MEMORANDUM

DATE: May 6, 2008

TO: Jim Stanton, Golden Valley Watermaster

FROM: Cindy Yenter, WD140 Watermaster

CC: Tim Luke, IDWR

RE: Cottonwood Creek Recharge

Mr. Russ Patterson has requested that ground water recharge occurring from Cottonwood Creek be credited as offset to his total allowable ground water withdrawals within Golden Valley Water District 45-O. I have conducted an initial inspection of the measuring devices at the recharge sites. As Watermaster of Water District 140, I will continue to provide general oversight of this project.

Two existing recharge sites, located within the boundaries of WD 45-O, are active and may receive water under the Southwest Irrigation District (SWID) decreed right no. 45-7567 authorizing ground water recharge. Nathan Erickson, ground water protection staff at Southern Region, indicates that the wells at both sites have approved injection permits.

On April 25, 2008, I visited the recharge sites with Jim Stanton. My immediate concern was the adequacy of measuring and recording devices at the surface water diversions to the recharge ponds. Both sites receive water via the West Ditch from Big Cottonwood Creek. Diversions are administered by the Oakley Canal Company. Each recharge site had an existing measurement structure, stilling well and recorder box in place, but the installed devices both need some specific modification or maintenance in order to meet minimum measurement standards. There were no totalizing recorders installed.

Following is a discussion and list of required work on each device:

North Site (near Patterson wells in NENE S06, 13S 21E)

This is a decent measurement location with an existing concrete bulkhead in the ditch just above the recharge pond. There is plenty of downstream drop and sufficient channel armoring for the operation of a sharp crested weir. The new 5-foot weir blade and staff gage are not installed correctly, however, and there is significant maintenance required in the weir pool upstream from the weir. The following list details required modifications and maintenance to the weir and measurement site:

- The weir blade must be installed on the *upstream* side of the 2X4 sill plate, to be made flush with the upstream face of the concrete bulkhead and the steel channel iron on the upstream sides of the opening.
- The staff gage must be moved away from the weir opening, a minimum distance of two times the maximum anticipated head over the weir. If this will not be possible, the staff gage may be mounted on or in the stilling well. Zero on the staff gage must be level with the top edge of the weir crest. I recommend use of an engineer's level to set the staff elevation.
- Dirt and rock must be cleared away from the upstream face of the concrete bulkhead below the weir blade, and away from the sides of the weir opening. The vegetation and willows

growing on the bank and next to the concrete structure must be removed and dirt backfill replaced around the structure as necessary.

- The weir entry pool should be widened slightly, upstream as far as the stilling well.
- The stilling well and recorder box need cleaned out.

North Recharge Site weir – modification diagram

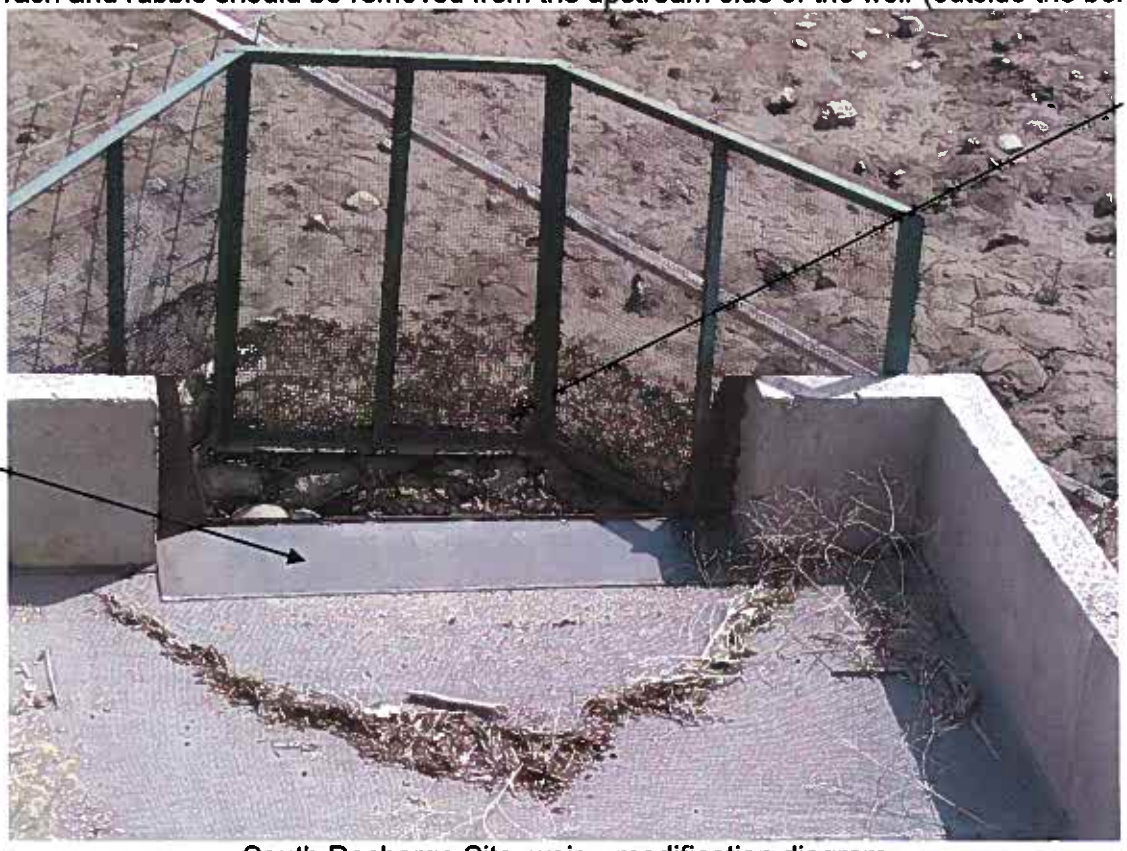
The Oakley Canal Co. watermasters indicated there was also a Parshall Flume on this diversion ditch at the headgate. I did not inspect this device, and I am unsure how far upstream it is. It may be an adequate device for headgate regulation, but cannot be used to satisfy the measuring conditions of the recharge water right because of its distance from the recharge site.

