

## Documentation of Conversion of the MODFLOW Reservoir (RES) Package For MODFLOW-2005

This documentation describes the changes to the Reservoir (RES) Package (Fenske, Leake, and Prudic, 1996) to convert it to work with MODFLOW-2005. See Chapter 9 of Harbaugh (2005) for further information about the MODFLOW-2005 program. The modified code is designated version 7, and this code has the same functionality as version 1 of this package, which is the version used in MODFLOW-2000.

1. Fortran module GWFRESMODULE was created to store the shared data for the RES Package; GWFRESMODULE incorporates the capability to support Local Grid Refinement. The following table describes the data.

Variable Name	Size	Description
NRES	Scalar	The number of reservoirs
IRESCB	Scalar	The file unit for saving reservoir budget data
NRESOP	Scalar	Reservoir option flag: 1 – reservoirs are entirely in layer 1 2 – reservoir layers are specified in IRESL 3 – reservoirs are connected to the highest active cell in the vertical column of cells at each horizontal reservoir location
IRESPT	Scalar	Print flag: print reservoir stage area, and volume if >0 – otherwise, no printing
NPTS	Scalar	Number of lines in tables of volume and area
IRES	NCOL,NROW	Reservoir number for each horizontal cell (0 indicates not part of a reservoir)
IRESL	NCOL,NROW	Layer numbers of cells connected to reservoirs
BRES	NCOL,NROW	Land-surface elevation of reservoirs
CRES	NCOL,NROW	Hydraulic conductance of reservoirs
BBRES	NCOL,NROW	Elevation of base of reservoir-bed sediments
HRES	NRES	Stage in reservoirs
HRESSE	2,NRES	Starting and ending stages for reservoirs in a stress period

2. All subroutines were changed to designate 2 for the process version and 7 for the package version: GWF2RES7.

3. The code in subroutines GWF2RES7ALP and GWF2RES7RPS was divided among subroutines GWF2RES7AR and GWF2RES7RP. GWF2RES7AR allocates memory and reads the data that are constant throughout a simulation. GWF2RES7RP, which is quite short, reads the reservoir stage each stress period.

4. GWF2RES7AR was modified to use ALLOCATE statements to reserve memory for the data in GWFRESMODULE rather than reserving space in the RX and IR arrays used by MODFLOW-2000.

5. Subroutine arguments that are contained in Fortran modules were replaced with USE statements in all subroutines.

6. Subroutine GWF2RES7DA was created to deallocate memory.

7. To support the Local Grid Refinement capability, subroutine SGWF2RES7PNT was created to set pointers to a grid, and subroutine SGWF2RES7PSV was created to save the pointers for a grid. The grid number, IGRID, was added as a subroutine argument to all of the primary subroutines, and subroutines SGWF2RES7PSV and SGWF2RES7PNT are called as appropriate.

## **Input Instructions for RES7**

Input for version 7 of RES is read from the file that has file type "RES" in the MODFLOW name file. The input is the same as for version 1.

## **REFERENCES**

- Harbaugh, A.W., 2005, MODFLOW-2005, the U.S. Geological Survey modular ground-water model—the Ground-Water Flow Process: U.S. Geological Survey Techniques and Methods 6-A16, variously p.
- Fenske, J.P., Leake, S.A., and Prudic, D.E., 1996, Documentation of a computer program (RES1) to simulate leakage from reservoirs using the modular finite-difference ground-water flow model (MODFLOW): U.S. Geological Survey Open-File Report 96-364, 51 p.