SCIENTIFIC NOTE BOOK # 728E

Summary of Groundwater Flow and Solute Transport Model Simulations within the Yucca Mountain Region

by

Veronica Brieno Rankin

Southwest Research Institute
Center for Nuclear Waste Regulatory Analyses
San Antonio, Texas

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1. INITIAL ENTRIES

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By agreement with the CNWRA QA, this notebook is to be printed at approximate quarterly intervals. This computerized Scientific Notebook is intended to address the criteria of CNWRA QAP-001.

[Veronica Brieno Rankin, August 24, 2005]

1.1. Objectives

Groundwater flow and contaminant transport of radionuclides are a function of the type of material present in the subsurface environment. In particular, hydraulic conductivity, porosity, and dispersivity can vary with material composition. The purpose of this investigation is to utilize GMS 5.1 computer software to employ MODFLOW and MT3D models to project groundwater flow and estimate the lateral extent and vertical depth of radionuclide migration under particular hydrogeologic conditions. By modifying hydraulic conductivity, porosity, longitudinal dispersivity, the ratio of transverse dispersivity to longitudinal dispersivity, and ratio of vertical dispersivity to longitudinal dispersivity, a greater understanding of the geologic setting and its role in the transport behavior of radionuclides.

1.2. Computers, Computer Codes, and Data Files

The computer software used in this analysis is GMS 5.1, more formally known as Groundwater Modeling System, created by Environmental Modeling Systems, Inc. (EMS-I). The computer models employed in this investigation are facilitated via GMS 5.1. They include MODFLOW and MT3DMS. MODFLOW is a 3-D finite difference flow model for saturated zones. MT3DMS is a 3-D solute transport model. An MT3DMS4 application was also employed independent of GMS 5.1, where the model was employed in a DOS window.

2. Introduction

The activities discussed in this scientific notebook relate to the projected groundwater flow and transport of radionuclides within the Yucca Mountain region utilizing MODFLOW and MT3D withing GMS 5.1. A description of these specific activities have been outlined in the File Summaries section, as follows: (1) Coordinate Transformation, (2) MT3D Grid Cell Activation, (3) Grid Refinement, (4) Selected Point Sources, and (5) Other Files Not Discussed.

3. File Summaries

3.1 Coordinate Transformation

Directory: {vrankin\GMS Data\S6b\S6b-Run 1\}

File: {S6C-run1}

File S6b-run1 does not possess a uniform coordinate system. In particular, the well locations, with respective starting heads for each well location, are presented in UTM NAD 27. Alternatively, the grid used in the file is presented in UTM NAD 83 coordinates. Consequently, the well locations do not accurately align with the grid. In attempt to correct this misalignment, this file was created utilizing all coordinate systems in UTM NAD 27. It is noted here that it is unsure whether this misalignment has influenced the projected direction of groundwater flow, as demonstrated in MODFLOW.

Subdirectory: {Trial and Error\}

A series of trial and errors were conducted to identify the influence of permeability in materials "UVA" and "Caldera_VR" on regional groundwater flow. Please refer to file {S6C-run1_Calibration} in directory {vrankin\GMS Data\File Summaries} for a more detailed explanation of the parameters used in the following files:

File: {S6C-run1_trial1}
File: {S6C-run1_trial2}
File: {S6C-run1_trial3}
File: {S6C-run1_trial4}
File: {S6C-run1_trial5}
File: {S6C-run1_trial6}
File: {S6C-run1_trial7}
File: {S6C-run1_trial8}

File: {S6C-run1_trial9}
File: {S6C-run1_trial10}
File: {S6C-run1_trial11}
File: {S6C-run1_trial12}

3.2 MT3D Grid Cell Activation

A primary task was to minimize the run time of the MT3D simulation. It is suggested that this could be achieved by inactivating grid cells and layers that do not display evidence of contaminant impact surrounding the projected plume perimeter. By inactivating grid cells and layers that are not directly affiliated with plume size and/or migration, the run time can be significantly reduced, as these cells and layers will not be included for computer analysis of contaminant transport. This will allow future MT3D simulation runs to be conducted more efficiently, which will enable research utilizing GMS software to progress.

Briefly, since cell activation for MODFLOW and MT3D is exclusive to its own specific coverage, any inactivation that occurs in MT3D will not affect the activation status of the cells defined in the MODFLOW coverage. Additionally, by allowing all grid cells to remain activated in MODFLOW, regional groundwater flow and its respective error summary will remain unaffected by cell inactivation conducted in the MT3D grid. This, in turn, will allow plume characteristics to remain consistent with previous MT3D simulations, where all grid cells were activated, as plume movement over time is governed by parameters outlined in both MODFLOW and MT3D and not by cell activation/inactivation. In scenarios where the plume might migrate into inactive MT3D cells (e.g., when considering dispersivity effects), it will be necessary to reactivate those particular cells so that impact occurring in those cells might be included in future MT3D simulation runs. Note, however, the plume shape and migration is not affected by inactive cells. Inactive cells merely prevent the user from seeing the full shape and location of the plume.

Upon completion of validation and sensitivity analyses of the MT3D model, the user has the option to reactivate the inactive grid cells and layers and run the MT3D simulation at the longer run time to achieve the same results. The primary purpose of this task is merely to reduce run time so that additional simulations possessing different sets of parameters can be conducted in the most time-efficient manner.

The methodology of grid cell and layer inactivation is discussed as follows:

1) Each MT3D grid layer was examined to identify the perimeter dimensions of the plume to be

isolated (i.e., determine particular cells to be inactivated).

2) Selected cells and grid layers that did not possess a impact from the plume were inactivated. This was achieved by changing the ICBUND value from 1 to 0 in the MT3D coverage.

3) Cells and grid layers that needed to be reactivated to consider the full extent of the plume can be done my changing the ICBUND value in MT3D from 0 to 1.

3.3 Grid Refinement

A primary task was to refine a selected portion of the grid that defines the Yucca Mountain area of interest to determine the influence of a smaller grid cell size on regional groundwater flow and containment transport. In the original grid, each cell size was 300m x 300m throughout the entire grid. The refined area would make selected cells in a portion of the grid 100m x 100m. The remainder of this summary will be divided into subsections, where the purpose and result of each file will be discussed, respectively.

Note: For a detailed explanation of the files described below, please refer to sheet "MF and MT3D Files" in MS Excel file {File Descriptions_VB_Rankin_2005.xls} in directory {vrankin\GMS Data\}. Please note that there are three sheets describing the different simulation activities. They will be noted in this discussion, where applicable.

Directory: {vrankin\GMS Data\S6b\ S6b-100m Grid\S6b-100m Grid_Full Plume\}

File: {S6b-100m Grid}

The purpose of this file was to refine the original grid contained in file {S6}, where each cell was 300m x 300m. Selected cells ranging from the north-central to south-central area within the Yucca Mountain area of interest were subdivided into 100m x 100m cells. These cells were included in the refinement because they encompassed the full extent of the plume that was calculated in the MT3D model, as displayed in file {S6-run2-transp}.

