Oregon

Kate Brown, Governor

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MEMORANDUM

TO: Water Resources Commission

FROM: Ken Lite, Senior Hydrogeologist KL
Justin Iverson, Groundwater Section Manager JI
Brenda Bateman, Technical Services Division Administrator BB

SUBJECT: Agenda Item D, October 13, 2016
Water Resources Commission Meeting

Mosier Wells Repair / Replacement and Abandonment Project Update

I. Introduction

The 2015 Oregon Legislature authorized funds to repair, replace, or remediate water wells in the Mosier Creek area (Senate Bill 5507, Section 64(3)). This is an informational report describing a cost-share project to implement this bill.

II. Background

Groundwater levels in Columbia River Basalt aquifers have declined more than 150 feet near Mosier since the early 1970's. The Oregon Water Resources Department (Department) completed a study of the Mosier area aquifers in 1987 and determined over-use and inadequate well seals between the Priest Rapids and Pomona basalt aquifers were the principle causes for the declining water levels in wells. Inadequate well seals cause intra borehole movement of water between distinct aquifers (termed commingling). Commingling occurs when a well is open to multiple aquifers with different head pressures. Columbia River Basalt is comprised of multiple, stacked lava flows with aquifers often located in fracture zones at the lava flow boundaries (top and bottom). The water in Columbia River Basalt aquifers is usually confined (under pressure) and there are often distinct pressure differences between the aquifers.

The Department held a public meeting in Mosier in October, 1987 to explain the study results and potential agency actions. The Department concluded the Pomona aquifer was over drafted, and the Priest Rapids aquifer was nearly fully allocated, but was being depressurized through at least one commingling well. The Department was authorized by the Water Resources Commission (WRC) in January, 1988 to hold a hearing to withdraw the Pomona and Priest Rapids aquifers from further appropriation with the exception of exempt uses; the WRC adopted the withdrawal orders for the Pomona and Priest Rapids aquifers in a six square area in May, 1988, where the severe water level declines were occurring, and directed the Department to

investigate commingling. A copy of the groundwater withdrawal order for Mosier is included in Attachment 1.

The Department entered into a stipulated agreement with the City of Mosier in July, 1989 to repair or abandon Mosier Well #3. Efforts to repair Mosier Well #3 were made in 1991 and 1992 using removable inflatable packers. A survey of the well done in 2000 revealed the well was still commingling. Another attempt to repair the well was done in 2007 using a cement plug and cement grout. However, the 2007 repair also failed. The well was permanently abandoned in 2013.

The Mosier Watershed Council and Wasco County Soil and Water Conservation District began a study in 2005 with the U.S. Geological Survey (USGS) to determine the cause of the continuing groundwater level declines in the Mosier area. The USGS concluded the principle cause of the severe groundwater decline and locally dry wells in the Mosier area was due to inadequate well construction.

The Department is currently working with the Mosier Watershed Council and the Wasco County Soil and Water Conservation District to assess and facilitate the repair or abandonment and replacement of commingling wells (termed remedy). The Department is also actively collecting data and monitoring water level trends, and providing consultation to drillers and landowners for new well construction in the Mosier area.

III. Discussion

A. Current Well Evaluations

The Wasco County Soil and Water Conservation District (District) has contracted with a hydrogeologic consultant for the past three years to identify, confirm, and develop remedy plans for potential commingling wells in the Mosier Creek basin. The consultant has evaluated 70 wells to date and developed an initial list of 47 potential commingling wells based on available well log information and knowledge of the hydrogeology of the area. Twenty four potential commingling wells have been assessed with a field evaluation or with existing well videos, and potential remedy plans were developed for 14 wells confirmed to be commingling.

B. Partners and Cost Share

The Department is contracting with the District and providing a grant of $1.0 million, funded by the Oregon Legislature, with leadership from Representative John Huffman, to administer a cost-share program to remedy commingling wells in the Mosier Creek area. The Mosier Creek area is defined as an area of the Mosier Creek basin that generally follows the boundary of the Mosier Groundwater Withdrawal area. A map of the withdrawn area is contained in Attachment 2.

