Documentation of Model Input and Output Values for Simulation of Regional Ground-Water Flow, Carbonate-Rock Province, Nevada, Utah, and Adjacent States

By Donald H. Schaefer

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TABLES

DISKETTE
(In pocket at back of report)

High-density, double-sided, soft-sectored, 5-1/4-inch diskette with text, input and output files, and supporting information

CONVERSION FACTORS

Multiply	By	To obtain
inch (in.)	2.540	centimeter
foot (ft)	0.3048	meter
mile (mi)	1.609	kilometer

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ABSTRACT

Documentation of model input values and sample output used during a conceptual evaluation of the regional ground-water flow in the carbonate-rock province of the Great Basin, Nevada, Utah, and adjacent states, was revised from previously published Open-File Report 91-479. The documentation, consisting of a listing of input values and sample output, is contained on a 5-1/4-inch diskette in files presented in American Standard Code for Information Interchange (ASCII) format. These files require approximately 740,000 bytes of disk space on an IBM-compatible microcomputer using the MS-DOS operating system.

INTRODUCTION

Ground-water flow in an area composed of basin fill and underlain by carbonate rocks in western Utah, eastern Nevada, and small parts of Arizona, California, and Idaho was studied as part of the U.S. Geological Survey's Great Basin Regional Aquifer-System Analysis (RASA; Harrill and others, 1983). A two-layer digital model was developed for the eastern part of the Great Basin, using a computer program written by McDonald and Harbaugh (1988). Results of the modeling effort are given by Prudic and others (1993) in Open-File Report 93-170, which is a revision of Professional Paper 1409-D. The revision was made to correct an inadvertent error discovered in November 1991. The error was a result of a coding transposition of the cell-dimension variables DELR and DELC listed by McDonald and Harbaugh (1988, chap. 5, p. 8). This error created an unintended regional anisotropy. The model was corrected and recalibrated during 1992. This report presents the corrected computer data sets and provides a description of grid location, a listing of model input values, and sample output. Also included is a file containing estimated heads in cells used as control cells during model calibration and several files used to calculate budgets for the regions and subregions discussed by Prudic and others (1993). The budgets were calculated using a computer program developed by Harbaugh (1990). The program was redimensioned to accommodate 41 zones as described by Harbaugh (1990, p. 22).

During recalibration, the southernmost row of model cells was removed from the model because all cells in the row are inactive. Removing this row from the model did not affect results. All data sets contained within the revised report reflect this change.

MODEL GRID

Organization of the model grid was based on a composite of U.S. Geological Survey base maps for Arizona, California, Idaho, Nevada, and Utah. The model grid is oriented northeasterly, parallel to the prevailing trend of fault-block mountains and adjacent valleys in the area (Prudic and others, 1993). The grid network contains 60 columns, 61 rows, and 2 layers. The width of each cell (along a row direction) is 5.0 mi. The length of each cell (along a column direction) is 7.5 mi. Each model layer contains 2,456 active cells. The latitudes and longitudes of the four corners of the grid (beginning at the origin of the grid at the northwestern corner and continuing in a clockwise direction) are as follows.

Corner	North latitude	West longitude
Northwest	42° 7' 30"	117° 2' 45"
Northeast	41° 22' 31"	111° 17' 9"
Southeast	34° 55' 41"	112° 56' 20"
Southwest	35° 36' 51"	118° 13' 28"

INPUT AND OUTPUT FILES

The revised input files and output for the flow model were developed on a Prime computer and transferred to an IBM-compatible microcomputer (operating under MS-DOS version 3.3). Files on the diskette are the same as those on the Prime computer and are presented in American Standard Code for Information Interchange (ASCII) format.

Although the model program can be used on a variety of computers, the input files might have to be reorganized depending on the specific computer and compiler being used. The computer program is written in Fortran 77.

The input files and the sample output are on one high-density, double-sided, soft-sectored diskette with a capacity of 1.2 megabytes. The root directory on the diskette contains one file (README.DOC, which is a copy of the printed text of this report) and two subdirectories (INPUT and OUTPUT). Tables 1 and 2 show the contents of the subdirectories INPUT and OUTPUT and descriptions of the files. Table 3 shows the files containing supporting information. Data contained in the files are in units of feet and seconds, except as noted. Maximum record length of the input files is 80 characters. The record length of the model output is 132 characters.

REFERENCES

Harbaugh, A.W., 1990, A computer program for calculating subregional water budgets using results from the U.S. Geological Survey modular three-dimensional finite-difference ground-water flow model: U.S. Geological Survey Open-File Report 90-392, 46 p.

Harrill, J.R., Welch, A.H., Prudic, D.E., Thomas, J.M., Carman, R.L., Plume, R.W., Gates, J.S., and Mason, J.L., 1983, Aquifer systems in the Great Basin region of Nevada, Utah, and adjacent states--A study plan: U.S. Geological Survey Open-File Report 82-445, 49 p.

McDonald, M.G., and Harbaugh, A.W., 1988, A modular three-dimensional finite-difference ground-water flow model: U.S. Geological Survey Techniques of Water-Resources Investigations, Book 6, Chapter A1, 586 p.

Prudic, D.E., Harrill, J.R., and Burbey, T.J., 1993, Conceptual evaluation of regional ground-water flow in the carbonate-rock province of the Great Basin, Nevada, Utah, and adjacent states: U.S. Geological Survey Open-File Report 93-170, 103 p.

Table 1. Model-input files, Fortran units, sizes, and descriptions

[Note: All data sets have maximum record length of 80 characters]

File	Fortran unit	Size (bytes)	Description
BASIC.DAT	5	739	Basic data input
DRAIN.DAT	20	1,978	Regional spring data
BCF.DAT	15	608	Block-centered-flow data
EVTRATE.DAT	49	12,462	Evapotranspiration rate
EVT.DAT	29	180	Evapotranspiration data
GHB.DAT	50	5,092	General-head-boundary data
SHEAD.TOP	32	17,236	Starting heads, top layer
SHEAD.BOT	33	17,112	Starting heads, bottom layer
TRANS.TOP	35	27,341	Transmissivity, top layer
TRANS.BOT	38	27,342	Transmissivity, bottom layer
IBOUND.TOP	30	12,462	Boundary, top layer
IBOUND.BOT	31	12,462	Boundary, bottom layer
OC.DAT	19	226	Output control data
RECH.DAT	17	25,754	Recharge data
SIP.DAT	18	74	Strongly implicit procedure data
LSELEV.DAT	48	20,274	Land-surface elevation
VCONT.DAT	36	27,342	Vertical hydraulic conductivity and vertical grid spacing
Total		208,684	

Table 2. Sample output file, Fortran unit, size, and description

File	Fortran unit	Size (bytes)	Description
CARB.OUT	6	407,399	Output for steady-state simulation

Table 3. Files containing supporting information, sizes, and descriptions

File	Size (bytes)	Description
HEAD.OBS	38,548	Estimated water-level altitudes in cells used as control points for model calibration
ZONES.DAT	15,763	ZONE file used to calculate regional and subregional water budgets
ZONES.LST	61,228	Output of budget program
ZONES.TXT	2,112	Table listing zone numbers used in budget calculations and corresponding region and subregion names.
Total	117,651	