DOCUMENTATION OF MODEL INPUT AND OUTPUT VALUES FOR THE GEOHYDROLOGY AND GROUND-WATER-FLOW SIMULATION OF THE SURPRISE SPRING BASIN AQUIFER SYSTEM, SAN BERNARDINO COUNTY, CALIFORNIA

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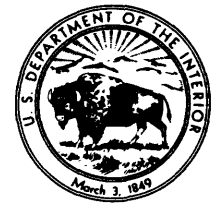

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DOCUMENTATION OF MODEL INPUT AND OUTPUT VALUES FOR THE GEOHYDROLOGY AND GROUND-WATER-FLOW SIMULATION OF THE SURPRISE SPRING BASIN AQUIFER SYSTEM, SAN BERNARDINO COUNTY, CALIFORNIA

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ABSTRACT

Model input and sample output values for the geohydrology and ground-water-flow simulation of the Surprise Spring basin aquifer system, San Bernardino County, California, were not documented in the original report. In this report, the documentation is contained on a 1.2 megabyte, 5 1/4-inch diskette in self-expanding compressed files, which can be decompressed with easy-to-use menus. The decompressed input and output files are presented according to the American International Standard Code for Information Interchange and require approximately 4.1 megabytes of disk space on an IBM-compatible microcomputer using the MS-DOS operating system.

INTRODUCTION

As part of a study of the geohydrology and ground-water flow of the Surprise Spring basin aquifer system, San Bernardino County, California, Londquist and Martin (1991) developed a two-layer mathematical model using the computational algorithm of McDonald and Harbaugh (1988). Although model input is summarized by Londquist and Martin (1991), detailed documentation of the grid location, model input, and sample output is not included. This report, a supplement to the report by Londquist and Martin (1991), provides detailed documentation of the model.

The original input and output for the Surprise Spring model were developed on a Prime computer, transferred to a microcomputer, and compressed so they could be placed on a single diskette. Those compressed files were collected into self-extracting files called libraries. The contents of each library can be extracted by typing the library name and pressing the enter key, thus decompressing the files into the original form according to the American International Standard Code for Information Interchange (ASCII).

This report is in two parts. The first part consists of this introductory text, a listing of input and output files, and an explanation of the decompression program. The compression-decompression program, LHarc, is copyrighted by Haruyasu Yoshizaki. Permission to copy is granted freely, provided that all copies contain the statement, "Copyright by Haruyasu Yoshizaki."

The second part of the report is a diskette that includes a copy of this text, the compressed files, and one subdirectory. The diskette is available for purchase from the U.S. Geological Survey Books and Open-File Reports Section at the address shown on the back of the title page. The high-density, double-sided, soft-sectored diskette has a capacity of 1.2 megabytes. Files on the diskette were created on an IBM compatible microcomputer using MS-DOS version 3.3. The compressed files for the model reside in two of the libraries: INPUT.EXE and OUTPUT.EXE. Table 1 shows contents of the root directory and a description of its contents.

Table 1. Contents of root directory

Item	Description
README.DOC	This report. An ASCII file.
SURPRISE.BAT	Batch file for menu method of decompressing files. An ASCII file.
INPUT.EXE	The self-extracting compressed library of model-input files (table 2). A non-ASCII file.
OUTPUT.EXE	The self-extracting compressed library of model-output files (table 3). A non-ASCII file.
LH113C.EXE	The self-extracting library of file-compression/decompression programs including documentation. The "Compression-Decompression Program" section of this report explains how to decompress this library. A non-ASCII file.
UTIL	Subdirectory containing menu-driven utilities.

MODEL DOCUMENTATION

MODEL GRID

Organization of the finite-difference model grid was based on a mosaic of 1:62,500 scale topographic maps. The origin of the model grid (the westernmost corner of row 1, column 1) is 1,250 feet north and 2,900 feet west of the southeast corner of section 32, township 4 north, range 6 east. The locations of the other three corners of the grid are 950 feet south and 1,200 feet east of the northwest corner of section 20, township 4 north, range 7 east; 500 feet south and 2,200 feet east of the northwest corner of section 32, township 2 north, range 8 east; and 1,650 feet north and 1,800 feet west of the southeast corner of section 8, township 1 north, range 7 east. All locations refer to the San Bernardino base line and meridian of the public land-survey system for California.