The District will use the grant to pay for 90 percent of the cost of assessing and remedying commingling wells, and will use District funds to cover the remainder of the costs. The program will pay for the full cost of an individual domestic (exempt) well remedy up to $98,000. Individual domestic well remedy costs exceeding $98,000 will be covered at 90 percent of the

cost plus the fixed cost of the assessment ($9,800), with the remainder paid by the landowner. The program will pay for 90 percent of remedy costs for permitted wells. Landowner participation in the program will be voluntary.

The cost of an individual remedy is currently estimated at $20,000-$70,000 per well. The higher amount is an estimate for well abandonment and replacement. Well abandonment and replacement may be the best alternative for many sites because of the complexities of well repairs in artesian aquifers.

C. Well Prioritization and Selection Process

The assessment work completed by the District has identified a pool of wells in the Mosier Creek area found to be commingling based on field evaluations or existing borehole videos. The District has developed recommendations and specifications to remedy these commingling wells (GSI, 2014 and 2016). The District will prioritize the list of confirmed commingling wells to be remedied using a ranking process that assigns a score for each well using a simple matrix of hydrologic criteria developed by the Department in conjunction with the Mosier Watershed Council.

The criteria used in the prioritization process include:

1. The aquifer type being impacted by commingling and the relationship of the aquifer to the most severely depleted aquifers - more points are awarded for basalt aquifers than for sedimentary aquifers.
2. The estimated rate of intra-borehole flow between aquifers- more points are awarded for higher rates of intra-borehole flow.
3. The up-aquifer distance from the well to the lower boundary of the aquifers (Rocky Prairie Thrust Fault, see Attachment 2). The distance relative to the boundary is a surrogate for the general differences in aquifer properties (i.e. the closer proximity to the boundary, the more likelihood of greater permeability and greater hydraulic head pressure). The closer the well is to the boundary, the more points awarded.

D. Well Repair / Replacement (Remedy) Process

The Department worked with the District to develop the following process for implementing well remedies within the Mosier Creek area.

1. The District will develop and maintain a prioritized list of identified commingling wells and track the status of remedies implemented at high-priority wells.
2. The Department will assist the District in generating criteria for soliciting and selecting a pool of qualified well drillers to implement identified well-specific remedies.
3. The District will solicit and obtain agreements with the owners of the prioritized commingling wells to implement the recommended remedies within the cost-share program.

4. The Department will assist the District in generating and evaluating criteria and specifications for individual well remedies at prioritized locations for which the District has an owner agreement to participate in the program. The specifications will be based on the well repair or replacement and abandonment plans derived from the initial field assessments, which will be reviewed and approved or modified by the Department. The District will use these specifications to request proposals from the pool of qualified drillers to implement the recommended remedy.
5. The District will contract with the selected well driller(s) to execute the remedy specifications, provide an adequate downhole video of the completed work, and ensure the pump and approved measuring tube is installed and operational.
6. The Department will provide guidance to drillers performing the well remedy through the existing Mosier Special Area Well Construction Standards program (OAR 690-200).
7. The Department will review and approve well remedy work before the District pays driller invoices.

E. Project Tracking

The District will submit an updated copy of their prioritized list of identified commingling wells with the status of remedies implemented at high-priority wells with each invoice to the Department.

IV. Groundwater Advisory Committee Feedback

The Groundwater Advisory Committee (GWAC), which advises the Commission on rules for the development and protection of groundwater, was briefed on the draft project to implement SB 5507 during its September 9, 2016 meeting. GWAC unanimously supported the draft project as presented.

V. Conclusion

The Department and U.S. Geological Survey have concluded commingling water wells are contributing to the groundwater level declines in Columbia River Basalt aquifers near Mosier. With a $1 million Grant, the Department is working with the Mosier Watershed Council and the Wasco County Soil and Water Conservation District to assess and facilitate the repair or abandonment and replacement of commingling wells in part of the Mosier basin using the guidelines presented above.

