: *Section C. Well Operation, Number 8. Alteration, Workover, and Well Simulation* third and fourth paragraphs:

The Town agrees that notice can be given to the EPA that work is needed to repair a well but maintains that "EPA Director's written approval" is unwarranted. The next paragraphs of the draft permit state:

The Permittee shall record all alterations and workovers on a Well Rework Record (EPA

Form 7520-19) and submit a revised well construction diagram when the well construction has been modified. The Permittee shall provide this and any other record of well workover or test data to EPA within sixty (60) days of completion of the activity.

The Permittee shall complete any activity which affects the tubing or casing and provide demonstration of internal (Part I) MI within ninety (90) days of beginning the activity. If the Permittee is unable to complete work within the specified time period, the Permittee shall propose an alternative schedule and obtain Director's written approval. Injection operations shall not resume until the well has successfully demonstrated mechanical integrity. If the well lost mechanical integrity, the Permittee must receive written approval from the Director to recommence injection.

The Town believes that the above requirements more than adequately cover if any repairs are needed. It is about demonstrating that the repairs did not impair mechanical integrity, which can be completed through submitting the form, the new well diagram, and submitting the mechanical integrity requirements.

EPA RESPONSE #2: See EPA's Response to Comment #1. However, it is important to note that the above requirements cited by the commenter still necessitate EPA's approval as it relates to the well's mechanical integrity.

COMMENT #3:
In *Appendix G – ASR Baseline Constituent List in Volatile Organics using EPA Method 524.2 or 8260* the footnote for Cyanogen Chloride states "the Permittee must find a laboratory that can test for cyanogen chloride in a chloraminated injectate". While the Town does not believe that cyanogen chloride will be an issue, the Town would like to inform the EPA that at this current time the Town knows of no laboratories with the ability to test for cyanogen chloride.

EPA RESPONSE #3: Cyanogen Chloride has been removed from the Appendix G parameter list because no laboratories have been identified that can evaluate the chemical. However, operators are required to remove Cyanide from the injectate stream if the source water is non-alkalized (i.e., a pH of less than 8.5).

COMMENT #4:
The Town provided our water quality laboratory, Colorado Analytical, a copy of *Appendix H – Bench Scale Water Chemistry Test Procedures for Nitrosamines* to determine if the procedure followed laboratory standards. The Town received the following comments back from our laboratory representative Shea Greiner, who provided the following comments:

Section A. Analysis of the Formation Water
The Permittee shall arrange for analytical data prepared by the laboratory to be submitted to them and EPA, simultaneously.

Prior to performing the Part I MI and Pilot Cycle Test, The Permittee shall collect four samples of sufficient size to meet the requirements for testing of the formation water from each of the proposed ASR wells. These samples shall be obtained using the volatile organic carbon (VOC) collection method and stored on a shelf at the temperature recorded for the recovered water until analyzed. The VOC collection method requires field staff to fill the bottle to the maximum level and exclude all air pockets.

1. These samples shall be "spiked" by the laboratory with a quantity of 10 ng/L of N-nitrosodimethylamine NDMA and 10 ng/L of N-nitroso-di-n-butylamine (NDBA). The purpose of this shelf test is to observe how NDMA and NDBA react with the native formation water. The sample bottles should be stored in a fashion that prevents light degradation.

2. Ninety (90) days following the collection of the formation samples, one sample bottle shall be analyzed for NDMA and NDBA. This analytical process shall be repeated for the next bottles on a quarterly (i.e., every 90 days) basis. The analytical results of NDMA and NDBA concentrations shall be reported to the Director within thirty (30) days.

EPA cannot require zero headspace when it is not part of the laboratory method. Please advise the Town which method EPA would like to use 521 or zero headspace method.

EPA RESPONSE #4: The conditions in this section have been clarified so that samples with zero headspace should be collected for the bottles that will be shelved. However, operators should use the bottles identified in Method 521 to analyze the samples.

COMMENT #5:
In the second paragraph of *Section* C. *Well Operation, Number 8. Alteration, Workover, and Well Simulation,* the EPA states that:

"Prior to beginning any addition or physical alteration to an injection well's construction or injection formation, the Permittee shall give advanced notice to the Director. Additionally, the Director's written approval must be obtained if the addition or physical alteration to the injection well modifies the approved well construction. Substantial alterations or additions may be cause for modification to the Permit and may include additional testing or monitoring requirements."

