CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

Ronald T. Green RTG

RH

4/13/01 This notebook is to document work performed on the saturated zone model 20-01402-861

One effort will be to construct a 3D numerical model to investigate the coupled effects of heat and water flow.

The lower three layers of the 6 layer structural model by Sims et al (1999) will be used in the initial attempt.

The model boundaries in Universal Transverse Mercator (UTM) in meters NAD83 are:

SE corner [~~560~~, 563,000 RH 4/13/01 ~~4,049,299~~ 4,049,000 RH 4/13/01]

NW corner [535,000 , ~~4,049,000~~ 4,090,000] RH 4/13/01

28 Km × ~~40.701 Km~~ 41 Km RH 4/13/01

This is the same E-W dimension as Sims et al (1999) but cropped off at south with same northern boundary

element size in EW direction 294.7 m $\left(\frac{1500}{294.7} = 5.09\right)$
element size in NS direction 297.1 m $\left(\frac{1500}{297.1} = 5.05\right)$

The data set of the Sims et al. is saved on a zip disc SZ Model 4/13/01 by R-Green (only the reformatted version, not the original, is on the zip

4/13/01
RFF

space delim.

.txt ⇒ .sp3 filter

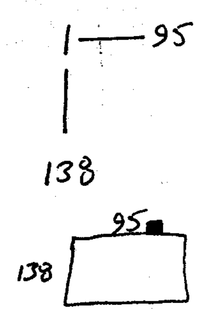
#	Type:	scattered	data			
#	Version:	5				
#	Descriptior	Exported	from	grid	top_pz_30((dsims	29 Jan
#	Format:	free				
#	Field:	1 x				
#	Field:	2 y				
#	Field:	3 z		meters		
#	Field:	4 column				
#	Field:	5 row				
#	Projection:	Universal	Transverse Mercator			
#	Zone:	11				
#	Units:	meters				
#	Ellipsoid:	GRS	1980			
#	End:					
#	Informatior from	grid:				
#	Grid_size:	95 x	138			
#	Grid_X_rar	535000 to	563000 ✓			
#	Grid_Y_rar	4049000 to	4090000 ✓			
#	Vertical_fa	top_pz_300.vflt				
#	History:	Top	elevation	grid	calculated from	ev112919.l (dsims

} 3D file (scatter data)

28x41 km

X	Y	Z	column (1-95)	row (1-138)
535000	4049000	425.7656	1	1
535297.9	4049000	428.1646	2	1
535595.7	4049000	429.9797	3	1
535893.6	4049000	430.3773	4	1
536191.5	4049000	429.0039	5	1
536489.4	4049000	426.7656	6	1
536787.2	4049000	423.6791	7	1
537085.1	4049000	422.3923	8	1
537383	4049000	422.4782	9	1
537680.9	4049000	83.06771	10	1
537978.7	4049000	-400.1063	11	1
538276.6	4049000	-392.1456	12	1
538574.5	4049000	-381.8696	13	1
538872.3	4049000	-371.6654	14	1
539170.2	4049000	-364.9223	15	1
539468.1	4049000	-361.3665	16	1
539766	4049000	-361.481	17	1
540063.8	4049000	-364.9614	18	1
540361.7	4049000	-367.3424	19	1
540659.6	4049000	-366.6796	20	1
540957.4	4049000	-360.9677	21	1
541255.3	4049000	-347.8059	22	1
541553.2	4049000	-328.1143	23	1
541851.1	4049000	-301.9438	24	1
542148.9	4049000	-269.8923	25	1
542446.8	4049000	-235.8588	26	1
542744.7	4049000	-201.7407	27	1
543042.6	4049000	-166.9356	28	1
543340.4	4049000	-133.0063	29	1
543638.3	4049000	-100.7823	30	1
543936.2	4049000	-70.1637	31	1
544234	4049000	-43.89968	32	1

top 1 bot 1 bot 2 . . . . .



This is a header of the original file by Sims et al (1999) with some additional information

These data were re-formatted for GMS by Stefan Mayer and appear as follows:

4/13/01
RFF

	A	B	C	D	E	F
	x	y	top1	bot1	bot2	bot3
	535000	4049000	426.2871	426.2771	425.7656	-3000
	535000	4049299	434.9258	434.9158	431.4045	-3000
	535000	4049599	441.1106	441.1006	437.273	-3000
	535000	4049898	444.9901	444.9801	441.9247	-3000
	535000	4050197	447.4351	447.4251	445.2263	-3000
	535000	4050496	449.053	449.043	447.6306	-3000
	535000	4050796	449.661	449.651	446.2105	-3000
	535000	4051095	449.139	449.129	442.5466	-3000
	535000	4051394	447.5886	447.5786	438.7017	-3000
	535000	4051693	444.8322	444.8222	431.8976	-3000
	535000	4051993	441.6417	441.6317	429.9182	-3000
	535000	4052292	437.6747	437.6647	426.4636	-3000
	535000	4052591	434.0194	434.0094	424.3359	-3000
	535000	4052891	432.62	430.7939	421.1206	-3000
	535000	4053190	439.7079	428.6139	416.444	-3000
	535000	4053489	448.3746	428.0239	410.9479	-3000
	535000	4053788	458.2832	429.1288	405.3168	-3000
	535000	4054088	469.3264	432.3589	401.8826	-3000
	535000	4054387	481.0426	437.0947	400.6252	-3000
	535000	4054686	493.0035	442.9048	402.2413	-3000
	535000	4054985	504.7746	449.7016	407.4298	-3000
	535000	4055285	515.6643	457.0833	418.3301	-3000

three-layersxy.sp2
on zip
SZ Model
4/13/01

Melissa Hill provided the reformatted file which is described as follows:

From: Melissa Hill [mehill@swri.edu]
Sent: Wednesday, March 28, 2001 1:36 PM
To: Ronald Green (rgreen)
Subject: input file for saturated zone model

three-layersxy.sp2

Ron

Attached is the file that you requested. Column C are the top elevations for the prow pass, Column D are the top elevations for the tertiary undefined, Column E are the top elevations for the paleozoics, and Column F is where we truncated the paleozoics. Call if you have questions--Missy

I had Troy Maxwell reformat this file to be in the proper format for AREST, put in this format to allow building an unstructured grid. The revised file is shown on the next page:

4/13/01
RH

	x	y	z	thickness
1	535000	4049000	426.2871	0.01
1	535000	4049000	426.2771	0.511536
1	535000	4049000	425.7656	3425.766
2	535000	4049299	434.9258	0.01
2	535000	4049299	434.9158	3.511231
2	535000	4049299	431.4045	3431.405
3	535000	4049599	441.1106	0.01
3	535000	4049599	441.1006	3.827545
3	535000	4049599	437.273	3437.273
4	535000	4049898	444.9901	0.01
4	535000	4049898	444.9801	3.055389
4	535000	4049898	441.9247	3441.925
5	535000	4050197	447.4351	0.01
5	535000	4050197	447.4251	2.198791
5	535000	4050197	445.2263	3445.226
6	535000	4050496	449.053	0.01
6	535000	4050496	449.043	1.412476
6	535000	4050496	447.6306	3447.631
7	535000	4050796	449.661	0.01
7	535000	4050796	449.651	3.440491
7	535000	4050796	446.2105	3446.211
8	535000	4051095	449.139	0.01
8	535000	4051095	449.129	6.582367

3layersfinal.xls
on zip
SZ Model 4/13/01

4/16/01
RH

Mesh generation will be made using AMESH
Description of 3D unstructured grid is as follows:

4/16/01
RH

Information potentially subject to copyright protection was redacted from this location. The redacted material is from a user manual containing information on AMESH input.

This is a example of 3D grid input

My table on top of page 4 needs one more column of identifier, Column 1 needs to be a sequential #. New file name ⇒ 3layers-amesh-in.xls
also on Zip SZ Model
4/13/01

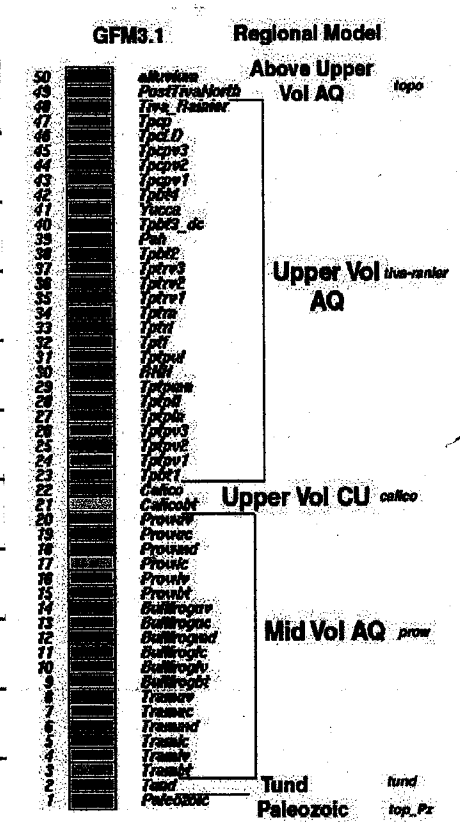
4/16/01
RJf

		x	y	z	thickness
1	1	535000	4049000	426.2871	0.01
2	1	535000	4049000	426.2771	0.511536
3	1	535000	4049000	425.7656	3425.766
4	2	535000	4049299	434.9258	0.01
5	2	535000	4049299	434.9158	3.511231
6	2	535000	4049299	431.4045	3431.405
7	3	535000	4049599	441.1106	0.01
8	3	535000	4049599	441.1006	3.827545
9	3	535000	4049599	437.273	3437.273
10	4	535000	4049898	444.9901	0.01
11	4	535000	4049898	444.9801	3.055389
12	4	535000	4049898	441.9247	3441.925
13	5	535000	4050197	447.4351	0.01
14	5	535000	4050197	447.4251	2.198791
15	5	535000	4050197	445.2263	3445.226
16	6	535000	4050496	449.053	0.01
17	6	535000	4050496	449.043	1.412476
18	6	535000	4050496	447.6306	3447.631
19	7	535000	4050796	449.661	0.01
20	7	535000	4050796	449.651	3.440491
21	7	535000	4050796	446.2105	3446.211
22	8	535000	4051095	449.139	0.01

Note: this is not correct format for 3D in file 4/27/01 RJf see pg 7

3layers_amesh_in.xls on Zip SZ Model 4/13/01

4/20/01 RJf



This is the column of lumped units from Darryl Simms. Note: only the bottom 3 units are included in this model:

Mid Vol AQ prow
Tund
Paleozoic

4/20/01 RJf

Properties assigned to these three units include the following (given by Chandrika Manepally) taken for DOE AMR

K = Permeability*g/n g = 9.81
n = 10^-6 Source: Bear and Verrjuit

	Permeability m2	K m/s
Granites	1.96E-16	1.92E-09
Lower Clastic Confining Unit	1.00E-16	9.81E-10
Lower Carbonate Aquifer	5.00E-14	4.91E-07
Upper Clastic Confining Unit	1.00E-16	9.81E-10
Lower Carbonate Aquifer Thurst	1.00E-14	9.81E-08
Upper Carbonate Aquifer	5.00E-15	4.91E-08
Top_PZ	1.0194e-14	1.07E-07
Undifferentiated Valley fill	5.00E-15	4.905E-08
Older Volcanic Confining Unit	2.00E-16	1.962E-09
Older Volcanic Aquifer	5.00E-16	4.905E-09
Lower Volcanic Confining Unit	2.00E-15	1.962E-08
Tund	1.9266e-15	1.89E-08
Crater Flat - Tram	2.36E-13	2.31516E-06
Crater Flat - Bullfrog	1.54E-11	0.000151074
Crater Flat - Prow Pass	8.00E-12	0.00007848
Prow	7.8797e-12	7.73E-05
Tiva		8.00E-14
Calico		5.00E-14

Name	Calibrated Average Permeability m2	K m/s
Lava Flow Aquifer	1.00E-12	0.00000981
Limestone Aquifer	1.00E-12	0.00000981
Valley Fill Aquifer	5.00E-12	0.00004905
Prow		2.29E-05

RJf 4/20/01 RJf 4/27/01

← this column was revised from in file on pg 6

local					
1	1	535000.0	4049000.0	3426.287100	0.010000
2	2	535000.0	4049000.0	3426.277100	0.511536
3	3	535000.0	4049000.0	3425.765564	3425.765564
4	1	535000.0	4049299.3	3434.925772	0.010000
5	2	535000.0	4049299.3	3434.915772	3.511231
6	3	535000.0	4049299.3	3431.404541	3431.404541
7	1	535000.0	4049598.5	3441.110586	0.010000
8	2	535000.0	4049598.5	3441.100586	3.827545
9	3	535000.0	4049598.5	3437.273041	3437.273041
10	1	535000.0	4049897.8	3444.990103	0.010000
11	2	535000.0	4049897.8	3444.980103	3.055389
12	3	535000.0	4049897.8	3441.924713	3441.924713
13	1	535000.0	4050197.1	3447.435140	0.010000
14	2	535000.0	4050197.1	3447.425140	2.198791
15	3	535000.0	4050197.1	3445.226349	3445.226349
16	1	535000.0	4050496.4	3449.053030	0.010000
17	2	535000.0	4050496.4	3449.043030	1.412476
18	3	535000.0	4050496.4	3447.630554	3447.630554

.in
Copied to ZP
R. Green
4/13/01
SZ Model

This is revised in file for input into amesh.vulcan
Note: this format for in is not good for amesh.vulcan

4/20/01 RWF

The DOE regional sat zone has 3 layers:

1) 0 - 500 m
2) 500 - 1250 m } valley fill alluvium, volcanic rx, shallow carbonates
3) 1250 - 2750 m } volcanic, carbonate, clastic rx

This info taken from "Simulated effects of climate change on the Death Valley GW flow system, NV & CA" by Frank D'Agnese, Grady M O'Brien, Claudia C. Faunt, & Carma A San Juan USGS Water Res. Investigation Report XX - XXXX, 1977

4/23/01 RWF

The initial estimate for lateral fluxes will be taken from the AMR "Recharge & Lateral GW Flow BC for the SZ Site-Scale Flow & Transport Model Rev 00" ANL-NBS-MD-000010 Rev 00

The lateral flow quantities are aligned with the three layer model by D'Agnese et al 1977 discussed at the top of this page. The elements in the regional 3 layer model are 1500m in both the E-W & N-S directions.