INPUT AND OUTPUT FILES

Decompression of the compressed libraries, INPUT.EXE and OUTPUT.EXE (table 1), creates 37 model-input files (table 2), and 5 model-output files (table 3). Units for the input and output files are in combinations of feet and seconds, where applicable. A total of about 4.1 megabytes is required on the hard disk to hold all the decompressed input and output ASCII files. The input files contain records of varying lengths (table 2); the records in output files are 132 characters or less.

The model simulates five pumping conditions: steady state, calibrated transient state, and three predictive transient states. The model program, written in Fortran 77, can be run on a variety of computers. However, the user might need to reorganize the input data, depending on the specific computer and compiler being used, and the computed output might differ slightly from that presented here.

COMPRESSION-DECOMPRESSION PROGRAM

LHarc is the program used to compress the original model input and output files into self-extracting libraries. The LHarc program and documentation may be obtained by copying LH113C.EXE to any directory on either the hard disk or a diskette, typing 'LH113C', and pressing the enter key. There is enough room on the Surprise Spring diskette for the program and documentation, which require 109,534 bytes.

There are two methods to decompress the INPUT.EXE and OUTPUT.EXE files. The "menu method" requires a version of MS-DOS more recent than 2.0, and the "DOS method" is used for versions 2.0 or earlier.

Table 2. Model-input files, Fortran units, maximum record length, number of records, size, and descriptions

[The suffix PAC refers to a package or module of the computational algorithm, DAT to data, and CON to control. Asterisk (*) indicates record length is 80 characters or less]

File	Fortran unit	Maximum record length	Number of records	Size (bytes)	Description
BASICPD.PAC	5	*	76	6,003	Basic package, predictive transient-state simulations.
BASICSS.PAC	5	*	43	3,399	Basic package, steady-state simulations.
BASICTR.PAC	5	*	43	3,396	Basic package, calibrated transient-state simulations.
BCFSS.PAC	20	*	11	869	Block-centered-flow package, steady-state simulations.
BCFTRPD.PAC	20	*	14	1,105	Block-centered-flow package, all transient-state simulations.
ETRATETR.DAT	111	110	138	15,456	Evapotranspiration rate, calibrated transient-state simulations.
ETSTOPTR.DAT	112	110	138	15,456	Evapotranspiration depth, calibrated transient-state simulations.
ETSURFTR.DAT	110	110	138	15,456	Evapotranspiration, land-surface altitude, calibrated transient-state simulations.
ETTR.PAC	109	*	95	3,090	Evapotranspiration package, calibrated transient-state simulations.
GHB.PAC	19	*	156	2,922	General-head-boundary package.
GRID.DAT	11	88	3	232	Grid spacing.
L1BOTALT.DAT	13	*	207	15,594	Layer 1 bottom altitude.
L1BOUND.DAT	7	88	69	6,210	Layer 1 boundary.
L1CON.DAT	12	100	345	31,050	Layer 1 lateral hydraulic conductivity.
L1HDSPD.DAT	9	*	345	24,978	Layer 1 heads, predictive transient-state simulations.
L1HDSSS.DAT	9	*	345	24,978	Layer 1 heads, steady-state simulations.
L1HDSTR.DAT	9	*	345	24,978	Layer 1 heads, calibrated transient-state simulations.
L1SF1.DAT	32	100	345	31,050	Layer 1 primary storage (specific yield).
L2BOTALT.DAT	34	*	207	15,594	Layer 2 bottom altitude.
L2BOUND.DAT	8	88	69	6,210	Layer 2 boundary.
L2CON.DAT	15	100	345	31,050	Layer 2 lateral hydraulic conductivity.
L2HDSPD.DAT	10	*	345	24,978	Layer 2 heads, predictive transient-state simulations.
L2HDSSS.DAT	10	*	345	24,978	Layer 2 heads, steady-state simulations.
L2HDSTR.DAT	10	*	345	24,978	Layer 2 heads, calibrated transient-state simulations.
L2SF1.DAT	33	100	345	31,050	Layer 2 primary storage (confined storage coefficient).