The concern with the above statement manifests when considering the delay in repairing a water supplier's vital infrastructure. Infrastructure that is an integral part of operations and supplying citizens with potable water. Often, repairs are so critical that crews work around the clock to ensure operations are up and running as soon as possible. The requirement to receive written approval from the Director before starting repairs could jeopardize response efforts. We request that the EPA remove

the aforementioned language and allow water suppliers to make repairs as quickly as they are needed.

EPA RESPONSE #5: See EPA's response to Comment #1.

COMMENT #6:
In *Appendix G-ASR Baseline Constituent List in Volatile Organics using EPA Method 524.2 or 8260* the EPA indicates that the Applicant must find a laboratory that can test for cyanogen chloride in a chloraminated injectate. This is the first that Aurora Water is aware that Cyanogen Chloride is a concern in potable water and requests that the EPA provide justification for sampling. Furthermore, Aurora Water knows of no laboratory with the ability to detect Cyanogen Chloride. This requirement may be near impossible (or extremely difficult) to meet and therefore should not be included.

EPA RESPONSE #6: See EPA's response to Comment #3

COMMENT #7:
In *Appendix H-Bench Scale Water Chemistry Test Procedures for Nitrosamines,* the EPA requirements contain a contradiction between "no headspace" and following the laboratory's sampling protocol for method 512. The requirement should be amended to remove this contradiction.

EPA RESPONSE #7: See EPA's Response to Comment #4

COMMENT #8:
Concern over the term and permit conditions surrounding "contaminants." On page 4 of the permit and page 9 of the Statement of Basis there are references to the injection of contaminants. Specifically, on page 4 the permit states: "The Permitee shall not construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of a fluid containing **any contaminant** into USDWs, except as authorized by 40 CFR part 146." Similarly, on page 9 of the Statement of Basis it states: Pursuant to the UIC regulations at 40 CFR Part 144.12, underground injection **cannot** cause movement of **a contaminant** into a USDW, if the presence of that **contaminant may cause a violation of any primary drinking water regulation under 40 CFR Part 142 or may otherwise adversely affect the health of persons**." While the criteria expressed in the Statement of Basis provide some definition of contaminant (exceedance of a primary drinking water MCL), the follow-on criteria of "may otherwise adversely affect the health of persons" may be too broad of a stipulation. Under that definition, would nitrosamines be considered a

contaminant that adversely impact health? Or arsenic or any other chemical (beryllium, cadmium, chromium, etc.) that is below the primary drinking water MCL but has health impacts. It would be my recommendation that the criteria be limited to the water being injected must meet primary drinking water standards. This also appears to be what is implied in 40 CFR Part 144.12(c) where for Class V wells specifically, only exceedance of primary drinking water standards is referenced under 40 CFR Part 144.12. Another solution may be to replace the vague requirement "of otherwise adversely affect the health of persons" with what is expressed under 40 CFR Part 144.12(d) which states "Whenever the Director learns that a Class V well may be otherwise adversely affecting the health of persons, he or she may prescribe such actions as may be necessary to prevent the adverse effect, including any action authorized under paragraph (c) of this section."

EPA RESPONSE #8: Language on page 4 has been changed to be consistent with 40 CFR 144.12(a). This specifies that operators may not inject or mobilize fluids which contains contaminants included on the primary national drinking water standards list or which could adversely impact the health of persons. While the commenter has concerns that this language is too broad, EPA cannot limit the scope of this regulatory standard. For those constituents that have an MCL, meeting the MCL would satisfy this standard. However, there are contaminants that do not have an MCL which can endanger drinking water sources. In fact, one purpose of issuing a Class V permit for ASR instead of allowing rule-authorization reflects a determination by EPA that there may be contaminants of concern that can adversely affect human health that do not have an MCL. Therefore, in order to clarify the scope of the endangerment standard, EPA included specific regulatory language in the final permit.

COMMENT #9:
Reporting Units. In the permit (page 12) and Appendix D, injection/recovery volumes and rates are to be reported in "oil field barrels" and "barrels per day." These are not typical units for municipal districts to record or report water flow rates and total volumes. None of the flow meters or SCADA systems are set up to record in these units (barrels). By requiring the reporting in barrels, there may be errors introduced in conversion of the rates and totals, and no archived SCADA data will be preserved in units of barrels or barrels per day. For reference, the existing Meridian Metropolitan District ASR permit stipulates recording the rates and total volumes in typical municipal water district units of gallons per minute and total gallons.

EPA RESPONSE #9: Reporting units have been changed from barrels to gallons.