4/30/01 RWF

Write a fortran routine to read in regional flux data from the DOE regional saturated zone flow model and output the data as the Boundary conditions for a site-scale MULTIFLO non-isothermal flow model

The input data is from the GW Flow BC AMR

Recharge and Lateral Groundwater Flow Boundary Conditions for the Saturated Zone Site-Scale Flow and Transport Model, Rev. 00

Table 7.2-1. Cell-by-cell flow terms [m^3/day] from the 1977 U. S. Geological Survey model of the Death Valley regional ground-water flow system along the west boundary of the site-scale model

NW

column	row	layer1	layer2	layer3	sum
62	66	300.2210	116.4051	172.6758	589.3019
62	67	385.4388	128.9357	283.9898	798.3643
62	68	91.2969	118.8400	182.6684	392.8053
62	69	81.6321	528.7921	163.5032	773.9274
62	70	119.7977	761.6837	117.8837	999.3651
62	71	102.2948	226.3122	177.2012	505.8082
62	72	3.5854	4.5799	4.5910	12.7563
62	73	0.9552	1.5968	-0.2015	2.3505
62	74	-43.1638	-0.7436	0.2239	-43.6835
62	75	-22.9567	-0.5382	1.9569	-21.5380
62	76	-26.6496	-0.5568	2.1711	-25.0353
62	77	-132.7272	-0.6117	1.8454	-131.4935
62	78	-30.6877	-0.1970	1.3879	-29.4968
62	79	67.7964	0.1506	1.0450	68.9920
62	80	99,1461	0.2877	0.9304	100.3642
62	81	102.5495	0.2189	0.6025	103.3709
62	82	150.8397	0.5854	0.4216	151.8467
62	83	33.8089	0.4745	0.6808	34.9642
62	84	23.4776	112.0292	0.8068	136.3135
62	85	115.8096	156.8466	45.4742	318.1306
62	86	545.1091	226.8207	656.8904	1428.8202
62	87	435.0265	644.8766	799.3350	1879.2381
62	88	389.4053	582.7269	31.7153	1003.8475
62	89	339.5885	482.1666	16.0400	837.7951
62	90	63.1286	604.9294	-1.8066	666.2514
62	91	-0.7494	7.4360	-1.9344	4.7522
62	92	-51.7265	-1.1885	-2.1722	-55.0872
62	93	-59.8463	-2.5714	-2.6846	-65.1023
62	94	-80.7184	-3.5531	-3.7052	-87.9767
62	95	-86.0093	-4.1979	-4.3128	-94.5200

SW

These data were copied into westFil.dat

put on Zip
R. Green 4/13/01
SZ Model

4/30/01 RK

Table 7.2-2. Cell-by-cell flow terms [m^3/day] from the 1977 U. S. Geological Survey model of the Death Valley regional ground-water flow system along the east boundary of the site-scale model

eastfd.dat

NE

column	row	layer1	layer2	layer3	sum
82	66	35.0744	104.1892	1.0335	140.2971
82	67	32.4961	59.5407	2.8732	94.9100
82	68	10.3283	17.9262	1.8526	30.1071
82	69	-3.4922	-6.7300	0.0019	-10.2203
82	70	-21.2585	-30.6522	0.0163	-51.8944
82	71	-31.1982	-40.6015	0.0209	-71.7788
82	72	-95.0790	-0.0151	0.0088	-95.0853
82	73	0.0957	22.1619	0.1119	22.3695
82	74	-0.0253	-4.9123	0.3112	-4.6264
82	75	5.1671	38.1532	0.3185	43.6388
82	76	5.3195	32.5464	14.2158	52.0817
82	77	23.1081	29.8514	36.8918	89.8513
82	78	21.1946	19.7791	14.2273	55.2010
82	79	5.6187	15.7595	4.4241	25.8023
82	80	1.4321	1.8868	-0.6955	2.6234
82	81	4.4139	1.3365	-0.0422	5.7082
82	82	14.2843	3.2528	0.0438	17.5809
82	83	13.3643	3.5229	-0.7694	16.1178
82	84	7.0857	2.9896	-1.4877	8.5876
82	85	6.2192	5.0466	0.1849	11.4497
82	86	29.3401	5.3965	31.3175	[illegible]
82	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
82	88	0.2848	1548.8440	3119.2073	4668.3361
82	89	0.3887	2089.5090	4151.5591	6241.4568
82	90	0.4157	2228.8079	4423.1963	6652.4199
82	91	0.4114	2201.4536	4385.2954	6587.1604
82	92	3.1997	2140.7375	4301.0850	6445.0222
82	93	5.1691	2058.0015	4210.7461	6273.9167
82	94	14.4602	1854.5498	3990.9055	5859.9155
82	95	13.8338	1559.0319	3689.5305	5262.3962

SE

Recharge and Lateral Groundwater Flow Boundary Conditions for the Saturated Zone Site-Scale Flow and Transport Model, Rev. 00

Table 7.2-3. Cell-by-cell flow terms [m^3/day] from the 1977 U. S. Geological Survey model of the Death Valley regional ground-water flow system along the north boundary of the site-scale model

northfd.dat

NW

column	row	layer1	layer2	layer3	sum
63	65	436.7631	158.6168	88.8833	684.2632
64	65	445.4616	666.2696	126.6694	1238.4006
65	65	470.4084	705.4063	142.2845	1318.0992
66	65	496.7751	743.2569	145.7451	1385.7771
67	65	511.1288	766.8786	141.3761	1419.3835
68	65	513.3553	770.7878	131.1927	1415.3358
69	65	500.4772	703.2574	116.6735	1320.4081
70	65	90.0194	124.4723	99.4196	313.9113
71	65	94.3074	135.7408	79.1619	309.2101
72	65	81.8713	125.9834	54.6917	262.5464
73	65	79.1612	122.4325	45.4847	247.0784
74	65	81.7757	123.9266	2.4599	208.1622
75	65	78.1031	207.5337	3.3195	288.9563
76	65	71.3560	834.7631	24.5218	930.6409
77	65	77.1166	911.6486	24.9287	1013.6939
78	65	84.7914	990.1692	26.3804	1101.3410
79	65	160.8794	1060.8494	27.2710	1248.9998
80	65	166.6360	1100.9541	27.4993	1295.0894
81	65	204.6464	321.8176	38.1635	564.6275
82	65	82.4114	226.1308	45.4612	354.0034

NE

5/4/01 RK

The translation of rows/columns to UTM coordinates is:

These are cell ~~centers~~ edges (RK 5/4/01)

			+750m, cell ~~edges~~ centers
column 62 = 533,340		west	534,090
column 82 = 563,340		east	
row 95 = 4,046,782		south	
row 65 = 4,091,782		north	4,092,532

4/30/01 RK

Recharge and Lateral Groundwater Flow Boundary Conditions for the Saturated Zone Site-Scale Flow and Transport Model, Rev. 00

Table 7.2-4. Cell-by-cell flow terms [m^3/day] from the 1977 U. S. Geological Survey model of the Death Valley regional ground-water flow system along the south boundary of the site-scale model

southfd.dat

SW

column	row	layer1	layer2	layer3	sum
63	95	-10.1696	-27.0123	-2.3935	-39.5754
64	95	-162.1753	-65.2793	-3.1454	-230.6000
65	95	-82.6131	-757.2695	-165.6998	-1005.5824
66	95	-358.8732	-600.8329	-192.5924	-1152.2985
67	95	-371.3719	-612.0051	-242.7134	-1226.0904
68	95	-511.8046	-755.4321	-249.1117	-1516.3484
69	95	-555.7947	-830.3972	-1310.7151	-2696.9070
70	95	-592.0862	-885.5881	-1346.3021	-2823.9764
71	95	-609.6418	-913.7783	-1431.5834	-2955.0035
72	95	-557.9603	-853.9814	-1365.4269	-2777.3686
73	95	-487.4033	-749.4507	-1280.9761	-2517.8301
74	95	-296.7092	-462.6852	-1192.6534	-1952.0478
75	95	-134.0494	-45.4739	-1074.3965	-1253.9198
76	95	-75.9106	-35.3944	-54.2203	-165.5253
77	95	-1.0317	16.2062	21.8088	36.9833
78	95	-10.1687	-97.8409	-152.0629	-260.0725
79	95	-6.4307	-3467.8037	-7410.0439	-10884.2783
80	95	-5.3251	-3423.5581	-7539.6074	-10968.4906
81	95	-32.0253	-3663.1204	-7828.6636	-11523.8093
82	95	-35.7936	-4120.3281	-8149.0601	-12305.1818

SE

The routine is called bc2bc.f. It takes the DOE regional SZ flow model fluxes and writes out the boundary conditions for a site-scale model in the bcon-a format. The DOE flux data is for 1500 x 1500 m blocks in the horizontal plane.

The DOE regional-scale flow model has 3 layers as described on pg 8. The 3 layers are uniform in thickness.

In contrast, the D. Sims model on pg 6-7 has 3 layers, but with variable thickness. BC2BC.F has to put the fluxes from the regional SZ DOE flow model into the correct Sims model layers

4/30/01 RFF

bc2bc.F divides the 1500 x 1500 m elements by 5.05 in the N-S direction (for 297.1 m blocks) and by 5.09 in the E-W direction (for 294.7 m blocks)

Note: Water flux is only put into layers 1 & 3 of the MULTIFLO model. Layer 2 is an aquitard

> If layer 1 of the Simms model (Mid Vol aq.) is less than 500 m thick, then only the thickness of layer 1 / 500m times DOE layer 1 flux is put into (out of) Simms model layer 1. The remainder of flux from DOE layer 1 plus all of flux from DOE layers 2 & 3 go into Simms layer 3 (Carbonate aquifer)

> If layer 1 of Simms model is greater than 500m then the appropriate portion of DOE layer 2 plus all of DOE layer 1 go into Simms layer 1, the remainder of layer 2 & all of layer 3 from DOE model go into layer 3 of Simms model.

> There is no instance when Simms layer 1 is greater than 1250m (thickness of DOE layer 1 (500m) ~~and~~ (plus) layer 2 (750m)), therefore this calculation is not included in bc2bc.F

4/30/01 RFF

The corners are handled differently in bc2bc.F. Each of the four corners of the Simms model (each corner has 2 active flow layers) includes the fluxes from both sides that make up the corner.

The DOE fluxes are expressed for the following coordinates:

xmin	533,340 m E	30 Km
xmax	563,340 m E	x
ymin	4,046,780 m N	45 Km
ymax	4,091,780 m N	

This is from pgs 18 & 19 of AMR on SZ BC.

These values differ slightly from those used in the Simms model:

west	535,000	28 ~~15~~ Km (RFF 4/30/01)
east	563,000	x
north	4,090,000	41 Km
south	4,049,000	

the differences are

west	1,660 m
east	340 m
north	1,780 m
south	2,220 m

4/30/01 RH

wrong 5/1/01 RH

input-dat

1	1	535000.0	4049000.0	3426.287100	0.010000
2	2	535000.0	4049000.0	3426.277100	0.511536
3	3	535000.0	4049000.0	3425.765564	3425.765564
4	1	535000.0	4049299.3	3434.925772	0.010000
5	2	535000.0	4049299.3	3434.915772	3.511231
6	3	535000.0	4049299.3	3431.404541	3431.404541
7	1	535000.0	4049598.5	3441.110586	0.010000
8	2	535000.0	4049598.5	3441.100586	3.827545
9	3	535000.0	4049598.5	3437.273041	3437.273041
10	1	535000.0	4049897.8	3444.990103	0.010000
11	2	535000.0	4049897.8	3444.980103	3.055389
12	3	535000.0	4049897.8	3441.924713	3441.924713
13	1	535000.0	4050197.1	3447.435140	0.010000
14	2	535000.0	4050197.1	3447.425140	2.198791
15	3	535000.0	4050197.1	3445.226349	3445.226349
16	1	535000.0	4050496.4	3449.053030	0.010000
17	2	535000.0	4050496.4	3449.043030	1.412476
18	3	535000.0	4050496.4	3447.630554	3447.630554
19	1	535000.0	4050795.6	3449.661032	0.010000
20	2	535000.0	4050795.6	3449.651032	3.440491
21	3	535000.0	4050795.6	3446.210541	3446.210541
22	1	535000.0	4051094.9	3449.138998	0.010000
413	2	535000.0	4090000.0	3492.500794	958.231934
414	3	535000.0	4090000.0	2534.268860	2534.268860
415	1	535297.9	4049000.0	3430.563497	0.010000
416	2	535297.9	4049000.0	3430.553497	2.388886
417	3	535297.9	4049000.0	3428.164612	3428.164612
826	1	535297.9	4090000.0	4044.937622	529.911499
827	2	535297.9	4090000.0	3515.026123	944.764465
828	3	535297.9	4090000.0	2570.261658	2570.261658
829	1	535595.7	4049000.0	3433.997457	0.010000
830	2	535595.7	4049000.0	3433.987457	4.007752
831	3	535595.7	4049000.0	3429.979706	3429.979706
1240	1	535595.7	4090000.0	4064.701904	526.341797
39328	1	563000.0	4089700.7	4389.704082	0.010000
39329	2	563000.0	4089700.7	4389.694082	0.010000
39330	3	563000.0	4089700.7	4389.594082	4389.694082
39331	1	563000.0	4090000.0	4385.101543	0.010000
39332	2	563000.0	4090000.0	4385.091543	0.010000
39333	3	563000.0	4090000.0	4385.081543	4385.081543

