	Scientific Analysis/Calculation Error Resolution Document *Complete only applicable items.*	QA: QA Page 1 of 5

INITIATION

1. Originator:	2. Date:	3. ERD No.
Jim Houseworth/Ming Zhu	5/19/08	ANL-NBS-HS-000015 ERD 01

4. Document Identifier:	5. Document Title:
ANL-NBS-HS-000015 REV 02	Development of Numerical Grids for UZ Flow and Transport Modeling

6. Description of and Justification for Change (Identify applicable CRs and TBVs):

I Background Information Summary

This ERD is prepared to resolve CR 12142 associated with *Development of Numerical Grids for UZ Flow and Transport Modeling*, ANL-NBS-HS-000015 REV 02 (BSC 2004 [DIRS 169855]).

CR 12142: Table 6-5 in *Development of Numerical Grids for UZ Flow and Transport Modeling*, ANL-NBS-HS-000015 REV 02 (BSC 2004 [DIRS 169855]) correlates the UZ model layers with hydrogeologic units for the Paintbrush Group (layers beginning with "Tp") as defined in Buesch et al. 1996 [DIRS 100106], Table 4. The lithostratigraphic unit at the base of the major unit "TSw" is shown as "Tptpv2". The corresponding UZ model layer is listed as "tsw39 (vit,zeo)" and the corresponding hydrogeologic unit is listed as "PV2". According to the source information in Buesch et al. 1996 [DIRS 100106], Table 4, the "PV2" (short for Tptpv2) is the uppermost lithostratigraphic unit in the major unit "CHn". The error in the unit classification has no impact on the output from the UZ flow model.

The same error exists in Table 6.1-1 of *UZ Flow Models and Submodels* (SNL 2007 [DIRS 184614]), Table 6-1 of *Analysis of Hydrologic Properties Data*, (BSC 2004 [DIRS 170038]), Table 6.1-1 of *Mountain-Scale Coupled Processes (TH/THC/THM) Models* (BSC 2005 [DIRS 174101]), Table 6.1-1 of *Parameter Sensitivity Analysis for Unsaturated Zone Flow* (BSC 2005 [DIRS 174116]), Table 6-3 of *Calibrated Properties Model* (BSC 2004 [DIRS 169857]), Table 6-1 of *Calibrated Unsaturated Zone Properties* (SNL 20007 [DIRS 179545]), Table 6.1-1 of *Rock Properties Model* (BSC 2004 [DIRS 170032]), and Table 2.3.2-2 of DOE/RW-0573, *Yucca Mountain Repository SAR*, Section 2.3.2.

(see attached)

CONCURRENCE

	Printed Name	Signature	Date
7. Checker	Charles Haukwa		05/21/2008
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APPROVAL

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10. Responsible Manager	Paul Dixon		5-22-08

(Continued from Block 6)

There is no other impact of this change to BSC (2004 [DIRS 169855]) on any downstream technical products.

The following documents that cite ANL-NBS-HS-000015 REV 02 [DIRS 169855] were checked for impacts as a result of this correction:

- 800-K0C-WIS0-00500-000-00A, *Thermal Calculation for Off-Normal Scenarios*
- ANL-EBS-MD-000030 REV 04, *Ventilation Model and Analysis Report*
- ANL-EBS-MD-000049 REV 03 AD 01, *Multiscale Thermohydrologic Model*
- ANL-EBS-MD-000075 REV 01, *Thermal Management Flexibility Analysis*
- ANL-NBS-HS-000034 REV02, *Water-Level Data Analysis for the Saturated Zone Site-Scale Flow and Transport Model*
- ANL-NBS-HS-000047 REV 01, *THC Sensitivity Study of Heterogeneous Permeability and Capillarity Effects*
- ANL-NBS-HS-000054 REV 00, *Data Analysis for Infiltration Modeling: Bedrock Saturated Hydraulic Conductivity Calculation*
- ANL-NBS-HS-000058 REV 00, *Calibrated Unsaturated Zone Properties*
- ANL-WIS-MD-000027 REV 00, *Features, Events, and Processes for the Total System Performance Assessment: Analyses*
- MDL-NBS-GS-000002 REV 02, *Geologic Framework Model (GFM2000)*
- MDL-NBS-HS-000001 REV 05, *Drift-Scale THC Seepage Model*
- MDL-NBS-HS-000005 REV 01, *Conceptual Model and Numerical Approaches for UZ Flow and Transport*
- MDL-NBS-HS-000008 REV 02 AD 01, *Radionuclide Transport Models Under Ambient Conditions*
- MDL-NBS-HS-000015 REV 02, *Drift-Scale Coupled Processes (DST and TH Seepage) Models*
- MDL-NBS-HS-000017 REV 01, *Drift Scale THM Model*
- MDL-NBS-HS-000017 REV 01 AD 01, *Abstraction of Drift Seepage*

- MDL-NBS-HS-000024 REV 01, *Hydrogeologic Framework Model for the Saturated Zone Site-Scale Flow and Transport Model*
- MDL-WIS-PA-000005 REV 00 AD 01, *Total System Performance Assessment Model /Analysis for the License Application*

II Inputs and/or Software

None

III Analysis and Results

In Table 6-5 in *Development of Numerical Grids for UZ Flow and Transport Modeling*, ANL-NBS-HS-000015 REV 02 (BSC 2004 [DIRS 169855]), the lithostratigraphic unit at the base of the major unit "TSw" is shown as "Tptpv2". The corresponding UZ model layer is listed as "tsw39 (vit, zeo)" and the corresponding hydrogeological unit is listed as "PV2". According to the source information in Buesch et al. (1996 [DIRS 100106], Table 4, the "PV2" unit (short for Tptpv2) is the uppermost lithostratigraphic unit of the major unit "CHn". This correction to Table 6-5 in *Development of Numerical Grids for UZ Flow and Transport Modeling*, ANL-NBS-HS-000015 REV 02 (BSC 2004 [DIRS 169855]) is given in Table 1 below. Note also that the designation of "tsw39" as the top model layer for the Calico Hills nonwelded (CHn) major unit (see Table 1) has no effect on the development of the UZ grid for use in the UZ flow model.

