

MEMO

State of Idaho

Department of Water Resources

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Date: July 5, 2011
To: ESHMC
From: Allan Wylie *AW*
cc: Sean Vincent, Rick Raymondi
Subject: MKMOD7 input file *.mdl

This memo discusses the format of the *.mdl file, an input file for MKMOD7. MKMOD7 generates a MODFLOW 'well' file based on the *.mdl file and 15 additional input files discussed elsewhere. The *.mdl file tells MKMOD7 the number of stress periods, the number of rows, columns and layers in the model, contains non-irrigated lands parameter estimation multipliers, contains a parameter estimation multiplier for wetlands, informs MKMOD7 of the types of points in the fixed point file (*.fpt), optionally tells MKMOD7 to create additional output files containing summations of selected components of irrigation, and optionally tells MKMOD7 which stress periods to average to build the input for an initial steady state period. The Appendix contains an example of a *.mdl file. The row numbering in the Appendix is added for reader convenience, line numbering should not be included in any functional *.mdl file.

The first two lines are ignored by MKMOD7 and commonly used as comment lines (lines 1 and 2 in the Appendix).

Lines 3 and 4 in the Appendix define the native time and distance units.

MKMOD7 ignores lines beginning with a pound sign, so line 5 is ignored by MKMOD7. This allows the user to insert comments and annotate the input file.

Line 6 contains three integers, the number of stress periods, and the starting and ending stress periods to average to build the initial steady state period. The example file in the Appendix is for a model with 342 stress periods, and stress periods 229 through 240 are averaged to produce a well file array for an initial MODFLOW steady state period.

The section beginning on line 7 contains one line for each stress period identified in line 6. Each line contains the length of the stress period and an optional comment that can be used to describe the stress period. The *.mdl file in the Appendix begins in May, 1980 and ends in October, 2008.

The four lines following the stress periods describe the model grid. This section begins on line 17 in the Appendix and continues through line 20. This section contains one line each for the number of rows, number of columns, number of layers and the layer to which ground water pumping is assigned. The example file is for a model containing 104 rows, 209 columns, one layer and all pumping is assigned to layer 1.

Lines 21 and 22 in the Appendix pertain to non-irrigated recharge. Line 21 informs MKMOD7 of the number (n) of non-irrigated recharge zones, and line 22 contains n+1 scaling factors. In our example line 21 contains an 11, so the first 11 numbers on line 22 are used to adjust non-irrigated recharge. The last number (n+1), the 12th number on line 22 in the Appendix, is the scaling factor used to adjust wetlands net evapotranspiration.

The section beginning on line 23 in the Appendix describes the number of fixed point types and the associated data flags in the fixed point (*.fpt) file. Line 23 in the Appendix contains the number of point types, the following lines (lines 24 through 27 in the Appendix) define the points. Each line contains the character used to identify the points in the *.fpt file, followed by the recharge array to which MKMOD7 assigns the stress. The point identifiers do not need to be single character, but must be consistent with the identifiers in the *.fpt file. The recharge arrays are:

WEL - ground water pumping

SWR - used by MKMOD7 to compute the on-farm water budget for surface water entities

GWR - used by MKMOD7 to compute on-farm water budget for ground water entities

PPT - precipitation and evapotranspiration

CNL - canal seepage

TRB - tributary underflow

Optional text can be added to each line following the recharge array assignment without affecting MKMOD7 operation.

The section beginning on line 28 in the Appendix is used to create optional output files containing summations of the various components of the on-farm water budget for any irrigation entity. The first line, line 28, contains the number of components being summed. Options include:

DIV - Total diversions

SEEP - Canal leakage

RET - Returns

ROF - Runoff

APP - Irrigation Water Applied

ET - Evapotranspiration

CIR - Crop Irrigation Requirement

DEF - Irrigation Deficit

EXS - Irrigation Excess

SM - Soil Moisture

RCH - Recharge
AREA - Acreage
Fsp - Sprinkler Fraction
RATE - Application Rate
EFF - Irrigation Efficiency
OFF - Off-site pumping
FPx - Fixed point types (the character identifiers from the preceding section)

The next line, line 29 in the Appendix, contains the suffix for the file to be created (rfx in the Appendix), the component to be summed, and the entities to be combined. Lines 28 and 29 in the Appendix instruct MKMOD7 to make one additional output file called *.rfx, and it is to consist of the sum of runoff (ROF) from entities IESW009, IESW020, and IESW055.

MKMOD7 posts various types of warnings to the computer screen. One of the warnings it posts concerns the area of land in each model cell. On line 30 of the Appendix the user nominates the threshold for the warnings concerning the area of land in a model cell. MKMOD7 sums the various land use types and assigns the remainder of the cell area to non-irrigated land. Because irrigated land area is calculated using rasters, there can be small errors when totaling the land use types in each model cell. Line 30 in the Appendix tells MKMOD7 to post warnings to the screen only if the calculated area of non-irrigated land is more negative than one negative acre ($-43,560 \text{ ft}^2$).

The last section, line 31 in the Appendix is optional and usually contains explanatory text.

Appendix

- 1) Bev/Cam trib broken into Beaver and Camas and Henry F broken into RtlPine and Henry F. *.mdl file modified to work with
- 2) MKMOD7, updates to the *.off and *.cni files. New *.ent file supplied by IWRRRI on 04Apr2011
- 3) DAYS
- 4) FEET
- 5) # Number of stress periods, first and last used for steady state
- 6) 342 229 240
- 7) 31 05/1980
- 8) 30 06/1980
- 9) 31 07/1980
- 10).
- 11).
- 12).
- 13) 31 07/2008
- 14) 31 08/2008
- 15) 30 09/2008
- 16) 31 10/2008
- 17) 104
- 18) 209
- 19) 1
- 20) 1
- 21) 11
- 22) 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
- 23) 4
- 24) W PPT Wetlands Correction
- 25) U WEL Urban Pumping
- 26) E WEL Exchange Pumping
- 27) M WEL MudLake Pumping
- 28) 1
- 29) rfx ROF IESW009+IESW020+IESW055
- 30) -43560
- 31) E110315A (created by A Wylie IDWR by modifying E110304A)