output-dat

1	2	1	-4.81274E-04	109617.	20.0000	0.150000
2	2	1	0.	591941.	20.0027	1.00000E-01
3	2	1	-2455.24	3.29464E+09	37.1340	5.00000E-02
4	2	1	-3.19677E-04	100979.8	20.0000	0.150000
5	2	1	0.	444033.	20.0177	1.00000E-01
6	2	1	-17.4208	3.36311E+08	37.1622	5.00000E-02
7	2	1	-3.19677E-04	100979.8	20.0000	0.150000
8	2	1	0.	475025.	20.0192	1.00000E-01
9	2	1	-17.4208	3.36886E+08	37.1916	5.00000E-02
10	2	1	-3.19677E-04	100979.8	20.0000	0.150000
11	2	1	0.	399369.	20.0154	1.00000E-01
12	2	1	-17.4208	3.37342E+08	37.2148	5.00000E-02
13	2	1	-3.19677E-04	100979.8	20.0000	0.150000
14	2	1	0.	315439.	20.0111	1.00000E-01
15	2	1	-17.4208	3.37666E+08	37.2313	5.00000E-02
16	2	1	-3.19677E-04	100979.8	20.0000	0.150000
17	2	1	0.	238395.	20.0072	1.00000E-01
18	2	1	-17.4208	3.37901E+08	37.2434	5.00000E-02
19	2	1	-2.37015E-04	100979.8	20.0000	0.150000
20	2	1	0.	437102.	20.0173	1.00000E-01
21	2	1	-12.8913	3.37762E+08	37.2363	5.00000E-02
22	2	1	-2.37015E-04	100979.8	20.0000	0.150000
413	2	1	0.	9.37946E+07	30.1279	1.00000E-01
414	2	1	261.071	2.47897E+08	38.0132	5.00000E-02
415	2	5	-6.37231E-04	100979.8	20.0000	0.150000
416	2	5	0.	333582.	20.0120	1.00000E-01
417	2	5	-45.3039	3.35301E+08	37.1460	5.00000E-02
826	2	6	92.7375	5.20211E+07	22.6496	0.150000
827	2	6	0.	9.24778E+07	30.0229	1.00000E-01
828	2	6	150.563	2.51417E+08	38.1555	5.00000E-02
829	2	5	-3.24609E-04	100979.8	20.0000	0.150000
830	2	5	0.	491873.	20.0201	1.00000E-01
831	2	5	-197.560	3.35479E+08	37.1551	5.00000E-02
1240	2	6	97.2856	5.16713E+07	22.6317	0.150000
39328	2	2	1.28697E-04	100979.8	20.0000	0.150000
39329	2	2	0.	100979.8	20.0002	1.00000E-01
39330	2	2	18.7939	4.30205E+08	41.9537	5.00000E-02
39331	2	2	3.78604E-04	100979.8	20.0000	0.150000
39332	2	2	0.	100979.8	20.0002	1.00000E-01
39333	2	2	1103.97	4.29753E+08	41.9306	5.00000E-02

These are some sample data from input.dat & output.dat files for bc2bc-F. Output.dat is written in the format of bcon_a

5/1/01 RH

Following is a check of the bc2bc-F reformatting script.

elements 4-6 have locations in x, y of 535,000.0, 4049299.3

535,000 is less than 535,001 therefore it is on the west boundary (i.e. column 62 on pg 9), 4049299.3 puts it within ±750m of row 94 on pg 9

row 94 is at 4048282 (or 4046782 + 1500)

Therefore $\frac{0.01}{500}(-80.7184)/5.05 = -3.19677e4$ for layer 1 of Simmons model.

Layer 3 is $\left[\left(\frac{499.99}{500}\right)(-80.7184) + (-3.5531) + (-3.7052)\right]/5.05$

$= -17.4208$

These values are consistent with output.dat

However, the corners are incorrect. Found error in bc2bc-F, fixed & re-ran with the following output.dat (next page)

RH

5/2/01 RTf

1	2	1	-3.80590E-04	109617.	20.0000	0.150000
2	2	1	0.	591941.	20.0027	1.00000E-01
3	2	1	-26.4064	3.29464E+09	37.1340	5.00000E-02
4	2	1	-3.19677E-04	100979.8	20.0000	0.150000
5	2	1	0.	444033.	20.0177	1.00000E-01
6	2	1	-17.4208	3.36311E+08	37.1622	5.00000E-02
7	2	1	-3.19677E-04	100979.8	20.0000	0.150000
8	2	1	0.	475025.	20.0192	1.00000E-01
9	2	1	-17.4208	3.36886E+08	37.1916	5.00000E-02
10	2	1	-3.19677E-04	100979.8	20.0000	0.150000
11	2	1	0.	399369.	20.0154	1.00000E-01
12	2	1	-17.4208	3.37342E+08	37.2148	5.00000E-02
13	2	1	-3.19677E-04	100979.8	20.0000	0.150000
14	2	1	0.	315439.	20.0111	1.00000E-01
15	2	1	-17.4208	3.37666E+08	37.2313	5.00000E-02
16	2	1	-3.19677E-04	100979.8	20.0000	0.150000
17	2	1	0.	238395.	20.0072	1.00000E-01
18	2	1	-17.4208	3.37901E+08	37.2434	5.00000E-02
19	2	1	-2.37015E-04	100979.8	20.0000	0.150000
20	2	1	0.	437102.	20.0173	1.00000E-01
21	2	1	-12.8913	3.37762E+08	37.2363	5.00000E-02
22	2	1	-2.37015E-04	100979.8	20.0000	0.150000
413	2	1	0.	9.37946E+07	30.1279	1.00000E-01
414	2	1	535.171	2.47897E+08	38.0132	5.00000E-02
415	2	5	-6.37231E-04	100979.8	20.0000	0.150000
416	2	5	0.	333582.	20.0120	1.00000E-01
417	2	5	-45.3039	3.35301E+08	37.1460	5.00000E-02
826	2	6	92.7375	5.20211E+07	22.6496	0.150000
827	2	6	0.	9.24778E+07	30.0229	1.00000E-01
828	2	6	150.563	2.51417E+08	38.1555	5.00000E-02
829	2	5	-3.24609E-04	100979.8	20.0000	0.150000
830	2	5	0.	491873.	20.0201	1.00000E-01
831	2	5	-197.560	3.35479E+08	37.1551	5.00000E-02
1240	2	6	97.2856	5.16713E+07	22.6317	0.150000
1241	2	6	0.	9.13654E+07	29.9304	1.00000E-01
1242	2	6	161.673	2.54811E+08	38.2934	5.00000E-02
1243	2	5	-3.24609E-04	100979.8	20.0000	0.150000
1244	2	5	0.	720482.	20.0318	1.00000E-01
1245	2	5	-197.560	3.35908E+08	37.1571	5.00000E-02
39328	2	2	1.28697E-04	100979.8	20.0000	0.150000
39329	2	2	0.	100979.8	20.0002	1.00000E-01
39330	2	2	18.7939	4.30205E+08	41.9537	5.00000E-02
39331	2	2	4.62725E-04	100979.8	20.0000	0.150000
39332	2	2	0.	100979.8	20.0002	1.00000E-01
39333	2	2	97.6629	4.29753E+08	41.9306	5.00000E-02

This is the SW corner, therefore it (element 1) gets fluxes from both the south and west ~~corners~~ boundaries RTf 5/2/01

west boundary

~~(-94.52)/5.05 = -18.717~~ RTf 5/2/01

(-94.520)/5.09 = -18.5697

south boundary

~~(-39.575)/5.09 = -7.775~~ RTf 5/2/01

(-39.5754)/5.05 = -7.8367

-26.406

This is in agreement w/ the corner calculation

5/2/01 RTf

Following is a copy of the script bc2bc.f also on Zip R Green 4/13/01 SZ Model

```
c this is bc2bc.f designed to take the DOE regional sz fluxes and put
c them in as the bc for a MULTIFLO site-scale sz non-isothermal model
C written on april 30, 2001 by RT Green
      character filename*64
      parameter(max=100)
      parameter(maxn=50000)
      real wflux1(max),wflux2(max),wflux3(max),wtotfl(max)
      real eflux1(max),eflux2(max),eflux3(max),etotfl(max)
      real nflux1(max),nflux2(max),nflux3(max),ntotfl(max)
      real sflux1(max),sflux2(max),sflux3(max),stotfl(max)
      real lay(maxn),x(maxn),y(maxn),z(maxn),depth(maxn)
      integer icount(maxn)
      integer wxcol(max),wycol(max),excol(max),eycol(max)
      real wcoly(max),ecoly(max)
      integer nxcol(max),nycol(max),sxcol(max),sycol(max)
      real ncolx(max),scolx(max)
      real flx(maxn)
      real north,south,east,west
      real density(22)
      data density /0.99987, 0.99999, 0.99973, 0.99913, 0.99823,
     1 0.99707, 0.99564, 0.99406, 0.99299, 0.99224, 0.99025, 0.98807,
     2 0.98573, 0.98324, 0.98059, 0.97781, 0.97489, 0.97183, 0.96865,
     3 0.96534, 0.96192, 0.95838/
      data gravity /9.8066/
      data west,east,north,south/535001.0,562999.0,4089999.0,4049001.0/
      data atmpress/100000.0/

      open(unit=40,file='output.dat')

c       itype1 = Dirichlet
c       itype2 = Neumann
c       itype3 = liquid flux
c       itype4 = radiation heat flux only
c       itype5 = mixed (specified gas pressure, temperature, and liquid flux)

      itype1 = 1
      itype2 = 2
      itype3 = 3
      itype4 = 4
      itype5 = 5

c       iface1 = west side
c       iface2 = east side
c       iface3 = top
c       iface4 = bottom
c       iface5 = south side
c       iface6 = north side

      iface1 = 1
      iface2 = 2
      iface3 = 3
      iface4 = 4
      iface5 = 5
      iface6 = 6

      por1 = 0.15
      por2 = 0.10
      por3 = 0.05

      open(unit=10,file='input.dat')

      open(unit=30,file='westfil.dat')
c     go to 100
        i2=1
        do while(.true.)

c  westfil is a file containing lateral flux data along west boundary from bc amr
c  wflux1 is the flux to/from the top layer, 0-500 m below potentiometric surface
c  wflux2 is the flux to/from the layer 500-1250 m below potentiometric surface
c  wflux3 is the flux to/from the bottom layer, 1250-2750 m below potentiometric surface
c  wtotfl is the total flux to/from all three layers at location (wxcol,wycol)

               read(30,*,end=12)wxcol(i2),wycol(i2),wflux1(i2),
     1              wflux2(i2),wflux3(i2),wtotfl(i2)
               wcoly(i2)=-(i2-1)*1500.0+4091780.0
               i2=i2+1

        enddo

 12     continue

         i2=i2-1

       open(unit=31,file='eastfil.dat')
        i3=1

        do while(.true.)

c  eastfil is a file containing lateral flux data along east boundary from bc amr

               read(31,*,end=13)excol(i3),eycol(i3),eflux1(i3),
     1                  eflux2(i3),eflux3(i3),etotfl(i3)
                    ecoly(i3)=-(i3-1)*1500.0+4091780.0

               i3=i3+1
        enddo

 13     continue

       i3=i3-1

       open(unit=32,file='northfil.dat')
        i4=1

        do while(.true.)

c  northfil is a file containing lateral flux data along north boundary from bc amr

               read(32,*,end=14)nxcol(i4),nycol(i4),nflux1(i4),
     1                 nflux2(i4),nflux3(i4),ntotfl(i4)
               ncolx(i4)=((i4)-1)*1500.0+533340.0
               i4=i4+1
        enddo

 14     continue

         i4=i4-1

       open(unit=33,file='southfil.dat')
        i5=1

        do while(.true.)

c  southfil is a file containing lateral flux data along south boundary from bc amr

               read(33,*,end=15)sxcol(i5),sycol(i5),sflux1(i5),
     1               sflux2(i5),sflux3(i5),stotfl(i5)
               scolx(i5)=((i5)-1)*1500.0+533340.0

               i5=i5+1
        enddo

 15     continue

         i5=i5-1

       read(10,'(A)') filename
        i=1

c  file 10 is eleme which contains eleme number, layer number, x,y,z, and thickness of each

       do while(.true.)
```