Table 1. Correlation of GFM2000 Lithostratigraphy, UZ Model Layer, and Hydrogeological Units

Major Unit (Modified from Montazer and Wilson 1984 [DIRS 100161])	GFM2000 Lithostratigraphic Nomenclature [a]	FY 02 UZ Model Layer	HGU (Flint 1998 [DIRS 100033], Table 1)
Tiva Canyon welded (TCw)	Tpcr	tcw11	CCR, CUC
	Tpcp	tcw12	CUL, CW
	TpcLD		
	Tpcpv3	tcw13	CMW
	Tpcpv2		
Paintbrush nonwelded (PTn)	Tpcpv1	ptn21	CNW
	Tpbt4	ptn22	BT4
	Tpy (Yucca)		
		ptn23	TPY
		ptn24	BT3
	Tpbt3		
	Tpp (Pah)	ptn25	TPP
	Tpbt2	ptn26	BT2
	Tptrv3		
	Tptrv2		
Topopah Spring Welded (TSw)	Tptrv1	tsw31	TC
	Tptrn		
		tsw32	TR
	Tptrl, Tptf	tsw33	TUL
	Tptpul, RHHtop		
	Tptpmn	tsw34	TMN
	Tptpll	tsw35	TLL
	Tptpln	tsw36	TM2 (upper 2/3 of Tptpln)
		tsw37	TM1 (lower 1/3 of Tptpln)
	Tptpv3	tsw38	PV3
Calico Hills nonwelded (CHn)	Tptpv2	tsw39 (vit, zeo)[b]	PV2
	Tptpv1	ch1 (vit, zeo)	BT1 or BT1*a* (altered)
	Tpbt1		
	Tac (Calico)	ch2 (vit, zeo)	CHV (vitric) or CHZ (zeolitic)
		ch3 (vit, zeo)	
		ch4 (vit, zeo)	
		ch5 (vit, zeo)	
	Tacbt (Calicobt)	ch6 (vit, zeo)	BT
	Tcpuv (Prowuv)	pp4	PP4 (zeolitic)
	Tcpuc (Prowuc)	pp3	PP3 (devitrified)
	Tcpmd (Prowmd)	pp2	PP2 (devitrified)
	Tcplc (Prowlc)		
	Tcplv (Prowlv)	pp1	PP1 (zeolitic)
	Tcpbt (Prowbt)		
	Tcbuv (Bullfroguv)		
Crater Flat undifferentiated (CFu)	Tcbuc (Bullfroguc)	bf3	BF 3 (welded)
	Tcbmd (Bullfrogmd)		
	Tcblc (Bullfroglc)		
	Tcblv (Bullfroglv)	bf2	BF2 (nonwelded)
	Tcbbt (Bullfrogbt)		
	Tctuv (Tramuv)		
	Tctuc (Tramuc)	tr3	Not Available
	Tctmd (Trammd)		
	Tctlc (Tramlc)		
	Tctlv (Tramlv)	tr2	Not Available
	Tctbt (Trambt) and below		

[a] Buesch et al. (1996 [DIRS 100106]) define the units in the Paintbrush Group (layers beginning with "Tp"). Moyer et al. (1995 [DIRS 103777]) describe the Tac and Tacbt. Buesch and Spengler (1999 [DIRS 107905]) describe the symbols for the Crater Flat Tuffs. GFM2000 nomenclature (BSC 2004 [DIRS 170029], Table 6-2) uses the symbols that are included parenthetically below layer Tpbt1. Additional details on how the GFM2000 units were combined or subdivided to obtain the UZ model units are found in the scientific notebook by Hinds and Dobson (2004 [DIRS 170886], pp. 11 to 15).

[b]The designation of "tsw39" as the top model layer for the Calico Hills nonwelded (CHn) major unit has no effect on the development of the UZ grid for use in the UZ flow model.

UZ = unsaturated zone.

IV Impact Evaluation

This change corrects an error in Table 6-5 of BSC (2004 [DIRS 169855]). The "Tptpv2" lithostratigraphic unit, and the corresponding "tsw39 (vit, zeo)" UZ model layer and "PV2" hydrogeologic unit have been moved from the "TSw" major unit to the "CHn" major unit. This placement has no impact because the "TSw" and "CHn" major units are not used for the development of the numerical grids, which are based on more detailed stratigraphic units. This change has no impact the conclusions of BSC (2004 [DIRS 169855]). Similarly, this change has no impact on the conclusions of the other affected reports identified: *UZ Flow Models and Submodels* (SNL 2007 [DIRS 184614]); *Analysis of Hydrologic Properties Data* (BSC 2004 [DIRS 170038]); *Mountain-Scale Coupled Processes (TH/THC/THM) Models* (BSC 2005 [DIRS 174101]; *Parameter Sensitivity Analysis for Unsaturated Zone Flow* (BSC 2005 [DIRS 174116]); *Calibrated Properties Model* (BSC 2004 [DIRS 169857]); *Calibrated Unsaturated Zone Properties* (SNL 20007 [DIRS 179545]); *Rock Properties Model* (BSC 2004 [DIRS 170032]); and *Yucca Mountain Repository SAR* (DOE/RW-0573).