NUS CORPORATION

R-33-1-90-9

FINAL ADDENDUM TO THE FINAL FEASIBILITY STUDY

VOLUME II OF II

C&R BATTERY SITE
CHESTERFIELD COUNTY, VIRGINIA

EPA WORK ASSIGNMENT NUMBER 37-01-3LP4
CONTRACT NUMBER 68-W8-0037

NUS PROJECT NUMBER 9851

JANUARY 1990

R-33-1-90-9

FINAL ADDENDUM TO THE FINAL FEASIBILITY STUDY

VOLUME II OF II

C&R BATTERY SITE
CHESTERFIELD COUNTY, VIRGINIA

EPA WORK ASSIGNMENT NUMBER 37-01-3LP4
CONTRACT NUMBER 68-W8-0037

NUS PROJECT NUMBER 9851

JANUARY 1990

SUBMITTED FOR NUS BY:

RICHARD M. NINESTEEL, P.E.
PROJECT MANAGER

APPROVED:

ROBERT E. STECIK, JR.
ARCS III PROGRAM MANAGER

TABLE OF CONTENTS

VOLUME II OF II

```
 PC  VERSION: MINTEQA2   DATE OF CALCULATIONS:  4-DEC-89  TIME: 21:31:52

RUNA1 C&R BATTERY
ADSORPTION, CLSD SYS, CO3=601.7, pH=4.82, SO4=4644, ALLOW ALL SOLIDS

-------------------------------------------------------------------------------
 Temperature (Celsius):  16.60
 Units of concentration: MG/L
 Ionic strength:  0.020 molal; FIXED
 If specified, total carbonate concentration represents total inorganic carbon.
 Do not automatically terminate if charge imbalance exceeds 30%
 Precipitation is allowed for all solids in the thermodynamic database and
   the print option for solids is set to: 1
 The maximum number of iterations is: 200
 The method used to compute activity coefficients is: Davies equation
 Intermediate output file
 Adsorption model: Diffuse Layer
 Number of adsorbing surfaces: 1

-------------------------------------------------------------------------------

 12.100  600.00 0.000 0.000 81
    150  4.850E+01   -3.64
    460  2.490E+01   -1.76
    732  4.644E+03   -3.55
    330  1.526E-02   -4.82
    600  1.853E+04   -7.00
    813  0.000E-01    0.00
    812  2.720E-02   -3.42
    811  6.800E-04   -5.03
     30  3.200E+00   -3.93
    280  2.800E+00   -4.30
     70  7.000E+00   -3.89
    140  6.017E+02   -2.03

 H2O HAS BEEN INSERTED AS A COMPONENT
  3   1
    330      4.8200      0.0000
  6   1
    813      0.0000      0.0000
  2  12
 123301 =feO-             0.0000    -8.9300    0.000    0.000-1.00 0.00 0.00    0.0000
 .00 3    1.000 812  -1.000 330  -1.000 813    0.000    0   0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

  0.000    0    0.000    0    0.000    0
 123302 =feOH2+           0.0000     7.2900    0.000    0.000 1.00 0.00 0.00    0.0000
 .00 3    1.000 812    1.000 330    1.000 813    0.000    0   0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

  0.000    0    0.000    0    0.000    0
 113301 =FeO-             0.0000    -8.9300    0.000    0.000-1.00 0.00 0.00    0.0000
 .00 3    1.000 811  -1.000 330  -1.000 813    0.000    0   0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

  0.000    0    0.000    0    0.000    0
 113302 =FeOH2+           0.0000     7.2900    0.000    0.000 1.00 0.00 0.00    0.0000
 .00 3    1.000 811    1.000 330    1.000 813    0.000    0   0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

  0.000    0    0.000    0    0.000    0
 116000 =FeOPb+           0.0000     4.7100    0.000    0.000 1.00 0.00 0.00    0.0000
 .00 5    1.000 811  -1.000 330    1.000 813    1.000 600    1.000    2   0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0
```