File: {S6-100m Grid_MF}

This file builds on {S6b-100m Grid_Full Plume} in that it possesses the the same grid. It also includes the MODFLOW parameters from file {S6-run1}. This file is a 'setup' file prior to running MODFLOW.

Directory: {vrankin\GMS Data\S6b\ S6b-100m Grid\S6b-100\\}

Subdirectory: {S6b-100m_Grid\\}

File: {S6b-100m_Grid}

The purpose of this file was to refine the original grid contained in file {S6}, where each cell in {S6} was 300m x 300m. In {S6b-100m_Grid}, selected cells within the north-central region within the Yucca Mountain area of interest were subdivided into 100m x 100m cells. These cells were included in the refinement because they encompassed all of the point sources included in the MT3D model, as displayed in file {S6-run2-transp}. This is to be the foundational file that is used for future MODFLOW and MT3D simulations that encompass a refined grid going from 300m x 300m to 100m x 100m to 300m x 300m, in a east/west and north/south direction.

Subdirectory: {S6b-100m_MF\\}

Subdirectory: {MF Runs_Error Reduction\\}
The purpose of this subdirectory is to conduct trial simulations to attempt to reduce the error that is summarized by the 'Error Summary.' In each trial, particular parameters were changed. These changes are described. as follows:

File: {S6b_100m_Run1_Trial1}

Changed selected cells that possessed Caldera material I.D.'s to LVA material I.D.'s.

File: {S6b_100m_Run1_Trial2}

Changed selected cells that possessed Caldera material I.D.'s to LVA material I.D.'s.

File: {S6b_100m_Run1_Trial3}

Changed selected cells that possessed Caldera material I.D.'s to LVA material I.D.'s.

File: {S6b_100m_Run1_Trial4}

Changed selected cells that possessed Caldera material I.D.'s to LVA material I.D.'s.

File: {S6b_100m_Run1_Trial5}

Changed selected cells that possessed Caldera material I.D.'s to LVA material I.D.'s.

File: {S6b_100m_Run1_Trial6}

Changed selected cells that possessed Caldera material I.D.'s to LVA material I.D.'s.

File: {S6b_100m_Run1_Trial7}

Changed LVA hydraulic conductivity (K), horizontally and vertically, from 0.5 to 0.55.

File: {S6b_100m_Run1_Trial8}

Changed Caldera_VR hydraulic conductivity (K), horizontally and vertically, from 0.0003 to 0.00035.

File: {S6b_100m_Run1_Trial9}

Changed LVC hydraulic conductivity (K), horizontally and vertically, from 0.0002 to 0.00025.

File: {S6b_100m_Run1_Trial10}

Changed LVA hydraulic conductivity (K), horizontally and vertically, from 0.5 to 0.52.

File: {S6b_100m_Run1_Trial11}

Changed selected cells that possessed Caldera material I.D.'s to LVA material I.D.'s.

File: {S6b_100m_Run1_Trial12}

Changed selected cells that possessed Caldera material I.D.'s to LVA material I.D.'s.

File: {S6b_100m_Run1_Trial13}

Changed Caldera_VR hydraulic conductivity (K), horizontally and vertically, from 0.00035 to 0.0004.

File: {S6b_100m_Run1_Trial14}

Changed LVC hydraulic conductivity (K), horizontally and vertically, from 0.00025 to 0.0003.

File: {S6b_100m_Run1_Trial15}

Changed UVA hydraulic conductivity (K), horizontally and vertically, from 0.5 to 0.52.

File: {S6b_100m_Run1_Trial16}

Changed Alluvium hydraulic conductivity (K), horizontally and vertically, from 3.0 to 3.2.

File: {S6b-100m_MF_Run1}

This file builds on {S6b-100m_Grid}, where MODFLOW parameters used in {S6-run1} were included. This file includes groundwater flow data after the MODFLOW simulation was run.

Subdirectory: {S6b-100m_Transition_Grid\}

The purpose of this subdirectory is to dedicate all files that possess a transitional grid, that is, a grid that refined cells from 300m x 300m to 200m x 200m to 100m x 100m to 200m x 200m to 300m x 300m in a east/west and north/south direction, where 100m x 100m cells reflected potential point sources, as described in {S6-run2-transp}.

Subdirectory: {S6b_100m_Transition_Grid_MF\}

This subdirectory contains files that only deal with MODFLOW simulations. The

MODFLOW parameters in file {S6b-100m_Transition_Grid_MF_Run1} is set up exactly the same as {S6-run1}, in view of the refined transitional grid. The MODFLOW parameters in file {S6b-100m_Transition_Grid_MF_Run2} is set up exactly the same as {S6-run2-transp}, in view of the refined grid.

File: {S6b-100m_Transition_Grid_MF_Run1}

The MODFLOW parameters in this file are the same as the parameters described in {S6-run1}. In particular, there was no change in any of the hydraulic conductivity (K) values assigned to any of the materials. For consistency purposes, the K values for selected material i.d.'s are described here so that a comparison can be made with the original file {S6-run1} to that of the remainder of the trials expressed in subdirectory {MF Runs_Error Reduction}. The purpose of this run is to compare the results with that of {S6-run1}. The results are as follows:

	{S6-run1}	{S6b-100m_Transition_Grid_MF_Run1}
Mean Error	0.230	1.488
Mean Abs. Error	9.098	9.001
Rt. Mean Sq. Error	16.197	16.163
Caldera_VR (K)	0.0003	0.0003
LVC (K)	0.0002	0.0002
Alluvium (K)	3.0	3.0
UVA (K)	0.5	0.5

File: {S6b-100m_Transition_Grid_MF_Run2}

The MODFLOW parameters in this file are the same as the parameters described in {S6-run1}. In particular, there was no change in any of the hydraulic conductivity (K)

values assigned to any of the materials. For consistency purposes, the K values for selected material i.d.'s are described here so that a comparison can be made with the original file {S6-run2-transp} to that of the remainder of the trials expressed in subdirectory {MF Runs_Error Reduction}. The purpose of this run is to compare the results with that of {S6-run2-transp}. The results are as follows:

		S6b_100m_Trans_MF _Run1	S6b_100m_Transition_Grid_ MF_Run2
Mean Error:		1.488	1.488
Mean Abs. Error:		9.001	9.001
Rt Mean Sq. Error:		16.613	16.613
PZ:	n	0.3	0.04
UVA:	K	0.3	0.5
	n	0.3	0.001
UVC:	n	0.3	0.001
LVA:	K	0.5	0.5
	n	0.3	0.001
LVC:	K	0.0003	0.0002
	n	0.3	0.001
CF_flt:	n	0.3	0.01
Alluvium:	K	3.0	3.0
	n	0.3	0.25
FMW_flt:	n	0.3	0.01
BR-PBC:	n	0.3	0.001
SC-IR:	n	0.3	0.01
SC-West:	n	0.3	0.01
VH1:	n	0.3	0.01
BM:	n	0.3	0.01
H95:	n	0.3	0.01
CA_flt:	n	0.3	0.01