4092532

534,090

moved from cell edge to cell center

RTf 5/9/01

This reads in the in file w/o 1 ocat as lead line (header) for 3 dimensions of unstructured grid (input.dat)

output is written into output.dat in bcon-a format

5/2/01 RJH

```
      read(10,*,end=11) icount(i),lay(i),x(i),y(i),z(i),depth(i)
      read(10,*,end=11) icount(i+1),lay(i+1),x(i+1),y(i+1),
     1 z(i+1),depth(i+1)
      read(10,*,end=11) icount(i+2),lay(i+2),x(i+2),y(i+2),
     1 z(i+2),depth(i+2)
c 9   format(a45,f11.3,f12.3,f12.4)
c     write(*,*) icount(i),lay(i),x(i),y(i),z(i),depth(i)

      temp1 = 20.0 + (depth(i)/2.0)*0.01
      temp2 = 20.0 + (depth(i)+depth(i+1)/2.0)*0.01
      temp3 = 20.0 + (depth(i)+depth(1+1)+depth(i+2)/2.0)*0.01

      press1 = depth(i)*density(itemp1)*gravity*10000.0+atmpress
      press2 = depth(i+1)*density(itemp2)*gravity*10000.0+atmpress
      press3 = depth(i+2)*density(itemp2)*gravity*10000.0+atmpress

      itemp1=ifix(temp1/5)
      itemp2=ifix(temp2/5)
      itemp3=ifix(temp3/5)

c check to see if the element is on a boundary, if yes skip to end

       if (y(i).lt.south.and.x(i).lt.west) go to 90
       if (y(i).lt.south.and.x(i).gt.east) go to 90
       if (y(i).gt.north.and.x(i).lt.west) go to 90
       if (y(i).gt.north.and.x(i).gt.east) go to 90

c  This determines whether the element falls on the west boundary

       if (x(i).lt.west)then
c      write(*,*) icount(i),lay(i),x(i),y(i),z(i),depth(i),west

c    If yes, then determine which column in westfil the element is located
c      m is the number of rows in the DOE regional ifixel

         do m=1,i2

          if(y(i).gt.(wcoly(m)-750.0).and.y(i).lt.(wcoly(m)+750.0))then

c         Once the correct column is located, determine the amount of flux to be prescribed

            if(lay(i).eq.1.and.depth(i).lt.500.0)then

                flx(icount(i))=(depth(i)/500.0)*wflux1(m)
                flx(icount(i+2))=wflux1(m)-flx(icount(i))+
     1           wflux2(m)+wflux3(m)
                flx(icount(i))=flx(icount(i))/5.05
                 flx(icount(i+1))=0.0
                flx(icount(i+2))=flx(icount(i+2))/5.05

              write(40,*)icount(i),itype2,iface1,flx(icount(i)),
     1         press1,temp1,por1
              write(40,*)icount(i+1),itype2,iface1,flx(icount(i+1)),
     1         press2,temp2,por2
              write(40,*)icount(i+2),itype2,iface1,flx(icount(i+2)),
     1         press3,temp3,por3

            else if (lay(i).eq.1.and.depth(i).gt.500.0)then

                factor=((depth(i)-500.0)/750.0)*wflux2(m)
                flx(icount(i))=wflux1(m)+factor
                flx(icount(i+2))=wflux3(m)+(wflux2(m)-factor)
                flx(icount(i))=flx(icount(i))/5.05
                 flx(icount(i+1))=0.0
                flx(icount(i+2))=flx(icount(i+2))/5.05

              write(40,*)icount(i),itype2,iface1,flx(icount(i)),
     1         press1,temp1,por1
              write(40,*)icount(i+1),itype2,iface1,flx(icount(i+1)),
     1         press2,temp2,por2
              write(40,*)icount(i+2),itype2,iface1,flx(icount(i+2)),
     1         press3,temp3,por3

            end if

          end if

         enddo

c  This determines whether the element falls on the east boundary

       else if (x(i).gt.east)then
c      write(*,*) icount(i),lay(i),x(i),y(i),z(i),depth(i),east

c    If yes, then determine which column in eastfil the element is located
c      m is the number of rows in the DOE regional ifixel

         do m=1,i3

          if(y(i).gt.(ecoly(m)-750.0).and.y(i).lt.(ecoly(m)+750.0))then

c         Once the correct column is located, determine the amount of flux to be prescribe

            if(lay(i).eq.1.and.depth(i).lt.500.0)then

                flx(icount(i))=(depth(i)/500.0)*eflux1(m)
                flx(icount(i+2))=eflux1(m)-flx(icount(i))+
     1           eflux2(m)+eflux3(m)
                flx(icount(i))=flx(icount(i))/5.05
                 flx(icount(i+1))=0.0
                flx(icount(i+2))=flx(icount(i+2))/5.05

              write(40,*)icount(i),itype2,iface2,flx(icount(i)),
     1         press1,temp1,por1
              write(40,*)icount(i+1),itype2,iface2,flx(icount(i+1)),
     1         press2,temp2,por2
              write(40,*)icount(i+2),itype2,iface2,flx(icount(i+2)),
     1         press3,temp3,por3

            else if (lay(i).eq.1.and.depth(i).gt.500.0)then

                factor=((depth(i)-500.0)/750.0)*eflux2(m)
                flx(icount(i))=eflux1(m)+factor
                flx(icount(i+2))=eflux3(m)+(eflux2(m)-factor)
                flx(icount(i))=flx(icount(i))/5.05
                 flx(icount(i+1))=0.0
                flx(icount(i+2))=flx(icount(i+2))/5.05

              write(40,*)icount(i),itype2,iface2,flx(icount(i)),
     1         press1,temp1,por1
              write(40,*)icount(i+1),itype2,iface2,flx(icount(i+1)),
     1         press2,temp2,por2
              write(40,*)icount(i+2),itype2,iface2,flx(icount(i+2)),
     1         press3,temp3,por3

            end if

          end if

         enddo

c  This determines whether the element falls on the north boundary

       write(*,*) i, y(i), north

       else if (y(i).gt.north)then
       write(*,*) icount(i),lay(i),x(i),y(i),z(i),depth(i),north

c    If yes, then determine which column in northfil the element is located
c      m is the number of rows in the DOE regional ifixel

         do m=1,i4
```

2 1 | 2 2

changed to iface1, itype2 from itype2, iface1 RJH 6/25/01

left as is RJH 6/25/01

5/2/01 RJH

```
          if(x(i).gt.(ncolx(m)-750.0).and.x(i).lt.(ncolx(m)+750.0))then

c         Once the correct column is located, determine the amount of flux to be prescribe

            if(lay(i).eq.1.and.depth(i).lt.500.0)then

                flx(icount(i))=(depth(i)/500.0)*nflux1(m)
                flx(icount(i+2))=nflux1(m)-flx(icount(i))+
     1           nflux2(m)+nflux3(m)
                flx(icount(i))=flx(icount(i))/5.09
                 flx(icount(i+1))=0.0
                flx(icount(i+2))=flx(icount(i+2))/5.09

              write(40,*)icount(i),itype2,iface6,flx(icount(i)),
     1         press1,temp1,por1
              write(40,*)icount(i+1),itype2,iface6,flx(icount(i+1)),
     1         press2,temp2,por2
              write(40,*)icount(i+2),itype2,iface6,flx(icount(i+2)),
     1         press3,temp3,por3

            else if (lay(i).eq.1.and.depth(i).gt.500.0)then

                factor=((depth(i)-500.0)/750.0)*nflux2(m)
                flx(icount(i))=nflux1(m)+factor
                flx(icount(i+2))=nflux3(m)+(nflux2(m)-factor)
                flx(icount(i))=flx(icount(i))/5.09
                 flx(icount(i+1))=0.0
                flx(icount(i+2))=flx(icount(i+2))/5.09

              write(40,*)icount(i),itype2,iface6,flx(icount(i)),
     1         press1,temp1,por1
              write(40,*)icount(i+1),itype2,iface6,flx(icount(i+1)),
     1         press2,temp2,por2
              write(40,*)icount(i+2),itype2,iface6,flx(icount(i+2)),
     1         press3,temp3,por3

            end if

          end if

         enddo

c  This determines whether the element falls on the south boundary
       else if (y(i).lt.south)then

c    If yes, then determine which column in southfil the element is located
c      m is the number of rows in the DOE regional ifixel
         do m=1,i5
          if(x(i).gt.(scolx(m)-750.0).and.x(i).lt.(scolx(m)+750.0))then

c         Once the correct column is located, determine the amount of flux to be prescribe

            if(lay(i).eq.1.and.depth(i).lt.500.0)then

                flx(icount(i))=(depth(i)/500.0)*sflux1(m)
                flx(icount(i+2))=sflux1(m)-flx(icount(i))+
     1           sflux2(m)+sflux3(m)
                flx(icount(i))=flx(icount(i))/5.09
                 flx(icount(i+1))=0.0
                flx(icount(i+2))=flx(icount(i+2))/5.09

              write(40,*)icount(i),itype2,iface5,flx(icount(i)),
     1         press1,temp1,por1
              write(40,*)icount(i+1),itype2,iface5,flx(icount(i+1)),
     1         press2,temp2,por2
              write(40,*)icount(i+2),itype2,iface5,flx(icount(i+2)),
     1         press3,temp3,por3

            else if (lay(i).eq.i.and.depth(i).gt.500.0)then

                factor=((depth(i)-500.0)/750.0)*sflux2(m)
                flx(icount(i))=sflux1(m)+factor
                flx(icount(i+2))=sflux3(m)+(sflux2(m)-factor)
                flx(icount(i))=flx(icount(i))/5.09
                 flx(icount(i+1))=0.0
                flx(icount(i+2))=flx(icount(i+2))/5.09

              write(40,*)icount(i),itype2,iface5,flx(icount(i)),
     1         press1,temp1,por1
              write(40,*)icount(i+1),itype2,iface5,flx(icount(i+1)),
     1         press2,temp2,por2
              write(40,*)icount(i+2),itype2,iface5,flx(icount(i+2)),
     1         press3,temp3,por3

            end if

          end if

         enddo

       end if

 90    continue

c check if a corner, then add both direction fluxes

c   first check if southwest corner

       if (y(i).lt.south.and.x(i).lt.west) then

c         Once the correct column is located, determine the amount of flux to be prescribe

            if(lay(i).eq.1.and.depth(i).lt.500.0)then

                flux0=((depth(i)/500.0)*sflux1(1))/5.09
                 flux1=((depth(i)/500.0)*wflux1(i2))/5.05
                flx(icount(i))=flux0+flux1
                flx(icount(i+2))=(sflux1(1)-flux0+
     1           sflux2(1)+sflux3(1))/5.05+
     2           (wflux1(i2)-flux1+wflux2(i2)+wflux3(i2))/5.09
                flx(icount(i+1))=0.0

              write(40,*)icount(i),itype2,iface1,flx(icount(i)),
     1         press1,temp1,por1
              write(40,*)icount(i+1),itype2,iface1,flx(icount(i+1)),
     1         press2,temp2,por2
              write(40,*)icount(i+2),itype2,iface1,flx(icount(i+2)),
     1         press3,temp3,por3

            else if (lay(i).eq.1.and.depth(i).gt.500.0)then

                factor0=(((depth(i)-500.0)/750.0)*sflux2(1))/5.05
                factor1=(((depth(i)-500.0)/750.0)*wflux2(i2))/5.09
                flx(icount(i))=sflux1(1)+factor0+wflux1(i2)+factor1
                flx(icount(i+2))=sflux3(1)+(sflux2(1)-factor0)+
     1          wflux3(i2)+(wflux2(i2)-ifactor1)
                 flx(icount(i+1))=0.0

              write(40,*)icount(i),itype2,iface1,flx(icount(i)),
     1         press1,temp1,por1
              write(40,*)icount(i+1),itype2,iface1,flx(icount(i+1)),
     1         press2,temp2,por2
              write(40,*)icount(i+2),itype2,iface1,flx(icount(i+2)),
     1         press3,temp3,por3

            end if

c    check if southeast corner

       else if (y(i).lt.south.and.x(i).gt.east) then
```

