

From: Brian Barels, Nebraska Public Power District
To: Gordon Fassett, Nebraska Department of Natural Resources
Re: Recharge Analysis for Temporary Appropriations A-19385 and A-19386
Date: February 20, 2017

Background

On August 28, 2015, the Nebraska Department of Natural Resources approved applications A-19385, Gothenburg Canal, and A-19386, Dawson County Canal, for recharge activities. These temporary appropriations expired one year from the order date. One condition included in each of the water appropriations was:

13. Within six months after the final date of diversion under this temporary permit, the appropriator shall file a map that depicts where the water was routed, and will provide in-depth quantitative analysis to the Department of the recharge achieved by utilizing the Gothenburg/Dawson County Canal, including all data provided for any contractual arrangements between NPPD, the Department or other persons.

With this technical memorandum, the Nebraska Public Power District (NPPD) fulfills the requirement.

Fall 2015 operations

Gothenburg Canal

The Gothenburg Canal ceased operating for irrigation needs on September 10th, 2015 and on September 11, 2015 began providing water to the B-1 reservoir and recharging groundwater using laterals 20 and 20F (see A-19385 Map). On September 14th, deliveries to the B-1 reservoir ended and the canal system continued operating solely for groundwater recharge until October 1st, when Daily Minimum Discharges were no longer being met at the Grand Island gage. From September 11th to September 30th, NPPD recorded diversions into the canal and laterals and made estimates of spills from the canal system.

From September 11-13, the daily deliveries into laterals 20 and 20F were estimated to be 26 acre-feet total. The daily estimated spills out the end of those laterals were estimated to be 8 acre-feet total. Subtracting the difference between the estimated deliveries (26 acre-feet) and estimated spills (8 acre-feet) produces the estimated recharge for September 11-13 of 18 acre-feet.

From September 14-30, the daily diversions into the Gothenburg Canal and laterals 20 and 20F were measured at the headgate and the spills from canal system were estimated. The difference between the daily diversions (1,583 acre-feet) and the estimated spills (76 acre-feet) produces the estimated recharge for September 14-30 of 1,507 acre-feet. The portions of canal which recharging groundwater during this period can be found on the A-19385 Map.

Dawson County Canal

The Dawson County Canal ceased operating for irrigation needs on September 10th, 2015 and on September 11, 2015 began to recharge groundwater. The canal system continued operating solely for groundwater recharge up until October 1st, when Daily Minimum Discharges were no longer being met at the Grand Island gage.

The Dawson County Canal gradually ceased recharge operations in some of the lateral systems during the period of operations (see A-19386 Map). The following summarizes the lateral systems periods of operation for groundwater recharge:

- Main canal, Laterals #2 and Wallace – Operated September 11-30
- Laterals #1, M, and B – Operated September 11-26
- Berquist Lateral – Operated September 11-24
- Pedersen Lateral – Operated September 11-17

From September 11th to September 30th, NPPD recorded diversions into the canal and made estimates of spills from the canal system. During that period, the Dawson County Canal diverted a total of 3,304 acre-feet of water and spilled a total of 501 acre-feet. The difference equals 2,845 acre-feet of recharge. The following summarizes the estimated recharge for the above noted periods:

- September 11-17, 1,331 acre-feet diverted, 273 acre-feet spilled, 1,101 acre-feet recharged
- September 18-24, 924 acre-feet diverted, 82 acre-feet spilled, 842 acre-feet recharged
- September 25-26, 351 acre-feet diverted, 48 acre-feet spilled, 303 acre-feet recharged
- September 27-30, 697 acre-feet diverted, 98 acre-feet spilled, 599 acre-feet recharged

Spring 2016 operations

Gothenburg Canal

The Gothenburg Canal did not operate for groundwater recharge in the spring of 2016.

Dawson County Canal

The Dawson County Canal provided groundwater recharge during the periods of April 6-13 and April 18-24. On April 6, NPPD began diversions for groundwater recharge into the Dawson County Canal. At that time, the Daily Minimum Discharge at Grand Island was being met according to data available. On or about April 13th, it is NPPD's understanding that the Grand Island gage data was retroactively reset based on an updated field measurement, and the daily data showed that Daily Minimum Discharge targets were not met from April 1st through April 13th. Therefore, on April 13th, NPPD stopped all diversions into the Dawson County Canal. On April 18th, the Grand Island flows once again began to

meet the Daily Minimum Discharge targets and NPPD restarted diversions for groundwater recharge. On April 24th, NPPD concluded its diversion for groundwater recharge on the Dawson County Canal and began operating for irrigation the following day. In total, the Dawson County Canal operated a total of 15 days for groundwater recharge. During these periods, only the Main Canal was used for recharge operation.

From April 6th to April 13th and April 18th to April 24th, NPPD recorded diversions into the canal and made estimates of spills from the canal system. During that period, the Dawson County Canal diverted a total of 1,397 acre-feet of water and spilled a total of 88 acre-feet. The difference equals 1,309 acre-feet of recharge. The following summarizes the estimated recharge for the above noted periods:

- April 6-13, 949 acre-feet diverted, 86 acre-feet spilled, 863 acre-feet recharged
- April 18-24, 448 acre-feet diverted, 2 acre-feet spilled, 446 acre-feet recharged