Grav1:	n	0.3	0.01
Grav2:	n	0.3	0.01
Caldra_PZ:	n	0.3	0.04
Caldera_VR:	K	0.0004	0.0003
	n	0.3	0.01
AB_Landsurf:	n	0.3	0.25

Subdirectory: {MF Runs_Error Reduction\}

This subdirectory only contains files that attempt to reduce the error, as described in the 'Error Summary.' A set of tables are provided for each respective file that describe the parameters modified from {S6b-100m_Transition_Grid_MF_Run1} and their respective 'Error Summary.' A second set of tables are provided for each respective file that describe the parameters modified from {S6b-100m_Transition_Grid_MF_Run2} and their respective 'Error Summary.'

File: {S6b-100m_Trans_Run1_Trial_1}

		S6b_100m_Trans_Run1_Trial_1
Mean Error:		1.174
Mean Abs. Error:		8.770
Rt Mean Sq. Error:		16.034
Caldera_VR:	K	0.00035
LVC:	K	0.0002

File: {S6b-100m_Trans_Run1_Trial_2}

		S6b_100m_Trans_Run1_Trial_2
Mean Error:		0.952
Mean Abs. Error:		8.676

Rt Mean Sq. Error:		15.771
Caldera VR:	K	0.00035
LVC:	K	0.00025

File: {S6b-100m_Trans_Run1_Trial_3}

File:		S6b_100m_Trans_Run1_Trial_3
Mean Error:		0.709
Mean Abs. Error:		8.512
Rt Mean Sq. Error:		15.512
Caldera VR:	K	0.0004
LVC:	K	0.00025

File: {S6b-100m_Trans_Run1_Trial_4}

File:		S6b_100m_Trans_Run1_Trial_4
Mean Error:		0.587
Mean Abs. Error:		8.611
Rt Mean Sq. Error:		15.535
Caldera VR:	K	0.0004
LVC:	K	0.0003

File: {S6b-100m_Trans_Run1_Trial_5}

File:		S6b_100m_Trans_Run1_Trial_5
Mean Error:		0.741
Mean Abs. Error:		8.556
Rt Mean Sq. Error:		15.583
Caldera_VR:	K	0.00038
LVC:	K	0.00027

File: {S6b-100m_Trans_Run1_Trial_6}

File:		S6b_100m_Trans_Run1_Trial_6
Mean Error:		0.622
Mean Abs. Error:		8.517
Rt Mean Sq. Error:		15.443
Caldera_VR:	K	0.00042
LVC:	K	0.00025

File: {S6b-100m_Trans_Run1_Trial_7}

File:		S6b_100m_Trans_Run1_Trial_7
Mean Error:		0.711
Mean Abs. Error:		8.510
Rt Mean Sq. Error:		15.419

Caldera_VR:	K	0.00042
LVC:	K	0.00025
Alluvium:	K	2.9
UVA:	K	0.5

File: {S6b-100m_Trans_Run1_Trial_8}

File:		S6b_100m_Trans_Run1_Trial_8
Mean Error:		0.202
Mean Abs. Error:		8.830
Rt Mean Sq. Error:		15.660
Caldera_VR:	K	0.0004
LVC:	K	0.0003
Alluvium:	K	3
UVA:	K	0.3

File: {S6b-100m_Trans_Run1_Trial_9}

File:		S6b_100m_Trans_Run1_Trial_9
Mean Error:		0.111
Mean Abs. Error:		8.909
Rt Mean Sq. Error:		15.700
Caldera_VR:	K	0.0004
LVC:	K	0.0003

Alluvium:	K	3
UVA:	K	0.25

File: {S6b-100m_Trans_Run2_Trial_1}

Please note that this file is the same as {S6b_100m_Trans_Run1_Trial8}

File:		S6b_100m_Trans_Run2_Trial1
Mean Error:		0.202
Mean Abs. Error:		8.830
Rt Mean Sq. Error:		15.660
UVA:	K	0.3
LVC:	K	0.0003
Caldera_VR:	K	0.0004

File: {S6b-100m_Trans_Run2_Trial_2}

File:		S6b_100m_Trans_Run2_Trial2
Mean Error:		0.218
Mean Abs. Error:		8.837
Rt Mean Sq. Error:		15.66
UVA:	K	Added Cells from Alluvium

File: {S6b-100m_Trans_Run2_Trial_3}

File:		S6b_100m_Trans_Run2_Trial3
Mean Error:		1.236
Mean Abs. Error:		8.795
Rt Mean Sq. Error:		15.441
Alluvium:	K	2
	n	0.2

File: {S6b-100m_Trans_Run2_Trial_4}

File:		S6b_100m_Trans_Run2_Trial4
Mean Error:		1.486
Mean Abs. Error:		8.732
Rt Mean Sq. Error:		15.461
LVA:	K	0.6
	n	0.003

Subdirectory: {S6b_100m_Transition_Grid_MT3D\}

File: {S6b_100m_Trans_Grid_Run1_MT3D}

This file possesses similar MODFLOW to that of files {S6b_100m_Trans_Run1_Trial8} and {S6b_100m_Trans_Run2_Trial1}. However, the Mean Error in this file is 0.201, as opposed to 0.202 in the latter two. In addition, the MT3D parameters have been allocated.

File: {S6b-100m_Trans_Run3_MT3D_setup}

This file builds on the file {S6b_100m_Transition_Grid_MF_Run2} in that it possesses the same hydraulic conductivities and porosities for the various material i.d.'s. The purpose of this file was to set up the MT3D simulation, based on the MODFLOW run that was employed in {S6b_100m_Transition_Grid_MF_Run2} file.

Subdirectory: {MT3D\}

File: {S6b_100m_Trans_Grid_Run2_MT3D}

This file builds on the MODFLOW file {S6b_100m_Trans_Grid_Run1_MT3D}, where MODFLOW was run a second time under the name {S6b_100m_Trans_Grid_Run2_MT3D}. Please note that no MODFLOW parameters were modified. An MT3D simulation was then conducted.

File: {S6b-100m_Trans_Run3_MT3D}

This file builds on {S6b-100m_Trans_Run3_MT3D_setup}, where the MT3D simulation was run. Ultimately, this simulation automatically ended prior to successful completion. This was probably due to the limited value placed on "Max Trans. Steps," which was assigned the value 500000. Therefore, only an out file exists.