2 6 | 2 5

the type, iface were reversed RJH 6/25/01

The revised file is in ~/57/bc2bc-new.F & on Zip SZ Model 4/13/01 RJH 7/10/01

Compiled version is bc2bc-new, also on Zip 4/13/01

5/2/01 RJJ

```
c          Once the correct column is located, determine the amount of flux to be prescribe
            if(lay(i).eq.1.and.depth(i).lt.500.0)then

                  flux0=((depth(i)/500.0)*sflux1(i5))/5.09
                   flux1=((depth(i)/500.0)*eflux1(i3))/5.05
                  flx(icount(i))=flux0+flux1
                  flx(icount(i+2))=(sflux1(i5)-flux0+
     1             sflux2(i5)+sflux3(i5))/5.05+
     2             (eflux1(i3)-flux1+eflux2(i3)+eflux3(i3))/5.09
                  flx(icount(i+1))=0.0

               write(40,*)icount(i),itype2,iface2,flx(icount(i)),
     1          press1,temp1,por1
               write(40,*)icount(i+1),itype2,iface2,flx(icount(i+1)),
     1          press2,temp2,por2
               write(40,*)icount(i+2),itype2,iface2,flx(icount(i+2)),
     1          press3,temp3,por3

            else if (lay(i).eq.1.and.depth(i).gt.500.0)then

                  factor0=(((depth(i)-500.0)/750.0)*sflux2(i5))/5.05
                  factor1=(((depth(i)-500.0)/750.0)*eflux2(i3))/5.09
                  flx(icount(i))=sflux1(i5)+factor0+eflux1(i3)+factor1
                  flx(icount(i+2))=sflux3(i5)+(sflux2(i5)-factor0)+
     1            eflux3(i3)+(eflux2(i3)-ifactor1)
                   flx(icount(i+1))=0.0

               write(40,*)icount(i),itype2,iface2,flx(icount(i)),
     1          press1,temp1,por1
               write(40,*)icount(i+1),itype2,iface2,flx(icount(i+1)),
     1          press2,temp2,por2
               write(40,*)icount(i+2),itype2,iface2,flx(icount(i+2)),
     1          press3,temp3,por3

            end if

c  check if northwest corner

         else if (y(i).gt.north.and.x(i).lt.west) then

c          Once the correct column is located, determine the amount of flux to be prescrib

            if(lay(i).eq.1.and.depth(i).lt.500.0)then

                  flux0=((depth(i)/500.0)*nflux1(1))/5.09
                   flux1=((depth(i)/500.0)*wflux1(1))/5.05
                  flx(icount(i))=flux0+flux1
                  flx(icount(i+2))=(nflux1(1)-flux0+
     1             nflux2(1)+nflux3(1))/5.05+
     2             (wflux1(1)-flux1+wflux2(1)+wflux3(1))/5.09
                  flx(icount(i+1))=0.0

               write(40,*)icount(i),itype2,iface1,flx(icount(i)),
     1          press1,temp1,por1
               write(40,*)icount(i+1),itype2,iface1,flx(icount(i+1)),
     1          press2,temp2,por2
               write(40,*)icount(i+2),itype2,iface1,flx(icount(i+2)),
     1          press3,temp3,por3

            else if (lay(i).eq.1.and.depth(i).gt.500.0)then

                  factor0=(((depth(i)-500.0)/750.0)*nflux2(1))/5.05
                  factor1=(((depth(i)-500.0)/750.0)*wflux2(1))/5.09
                  flx(icount(i))=nflux1(1)+factor0+eflux1(1)+factor1
                  flx(icount(i+2))=nflux3(1)+(nflux2(1)-factor0)+
     1            wflux3(1)+(wflux2(1)-ifactor1)
                   flx(icount(i+1))=0.0

               write(40,*)icount(i),itype2,iface1,flx(icount(i)),
     1          press1,temp1,por1
               write(40,*)icount(i+1),itype2,iface1,flx(icount(i+1)),
     1          press2,temp2,por2
               write(40,*)icount(i+2),itype2,iface1,flx(icount(i+2)),
     1          press3,temp3,por3

            end if

c  check if northeast corner

         else if (y(i).gt.north.and.x(i).gt.east) then

c          Once the correct column is located, determine the amount of flux to be prescribed

            if(lay(i).eq.1.and.depth(i).lt.500.0)then

                  flux0=((depth(i)/500.0)*nflux1(i4))/5.09
                   flux1=((depth(i)/500.0)*eflux1(1))/5.05
                  flx(icount(i))=flux0+flux1
                  flx(icount(i+2))=(nflux1(i4)-flux0+
     1             nflux2(i4)+nflux3(i4))/5.05+
     2             (eflux1(1)-flux1+eflux2(1)+eflux3(1))/5.09
                  flx(icount(i+1))=0.0

               write(40,*)icount(i),itype2,iface2,flx(icount(i)),
     1          press1,temp1,por1
               write(40,*)icount(i+1),itype2,iface2,flx(icount(i+1)),
     1          press2,temp2,por2
               write(40,*)icount(i+2),itype2,iface2,flx(icount(i+2)),
     1          press3,temp3,por3

            else if (lay(i).eq.1.and.depth(i).gt.500.0)then

                  factor0=(((depth(i)-500.0)/750.0)*nflux2(i4))/5.05
                  factor1=(((depth(i)-500.0)/750.0)*eflux2(1))/5.09
                  flx(icount(i))=nflux1(i4)+factor0+eflux1(1)+factor1
                  flx(icount(i+2))=nflux3(i4)+(nflux2(i4)-factor0)+
     1            eflux3(1)+(eflux2(1)-ifactor1)
                   flx(icount(i+1))=0.0

               write(40,*)icount(i),itype2,iface2,flx(icount(i)),
     1          press1,temp1,por1
               write(40,*)icount(i+1),itype2,iface2,flx(icount(i+1)),
     1          press2,temp2,por2
               write(40,*)icount(i+2),itype2,iface2,flx(icount(i+2)),
     1          press3,temp3,por3

            end if

         end if

         i=i+3

         enddo

 11      continue

        close(10)
        close(30)
        close(31)
        close(32)
        close(33)
        close(40)
        end
```

the itype, iface — were renamed 6/25/01 RJJ

7/10/01 RJJ

The input.dat file for bc2bc-new.F looks like

locat

1	1	535000.000	4049000.000	3426.287	0.010
2	2	535000.000	4049000.000	3426.277	0.512
3	3	535000.000	4049000.000	3425.766	3425.766
4	1	535000.000	4049299.250	3434.926	0.010
5	2	535000.000	4049299.250	3434.916	3.511
6	3	535000.000	4049299.250	3431.405	3431.405
7	1	535000.000	4049598.500	3441.111	0.010
8	2	535000.000	4049598.500	3441.101	3.828
9	3	535000.000	4049598.500	3437.273	3437.273
10	1	535000.000	4049897.750	3444.990	0.010
11	2	535000.000	4049897.750	3444.980	3.055
12	3	535000.000	4049897.750	3441.925	3441.925
13	1	535000.000	4050197.000	3447.435	0.010
14	2	535000.000	4050197.000	3447.425	2.199
15	3	535000.000	4050197.000	3445.226	3445.226
39321	3	563000.000	4089102.250	4396.952	4396.952
39322	1	563000.000	4089401.500	4393.913	0.010
39323	2	563000.000	4089401.500	4393.903	0.010
39324	3	563000.000	4089401.500	4393.893	4393.893
39325	1	563000.000	4089700.750	4389.704	0.010
39326	2	563000.000	4089700.750	4389.704	0.010
39327	3	563000.000	4089700.750	4389.694	4389.694
39328	1	563000.000	4090000.000	4385.102	0.010
39329	2	563000.000	4090000.000	4385.091	0.010
39330	3	563000.000	4090000.000	4385.082	4385.082

w/ <cr> on last line

this file is in ~/sz/input.dat, also on zip SZ model 4/13/01

input.dat was taken from 3layersFinal5.xls & 3layersFinal5.txt in ~/sz/* & on zip SZ model 4/13/01

7/10/01 RH

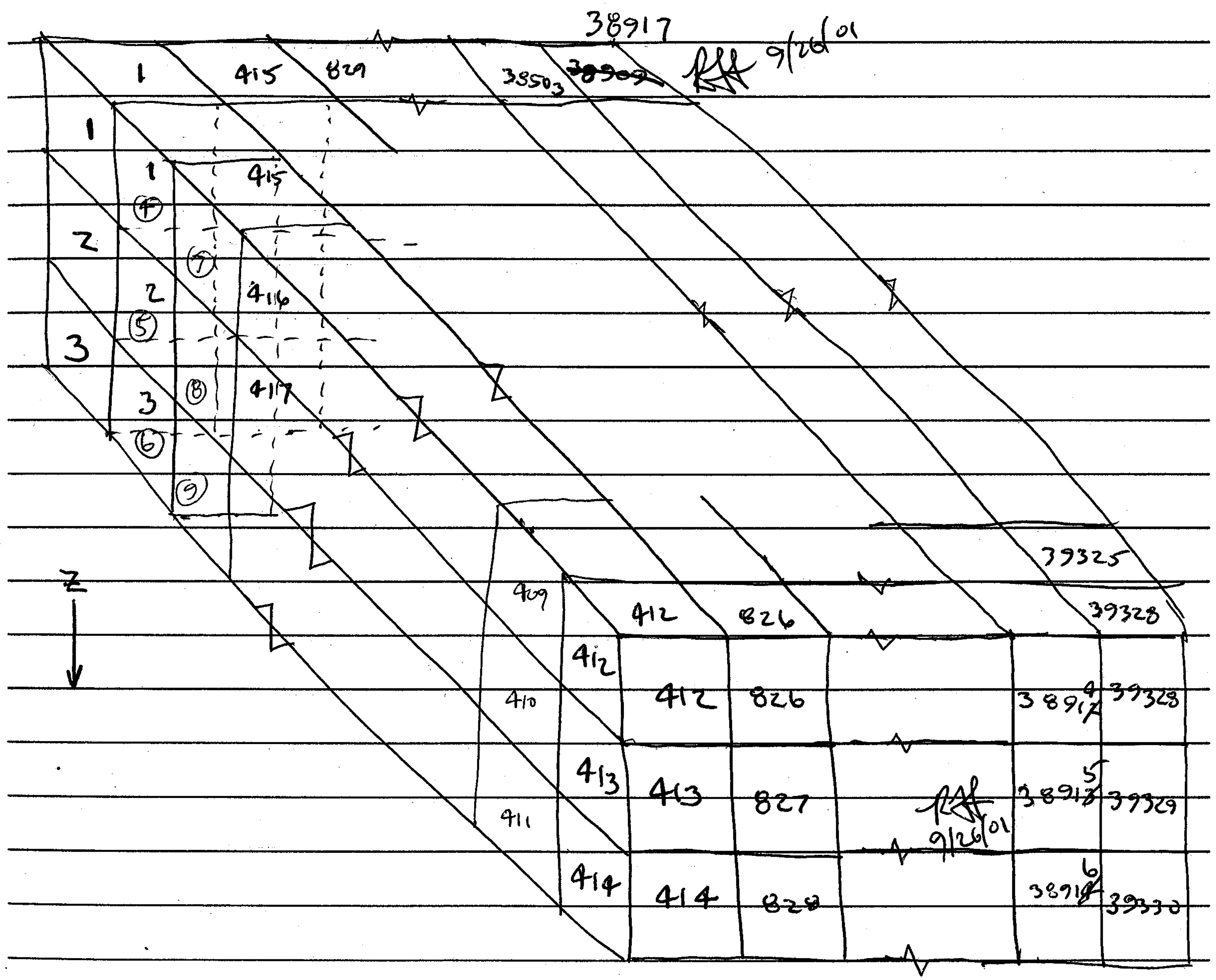
This is what ~~the~~ output from 6c2bc-new looks like → output.dat

1	1	2	-3.40631E-04	109617.	20.0000	0.150000
2	1	2	0.	592387.	20.0027	1.00000E-01
3	1	2	-18.7165	3.29464E+09	37.1340	5.00000E-02
1	5	2	-6.37231E-04	109617.	20.0000	0.150000
2	5	2	0.	592387.	20.0027	1.00000E-01
3	5	2	-45.3039	3.29464E+09	37.1340	5.00000E-02
4	1	2	-3.40631E-04	100979.8	20.0000	0.150000
5	1	2	0.	444010.	20.0177	1.00000E-01
6	1	2	-18.7165	3.36311E+08	37.1622	5.00000E-02
7	1	2	-3.40631E-04	100979.8	20.0000	0.150000
8	1	2	0.	475070.	20.0192	1.00000E-01
9	1	2	-18.7165	3.36886E+08	37.1916	5.00000E-02
10	1	2	-3.19677E-04	100979.8	20.0000	0.150000
11	1	2	0.	399331.	20.0154	1.00000E-01
12	1	2	-17.4208	3.37342E+08	37.2148	5.00000E-02
13	1	2	-3.19677E-04	100979.8	20.0000	0.150000
14	1	2	0.	315460.	20.0111	1.00000E-01
15	1	2	-17.4208	3.37666E+08	37.2313	5.00000E-02
16	1	2	-3.19677E-04	100979.8	20.0000	0.150000
17	1	2	0.	238349.	20.0072	1.00000E-01
18	1	2	-17.4208	3.37901E+08	37.2434	5.00000E-02
19	1	2	-3.19677E-04	100979.8	20.0000	0.150000
20	1	2	0.	437054.	20.0173	1.00000E-01
21	1	2	-17.4208	3.37762E+08	37.2363	5.00000E-02
22	1	2	-3.19677E-04	100979.8	20.0000	0.150000
23	1	2	0.	744909.	20.0330	1.00000E-01
24	1	2	-17.4208	3.37403E+08	37.2180	5.00000E-02
39323	2	2	0.	100979.8	20.0002	1.00000E-01
39324	2	2	5.96176	4.30617E+08	41.9747	5.00000E-02
39325	2	2	4.09042E-05	100979.8	20.0000	0.150000
39326	2	2	0.	100979.8	20.0002	1.00000E-01
39327	2	2	5.96176	4.30205E+08	41.9537	5.00000E-02
39328	2	2	4.09042E-05	100979.8	20.0000	0.150000
39329	2	2	0.	100979.8	20.0002	1.00000E-01
39330	2	2	5.96176	4.29753E+08	41.9306	5.00000E-02
39328	6	2	3.23817E-04	100979.8	20.0000	0.150000
39329	6	2	0.	100979.8	20.0002	1.00000E-01
39330	6	2	69.5485	4.29753E+08	41.9306	5.00000E-02

in ~/sz/output.dat also on zip SZ 4/13/01
exactly same ~~as~~ 6con_a, also on zip

