



Clackamas River Water

October 14, 2016

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Ms. Jen Woody
Hydrogeologist
Oregon Water Resources Department
725 Summer Street NE, Suite A
Salem Oregon 97301

Subject: Request for a 5-Year Time Extension for ASR Limited License #003

Dear Jen:

On behalf of Clackamas River Water (CRW), this letter requests a 5-year time extension for Aquifer Storage and Recovery (ASR) Limited License #003. The current ASR Limited License #003 authorizing ASR testing at six wells completed in the Columbia River Basalt Group (CRBG) aquifer will expire in November 1, 2016. We understand that certain criteria must be met in order to grant an extension; a discussion of those points is provided below:

Rationale for Time Extension

CRW requests an extension of time for their limited license to continue to explore the feasibility of ASR in and around CRW's service area. CRW owns one operational ASR well: CRW-1. However, since the previous limited license renewal in 2011, no injection has occurred at CRW-1. The volume of residual stored water at the end of 2002 pilot testing (last storage event) was 11.71 million gallons (MG). During years 2006 and 2007, the residual stored water was recovered using CRW-1, which is located on Redland Road (Figure 1). After the ASR storage account was depleted in 2007, CRW continued to pump native groundwater at CRW-1 under Oregon Water Resources Department (Department) Permit #G67728.

Although CRW has not stored water in CRW-1 since 2002, CRW is still interested in pursuing ASR pilot testing to augment its peak season supply and to improve the quality of the water withdrawn from the CRBG aquifer. Consequently, CRW is requesting more time for testing to determine the feasibility of using ASR prior to applying for an ASR permit. Results of previous ASR testing at CRW-1 and a more detailed rationale for a time extension request is discussed below.

Results of Previous ASR Testing at CRW-1

To date, the only full scale cycle tests conducted under ASR Limited License #003 occurred at CRW-1 from November to December 2001 (Cycle Test #1) and from December 2001 to November 2002 (Cycle Test #2). Cycle Test #1 was conducted as an initial, relatively short duration cycle test to evaluate system operation for Cycle Test #2 (the longer cycle test). During Cycle Test #2, approximately 130 MG of water were injected at an average rate of 670 gallons per minute (gpm) for 122 days. The long-term injection specific capacity of CRW-1 during Cycle Test #2 was 6.1

gpm/foot. The water was stored for 62 days and then 104 MG were recovered at an average rate of 793 gpm, leaving 11.71 MG of recoverable storage. The long-term pumping specific capacity of CRW-1 during Cycle Test #2 was 4.8 gpm/foot. During the cycle tests, a network of seven observation wells was monitored to assess aquifer hydraulic properties.

The primary observations and conclusions based on Cycle Test #2 were as follows:

- Storage of approximately 230 MG at CRW-1 is achievable without substantial loss of water;
- The aquifer is confined and bounded by faults to the northwest, northeast, and southeast;
- Water levels at an observation well located about 3,000 feet northwest of CRW-1 (Rossman landfill MW-1) increased 9.25 feet during the injection period, to about 6 feet below ground surface (bgs);
- Water quality of recovered water complied with the requirements of the limited license conditions; however, the quality of the recovered water diminished relatively early in the recovery period. At 50% to 75% recovery, the recovered water quality was similar to CRBG native groundwater; and
- To recover more than 50% to 75% of stored water, a mixing zone that separates the injected water from the native groundwater may need to be developed. The mixing zone would act as a "buffer" and could be developed by injecting a greater volume of water than is recovered during successive ASR cycles.

Purpose of ASR LL #003 Extension

CRW's current plan is first to assess the remaining 5 sites designated in the ASR Limited License #003 in order to determine the most viable. In addition, other siting possibilities that satisfy OWRD criteria need to be considered. The objective is to determine the sites with the best overall efficiency. This will involve analysis of existing wells to determine if injected water yield improvement is attainable, both in minimizing the percentage of existing groundwater withdrawn and in the compatibility between ground water and surface water. During this limited license 5-year period, CRW plans to evaluate ASR storage options to determine the potential ASR well capacities for instantaneous flow, water quality and storage capacity. Analysis of available data on the water quality and capacity of existing wells, doing additional analysis of groundwater wells and performing related bench scale mixing studies are part of this effort. CRW has undertaken a large water main replacement project that will change the routing of water delivery to the system where potential ASR sites are located. Water transmission mains that are on the eastside of the system will not be the primary source for water delivery, a new system of watermain known as the "backbone" is underway which will serve the territory from the east side. This change is expected to effect the location of ASR wells and requires the data collection and review described for this renewal period. Water quality at well CRW-1 was found to be corrosive even when highly diluted.