File: {S6b-100m_Trans_Run4_MT3D}

This file was created in attempt to resolve the issues associated with file {S6b-100m_Trans_Run3_MT3D}. The value of the "Max Trans. Steps" was increased from 500000 to 2000000. However, in order to confirm that the assigned value of 2000000 would correct this deficiency, this run time was set to 3650, as opposed to 365000.

File: {S6b-100m_Trans_Run5_MT3D}

Since the MT3D simulation in file {S6b-100m_Trans_Run4_MT3D}

finished successfully, the purpose of this file was to increase the time frame. Therefore the 'time' parameter was modified from 3650 to 365000. Unfortunately, the MT3D simulation prematurely stopped, as there was an error regarding the "Max. # Total Particles Allowed." In particular, the error message indicated that the maximum number of particles was exceeded. The maximum particle value that was allocated to run this model was 500000.

Subdirectory: {Dispersivity Trials\}

File: {S6b_100m_Trans_Run4_MT3D_T1}

File: {S6b-100m_Trans_Run5_MT3D_T2}

This file attempts to isolate the problem with file {S6b-100m_Trans_Run5_MT3D}, as described above. All parameters were kept the same as {S6b-100m_Trans_Run5_MT3D}(including the maximum number of particles), with the exception of 'time.' In this MT3D simulation, 'time' was reduced to 36500. Unfortunately, the MT3D simulation, once again, prematurely stopped, as there was an error regarding the "Max. # Total Particles Allowed." In particular, the error message indicated that the maximum number of particles was exceeded.

File: {S6b-100m_Trans_Run5_MT3D_T3}

This file attempts to isolate the problem with file {S6b-100m_Trans_Run5_MT3D_T2}, as described above. All parameters were kept the same as {S6b-100m_Trans_Run5_MT3D_T2, with the exception of the maximum number of particles. In this MT3D simulation, the maximum number of particles was increased to 2000000. On this occasion, the file finished successfully.

File: {S6b-100m_Trans_Run5_MT3D_T4}

The purpose of this file was to alter the longitudinal dispersivity. This file is derived from file {S6b-100m_Trans_Run5_MT3D_T3}, where longitudinal dispersivity was changed from 100 to 50.

File: {S6b-100m_Trans_Run5_MT3D_T5}

This file is the same as file {S6b-100m_Trans_Run5_MT3D_T3}. The purpose of this simulation was to increase 'time' from 36500 to 365000. This file was intentionally aborted prior to MT3D simulation being 'successfully finished.' Please note that when examining the model results, it appears that the simulation when to completion. At the time of this simulation run, it is unclear to the user (i.e., me) how the internal functions within MT3D are employed. Therefore, it is doubtful that this model accurately depicts a valid outcome.

File: {S6b-100m_Trans_Run5_MT3D_T6}

This file is the same as file {S6b-100m_Trans_Run5_MT3D_T4}. However, the number of point sources were limited to 2 on layers 2 though 6, respectively. One point source is situated on the north end of the proposed repository and the other is situated on the south end for each layer.

File: {S6b-100m_Trans_Run5_MT3D_T7}

This file is the same as file {S6b-100m_Trans_Run5_MT3D_T6}. However, in this simulation, there were only 2 designated point sources: one on layer 2, where it is situated on the north end of the proposed repository and the other on layer 6, where it is situated on the south end of the proposed repository. The rationale for this arrangement is that since each layer represents the top of water table, layer 2 represents.

File: {S6b-100m_Trans_Run5_MT3D_T8}

This file is the same as file {S6b-100m_Trans_Run5_MT3D_T7}. However, in this simulation, the sources was turned off after 70 years. As a reminder, the 'time' parameter was set, thus far, to 36500. There are also 2 stress periods in this file, whereas all the previous simulations possessed only 1 stress period.

Subdirectory: {Inactivated Cells\}

File: {S6b-100m_Trans_Run5_MT3D_T5_Inactive}

The purpose of this file was to determine if inactivating selected cells would alter the outcome of a MT3D simulation, given that it possessed the same parameters as an MT3D simulation that had all cells activated. In particular, this file is the same file as {S6b-100m_Trans_Run5_MT3D_T5}. The only difference between the two is that this file contains selected cells that were inactivated. This file was intentionally aborted prior to MT3D simulation being 'successfully finished.' Please note that when examining the model results, it appears that the simulation when to completion. At the time of this simulation run, it is unclear to the user (i.e., me) how the internal functions within MT3D are employed. Therefore, it is doubtful that this model accurately depicts a valid outcome.

File: {S6b-100m_Trans_Run5_MT3D_T6_Inactive}

This file is the same file as {S6b-100m_Trans_Run5_MT3D_T5_Inactive}, as described above. This file also includes selected layers that were inactivated. The simulation was intentionally aborted prematurely.

File: {S6b-100m_Trans_Run5_MT3D_T8_Inactive}

This file is the same as file {S6b-100m_Trans_Run5_MT3D_T8}. The only difference is that this file has selected cells and layers inactivated. The simulation was intentionally aborted prematurely.

File: {S6b-100m_Trans_Run5_MT3D_T5_Inactive_70yr}

This file is the same as {S6b-100m_Trans_Run5_MT3D_T5}. The only differences are that: (1) selected cells and layers were inactivated and (2) the point sources were turned off after 70 years, thus increasing the stress period from 1 to 2.

File: {S6b_100m_Transition_Grid}

The purpose of this file was to refine the original grid contained in file {S6}, where each cell in {S6} was 300m x 300m. In {S6b-100m_Transition_Grid}, selected cells within the north-central region within the Yucca Mountain area of interest were subdivided into 200m x 200m cells and then to 100m x 100m cells. These cells were included in the refinement because they encompassed all of the point sources included in the MT3D model, as displayed in file {S6-run2-transp}. This is to be the foundational file that is used for future MODFLOW and MT3D simulations that encompass a refined grid that transitions from 300m x 300m to 200m x 200m to 100m x 100m to 200m x 200m to 300m x 300m, in a east/west and north/south direction. It is suggested here that by refining the grid by allowing for a transition in cell size, error will be reduced when running MODFLOW.

3.4 Selected Point Sources

The purpose of this initiative was to examine plume characteristics under certain conditions. A series of MT3D simulations were conducted utilizing various parameters. These parameter modifications can be divided into two basic categories: (1) dispersivity and (2) point sources. Three different longitudinal dispersivity values, 1, 10, and 100, were utilized under four sets of conditions: 1) when all point sources were continuously turned on, 2) when a single north point source and single south point source were continuously turned on, 3) when a single north point source was continuously turned on, and 4) when a single south point source was continuously turned on. These combinations were then applied to two different scenarios: 1) according to NRC conditions, where the ratio of transverse dispersivity to longitudinal dispersivity was 0.1 and the ratio of vertical dispersivity to longitudinal dispersivity was 0.01, and 2) according to DOE conditions, where the ratio of transverse dispersivity to longitudinal dispersivity was 0.005 and the ratio of vertical dispersivity to longitudinal dispersivity was 0.0005.