AR302790

```
8126000 =feOPb+          0.0000    0.3000   0.000   0.000 1.00 0.00 0.00   0.0000
2.00 5   1.000 812  -1.000 330   1.000 813   1.000 600   1.000   2   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

  0.000   0   0.000   0   0.000   0
8121500 =feOCa+           0.0000   -5.8500   0.000   0.000 1.00 0.00 0.00   0.0000
2.00 4   1.000 812  -1.000 330   1.000 813   1.000 150   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

  0.000   0   0.000   0   0.000   0
8111500 =FeOHCa++         0.0000    4.9700   0.000   0.000 2.00 0.00 0.00   0.0000
2.00 3   1.000 811   1.000 150   2.000 813   0.000   0   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

  0.000   0   0.000   0   0.000   0
8117320 =FeSO4-           0.0000    7.7800   0.000   0.000-1.00 0.00 0.00   0.0000
2.00 5   1.000 811   1.000 330  -1.000 813   1.000 732  -1.000   2   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

  0.000   0   0.000   0   0.000   0
8127320 =feSO4-           0.0000    7.7800   0.000   0.000-1.00 0.00 0.00   0.0000
2.00 5   1.000 812   1.000 330  -1.000 813   1.000 732  -1.000   2   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

  0.000   0   0.000   0   0.000   0
8117321 =FeOHSO4-2        0.0000    0.7900   0.000   0.000-2.00 0.00 0.00   0.0000
2.00 4   1.000 811  -2.000 813   1.000 732  -1.000   2   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

  0.000   0   0.000   0   0.000   0
8127321 =feOHSO4-2        0.0000    0.7900   0.000   0.000-2.00 0.00 0.00   0.0000
2.00 4   1.000 812  -2.000 813   1.000 732  -1.000   2   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

  0.000   0   0.000   0   0.000   0
```

INPUT DATA BEFORE TYPE MODIFICATIONS

ID	NAME	ACTIVITY GUESS	LOG GUESS	ANAL TOTAL
150	Ca+2	2.291E-04	-3.640	4.850E+01
460	Mg+2	1.738E-02	-1.760	2.490E+01
732	SO4-2	2.818E-04	-3.550	4.644E+03
330	H+1	1.514E-05	-4.820	1.526E-02
600	Pb+2	1.000E-07	-7.000	1.853E+04
813	ADS1PSI0	1.000E+00	0.000	0.000E-01
812	ADS1TYP2	3.802E-04	-3.420	2.720E-02
811	ADS1TYP1	9.333E-06	-5.030	6.800E-04
30	Al+3	1.175E-04	-3.930	3.200E+00
280	Fe+2	5.012E-05	-4.300	2.800E+00
470	Mn+2	1.288E-04	-3.890	7.000E+00
140	CO3-2	9.333E-03	-2.030	6.017E+02
2	H2O	1.000E+00	0.000	0.000E-01

AR302791

ID	NAME	ANAL MOL	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DIFF F
150	Ca+2	4.850E+01	0.000E-01	2.291E-04	-3.64000	1.000000	0.0000	0.000E-0
460	Mg+2	2.490E+01	0.000E-01	1.738E-02	-1.76000	1.000000	0.0000	0.000E-0
732	SO4-2	4.644E+03	0.000E-01	2.818E-04	-3.55000	1.000000	0.0000	0.000E-0
330	H+1	1.526E-02	0.000E-01	1.514E-05	-4.82000	1.000000	4.8200	0.000E-0
600	Pb+2	1.853E+04	0.000E-01	1.000E-07	-7.00000	1.000000	0.0000	0.000E-0
813	ADS1PSI0	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0
812	ADS1TYP2	2.720E-02	0.000E-01	3.802E-04	-3.42000	1.000000	0.0000	0.000E-0
811	ADS1TYP1	6.800E-04	0.000E-01	9.333E-06	-5.03000	1.000000	0.0000	0.000E-0
30	Al+3	3.200E+00	0.000E-01	1.175E-04	-3.93000	1.000000	0.0000	0.000E-0
280	Fe+2	2.800E+00	0.000E-01	5.012E-05	-4.30000	1.000000	0.0000	0.000E-0
470	Mn+2	7.000E+00	0.000E-01	1.288E-04	-3.89000	1.000000	0.0000	0.000E-0