9/26/01

The grid looks like the following

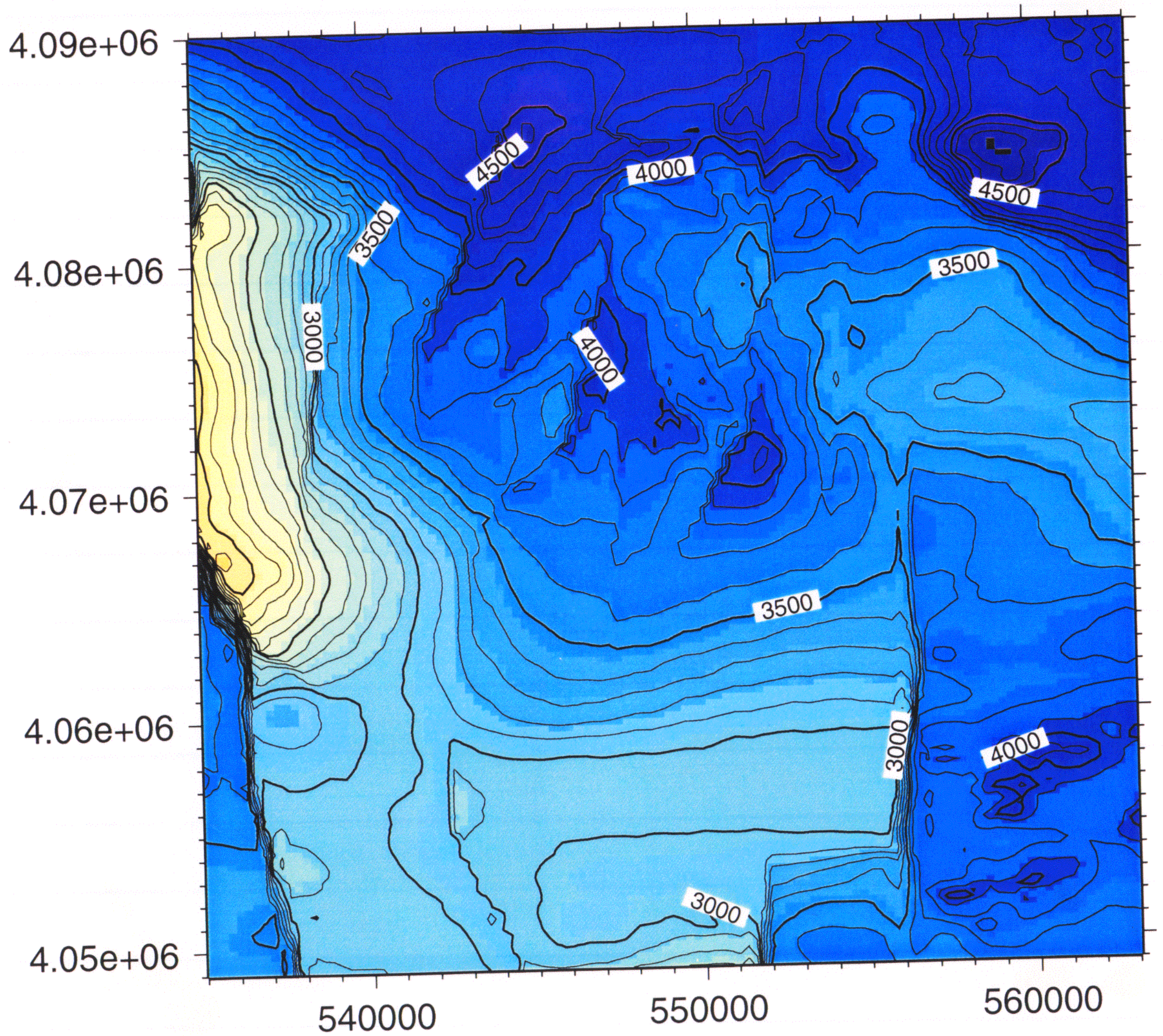


10/24/01
RJf

Nathan Franklin plotted up the clame file to illustrate geometry of the three units

.ps files located on D:\SZ.ps

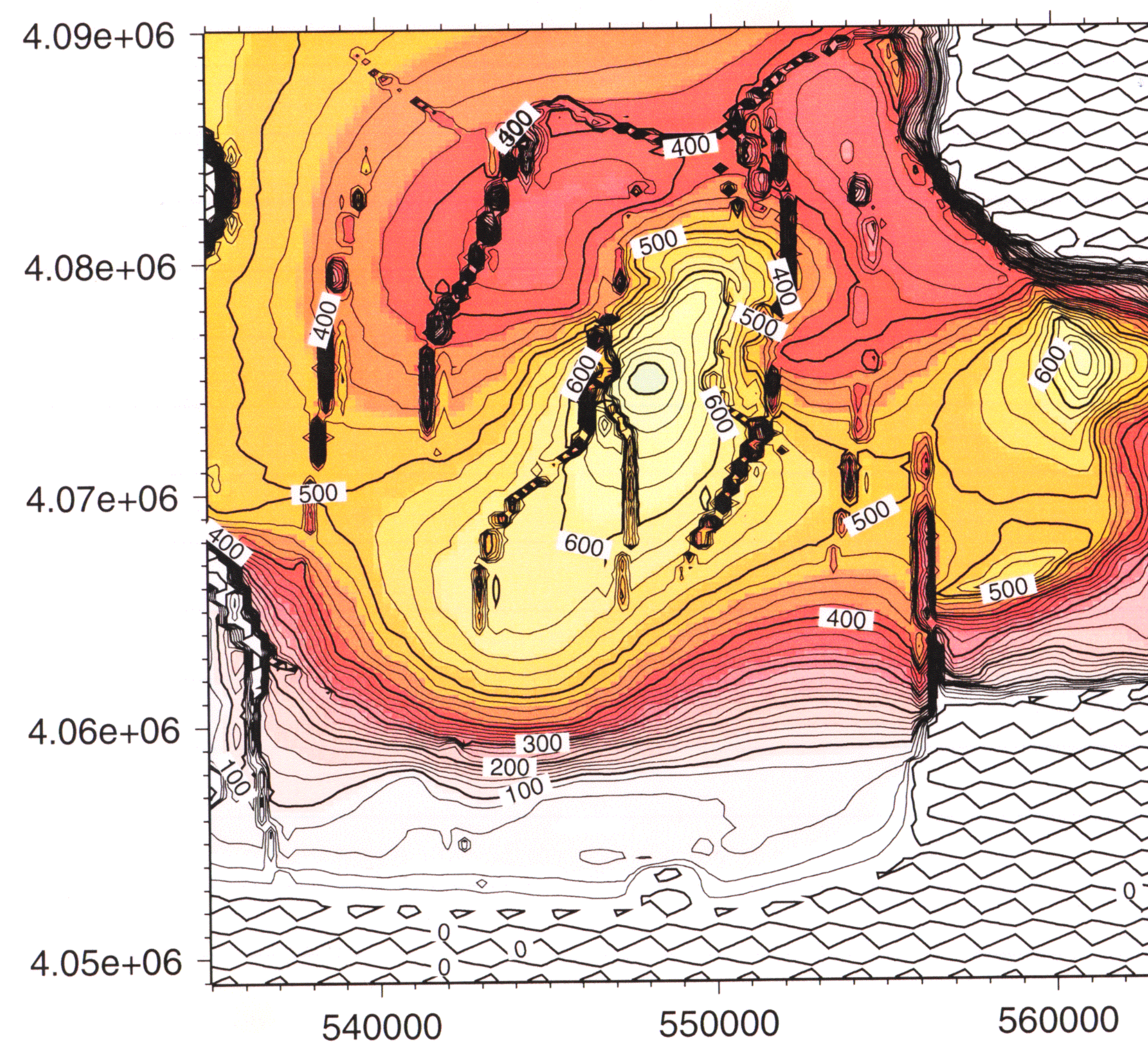
Top layer surface : alluvial/volcanic aquifer



1.dat

10/24/01
RJf

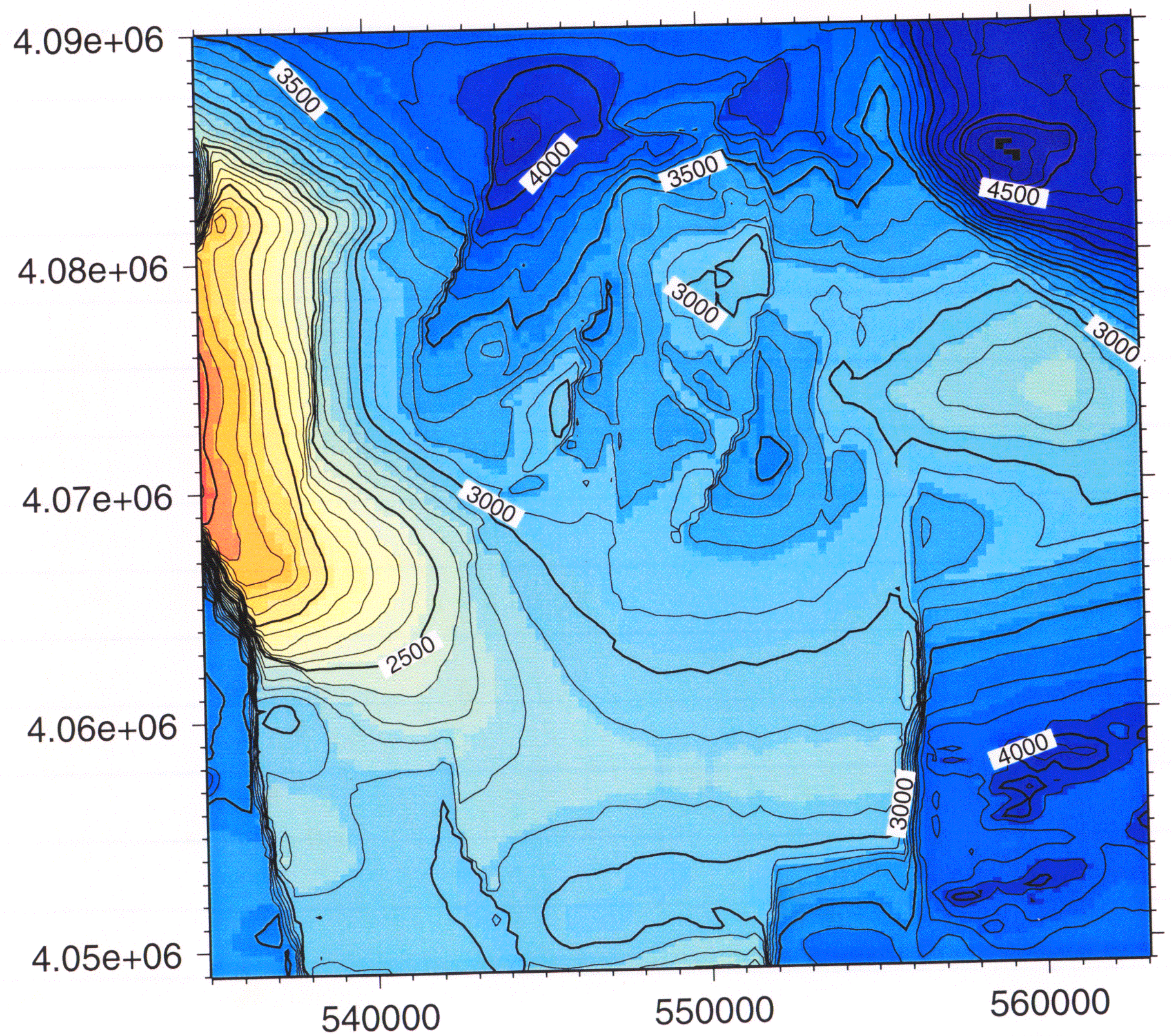
Top layer isopach : alluvial/volcanic aquifer



1.Isopach

10/29/01
RJf

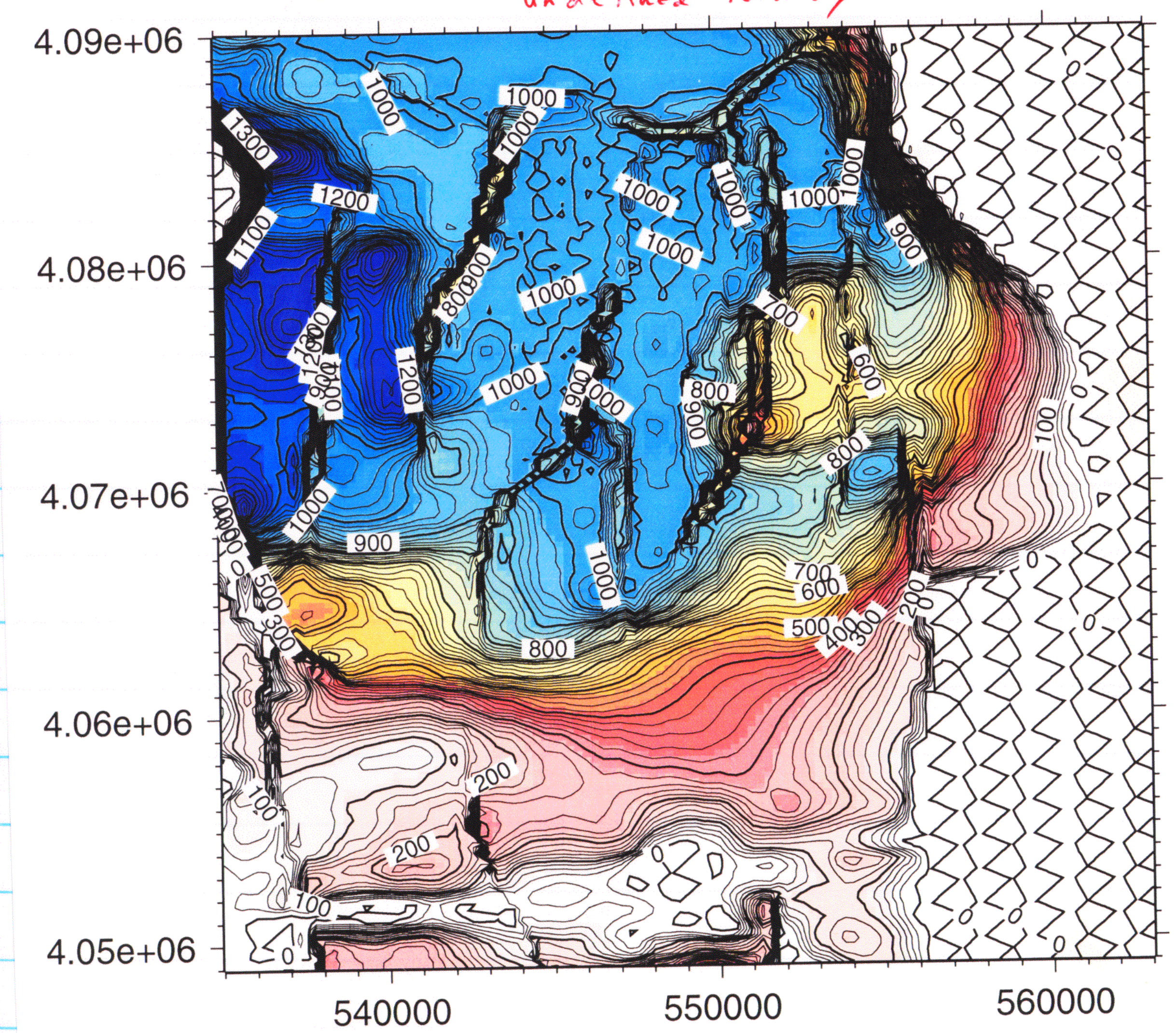
Second layer surface : confining layer undefined tertiary