These combinations were conducted under various settings, where selected cells in each respective simulation were inactivated to reduce run time: 1) using the S6b-run2 simulation, which was modified accordingly, 2) using a modified version of #1, which possessed a refined transitional grid, where cells size transitioned from 300m x 300m to 200m x 200m to 100m x 100m and back, both in the east/west and north/south directions, and 3) . Please note that not every combination was evaluated in the MT3D simulations. Additionally, there are various specifics that differ from simulation to simulation. Below is a summary of the file names created, to date, and their respective parameters included in the 'PS Runs'and 'Respository Runs'sheets in the MS Excel file {File Descriptions_VB_Rankin_2005.xls} in the {vrankin\GMS Data\} directory, as described above:

Directory: {vrankin\GMS Data\Selected Point Sources\}

Subdirectory: {Approach 1 MF\}

File: {Approach_1_MF}
This file was an attempt to use the parameters outlined in "Approach 1" of the 2002 J. Winterle report to evaluate the outcome of the MODFLOW simulation. This file was not utilized an any of the simulations described in this document.

Subdirectory: {S6-run2 modified\}

Subdirectory: {S6-run2-modified_All PS Trials\}

Subdirectory: {All_disp_10}

File: {repeat disp 10 run.zip}

File: {S6-run2-modified_inactive_All_PS}

Note: This file was saved under the same name as an active file, but possesses a longitudinal dispersivity of 10. The other file that has the same name possesses a longitudinal dispersivity of 100.

File: {S6-run2-modified_All_PS_10K}

File: {S6-run2-modified_All_PS_DOE}

Subdirectory: {S6-run2-modified_North PS Trials\}

File: {S6-run2-modified_inactive_North_PS_disp1}

File: {S6-run2-modified_inactive_North_PS_disp10}

File: {S6-run2-modified_inactive_North_PS_T1}

Subdirectory: {S6-run2-modified_North_South PS Trials\}

File: {S6-run2-modified_inactive_North_South_PS_disp1}

File: {S6-run2-modified_inactive_North_South_PS_disp10}

File: {S6-run2-modified_inactive_North_South_PS_DOE}

File: {S6-run2-modified_inactive_North_South_PS_T1}

Subdirectory: {S6-run2-modified_South PS Trials\}

Note: Subdirectory Empty

File: {S6-run2-modified_active_grid}

Note: The MODFLOW file that is used for all 300m x 300m grid MT3D simulations is derived from this file. This is because there are no cells that were inactivated by the user (i.e., me).

File: {S6-run2-modified_inactive}

File: {S6-run2-modified_inactive_All_PS}

Note: A second file exists, as described above in subdirectory {All_disp_10}, that possesses the same file name. This file possesses a longitudinal dispersivity of 100. The other file that has the same name possesses a longitudinal dispersivity of 10.

File: {S6-run2-modified_inactive_North_PS}

File: {S6-run2-modified_inactive_North_South_PS}

File: {S6-run2-modified_inactive_South_PS}

Subdirectory: {S6-run2 modified_Refined Grid\}

Subdirectory: {S6-run2-modified_Refined All PS Trials\}

Note: Subdirectory Empty

Subdirectory: {S6-run2-modified_Refined North PS Trials\}

File: {S6-run2-modified_refined_inactive_North_PS_T1}

Subdirectory: {S6-run2-modified_Refined North_South PS Trials\}

File: {S6-run2-modified_refined_inactive_North_South_PS_T1}

Subdirectory: {S6-run2-modified_Refined South PS Trials\}

Note: Subdirectory Empty

File: {S6-run2-modified_active_unrefined_grid}

File: {S6-run2-modified_refined_grid}

Note: The MODFLOW file that is used for all refined grid MT3D simulations is derived from this file. This is because there are no cells that were inactivated by the user (i.e., me).