140	CO3-2	6.017E+02	0.000E-01	9.333E-03	-2.03000	1.000000	0.0000	0.000E-0
2	H2O	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0

CHARGE BALANCE: UNSPECIATED

SUM OF CATIONS= 1.886E-01 SUM OF ANIONS = 1.196E-01

PERCENT DIFFERENCE = 2.238E+01 (ANIONS - CATIONS)/(ANIONS + CATIONS)

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
0	CO3-2	1.027E-02	4.774E+01	-2.03000
1	CO3-2	1.027E-02	2.418E+01	-4.31849
2	Mg+2	1.049E-03	5.831E-02	-1.77083
3	SO4-2	4.953E-02	1.400E-01	-1.82767
4	ADS1TYP1	6.800E-04	1.730E-02	-6.90573
5	ADS1PSI0	1.709E-02	-1.579E-01	-2.87146
6	ADS1PSI0	1.008E-02	-1.099E-01	-2.41517
7	ADS1PSI0	5.862E-03	-3.592E-02	-1.95058
8	ADS1PSI0	4.337E-03	-1.808E-02	-1.69663
9	ADS1PSI0	3.593E-03	-5.236E-03	-1.54103
10	ADS1PSI0	3.355E-03	-7.914E-04	-1.48503
11	ADS1PSI0	3.314E-03	-2.113E-05	-1.47490
12	ADS1PSI0	3.313E-03	-1.605E-08	-1.47462

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:53: 5

ITERATIONS= 13: SOLID ANGLESITE PRECIPITATES

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
13	ADS1PSI0	3.313E-03	-1.508E-02	-1.47462
14	SO4-2	-4.210E-02	8.021E-02	-3.61038
15	SO4-2	-4.210E-02	1.594E+00	-4.61038
16	ADS1TYP2	2.720E-02	5.882E-01	-1.46612
17	SO4-2	-4.210E-02	9.380E-02	-5.94662
18	ADS1PSI0	1.833E-02	-6.446E-02	-2.93189
19	ADS1PSI0	1.575E-02	-2.449E-02	-2.80031
20	ADS1PSI0	1.386E-02	-8.128E-03	-2.69022
21	ADS1PSI0	1.281E-02	-1.766E-03	-2.62213
22	ADS1PSI0	1.251E-02	-1.161E-04	-2.60144
23	ADS1PSI0	1.249E-02	-5.290E-07	-2.59996

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:53:29

ITERATIONS= 24: SOLID CERRUSITE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATION: 4 DEC 89 TIME: 11:44:48

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
24	SO4-2	-3.182E-02	-7.908E-03	-6.01830
25	SO4-2	-3.182E-02	-1.676E-03	-5.92146
26	SO4-2	-3.182E-02	-8.729E-05	-5.89850
27	SO4-2	-3.182E-02	-2.273E-07	-5.89735

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:53:39

ITERATIONS= 28: SOLID DIASPORE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 11:33:14

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
28	SO4-2	-3.182E-02	-3.650E-08	-5.89735

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:53:45

ITERATIONS= 29: SOLID LARNAKITE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:53:48

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
29	ADS1PSI0	1.156E-02	-4.478E-04	-2.53327
30	ADS1PSI0	1.150E-02	-1.378E-06	-2.52888
31	ADS1PSI0	1.150E-02	-2.515E-10	-2.52885