2.dat

10/29/01
RJf

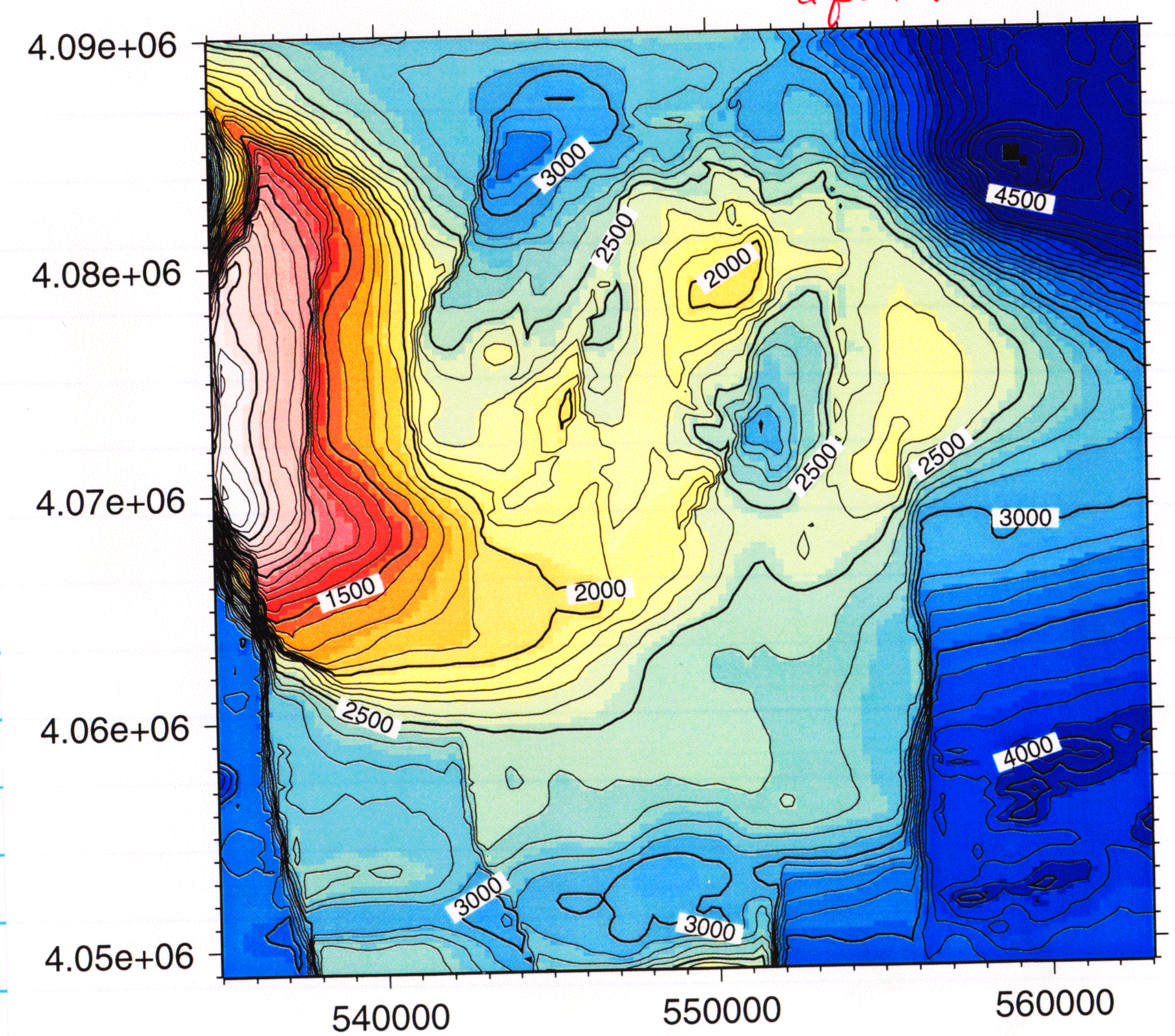
Second layer isopach : confining layer undefined tertiary



2. isopach

10/24/01
RH

third layer surface: paleozoic carbonate aquifer



3.dat

10/25/01
RH

/net/~~home~~ spock/home/rgreen/SZ/9-29/SZ13.dat would not converge. Noted that multi.con (next page 30) was not monotonically ascending - Wrote following script to put them in order .../redo-con.F

(RH 10/25/01)

before & after multi.con on page 30

```
c       re-format multi.con so that all elements are in ascending order
c       written by RT Green Oct 25, 2001

        parameter(maxn=500000)
        integer cola(maxn),colb(maxn),colc(maxn),cold(maxn),cole(maxn)
        real colf(maxn),colg(maxn),colh(maxn),coli(maxn)
         integer colcount, colcounta,i,j,k,ii

      open(unit=10,file='multi.test')
      open(unit=20,file='mulnu.con')

c i is the element number

        i = 0
        colcount = 0

        do while (.true.)

        i = i + 1
        read(10,*,end=99)cola(i),colb(i),colc(i),cold(i),cole(i),
     1                  colf(i),colg(i),colh(i),coli(i)
        ii = i

        enddo
 99     continue

        close(unit=10)
      open(unit=10,file='multi.test')

c this loop is for each line in multi.con
c       write (*,*)ii
        do i = 1, ii
              read(10,*)cola(i),colb(i),colc(i),cold(i),cole(i),
     1                  colf(i),colg(i),colh(i),coli(i)
c this loop is to pluck out each line with the value i in column 1

              do  k = 1,8
              j = i + k - 1
              if(cola(i).le.colcount)go to 50
              if(cola(j).eq.cola(i)) then

                     write(20,*)cola(j),colb(j),colc(j),cold(j),cole(j),
     1                colf(j),colg(j),colh(j),coli(j)

              endif
              enddo

              colcount = cola(i)

 50           continue

        enddo


        end
```

10/25/01
RFF

multi.con before re formating

1	4	3	2	2	149.6	149.6	1.489	-1.6536
1	415	414	1	1	148.9	148.9	1.496	-0.822425
2	5	3	2	2	149.6	149.6	299.6	-1.6536
2	416	414	1	1	148.9	148.9	217	-0.822425
→ 1	2	1	3	3	0.256	0.005	22280	-90
3	6	3	2	2	149.6	149.6	510600	-1.07954
3	417	414	1	1	148.9	148.9	512800	-0.461434
→ 2	3	1	3	3	1713	0.256	22280	-90
4	7	3	2	2	149.6	149.6	1.489	-1.18404
4	418	414	1	1	148.9	148.9	2.993	-0.67415
5	8	3	2	2	149.6	149.6	546.5	-1.18404
5	419	414	1	1	148.9	148.9	1124	-0.67415
4	5	1	3	3	1.756	0.005	44570	-90
6	9	3	2	2	149.6	149.6	511500	-1.12337
6	420	414	1	1	148.9	148.9	1.027e+06	-0.580103
5	6	1	3	3	1716	1.756	44570	-90
7	10	3	2	2	149.6	149.6	1.489	-0.74265
7	421	414	1	1	148.9	148.9	2.993	-0.567217
8	11	3	2	2	149.6	149.6	512.6	-0.74265
8	422	414	1	1	148.9	148.9	988.9	-0.567217
7	8	1	3	3	1.914	0.005	44570	-90
9	12	3	2	2	149.6	149.6	512300	-0.890622
9	423	414	1	1	148.9	148.9	1.029e+06	-0.768578
8	9	1	3	3	1719	1.914	44570	-90
10	13	3	2	2	149.6	149.6	1.489	-0.468121
10	424	414	1	1	148.9	148.9	2.993	-0.522211
11	14	3	2	2	149.6	149.6	391.3	-0.468121
11	425	414	1	1	148.9	148.9	559.3	-0.522211
10	11	1	3	3	1.528	0.005	44570	-90

note, not all are monotonically descending

multi.con after re-formating

1	4	3	2	2	149.600	149.600	1.48900	-1.65360
1	415	414	1	1	148.900	148.900	1.49600	-0.822425
1	2	1	3	3	0.256000	5.00000E-03	22280.0	-90.0000
2	5	3	2	2	149.600	149.600	299.600	-1.65360
2	416	414	1	1	148.900	148.900	217.000	-0.822425
2	3	1	3	3	1713.00	0.256000	22280.0	-90.0000
3	6	3	2	2	149.600	149.600	510600.	-1.07954
3	417	414	1	1	148.900	148.900	512800.	-0.461434
4	7	3	2	2	149.600	149.600	1.48900	-1.18404
4	418	414	1	1	148.900	148.900	2.99300	-0.674150
4	5	1	3	3	1.75600	5.00000E-03	44570.0	-90.0000
5	8	3	2	2	149.600	149.600	546.500	-1.18404
5	419	414	1	1	148.900	148.900	1124.00	-0.674150
5	6	1	3	3	1716.00	1.75600	44570.0	-90.0000
6	9	3	2	2	149.600	149.600	511500.	-1.12337
6	420	414	1	1	148.900	148.900	1.02700E+06	-0.580103
7	10	3	2	2	149.600	149.600	1.48900	-0.742650
7	421	414	1	1	148.900	148.900	2.99300	-0.567217
7	8	1	3	3	1.91400	5.00000E-03	44570.0	-90.0000
8	11	3	2	2	149.600	149.600	512.600	-0.742650
8	422	414	1	1	148.900	148.900	988.900	-0.567217
8	9	1	3	3	1719.00	1.91400	44570.0	-90.0000
9	12	3	2	2	149.600	149.600	512300.	-0.890622
9	423	414	1	1	148.900	148.900	1.02900E+06	-0.768578
10	13	3	2	2	149.600	149.600	1.48900	-0.468121
10	424	414	1	1	148.900	148.900	2.99300	-0.522211
10	11	1	3	3	1.52800	5.00000E-03	44570.0	-90.0000
11	14	3	2	2	149.600	149.600	391.300	-0.468121

10/25/01
RFF Re-formating multi.con had no noticeable effect on convergence. Next step is to look at geometric aspect ratio of elements

11/15/01 Re-worked SZ model starting with 3 layer model. The original data are from Darrell Sims

locat

1	1	535148.9375	4049149.625	3427.265564	1
2	2	535148.9375	4049149.625	3426.265564	1
3	3	535148.9375	4049149.625	1712.882782	3425.765564
4	1	535148.9375	4049448.895	3435.415772	1
5	2	535148.9375	4049448.895	3433.160156	3.5112305
6	3	535148.9375	4049448.895	1715.702271	3431.404541
7	1	535148.9375	4049748.165	3441.600586	1
8	2	535148.9375	4049748.165	3439.186813	3.8275451
9	3	535148.9375	4049748.165	1718.63652	3437.273041
10	1	535148.9375	4050047.435	3445.480103	1
11	2	535148.9375	4050047.435	3443.452408	3.0553894
12	3	535148.9375	4050047.435	1720.962357	3441.924713
13	1	535148.9375	4050346.705	3447.92514	1
14	2	535148.9375	4050346.705	3446.325745	2.1987915
15	3	535148.9375	4050346.705	1722.613174	3445.226349
16	1	535148.9375	4050645.975	3449.54303	1
17	2	535148.9375	4050645.975	3448.336792	1.4124756
18	3	535148.9375	4050645.975	1723.815277	3447.630554
19	1	535148.9375	4050945.245	3450.151032	1
20	2	535148.9375	4050945.245	3447.930786	3.4404907
21	3	535148.9375	4050945.245	1723.10527	3446.210541

Put into spock /home/rjveen/ SZ/~~In-11-15-01~~ RFF 11/15/01 IN-11-15-01 (correct file name)

This file was re-worked, putting locations at node centers. This doesn't really affect x, y but it does to the z coordinate. This was done in excel then transfered to a data file.