Attachments:

Attachment 1 Withdrawal Order
Attachment 2 Map Showing the Mosier Wells Project Area and Features

Ken Lite
503-986-0842

BEFORE THE WATER RESOURCES COMMISSION
OF THE
STATE OF OREGON

IN THE MATTER OF THE WITHDRAWAL FROM FURTHER APPROPRIATION OF UNAPPROPRIATED WATER OF THE POMONA AQUIFER NEAR MOSIER	))))	RULE FOR A WITHDRAWAL ORDER

The Pomona aquifer near Mosier includes all water contained within the Pomona Member of the Columbia River Basalt. The spring water level altitudes in wells open only to this aquifer are approximately 400 feet above mean sea level at present. The spring water level in these wells currently declines approximately 6.9 feet per year, and the water level seasonally fluctuates more than 30 feet. The exterior boundaries of the proposed withdrawal area are mostly unseen geological features. For administrative purposes, precise boundaries have been designated to approximate the irregular natural boundaries. The precise boundaries are all within Wasco County and are described as follows:

> Beginning at the northwest corner of the SW quarter of 2N/11E-12, then south to the southwest corner of the NW quarter of 2N/11E-24, then east to the southeast corner of the NW quarter of 2N/12E-19, then north to the northeast corner of the NW quarter of 2N/12E-19, then east to the northeast corner of 2N/12E-19, then north to he southwest corner of the NW quarter of the NW quarter of 2N/12E-17, then east to the southeast corner of the NW quarter of the NW quarter of 2N/12E-17, then north to the northeast corner of the NW quarter of the NW quarter of 2N/12E-17, then east to the northeast corner of 2N/12E-17, then north to the southeast corner of the NE quarter of the NE quarter of 2N/12E-8, then west to the southwest corner of the NE quarter of the NE quarter of 2N/12E-8, then north to the northwest corner of the NE quarter of the NE quarter of 2N/12E-8, then west to the northwest corner of the NE quarter of 2N/12E-8, then north to the northeast corner of the SE quarter of the SW quarter of 2N/12E-5, then west to the northeast corner of the SW quarter of the SW quarter of 2N/12E-6, then south to the northeast corner of the SE quarter of the SW quarter of the SW quarter of 2N/12E-6, then west to the northwest corner of the SE quarter of the SW quarter of the SE quarter of 2N/11E-1, then south to the southwest corner of the SE quarter of the SW quarter of the SE quarter of 2N/11E-1, then west to the northwest corner of the NE quarter of 2N/11E-12, then south to the southeast corner of the NE quarter of the NW quarter of 2N/11E-12, then west to the southwest corner of the NE quarter of the NW quarter of 2N/11-12, then south to the southeast corner of the SW quarter of the NW quarter of 2N/11E-12, then west to the northwest corner of the SW quarter of 2N/11E-12 to close the boundary.

FINDINGS

1. The Pomona aquifer near Mosier is a primary source of ground water in that area.

2. Irrigation is the primary use of the Pomona aquifer.

3. Water levels in observation wells are currently declining approximately 6.9 feet per year.

4. The water level in a state observation well declined approximately 2.0 feet per year from 1963 and 1971 and approximately 6.5 feet per year from 1976 to 1986.

5. Estimated total annual discharge from the Pomona aquifer is 676 acre-feet.

6. Estimated total annual recharge to the Pomona aquifer is 560 acre-feet.

7. At least 28 percent of total recharge to the Pomona aquifer comes from the Priest Rapids aquifer through interconnecting wells.

8. Pumping water levels in the aquifer may intercept and begin draining the aquifer within five years.

9. In view of the current land use plan within the proposed withdrawal area, some new exempt water uses (ORS 537.545) could be allowed.

