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Nine Water Resources-Related Maps and GIS Coverages for Modeling the Wet Walnut Creek Basin

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**List of maps**

This report consists of nine 1:250,000-scale ARC-INFO GIS maps, produced as ARCVIEW projects to assist in the modeling of water resources of the Walnut Creek basin, Kansas.

1. A GIS coverage and map of the Wet Walnut Creek basin identifying the watershed control structures and subbasins (see map 1 titled "Subbasins in Wet Walnut Creek Basin"). 78 subbasins identified by NRCS are indicated on the map, and their areas specified using GIS tools. Subbasins numbered 54 or greater do not have a water control structure. The map also displays the combined alluvial and terrace deposits, thus outlining the Wet Walnut Creek Valley aquifer to be simulated; the map also displays a reference model grid consisting of 0.5 mile × 0.5 mile grid cells.

2. An initial condition consisting of an equilibrium ("predevelopment") water table surface is required for modeling. Because such a surface was not available, we decided to create one based on available pre-1980 Kansas Geological Survey publications, mentioned in section II (see map 2 titled "Composite Predevelopment Water Table Map for Wet Walnut Creek Valley"). Thus, we combined ground-water level data from Latta (1950) for Barton County, measured mainly during 1944, data from McNellis (1973) for Rush County, measured mainly during 1960, and data from Jenkins and Pabst (1977) for Ness County, measured mainly during 1974, to create a GIS coverage and map of a composite, quasi-equilibrium water table of the valley. The measured wells are also indicated on the map.

3. The base of the alluvial aquifer is also required for modeling. An existing KGS bedrock map compiled by a former colleague (Thomas McAllen, personal communication, 1997) was digitized and extended by adding additional bedrock values for the western portion of the study area (based on driller's logs and other

data available at KGS). Thus a bedrock coverage and map was created (see map 3 titled "Bedrock Map for Wet Walnut Creek Valley").

4. Land surface elevations are also required for this study. A digital line graph (DLG) coverage of land surface elevations for the study area at a scale of 1:100,000 was extracted from the Kansas Data Access and Support Center (DASC) database, and a surface contour elevation map of the Walnut Creek basin was produced. This map is not included in this set.

Modeling however requires discrete values of input data. Thus, the contour maps outlined under items 2 to 4 above were discretized to 0.5 mile × 0.5 mile cells, and cell-center values were obtained using a series of ARC-INFO GIS commands, such as CREATE TIN, GENERATE Fishnet, and TINSPOT (to perform bilinear interpolation).

5. As a result of the above-mentioned discretization procedure, a derivative GIS coverage and map of "predevelopment" aquifer saturated thickness was produced by subtracting the interpolated cell-centered values of the composite "predevelopment" water table from the corresponding bedrock values (see map 4 titled "Predevelopment Saturated Thickness Map for Wet Walnut Creek Valley"). As can be seen from that map, the aquifer saturated thickness generally increases from west to east, with the greatest aquifer saturated thickness values occurring near the downstream end of the valley.

6. An up-to-date (1997) water rights file for the Wet Walnut Creek Valley was requested and obtained from the Division of Water Resources (DWR), Kansas Department of Agriculture (Brownie Wilson, 1998, personal communication). A GIS coverage and map indicating both surface and ground-water rights in the valley has been created from these data (see map 5 titled "Locations of Water Rights in Wet Walnut Creek Valley").

7. An unpublished 1981 water table map for the Wet Walnut valley (Thomas McClain, 1998, personal communication) was digitized, and an ARC-INFO coverage and map was produced (map 6 titled "1981 Water Table Map for Wet Walnut Valley"). By combining this map with the existing bedrock map of the same area (see item 3 above), a "1981 saturated thickness map for Wet Walnut Valley" (map 7) was also produced.

8. Finally, by combining 1996 annual ground-water level data from the KGS data base with measurements of water levels in the area conducted by DWR-Stafford Field Office personnel, a "1996 water table map for Wet Walnut valley" (map 8), and a "1996 saturated thickness map for Wet Walnut valley" map (map 9) were produced using Arc-Info.

## ACKNOWLEDGMENT

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## REFERENCES

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