File: {S6-run2-modified_refined_inactive}

File: {S6-run2-modified_refined_inactive_All_PS}

File: {S6-run2-modified_refined_inactive_North_PS}

File: {S6-run2-modified_refined_inactive_North_South_PS}

File: {S6-run2-modified_refined_inactive_South_PS}

Subdirectory: {S6-run2_modified_repository\}

Subdirectory: {All_PS\}

Subdirectory: {All_PS_alt_disp\}

Subdirectory: {All_PS_alt_disp150\}

Subdirectory: {All_PS_alt_disp150_10K\}

File: {S6-run2-modified_All_PS_alt_disp150_10K}

File: {S6-run2-modified_All_PS_alt_disp150}

Subdirectory: {All_PS_alt_disp150_alluvium275_10K\}

File:{S6-run2-modified_All_PS_alt_disp150_alluvium275_10K}

Subdirectory: {All_PS_alt_disp150_alluvium275_DOE_10K\}

File: {S6-run2-modified_All_PS_alt_disp150_alluvium275_DOE_10K}

Subdirectory: {All_PS_alt_disp150_DOE\}

Subdirectory: {All_PS_alt_disp150_DOE_10K\}

File: {S6-run2-modified_All_PS_alt_disp150_DOE_10K}

File: {S6-run2-modified_All_PS_alt_disp150_DOE}

Subdirectory: {All_PS_alt_disp165_10K\}

File: {S6-run2-modified_All_PS_alt_disp165_10K}

Subdirectory: {All_PS_alt_disp165_DOE_10K\}

Subdirectory: {All_PS_disp_1\}

Subdirectory: {All_disp1_alternative_rep\}

File: {S6-run2-modified_alt_rep_All_PS_disp1}

File: {S6-run2-modified_rep_All_PS_disp1}

Subdirectory: {All_PS_disp_10\}

Subdirectory: {All_disp10_alternative_rep\}

Subdirectory: {All_disp10_alternative_rep_10K\}

File: {S6-run2-modified_rep_All_PS_disp10_10K}

File: {S6-run2-modified_alt_rep_All_PS_disp10}

File: {S6-run2-modified_rep_All_PS_disp10}

Subdirectory: {All_PS_disp_100\}

Subdirectory: {All_disp100_alternative_rep\}

Subdirectory: {All_disp100_alternative_rep_10K\}

File: {S6-run2-modified_rep_All_PS_10K}

File: {S6-run2-modified_alt_rep_All_PS}

File: {S6-run2-modified_rep_All_PS}

Subdirectory: {All_PS_DOE_disp1\}

Subdirectory: {All_DOE_disp1_alternative_rep\}

File: S6-run2-modified_alt_rep_All_PS_DOE_disp1}

File: {S6-run2-modified_rep_All_PS_DOE_disp1}

Subdirectory: {All_PS_DOE_disp10\}

Subdirectory: {All_DOE_disp10_alternative_rep\}

File: {S6-run2-modified_alt_rep_All_PS_DOE_disp10}

File: {S6-run2-modified_rep_All_PS_DOE_disp10}

Subdirectory: {All_PS_DOE_disp_100\}

Subdirectory: {All_DOE_disp100_alternative_rep\}

File: {S6-run2-modified_alt_rep_All_PS_DOE_disp100}

File: {S6-run2-modified_rep_All_PS_DOE_disp100}

Subdirectory: {East_PS\}

Subdirectory: {East_PS_disp100\}

File: {S6-run2-modified_alt_rep_East_PS}

Subdirectory: {East_PS_disp100_10K\}

File: {S6-run2-modified_alt_rep_East_PS_10K}

Subdirectory: {East_PS_disp100_DOE_10K\}

File: {S6-run2-modified_alt_rep_East_PS_DOE_disp100_10K}

Subdirectory: {East_West_PS\}

Subdirectory: {East_West_PS_disp1\}

File: {S6-run2-modified_alt_rep_East_West_PS_disp1}

Subdirectory: {East_West_PS_disp10\}

File: {S6-run2-modified_alt_rep_East_West_PS_disp10}

Subdirectory: {East_West_PS_disp10_10K\}

File: {S6-run2-modified_alt_rep_East_West_PS_disp10_10K}

Subdirectory: {East_West_PS_disp100\}

File: {S6-run2-modified_alt_rep_East_West_PS}

Subdirectory: {East_West_PS_disp100_10K\}

File: {S6-run2-modified_alt_rep_East_West_PS_10K}

Subdirectory: {East_West_PS_DOE_disp1\}

File: {S6-run2-modified_alt_rep_East_West_PS_DOE_disp1}

Subdirectory: {East_West_PS_DOE_disp10\}

File: {S6-run2-modified_alt_rep_East_West_PS_DOE_disp10}

Subdirectory: {East_West_PS_DOE_disp10_10K\}

File: {S6-run2-modified_alt_rep_East_West_PS_DOE_disp10_10K}

Subdirectory: {East_West_PS_DOE_disp100\}

File: {S6-run2-modified_alt_rep_East_West_PS_DOE_disp100}

Subdirectory: {East_West_PS_DOE_disp100_10K\}

File: {S6-run2-modified_alt_rep_East_West_PS_DOE_disp100_10K}

Subdirectory: {GMS MT3D Figures\}

File: {S6-run2-modified_rep_Figure_Files}

This file contains the compliance boundary and other graphical formatting that shows cross-sectional views of A-A' (i.e., West to East), B-B' (North to South), and 3-D view.

Subdirectory: {North_PS\}

Subdirectory: {North_PS_disp1\}

File: {S6-run2-modified_rep_North_PS_disp1}

Subdirectory: {North_PS_disp10\}

File: {S6-run2-modified_rep_North_PS_disp10}

Subdirectory: {North_PS_disp100\}

File: {S6-run2-modified_rep_North_PS}

Subdirectory: {North_PS_DOE\}

File: {S6-run2-modified_rep_North_PS_DOE}

Subdirectory: {North_PS_DOE_disp1\}

File: {S6-run2-modified_rep_North_PS_DOE_disp1}

Subdirectory: {North_PS_DOE_disp100\}

File: {S6-run2-modified_rep_North_PS_DOE_disp100}

Subdirectory: {North_South_PS\}

Subdirectory: {North_South_PS_disp1\}

File: {S6-run2-modified_rep_North_South_PS_disp1}

Subdirectory: {North_South_PS_disp10\}

File: {S6-run2-modified_rep_North_South_PS_disp10}

Subdirectory: {North_South_PS_disp10_10K\}

File: {S6-run2-modified_rep_North_South_PS_disp10_10K}

Subdirectory: {North_South_PS_disp100\}

File: {S6-run2-modified_rep_North_South_PS}

Subdirectory: {North_South_PS_disp100_10K\}

File: {S6-run2-modified_rep_North_South_PS_10K}

Subdirectory: {North_South_PS_DOE\}

File: {S6-run2-modified_rep_North_South_PS_DOE}

Subdirectory: {North_South_PS_DOE_disp1\}

File: {S6-run2-modified_rep_North_South_PS_DOE_disp1}

Subdirectory: {North_South_PS_DOE_disp10_10K\}

File: {S6-run2-modified_rep_North_South_PS_DOE_10K}

Subdirectory: {North_South_PS_DOE_disp100\}

File: {S6-run2-modified_rep_North_South_PS_DOE_disp100}

Subdirectory: {North_South_PS_DOE_disp100_10K\}

File: {S6-run2-modified_rep_North_South_PS_DOE_disp100_10K}

Subdirectory: {South_PS\}

Subdirectory: {South_PS_disp1\}

File: {S6-run2-modified_rep_South_PS_disp1}

Subdirectory: {South_PS_disp10\}

File: {S6-run2-modified_rep_South_PS_disp10}

Subdirectory: {South_PS_disp100\}

File: {S6-run2-modified_rep_South_PS}

Subdirectory: {South_PS_DOE\}

File: {S6-run2-modified_rep_South_PS_DOE}

Subdirectory: {South_PS_DOE_disp1\}

File: {S6-run2-modified_rep_South_PS_DOE_disp1}

Subdirectory: {South_PS_DOE_disp100\}

File: {S6-run2-modified_rep_South_PS_DOE_disp100}

File: {south_runs.zip}

Subdirectory: {West_PS\}

Subdirectory: {West_PS_disp100\}

File: {S6-run2-modified_alt_rep_West_PS}

Subdirectory: {West_PS_disp100_10K\}

File: {S6-run2-modified_alt_rep_West_PS_10K}

Subdirectory: {West_PS_DOE_disp100_10K\}

File: {S6-run2-modified_alt_rep_West_PS_DOE_disp100_10K}

File: {geo}

This file is the aerial photo of the Yucca Mountain region proposed nuclear repository site.

Application: {mt3dms4.exe}

3.5 Other Files Not Discussed

Directory: {vrankin\GMS Data\}

Subdirectory: {ArcView Data}

Subdirectory: {2002_repository\}

Possesses ArcView files that depict the shape of the proposed repository in 2002. The file {beason_z11nad83.shp} was integrated into the files contained {vrankin\GMS Data\Selected Point Sources\S6-run2_modified_repository}, with the exception of those files in subdirectories that contain "alternative_rep." Please refer the subdirectory below for further discussion.

Subdirectory: {lalayout_2004\}

Possesses ArcView files that depict the shape of the present proposed repository. Those subdirectories which contain "alternative_rep," utilize the file {2004repos11n83.shp}.

Application: {mt3dms4.exe}

This application was utilized to run MT3D simulations in the DOS window, as described above.

