Notes on IWFM Version 3.02

(Emin Can Dogrul; DWR)

This version of IWFM includes the following modifications and corrections:

1. **(08/30/2010)** All IWFM executables are linked to the latest version of the IWFM_Util library. This means that previously build applications that use year 3000 flag will need to be modified to use year 4000 flag.
2. **(08/30/2010)** All source code and input file templates are now under version control. This required the inclusion of VersionF.f90 file and minor changes to Openning_screen.f90 file. Other files that use version number are also modified accordingly.
3. **(08/30/2010)** Generalized preconditioned conjugate method is included as an alternative solver to SOR method.
4. **(09/01/2010)** Two types of subsidence output were implemented. One at user-defined nodes or x-y coordinates, and second as Tecplot format. This required modifications to 2 input files (main input file and print control file) as well as several source code files.
5. **(09/13/2010)** A new feature is added to print-out IWFM version as well as the versions of IWFM components (currently only IWFM_Util.lib) to the screen. This is done when an IWFM executable is run with the "-about" flag. In this case, IWFM prints out the versions of IWFM and its components and stops**.**
6. **(09/13/2010)** A water balancing error occurred when one or more lakes were touching each other. This is corrected.

7. **(09/15/2010)** When specified head boundary conditions were given as time series data, large values of mass balance discrepancy were listed in the groundwater budget tables. This is fixed.
8. **(09/15/2010)** The work space for the LU factorization procedure (ILUT) in the PGMRES solver was doubled. This was done because Walla Walla Basin model which is quite large was causing the ILUT procedure to run out of work space.
9. **(09/15/2010)** To speed up the run time, a new variable (ElemToPump) was created to link elements to well and element pumping data. This variable helps to avoid array searches in NFLOW procedure that significantly speeds up the run-times.
10. **(09/16/2010)** To speed up the run time further, a new variable (ElemToRecvLoss) was created to link each element to recoverable loss information from diversions and bypasses. This variable helps to avoid array searches in NFLOW procedure.
11. **(09/23/2010)** FPE_CHECK file is modified to use the features from new Fortran 2003 standard in order to increase portability.
12. **(10/06/2010)** The size of the Newton-Raphson step is limited such that its size at a given iteration is less than its size in the previous iteration. This seems to help with convergence in certain cases.
13. **(03/10/2011)** The derivatives of the transmissivity are now included in the computation of the Jacobian for the groundwater equation. This should improve the stability of the code when the aquifer nodes start drying.
14. **(03/17/2011)** Tile drain nodes are no longer represented by adding -10000 to the groundwater node in file Unit 17 to avoid problems when an application has more than

10000 nodes in a single aquifer layer. Now tile drain nodes are represented with a negative node number and subsurface irrigation nodes are represented with a positive node number.

15. **(04/12/2011)** When time-series specified head boundary conditions were used along with supply adjustment, the specified head values at the boundary nodes were incorrectly set to the values from the previous time step. This was corrected.
16. **(04/13/2011)** Methods to compute adaptive convergence criteria for matrix inversion and damping of the solution vector (difference vector) that are developed by UC Davis are implemented.