Amount of Time Requested

Because CRW has not fully developed its ASR wells or evaluated potential ASR storage options to improve water quality using recharge, CRW would like to request a 5-year extension to the ASR Limited License #003. Through the extension of its ASR limited license, CRW's ASR program will be better defined before applying for an ASR permit. Consequently, CRW would like to request a 5-year extension to ASR Limited License #003.

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Compliance with the Terms and Conditions of the Current Limited License

Several terms and conditions are defined in ASR Limited License #003, such as notice prior to injection and recovery and keeping a record of use. CRW has complied with the terms of their limited license and they have worked in good faith to report ASR pilot testing data to the Department on a regular basis. CRW has never received a notice from the Department that they are out of compliance with the terms of the license. Specifically, the following has been completed to comply with the terms and conditions of the license:

- The maximum recovery rate was less than 12,000 gpm, which complies with the terms of the license. No injection took place during the last 5-year extension period.
- Condition 1 - This letter requests an extension.
- Condition 2 - CRW has not injected water under ASR Limited License #003 since 2002. Notice of intent to recover water was given to the watermaster before recovering the residual 11.71 MG of water that remained in storage.
- Condition 3 - CRW has kept record of the injection and recovery volumes and has reported the data to the Department in the year-end ASR reports.
- Condition 4 - No proposed modifications to the limited license have been requested.
- Condition 5 - CRW understands that the limited license does not receive a priority date like a water right.
- Condition 6 - CRW completed a UIC registration with the original ASR limited license (UIC Number 11958) and has complied with all state and local permits with regard to injecting, recovering, and pumping to waste.
- Condition 7 - The Department received an ASR work plan prior to pilot testing. Additionally, Oregon State Department of Human Services Drinking Water Program (DHS-DWP) approved the well modifications to CRW-1 that were required to bring the well into compliance with state well construction standards.
- Condition 8 - During Cycle Test #1 (year 2001) and Cycle Test #2 (year 2001 through 2002), injection, storage, and recovery samples were collected for analysis. All samples collected for analysis complied with Safe Drinking Water Act (SDWA) regulations and no constituents in the injection water were above 50% of the maximum contaminant level (MCL).
- Condition 9 - Because no additional cycle tests took place under the last 5-year period of this limited license (2011 through 2016), water quality samples were not collected. However, when cycle testing is resumed, CRW intends to collect water quality samples in compliance with the terms outlined in their limited license and to ensure that the water delivered to its customers meets all federal and state drinking water standards.
- Condition 10 - Because no additional cycle tests took place under the last 5-year period of this limited license (2011 through 2016), a monitoring plan was not necessary to measure the response due to ASR activities. However, CRW will maintain a detailed monitoring plan to measure the response in the regional aquifer due to ASR activities. If changes in the points of monitoring are proposed (new points added and others dropped based on data trends), the Department will be notified of the changes.

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- Condition 11 -DHS-DWP approved the well modifications to CRW-1 that were required to bring the well into compliance with state well construction standards. The well modifications were submitted to the Department for approval.
- Condition 12 - CRW has recovered up to 95% of the stored volume each year. However, using their existing groundwater permit, CRW pumped native groundwater after the ASR account was depleted in 2007. Yearly reporting to the Department has documented the amount of recovered water; both ASR water and native groundwater.
- Condition 13 - Yearly ASR reports have been submitted to the Department since the start of ASR pilot testing.
- Condition 14 - No injuries to existing groundwater users have been reported since the start of ASR activities.
- Condition 15 - CRW has used the recovered water in accordance with the diversion authorization or for non-municipal use for the purposes of ASR testing as outlined in the limited license.
- Condition 16 - Because no additional cycle tests took place under the 5-year period of this limited license (2011 through 2016), CRW has not met with the Department to review the status of its ASR project.
- Condition 17 - The Department has not suggested additional conditions to the limited license since its issue date.
- Condition 18 - Because no additional cycle tests took place under the 5-year period of this limited license (2011 through 2016), CRW has not actively kept the public informed of the ASR program. However, when cycle testing is resumed, CRW intends to keep the public informed of the ASR program through their Consumer Confidence Report and through other presentations, publications, and community meetings, as needed.
- Condition 19 - No adverse effects have been observed due to ASR testing.
- Condition 20 - Yearly running accounts of the amount of the residual stored ASR water were submitted to the Department.

Thank you for considering this request and please do not hesitate to call us at 503 722-9220 if you have questions.

All the best,



Suzanne DeLorenzo, PhD
Water Quality Manager
Clackamas River Water

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