South Site (at Big Cedar Canyon WMA in SESW S08, 13S 21E)

The receiving pond at this site is situated just off the West Ditch, and diversions are made directly into the pond from the ditch headgate. A concrete structure built within the settling pond measures flows over a 4-foot Cippoletti weir and into a catch basin at the head of the pipeline going to the injection well. This weir is close enough to the headgate that, once the pond is full, it may also be used to regulate diversions. This is a good measurement site requiring one modification and some minor cleanup:

- The steel plate which has been welded to the downstream side of the weir blade must be removed. This device was put in place to help hold the trash screen in place, but it does not allow proper free-fall over the weir. James Mullen, Oakley Canal Co, indicated that he would remove the plate and find another way to secure the trash screen. The trash screen must be positioned low enough in the box so that adequate fall is available below the weir.

- The staff gage should be checked for level with the weir crest, and the stilling well and recorder box cleaned out.
- Trash and rubble should be removed from the upstream side of the weir (outside the box).



South Recharge Site weir – modification diagram

Volume Totalizing Requirements for Plan Implementation

Both the North and the South recharge sites will need a totalizing recorder installed in order to meet the conditions of use of the water right, and to provide accurate documentation of volume of flow recharged. My recommendation is the installation of a pressure transducer and electronic data logger in the recording station at each site. Maintenance of the instruments and periodic downloads of data will need to be conducted by some qualified party, which may or may not be IDWR or Water District staff. The cost associated with data collection should ultimately be borne by the water user or users who benefit from any accrued recharge credits.

Because water is available now and in priority, recharge should commence or continue this season. Watermaster records from Oakley Canal Company may be submitted for 2008 recharge diversion records, provided that:

- All required weir maintenance and repair at both sites is completed by May 12, 2008.
- Recharge measurements at the north (Patterson) site are taken over the 5-foot weir above the pond.
- Watermaster records or other data submitted include a daily record of ***both*** head measurement and flow, clear documentation of turn-on and turn-off dates, and have measurement units identified.
- Head measurement devices and data loggers must be installed at both sites prior to any recharge in 2009, and the party responsible for data collection be identified.

Recharge Credit Accrual

A documented positive change in measured ground water levels, or other hard data supporting the increase in available ground water *at the target points of diversion*, will be necessary following recharge before any additional diversion volume will be authorized. Mr. Patterson should also be advised that recharged flows might not be available or credited on a volume-for-volume basis; in other words, 500 acre-feet of recharge might not authorize a full 500 acre-feet of additional ground water diversions. IDWR will refer to past USGS reports and/or available ground water modeling prior to calculating recharge credits. Mr. Patterson should not expect that any diversion credits will be awarded until 2009 or later.

Water right 45-7567 for ground water recharge is currently in the name of SWID. I presume that Mr. Patterson has an arrangement with SWID for his use of this right. To avoid any questions which may arise in the future regarding the application of recharge credits pursuant to the above right, Mr. Patterson must submit a written statement from SWID which confirms Mr. Patterson's exclusive use of the right, and any other conditions which might limit his specific use of any recharge credits accrued. Mr. Patterson should submit this documentation no later than November 1, 2008.

Ground Water Level Monitoring in WD 45-O

The WD 45-O Watermaster monitors ground water levels in several wells, including two wells close to the Patterson wells, on a monthly basis during the irrigation season (March – Nov). Water levels are monitored continuously during the same period at a well near the Tugaw ranch, but the mechanical level recorder must be removed in the winter months due to freeze up. There is, consequently, a fairly comprehensive historical record with which to compare recharge response, and although the record is limited to the irrigation season Mr. Stanton feels that he is measuring both the high and low ground water levels. Inclusion of non-irrigation season measurements would add some resolution to the data already available, and I would recommend that WD 45-O add at least one winter (Dec – Feb) water level measurement to future data, as weather conditions permit.

Upgrades to monitoring equipment might be considered so that continuous year-round monitoring of water levels might occur on at least two wells in Golden Valley, one near Tugaw and one near Patterson. This would provide a broader record of ground water level activity in the area which could then be supplemented with manual monthly measurements of other wells. A project of this nature has the potential to benefit all members of WD 45-O. I am uncommitted at this time who should be obligated to pay for these upgrades.

Suggestions for additional ground water level monitoring within Water District 45-O are not binding and are not required at this time for the implementation of Mr. Patterson's recharge plan. However, I recommend that this concept at least be discussed with the water users.