ID	NAME	ANAL MOL	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DIFF F
150	Ca+2	1.240E-03	1.239E-03	7.131E-04	-3.14682	0.575360	0.2401	5.936E-1
460	Mg+2	1.049E-03	1.049E-03	6.036E-04	-3.21925	0.575360	0.2401	0.000E-0
811	ADS1TYP1	6.800E-04	6.009E-09	6.009E-09	-8.22118	1.000000	0.0000	0.000E-0
280	Fe+2	5.136E-05	5.136E-05	2.955E-05	-4.52947	0.575360	0.2401	0.000E-0
470	Mn+2	1.305E-04	1.305E-04	7.509E-05	-4.12441	0.575360	0.2401	0.000E-0
813	ADS1PSI0	1.150E-02	2.959E-03	2.959E-03	-2.52885	1.000000	0.0000	-9.935E-1
812	ADS1TYP2	2.720E-02	3.574E-03	3.574E-03	-2.44690	1.000000	0.0000	0.000E-0
732	SO4-2	4.953E-02	2.242E-06	1.290E-06	-5.88935	0.575360	0.2401	0.000E-0
30	Al+3	1.215E-04	3.011E-07	8.682E-08	-7.06136	0.288313	0.5401	0.000E-0
2	H2O	-3.862E-19	-1.247E-02	9.974E-01	-0.00114	1.000000	0.0011	-1.215E-1
140	CO3-2	1.027E-02	8.977E-12	5.165E-12	-11.28694	0.575360	0.2401	0.000E-0
600	Pb+2	9.162E-02	1.967E-02	1.132E-02	-1.94633	0.575360	0.2401	0.000E-0
330	H+1	1.551E-05	1.313E-02	1.514E-05	-4.82000	0.870933	4.8200	0.000E-0

SPECIES: TYPE I - COMPONENTS

ID	NAME	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DH
150	Ca+2	1.239E-03	0.0007131	-3.14682	0.575360	0.240	0.000
460	Mg+2	1.049E-03	0.0006036	-3.21925	0.575360	0.240	0.000
732	SO4-2	2.242E-06	0.0000013	-5.88935	0.575360	0.240	0.000
470	Mn+2	1.305E-04	0.0000751	-4.12441	0.575360	0.240	0.000
600	Pb+2	1.967E-02	0.0113153	-1.94633	0.575360	0.240	0.000
140	CO3-2	8.977E-12	0.0000000	-11.28694	0.575360	0.240	0.000
812	ADS1TYP2	3.574E-03	0.0035736	-2.44690	1.000000	0.000	0.000
811	ADS1TYP1	6.009E-09	0.0000000	-8.22118	1.000000	0.000	0.000
30	Al+3	3.011E-07	0.0000001	-7.06136	0.288313	0.540	0.000
280	Fe+2	5.136E-05	0.0000295	-4.52947	0.575360	0.240	0.000

SPECIES: TYPE II - COMPLEXES

ID	NAME	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DH
127321	=feOHSO4-2	3.255E-03	0.0032554	-2.48740	1.000000	0.790	0.000
301401	H2CO3 AQ	7.725E-05	0.0000776	-4.11008	1.004616	16.815	-2.247
307320	HSO4 -	1.729E-09	0.0000000	-8.82218	0.870933	1.947	4.910
300020	OH-	3.956E-10	0.0000000	-9.46271	0.870933	-14.222	13.345
603300	MgOH +	3.538E-11	0.0000000	-10.51122	0.870933	-12.051	15.935
601400	MgCO3 AQ	2.603E-12	0.0000000	-11.58249	1.004616	2.922	2.022
601401	MgHCO3 +	1.551E-08	0.0000000	-7.86933	0.870933	11.517	-2.430
607320	MgSO4 AQ	1.287E-07	0.0000001	-6.88833	1.004616	2.218	1.399
503300	CaOH +	6.687E-12	0.0000000	-11.23481	0.870933	-12.847	14.535
501400	CaHCO3 +	1.324E-08	0.0000000	-7.93803	0.870933	11.376	1.790
501401	CaCO3 AQ	4.416E-12	0.0000000	-11.35298	1.004616	3.079	4.030
507320	CaSO4 AQ	1.736E-07	0.0000002	-6.75841	1.004616	2.276	1.470
303300	AlOH +2	5.685E-08	0.0000000	-7.48534	0.575360	-5.003	11.899
303301	Al(OH)2 +	3.439E-08	0.0000000	-7.52364	0.870933	-10.040	0.000
303302	Al(OH)4 -	2.177E-12	0.0000000	-11.72214	0.870933	-23.876	44.060
307320	AlSO4 +	1.212E-10	0.0000000	-9.97640	0.870933	3.034	2.150
307321	Al(SO4)2 -	1.201E-14	0.0000000	-13.98041	0.870933	4.920	2.840
303303	Al(OH)3 AQ	2.473E-09	0.0000000	-8.60478	1.004616	-16.002	0.000
803300	FeOH +	3.706E-10	0.0000000	-9.49107	0.870933	-9.720	15.199
803301	FeOH3 -1	2.204E-22	0.0000000	-21.71672	0.870933	-31.584	30.300
807320	FeSO4 AQ	5.262E-09	0.0000000	-8.27845	1.004616	-2.170	2.200

