September 21, 2004

To: Tina Kurtz

From: Don Adelman

Subject: Preparation of Hydrographs of Stream Gages in the Upper and Lower Republican NRD

The hydrographs were broken down into four groups with each group being its own separate MS-Excel file. Within each file was a separate spreadsheet for each gage. The spreadsheet had data downloaded into it from three different possible websites. Finally, the spreadsheet includes the hydrograph generated from the data. One group of data and, therefore, file was the stream gage data for thirteen gages operated by USGS in either Nebraska or Kansas. Hydrographs #1 through 13 were computed by converting the annual average stream flow from the first full year the gage was operated up through 2002 by multiplying the average which was in cubic feet per second by either 366 days for a leap year or by 365 days if it was for a non leap year. The average was now in a volume term referred to as cfs-days. One cfs-day is equivalent to 1.984 acre-feet per day. By multiplying the annual cfs-days by 1.984 gives results in acre-feet per year which were the units the hydrograph was to be in. The recent daily data on the USGS web site for Kansas and Nebraska was downloaded for the above thirteen gages and used to compute the annual flow for the gages for 2003. Therefore, review of the hydrographs generated reveals they go through calendar year 2003.

Another file of stream gage data were for the seven gages in the above two NRD's taken over by DNR when USGS relinquished operation of them in the early to middle 1990's. This data was divided into two parts. The data collected by USGS is resident on the DNR website and has already been converted into acre-feet per month. The data was summed to an annual value. The later DNR data on our site is also in acre-feet per month and was summed to an annual value. The data was merged for each gage and again is on a separate spreadsheet and includes a hydrograph. The data for Hydrographs #14 through 20 runs through 2002 and could not be updated to 2003 because DNR doesn't have recent daily data in a format that's as accessible as USGS has. The available DNR data covered only part of 2003 ending September 30.

The third file was for 10 DNR gages of canal diversion data that was downloaded from our website and again each gage was assigned to a separate spreadsheet in the file. The data was in units of acre-feet by month, was summed by year and hydrographs were generated from the data. Hydrographs #21 through 30 run through 2003. Although the data only went through September, 2003, it was assumed the bulk of the irrigation water diverted by the canals has ceased by September 30, so the 2003 data was used in the hydrographs.

The fourth file was for 2 reservoirs, Harlan County and Enders. The date selected for the storage content of the reservoirs was May 31. Plots # 31 and 32 are for Enders and Harlan County Reservoirs, respectively. Daily data for both reservoirs was

downloaded from the DNR website and the May 31 reservoir volumes were extracted from this data. The two plots run through 2004. Data from the U.S. Bureau of Reclamation website made it possible to get information up through 2004. The storage content is in acre-feet.

A total of 32 plots were generated for 32 different locations. An additional gaging station, Sappa Creek near Beaver City, was not plotted as the data for it was not available. I think this gage has been discontinued. One of the USGS gages in Kansas that were included in the first group of files discussed is a relatively new gage on Sappa Creek that may be operated in place of the Beaver City gage.