10. The proposed withdrawal is consistent with the purposes and standards as provided in Sections 3 and 6(d) of the Columbia River Gorge National Scenic Area Act, P.L. 99-663, and the interim guidelines or the scenic area managaement plan.

CONCLUSION

The Pomona aquifer is currently being overdrafted. The issuance of additional ground water rights would increase the overdraft of the Pomona aquifer. Withdrawal of the Pomona aquifer from further appropriation near Mosier is necessary to meet the statutory water resources policies to:

a. Protect existing rights to appropriate ground water;
b. Limit beneficial use to the capacity of available sources;
c. Assure adequate and safe supplies of ground water for human consumption;
d. Prevent overdrawing of ground water supplies while conserving maximum supplies of ground water for agricultural, commercial, industrial, recreational and other beneficial uses.

RULE

1. Except for uses listed in (2) of this rule, the unappropriated waters of the Pomona aquifer near Mosier are withdrawn from further appropriation.

2. Future appropriation of waters of the Pomona aquifer near Mosier for the following uses is not subject to this withdrawal:

a. Stockwatering purposes;
b. Watering any lawn or non-commercial garden not exceeding one-half acre in area;
c. Single or group domestic purpose not exceeding 15,000 gallons a day;
d. Down-hole heat exchange purposes; or
e. Industrial or commercial purposes not exceeding 5,000 gallons a day.

3. This withdrawal shall be in effect until this rule is modified or revoked by the Commission.

4. This withdrawal applies to all ground water permit applications pending as of May 13, 1988.

WATER RESOURCES COMMISSION

William H. Young

WILLIAM H. YOUNG, DIRECTOR
WATER RESOURCES DEPARTMENT

3640E

BEFORE THE WATER RESOURCES COMMISSION
OF THE
STATE OF OREGON

IN THE MATTER OF THE WITHDRAWAL FROM FURTHER APPROPRIATION OF UNAPPROPRIATED WATER OF THE PRIEST RAPIDS AQUIFER NEAR MOSIER	))))	RULE FOR A WITHDRAWAL ORDER

The Priest Rapids aquifer near Mosier includes all water contained within the Priest Rapids Member of the Columbia River Basalt and the overlying sedimentary interbed. Spring water level altitudes in wells open only to this aquifer are approximately 400 feet above mean sea level at present. The spring water level in these wells currently declines approximately 3.3 feet per year, and the water level seasonally flucuates more than 10 feet. The external boundaries of the proposed withdrawal area are mostly unseen geological features. For administrative purposes, precise boundaries have been designated to approximate the irregular natural boundaries. The precise boundaries are all within Wasco County and are described as follows:

Beginning at the northwest corner of the SW quarter of 2N/11E-12, then south to the southwest corner of the NW quarter of 2N/11E-24, then east to the southeast corner of the NW quarter of 2N/12E-19, then north to the northeast corner of the NW quarter of 2N/12E-19, then east to the northeast corner of 2N/12E-19, then north to he southwest corner of the NW quarter of the NW quarter of 2N/12E-17, then east to the southeast corner of the NW quarter of the NW quarter of 2N/12E-17, then north to the northeast corner of the NW quarter of the NW quarter of 2N/12E-17, then east to the northeast corner of 2N/12E-17, then north to the southeast corner of the NE quarter of the NE quarter of 2N/12E-8, then west to the southwest corner of the NE quarter of the NE quarter of 2N/12E-8, then north to the northwest corner of the NE quarter of the NE quarter of 2N/12E-8, then west to the northwest corner of the NE quarter of 2N/12E-8, then north to the northeast corner of the SE quarter of the SW quarter of 2N/12E-5, then west to the northeast corner of the SW quarter of the SW quarter of 2N/12E-6, then south to the northeast corner of the SE quarter of the SW quarter of the SW quarter of 2N/12E-6, then west to the northwest corner of the SE quarter of the SW quarter of the SE quarter of 2N/11E-1, then south to the southwest corner of the SE quarter of the SW quarter of the SE quarter of 2N/11E-1, then west to the northwest corner of the NE quarter of 2N/11E-12, then south to the southeast corner of the NE quarter of the NW quarter of 2N/11E-12, then west to the southwest corner of the NE quarter of the NW quarter of 2N/11-12, then south to the southeast corner of the SW quarter of the NW quarter of 2N/11E-12, then west to the northwest corner of the SW quarter of 2N/11E-12 to close the boundary.