Application: {mt3dms4-gms.exe}

Application: {run.bat}

This application was utilized to run batch files in the DOS window for the MT3D simulations described above.

3.6 TDAST-2

TDAST-2 was employed so that the potential plume could be characterized at the 18,000km compliance boundary utilizing specified parameters. Two primary plume attributes were investigated: (1) Peak Concentration, and (2) Plume Width. The parameters used in TDAST-2 included dispersivity, radioactive decay for source concentration and solute, and retardation factor. The files are listed as follows. Please refer to {Graphs for TC99_Outfiles_modified dispersivities} for file descriptions

Directory: {TC99\}

For files pertaining to peak concentration:

Input File: {INFILE2.dat}	**Output File:** {outfile2.out}
Input File: {INFILE2_rev_1.dat}	**Output File:** {outfile2_rev_1.out}
Input File: {INFILE2_rev_2.dat}	**Output File:** {outfile2_rev_2.out}
Input File: {INFILE2_rev_3.dat}	**Output File:** {outfile2_rev_3.out}
Input File: {INFILE2_rev_4.dat}	**Output File:** {outfile2_rev_4.out}
Input File: {INFILE2_rev_5.dat}	**Output File:** {outfile2_rev_5.out}
Input File: {INFILE3.dat}	**Output File:** {outfile3.out}
Input File: {INFILE3_rev_1.dat}	**Output File:** {outfile3_rev_1.out}
Input File: {INFILE3_rev_2.dat}	**Output File:** {outfile3_rev_2.out}
Input File: {INFILE3_rev_3.dat}	**Output File:** {outfile3_rev_3.out}
Input File: {INFILE3_rev_4.dat}	**Output File:** {outfile3_rev_4.out}
Input File: {INFILE3_rev_5.dat}	**Output File:** {outfile3_rev_5.out}
Input File: {INFILE4.dat}	**Output File:** {outfile4.out}
Input File: {INFILE4_rev_1.dat}	**Output File:** {outfile4_rev_1.out}
Input File: {INFILE4_rev_2.dat}	**Output File:** {outfile4_rev_2.out}
Input File: {INFILE4_rev_3.dat}	**Output File:** {outfile4_rev_3.out}
Input File: {INFILE4_rev_4.dat}	**Output File:** {outfile4_rev_4.out}
Input File: {INFILE4_rev_5.dat}	**Output File:** {outfile4_rev_5.out}
Input File: {INFILE5.dat}	**Output File:** {outfile5.out}
Input File: {INFILE5_rev_1.dat}	**Output File:** {outfile5_rev_1.out}
Input File: {INFILE5_rev_2.dat}	**Output File:** {outfile5_rev_2.out}
Input File: {INFILE5_rev_3.dat}	**Output File:** {outfile5_rev_3.out}
Input File: {INFILE5_rev_4.dat}	**Output File:** {outfile5_rev_4.out}
Input File: {INFILE5_rev_5.dat}	**Output File:** { outfile5_rev_5.out}

For files pertaining to plume width:

Input File: {INFILE2-PWD.dat} **Output File:** {outfile2-pwd.out}
Input File: {INFILE2-PWD_rev_1.dat} **Output File:** {outfile2-pwd_rev_1.out}
Input File: {INFILE2-PWD_rev_2.dat} **Output File:** {outfile2-pwd_rev_2.out}
Input File: {INFILE2-PWD_rev_3.dat} **Output File:** {outfile2-pwd_rev_3.out}
Input File: {INFILE2-PWD_rev_4.dat} **Output File:** {outfile2-pwd_rev_4.out}
Input File: {INFILE2-PWD_rev_5.dat} **Output File:** {outfile2-pwd_rev_5.out}

Input File: {INFILE3-PWD.dat} **Output File:** {outfile3-pwd.out}
Input File: {INFILE3-PWD_rev_1.dat} **Output File:** {outfile3-pwd_rev_1.out}
Input File: {INFILE3-PWD_rev_2.dat} **Output File:** {outfile3-pwd_rev_2.out}
Input File: {INFILE3-PWD_rev_3.dat} **Output File:** {outfile3-pwd_rev_3.out}
Input File: {INFILE3-PWD_rev_4.dat} **Output File:** {outfile3-pwd_rev_4.out}
Input File: {INFILE3-PWD_rev_5.dat} **Output File:** {outfile3-pwd_rev_5.out}

Input File: {INFILE4-PWD.dat} **Output File:** {outfile4-pwd.out}
Input File: {INFILE4-PWD_rev_1.dat} **Output File:** {outfile4-pwd_rev_1.out}
Input File: {INFILE4-PWD_rev_2.dat} **Output File:** {outfile4-pwd_rev_2.out}
Input File: {INFILE4-PWD_rev_3.dat} **Output File:** {outfile4-pwd_rev_3.out}
Input File: {INFILE4-PWD_rev_4.dat} **Output File:** {outfile4-pwd_rev_4.out}
Input File: {INFILE4-PWD_rev_5.dat} **Output File:** {outfile4-pwd_rev_5.out}

Input File: {INFILE5-PWD.dat} **Output File:** {outfile5-pwd.out}
Input File: {INFILE5-PWD_rev_1.dat} **Output File:** {outfile5-pwd_rev_1.out}
Input File: {INFILE5-PWD_rev_2.dat} **Output File:** {outfile5-pwd_rev_2.out}
Input File: {INFILE5-PWD_rev_3.dat} **Output File:** {outfile5-pwd_rev_3.out}
Input File: {INFILE5-PWD_rev_4.dat} **Output File:** {outfile5-pwd_rev_4.out}
Input File: {INFILE5-PWD_rev_5.dat} **Output File:** {outfile5-pwd_rev_5.out}

3.7 MT3D Future Climate

Directory: {Modified Fetter\}

The purpose of this directory is to build on a series of MT3D files that include future climate data (previous MT3D files did not include future climate data), created by Allen Fetter, a visiting SwRI researcher, in which the MT3D model was run using a longitudinal dispersivity value of 1, 10, 100, and 300, respectively, for All Point Sources and 1, 10, and 100, respectively for East and West Point Sources. Please refer to section 3.4 for previous selected point sources investigations.

Subdirectory: {\All-Sources-Disp-1\}

File: {S6-Run4-Disp-1}

Subdirectory: {\All-Sources-Disp-10\}

File: {S6-Run4-Disp-10}

Subdirectory: {\All-Sources-Disp-100\}

File: {S6-Run4-Disp-100}

Subdirectory: {\All-Sources-Disp-300\}

File: {S6-Run4-Disp-300}

Subdirectory: {\ East-West Sources-Disp-1\}

File: {S6-Run4-E-W-Disp-1}

Subdirectory: {\ East-West Sources-Disp-10\}

File: {S6-Run4-E-W-Disp-10}

Subdirectory: {\ East-West Sources-Disp-100\}

File: {S6-Run4-E-W-Disp-100}

3.8 Layer Refinement

In an effort to collect porosity value data, the grid model was modified by making each layer 50 meters. In particular, layers that were formerly 200m were split into 4 – 50m layers and 100m layers were split into 2-50m layers. This task was completed by first splitting the layers of the file that contained future climate. The task was completed a second time utilizing a file that was derived from a previously run MT3D file. These files are summarized below.