Table 2. Model-input files, Fortran units, maximum record length, number of records, size, and descriptions--*Continued*

File	Fortran unit	Maximum record length	Number of records	Size (bytes)	Description
L2SF2.DAT	35	100	345	31,050	Layer 2 secondary storage (specific yield).
L2TOPALT.DAT	36	*	207	15,594	Layer 2 top altitude.
OUTPUTPD.CON	30	*	451	35,592	Output control, predictive transient-state simulations.
OUTPUTSS.CON	30	*	10	753	Output control, steady-state simulation.
OUTPUTTR.CON	30	*	298	23,505	Output control, calibrated transient-state simulations.
SSOR.PAC	29	*	2	158	Slice-successive-overrelaxation package.
VCONT.DAT	14	120	345	36,502	Variable including vertical hydraulic conductivity and thickness of layers.
WELCONPD.PAC	31	*	119	2,570	Well package, predictive 50-year transient-state simulation using 1985 pumpage.
WELNEWPD.PAC	31	*	327	11,899	Well package, predictive 50-year transient-state simulation using 1985 pumpage plus projected pumpage from 3 wells.
WELOLDPD.PAC	31	*	309	10,400	Well package, predictive 50-year transient-state simulation using projected pumpage added to 1985 pumpage at 1985 well locations.
WELSS.PAC	31	*	32	1,294	Well package, steady-state simulation.
WELTR.PAC	31	*	1140	46,870	Well package, calibrated transient-state simulation.
TOTAL				601,247	

Table 3. Model-output files assigned to Fortran unit 6, number of records, size, and descriptions

File	Number of records	Size (bytes)	Description
STEADY.OUT	3,524	421,025	Steady-state simulation.
PREDCON.OUT	7,805	718,416	Predictive 50-year transient-state simulation using 1985 pumpage.
PREDNEW.OUT	8,066	743,561	Predictive 50-year transient-state simulation using 1985 pumpage plus projected pumpage from 3 wells.
PREDOLD.OUT	8,139	751,358	Predictive 50-year transient-state simulation using projected pumpage added to 1985 pumpage at 1985 well locations.
TRANS.OUT	8,315	816,053	Calibrated transient-state simulation.
TOTAL		3,450,413	

MENU METHOD

To implement the decompression program, place the diskette in drive A:, attach to A:, type 'SURPRISE', and press the enter key. The menu shown in figure 1*A* will appear. When either drive C: or D: is selected, the menu shown in figure 1*B* will appear. By selecting choices from both menus, each group of files may be placed on either or both drives in any convenient combination.

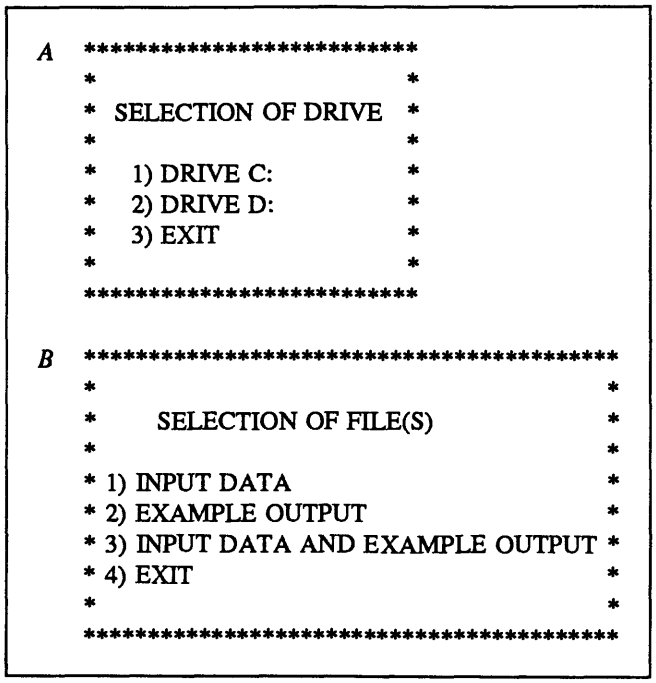

Figure 1. Menus to select drive and files.

Decompressing the self-extracting files will create a SURPRISE directory on the drive(s) and, depending on the option selected, subdirectories INPUT and OUTPUT. These subdirectories will contain the decompressed input and output files totaling 618,432 and 3,450,443 bytes of disk space respectively.

DOS METHOD

Files can be decompressed and placed in any drive having sufficient free space by copying the appropriate filename.EXE to a subdirectory of that drive and then executing by typing the file name. For example, if the input files are to be placed in a subdirectory named MODEL on the D: drive, copy the file INPUT.EXE to D:\MODEL; attach to that directory; type 'INPUT'; and press the enter key. Computer instructions contained within INPUT.EXE will cause the decompression of this file and place decompressed files into D:\MODEL.

SELECTED REFERENCES

Londquist, C.J., and Martin, Peter, 1991, Geohydrology and ground-water-flow simulation of the Surprise Spring basin aquifer system, San Bernardino County, California: U.S. Geological Survey Water-Resources Investigations Report 89-4099, 41 p.

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