11/15/02 RH

The data file with node locations had to be re-formated to be compatible with amesh.vulcan. Used Format-in.F to re-format located in ~/sz/nodal/*
re-formated file called in-reFormat-11-15

This is the reformated in file for input into amesh

locat

1	1	535148.938	4049149.500	3427.266	1.000
2	2	535148.938	4049149.500	3426.266	1.000
3	3	535148.938	4049149.500	1712.883	3425.766
4	1	535148.938	4049449.000	3435.416	1.000
5	2	535148.938	4049449.000	3433.160	3.511
6	3	535148.938	4049449.000	1715.702	3431.405
7	1	535148.938	4049748.250	3441.601	1.000
8	2	535148.938	4049748.250	3439.187	3.828
9	3	535148.938	4049748.250	1718.636	3437.273
10	1	535148.938	4050047.500	3445.480	1.000
11	2	535148.938	4050047.500	3443.452	3.055
12	3	535148.938	4050047.500	1720.962	3441.925
13	1	535148.938	4050346.750	3447.925	1.000
14	2	535148.938	4050346.750	3446.326	2.199
15	3	535148.938	4050346.750	1722.613	3445.226
16	1	535148.938	4050646.000	3449.543	1.000
17	2	535148.938	4050646.000	3448.337	1.412
18	3	535148.938	4050646.000	1723.815	3447.631
19	1	535148.938	4050945.250	3450.151	1.000
20	2	535148.938	4050945.250	3447.931	3.440
21	3	535148.938	4050945.250	1723.105	3446.210

amesh.vulcan generates 3 files: eleme, segmt, conne
eleme has the correct format, but conne & segmt do not
original conne file is as follows →

in sz/nodal/conne-orig-format

conne

1* 1	1	6.489e+02	0.000e+00	7.992e+02		
1 4	1	1.498e+02	1.498e+02	7.979e+02	2.720e-02	
1 415	1	1.489e+02	1.489e+02	7.992e+02	1.271e-02	
1* 2	1	6.495e+02	0.000e+00	7.979e+02		
2* 3	1	6.489e+02	0.000e+00	7.992e+02		
2 5	1	1.498e+02	1.498e+02	1.800e+03	2.301e-02	
2 416	1	1.489e+02	1.489e+02	1.354e+03	1.038e-02	
2* 4	1	6.495e+02	0.000e+00	7.979e+02		
2 1	1	5.000e-01	5.000e-01	6.377e+05	1.	
3* 5	1	6.489e+02	0.000e+00	2.738e+06		
3 6	1	1.498e+02	1.498e+02	2.736e+06	9.412e-03	
3 417	1	1.489e+02	1.489e+02	2.739e+06	4.025e-03	
3* 6	1	6.495e+02	0.000e+00	2.733e+06		

11/15/01 RH

used Format-con3.F to reformate for input into formate needed by nathanmesh.c used to create multi.con & multi.phr

reformated conne looks like (in ~/sz/nodal/conne)

conne

1* 1	1	6.489e+02	0.000e+00	7.992e+02	
1 4	1	1.498e+02	1.498e+02	7.979e+02	2.720e-02
1 415	1	1.489e+02	1.489e+02	7.992e+02	1.271e-02
1* 2	1	6.495e+02	0.000e+00	7.979e+02	
2* 3	1	6.489e+02	0.000e+00	7.992e+02	
2 5	1	1.498e+02	1.498e+02	1.800e+03	2.301e-02
2 416	1	1.489e+02	1.489e+02	1.354e+03	1.038e-02
2* 4	1	6.495e+02	0.000e+00	7.979e+02	
2 1	1	5.000e-01	5.000e-01	6.377e+05	1.
3* 5	1	6.489e+02	0.000e+00	2.738e+06	
3 6	1	1.498e+02	1.498e+02	2.736e+06	9.412e-03
3 417	1	1.489e+02	1.489e+02	2.739e+06	4.025e-03
3* 6	1	6.495e+02	0.000e+00	2.733e+06	

reformatted & original segmt files are as follows

needs segmt

~/sz/segmt-orig-format

534500	4048500	534500	4049299.25	0	1*	1
534500	4049299.25	535297.875	4049299.25	1	1	4
535297.875	4049299.25	535297.875	4048500	1	1	415
535297.875	4048500	534500	4048500	0	1*	2
534500	4048500	534500	4049299.25	0	2*	3
534500	4049299.25	535297.875	4049299.25	1	2	5
535297.875	4049299.25	535297.875	4048500	1	2	416
535297.875	4048500	534500	4048500	0	2*	4
534500	4048500	534500	4049299.25	0	3*	5
534500	4049299.25	535297.875	4049299.25	1	3	6
535297.875	4049299.25	535297.875	4048500	1	3	417
535297.875	4048500	534500	4048500	0	3*	6
534500	4049299.25	534500	4049598.62	0	4*	7
534500	4049598.62	535297.875	4049598.62	1	4	7

~/sz/segmt

534500	4048500	534500	4049299.25	0	1*	1
534500	4049299.25	535297.875	4049299.25	1	1	4
535297.875	4049299.25	535297.875	4048500	1	1	415
535297.875	4048500	534500	4048500	0	1*	2
534500	4048500	534500	4049299.25	0	2*	3
534500	4049299.25	535297.875	4049299.25	1	2	5
535297.875	4049299.25	535297.875	4048500	1	2	416
535297.875	4048500	534500	4048500	0	2*	4
534500	4048500	534500	4049299.25	0	3*	5
534500	4049299.25	535297.875	4049299.25	1	3	6
535297.875	4049299.25	535297.875	4048500	1	3	417
535297.875	4048500	534500	4048500	0	3*	6
534500	4049299.25	534500	4049598.62	0	4*	7
534500	4049598.62	535297.875	4049598.62	1	4	7

* rows were moved

11/15/01 RJJ

eleme file format does not need to be modified

eleme

1	rock1	6.377e+05	535148.938	4049149.500	3427.2660
2	rock1	7.153e+05	535148.938	4049149.500	3426.2660
3	rock1	2.185e+09	535148.938	4049149.500	1712.8830
4	rock1	2.389e+05	535148.938	4049449.000	3435.4160
5	rock1	7.986e+05	535148.938	4049449.000	3433.1600
6	rock1	8.197e+08	535148.938	4049449.000	1715.7020
7	rock1	2.388e+05	535148.938	4049748.250	3441.6010
8	rock1	8.845e+05	535148.938	4049748.250	3439.1870
9	rock1	8.207e+08	535148.938	4049748.250	1718.6360
10	rock1	2.388e+05	535148.938	4050047.500	3445.4800
11	rock1	7.125e+05	535148.938	4050047.500	3443.4520
12	rock1	8.218e+08	535148.938	4050047.500	1720.9620
13	rock1	2.388e+05	535148.938	4050346.750	3447.9250
14	rock1	5.175e+05	535148.938	4050346.750	3446.3260
15	rock1	8.226e+08	535148.938	4050346.750	1722.6130
16	rock1	2.388e+05	535148.938	4050646.000	3449.5430
17	rock1	3.901e+05	535148.938	4050646.000	3448.3370
18	rock1	8.231e+08	535148.938	4050646.000	1723.8150
19	rock1	2.388e+05	535148.938	4050945.250	3450.1510
20	rock1	8.254e+05	535148.938	4050945.250	3447.9310

for input into nathanmesh.c all three files need header lines, i.e. segmt on first line of segmt, eleme on first line of eleme and conne on first line of conne.

nathanmesh.c converts the reformatted segmt & conne files along with eleme and phk_a (and bcon_a) to produce multi.con, multi.phk, and multi.bc (if there are bcs)

(and bcon_a if there are bcs)

11/15/01 RJJ

phik_a

1	1	1	1	1.00000E-01	7.88000E-12	7.88000E-12	7.88000E-12
2	2	3	2	1.00000E-01	1.93000E-15	1.93000E-15	1.93000E-15
3	3	5	3	1.00000E-01	1.09000E-14	1.09000E-14	1.09000E-14
4	4	1	1	1.00000E-01	7.88000E-12	7.88000E-12	7.88000E-12
5	5	3	2	1.00000E-01	1.93000E-15	1.93000E-15	1.93000E-15
6	6	5	3	1.00000E-01	1.09000E-14	1.09000E-14	1.09000E-14
7	7	1	1	1.00000E-01	7.88000E-12	7.88000E-12	7.88000E-12
8	8	3	2	1.00000E-01	1.93000E-15	1.93000E-15	1.93000E-15
9	9	5	3	1.00000E-01	1.09000E-14	1.09000E-14	1.09000E-14
10	10	1	1	1.00000E-01	7.88000E-12	7.88000E-12	7.88000E-12
11	11	3	2	1.00000E-01	1.93000E-15	1.93000E-15	1.93000E-15
12	12	5	3	1.00000E-01	1.09000E-14	1.09000E-14	1.09000E-14
13	13	1	1	1.00000E-01	7.88000E-12	7.88000E-12	7.88000E-12
14	14	3	2	1.00000E-01	1.93000E-15	1.93000E-15	1.93000E-15
15	15	5	3	1.00000E-01	1.09000E-14	1.09000E-14	1.09000E-14
16	16	1	1	1.00000E-01	7.88000E-12	7.88000E-12	7.88000E-12
17	17	3	2	1.00000E-01	1.93000E-15	1.93000E-15	1.93000E-15
18	18	5	3	1.00000E-01	1.09000E-14	1.09000E-14	1.09000E-14
19	19	1	1	1.00000E-01	7.88000E-12	7.88000E-12	7.88000E-12

~/sz/noda/phik_a

this was generated using phik-write.f in ~/sz/6-25/*

↱ compiled using CC ___ -lm

10: home/rgreen/satzone/nathanmesh used to generate multi.con & multi.phk

multi.con

1	4	3	2	2	149.8	149.8	797.9	-1.55875
1	415	414	1	1	148.9	148.9	799.2	-0.728387
2	5	3	2	2	149.8	149.8	1800	-1.31862
2	416	414	1	1	148.9	148.9	1354	-0.594914
1	2	1	3	3	0.5	0.5	637700	-90
3	6	3	2	2	149.8	149.8	2.736e+06	-0.539272
3	417	414	1	1	148.9	148.9	2.739e+06	-0.230625
2	3	1	3	3	1713	0.5	637700	-90
4	7	3	2	2	149.6	149.6	797.9	-1.18404
4	418	414	1	1	148.9	148.9	299.4	-0.674152
5	8	3	2	2	149.6	149.6	2928	-1.1538
5	419	414	1	1	148.9	148.9	1124	-0.627225
4	5	1	3	3	1.756	0.5	238900	-90
6	9	3	2	2	149.6	149.6	2.74e+06	-0.561739
6	420	414	1	1	148.9	148.9	1.028e+06	-0.29006

multi.phk

1	1	1	1	1	637700	0.1	7.88e-12	7.88e-12	7.88e-12
2	2	1	3	2	715300	0.1	1.93e-15	1.93e-15	1.93e-15
3	3	1	5	3	2.185e+09	0.1	1.09e-14	1.09e-14	1.09e-14
4	4	1	1	1	238900	0.1	7.88e-12	7.88e-12	7.88e-12
5	5	1	3	2	798600	0.1	1.93e-15	1.93e-15	1.93e-15
6	6	1	5	3	8.197e+08	0.1	1.09e-14	1.09e-14	1.09e-14
7	7	1	1	1	238800	0.1	7.88e-12	7.88e-12	7.88e-12
8	8	1	3	2	884500	0.1	1.93e-15	1.93e-15	1.93e-15
9	9	1	5	3	8.207e+08	0.1	1.09e-14	1.09e-14	1.09e-14
10	10	1	1	1	238800	0.1	7.88e-12	7.88e-12	7.88e-12
11	11	1	3	2	712500	0.1	1.93e-15	1.93e-15	1.93e-15
12	12	1	5	3	8.218e+08	0.1	1.09e-14	1.09e-14	1.09e-14
13	13	1	1	1	238800	0.1	7.88e-12	7.88e-12	7.88e-12
14	14	1	3	2	517500	0.1	1.93e-15	1.93e-15	1.93e-15
15	15	1	5	3	8.226e+08	0.1	1.09e-14	1.09e-14	1.09e-14
16	16	1	1	1	238800	0.1	7.88e-12	7.88e-12	7.88e-12

↑ ist ↑ ithrm

3/27/02 RJF

Worked on amesh.c et al. to increase format to accommodate >100,000 elements.

worked with the gcc compiler on io

there appear to be two programs.

pmesh.c

fprint (sF 5.5 → 7.7 twice

fprint (cF 5.5 → 7.7 twice

fprint (cF 5.5 → 7.7 twice

fprint (cF 5.5 → 7.7 once

removed *.o make caused error.

ran w/ no errors, then changed rmesh.c
change 5 in buffer allocation in 4 locations

immediate error, changed rmesh.c back to original, change char in amesh.h from 8 to 7

nothing obvious to change in belem.c
" " " " " bstar.c
" " " " " extre.c

3/27/02 RJF

With only changes to pmesh.c, no change in format plus get an error w/ element # 2 (additional digits) i.e. 261 not 2

Started changing rmesh.c
changed first 5 to 7 no change
~~" 2nd " " "~~ RJF 3/27/02
RJF 3/27/02 " 3rd " " " did not run
changed 2nd 5 back to 5, changed 3rd 5 to 7 still 261
changed 4th 5 to 7 * fixed 2, not 261

I have reviewed this scientific notebook and find it in agreement with QAP-001. There is sufficient information regarding methods used for conducting tests, acquiring and analyzing data so that another qualified individual could repeat the activity.

E. C. Pearcy
4/4/2002

4/08/02 RH

Nathan was able to get amesh to handle
larger arrays (i.e. 6 digits) for the
sat zone model with 262,200 elements
→ 28 layers, equal thicknesses, but spatially
variable in x, y   x = 95, y = 138
He (Nathan) needed the g++ compiler on IO for this
I copied his amesh, input, output files
from ~/nfranklin/work/rgreen/ameshManApr/*
RH 9/8/02
to IO /rgreen/amesh/apr8/from nathan/*

I have re-reviewed this notebook along with
the last entry and determined that it
complies with QAP-001. Information is sufficient
for a competent hydrogeologic modeler to
replicate this work.

Gordon Wittmeyer 9/21/2004