FINDINGS

1. The Priest Rapids aquifer near Mosier is a primary source of ground water in that area.

2. Irrigation and municipal supplies are the primary uses of the Priest Rapids aquifer.

3. Water levels in observation wells are currently declining approximately 3.3 feet per year.

4. The water level in a state observation well declined approximately 3.3 feet per year from 1974 to 1986.

5. Estimated total annual discharge from the Priest Rapids aquifer is 623 acre-feet.

6. Estimated total annual recharge to the Priest Rapids aquifer is 548 acre-feet.

7. Approximately 153 acre-feet is lost annually to other aquifers through interconnecting wells.

8. Reconstructing wells interconnecting the Priest Rapids aquifer with other aquifers may arrest the decline and save enough water for current users and Pomona aquifer appropriators who decide to deepen their wells.

9. In view of the current land use plan within the proposed withdrawal area, some new exempt water uses (ORS 537.545) could be allowed.

10. The proposed withdrawal is consistent with the purposes and standards as provided in Sections 3 and 6(d) of the Columbia River Gorge National Scenic Area Act, P.L. 99-663, and the interim guidelines or the scenic area managaement plan.

CONCLUSION

Recharge to the Priest Rapids aquifer may be sufficient to support current users and current Pomona appropriators who deepen into the Priest Rapids aquifer after necessary well reconstruction is accomplished. The issuance of additional ground water rights would allow expanded pumpage and possible overdraft of the Priest Rapids aquifer. Withdrawal of the Priest Rapids aquifer from further appropriation near Mosier is necessary to meet the statutory water resource policies to:

a. Protect existing rights to appropriate ground water;
b. Limit beneficial use to the capacity of available sources;
c. Assure adequate and safe supplies of ground water for human consumption;
d. Prevent overdrawing of ground water supplies while conserving maximum supplies of ground water for agricultural, commercial, industrial, recreational and other beneficial uses.

RULE

1. The unappropriated waters of the Priest Rapids aquifer near Mosier are withdrawn from further appropriation except as specified in sections (2) and (3) of this rule.

2. Future appropriation of waters of the Priest Rapids aquifer near Mosier for the following uses is not subject to this withdrawal:

   a. Stockwatering purposes;
   b. Watering any lawn or non-commercial garden not exceeding one-half acre in area;
   c. All pending ground water permit applications received by the close of business on May 13, 1988;
   d. Single or group domestic purposes not exceeding 15,000 gallons a day;
   e. Down-hole heat exchange purposes;
   f. Industrial or commercial purposes not exceeding 5,000 gallons a day;

3. Permit or certificate holders presently identified as appropriating water from the Pomona aquifer are not subject to this withdrawal, if they:

   a. File a primary water right for Priest Rapids aquifer water by May 13, 1990, that does not exceed their current water right for Pomona aquifer water, and

   b. Alter their source of water to the Priest Rapids aquifer, and

   c. Abandon their water right for Pomona aquifer water.

   OR

   a. File a supplemental water right for Priest Rapids aquifer water by May 13, 1990, that does not exceed their current water right for Pomona aquifer water, and

   b. Develop a source of water in the Priest Rapids aquifer, and

   c. Exercise the primary water right for Pomona aquifer water only once every five years.

4. This withdrawal shall be in effect until this rule is modified or revoked by the Commission.

WATER RESOURCES COMMISSION

William H. Young

WILLIAM H. YOUNG, DIRECTOR
WATER RESOURCES DEPARTMENT

3640E

Attachment 2: Map Showing the Mosier Wells Project Area and Features