Directory: {Modified Fetter\}

Subdirectory: {\ 50m Layers\}

File: {S6-Run4-Disp-300_50m_Layers}

Note: This file was a modified version of the Allen Fetter file that included future climate data and was previously named {S6-Run4-Disp-300}. The grid layers were split into 50m layers and then resaved. MODFLOW was not run in this file.

Subdirectory: {\50m Layers-All Activated\}

File: {S6-Run4-Disp-300_50m_Layers_All-Activated}

Note: This file was previously named {S6-Run4-Disp-300_50m_Layers} and resaved after all grid cells on each grid layer were reactivated and MODFLOW was run.

Directory: {50m Layers_MF\}

File: {50m_Layers_MF}

Note: This file was take from {S6-run2-modified_alt_rep_All_PS_10K}. Since the MODFLOW file that was used in {S6-run2-modified_alt_rep_All_PS_10K} was not available, the material properties needed to be reentered. The material properties were taken from the following 2005 NRC report: Farrell, David, Rankin, Veronica, and Buseman-Williams, Anna, Development and Application of a Model to Simulate Saturated Zone Transport from the Location of the Proposed Repository Footprint at Yucca Mountain. And are described below. After the material properties were defined, the grid layers were split into 50m layers, all grid cells on each grid layer were reactivated, and MODFLOW was run the file was resaved as {50m_Layers_MF}.

File:		***50m_Layers_MF***
Mean Error:		*15.211*
Mean Abs. Error:		*24.142*
Rt Mean Sq. Error:		*73.711*
PZ:	**K**	*0.05*
	n	*0.01*
UVA:	**K**	*0.5*
	n	*0.001*
UVC:	**K**	*0.15*
	n	*0.1*
LVA:	**K**	*0.15*

	n	*0.001*
LVC:	**K**	*0.0002*
	n	*0.1*
CF_flt:	**K**	*0.00005*
	n	*0.01*
Alluvium:	**K**	*3.0*
	n	*0.1*
FMW_flt:	**K**	*5*
	n	*0.001*
BR-PBC:	**K**	*4*
	n	*0.001*
SC-IR:	**K**	*0.0005*
	n	*0.01*
SC-West:	**K**	*0.0005*
	n	*0.01*
VH1:	**K**	*0.00005*
	n	*0.01*
BM:	**K**	*0.05*
	n	*0.01*
H95:	**K**	*0.005*
	n	*0.01*
CA_flt:	**K**	*0.5*
	n	*0.01*
Grav1:	**K**	*0.001*
	n	*0.01*
Grav2:	**K**	*0.05*
	n	*0.01*
Caldra_PZ:	**K**	*0.001*
	n	*0.01*
Caldera_VR:	**K**	*0.0003*
	n	*0.01*
AB_Landsurf:	**K**	*10*
	n	*0.25*

Directory: {\50m Layers_MF_Trials\}

Upon evaluation the Error Summary of file {50m_Layers_MF}, as described above. It was noticed that the Error Summary was not similar to the Error Summary of the original MODFLOW file that was utilized for all previous MT3D model runs that were described in this notebook. There are two possible reasons for this difference. First, since the original MODFLOW file was not used, as it was unavailable at the time of the completion of this task, it is unclear whether the model parameters matched exactly the parameters that were used in the original MODFLOW file. Second, if the parameters did in fact match the parameters of the original MODFLOW file, it is possible that the Error Summary could reflect the fact that the grid layers are no longer similar to the dimensions of the previous layer dimensions. Since the Error Summary indicates that the error is significantly great in {50m_Layers_MF}, calibration trials were conducted in an effort to reduce the error, as summarized below. The parameters adjusted in these trials are described in {50m Layers_File Description}.

Subdirectory: {\50m Layers_MF_T1\}

File: {50m_Layers_MF_T1}

Subdirectory: {\50m Layers_MF_T2\}

File: {50m_Layers_MF_T2}

Subdirectory: {\50m Layers_MF_T3\}

File: {50m_Layers_MF_T3}

Subdirectory: {\50m Layers_MF_T4\}

File: {50m_Layers_MF_T4}

Subdirectory: {\50m Layers_MF_T5\}

File: {50m_Layers_MF_T5}

Subdirectory: {\50m Layers_MF_T6\}

File: {50m_Layers_MF_T6}

Subdirectory: {\50m Layers_MF_T7\}

File: {50m_Layers_MF_T7}

Subdirectory: {\50m Layers_MF_T8\}

File: {50m_Layers_MF_T8}

Subdirectory: {\50m Layers_MF_T9\}

File: {50m_Layers_MF_T9}

Subdirectory: {\50m Layers_MF_T10\}

File: {50m_Layers_MF_T10}

Subdirectory: {\50m Layers_MF_T11\}

File: {50m_Layers_MF_T11}

Subdirectory: {\50m Layers_MF_T12\}

File: {50m_Layers_MF_T12}

Subdirectory: {\50m Layers_MF_T13\}

File: {50m_Layers_MF_T13}

Subdirectory: {\50m Layers_MF_T14\}

File: {50m_Layers_MF_T14}

Subdirectory: {\50m Layers_MF_T15\}

File: {50m_Layers_MF_T15}

Subdirectory: {\50m Layers_MF_T16\}

File: {50m_Layers_MF_T16}

Subdirectory: {\50m Layers_MF_T17\}

File: {50m_Layers_MF_T17}

Subdirectory: {\50m Layers_MF_T18\}

File: {50m_Layers_MF_T18}

Subdirectory: {\50m Layers_MF_T19\}

File: {50m_Layers_MF_T19}

Subdirectory: {\50m Layers_MF_T20\}

File: {50m_Layers_MF_T20}

Subdirectory: {\50m Layers_MF_T21\}

File: {50m_Layers_MF_T21}

Subdirectory: {\50m Layers_MF_T22\}

File: {50m_Layers_MF_T22}

April 30, 2010. Close-out of Electronic Notebook 728E
No further entries will be made to this electronic note book. All electronic files worth saving are archived onto a single disk attached to this notebook.

Entries into Scientific Notebook No. 728E for the period July 24, 2005 to June 8, 2006 have been made by Veronica Brieno Rankin.

No original text entered into this Scientific Notebook has been removed.

ADDITIONAL INFORMATION FOR SCIENTIFIC NOTEBOOK NO. 728E

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Remarks: (computer runs, etc.)	Notebook data files for GMS models