2803302	FeOH2 AQ	8.497E-17	0.0000000	-16.06872	1.004616	-21.179	28.565
4703300	MnOH +	7.219E-11	0.0000000	-10.20151	0.870933	-10.836	14.399
4703301	Mn(OH)3 -1	3.910E-25	0.0000000	-24.46782	0.870933	-34.740	0.000
4707320	MnSO4 AQ	1.578E-08	0.0000000	-7.79987	1.004616	2.212	2.170
4701400	MnHCO3 +	2.683E-09	0.0000000	-8.63134	0.870933	11.660	0.000
6001400	Pb(CO3)2-2	2.290E-14	0.0000000	-13.88021	0.575360	10.880	0.000
6003300	PbOH +	1.669E-05	0.0000145	-4.83747	0.870933	-7.650	0.000
6[redacted]01	Pb(OH)2 AQ	3.710E-10	0.0000000	-9.42861	1.004616	-17.122	0.000
6003302	Pb(OH)3 -	3.238E-16	0.0000000	-15.54975	0.870933	-28.000	0.000
6003303	Pb2OH +3	1.277E-05	0.0000037	-5.43381	0.288313	-5.820	0.000
6007320	PbSO4 AQ	8.172E-06	0.0000082	-5.08569	1.004616	2.748	0.000
6003304	Pb3(OH)4+2	1.712E-11	0.0000000	-11.00665	0.575360	-24.203	26.500
6001401	PbCO3 AQ	1.011E-06	0.0000010	-5.99327	1.004616	7.238	0.000
6003305	Pb(OH)4 -2	7.416E-23	0.0000000	-22.36989	0.575360	-39.459	0.000
6007321	Pb(SO4)2-2	9.661E-11	0.0000000	-10.25504	0.575360	3.710	0.000
6001402	PbHCO3 +	1.610E-05	0.0000140	-4.85327	0.870933	13.260	0.000
3301400	HCO3 -	2.317E-06	0.0000020	-5.69502	0.870933	10.472	-3.617
3123301	=feO-	9.375E-05	0.0000937	-4.02804	1.000000	-8.930	0.000
3123302	=feOH2+	3.121E-03	0.0031207	-2.50575	1.000000	7.290	0.000
3113301	=FeO-	1.576E-10	0.0000000	-9.80232	1.000000	-8.930	0.000
3113302	=FeOH2+	5.248E-09	0.0000000	-8.28003	1.000000	7.290	0.000
3116000	=FeOPb+	6.800E-04	0.0006800	-3.16750	1.000000	4.710	0.000
3126000	=feOPb+	1.573E-02	0.0157318	-1.80322	1.000000	0.300	0.000
3121500	=feOCa+	7.038E-10	0.0000000	-9.15257	1.000000	-5.850	0.000
3111500	=FeOHCa++	3.502E-12	0.0000000	-11.45571	1.000000	4.970	0.000
3117320	=FeSO4-	2.396E-09	0.0000000	-8.62054	1.000000	7.780	0.000
3127320	=feSO4-	1.425E-03	0.0014248	-2.84625	1.000000	7.780	0.000
3117321	=FeOHSO4-2	5.474E-09	0.0000000	-8.26168	1.000000	0.790	0.000

SPECIES: TYPE III - FIXED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
[redacted] 2	H2O	-1.247E-02	-1.904	0.001	0.000
330	H+1	1.313E-02	-1.882	4.820	0.000

SPECIES: TYPE IV - PRECIPITATED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
060003	ANGLESITE	4.437E-02	-1.353	7.836	-2.150
060000	CERRUSITE	1.018E-02	-1.992	13.233	-4.860
003002	DIASPORE	1.211E-04	-3.917	-7.396	24.630
060000	LARNAKITE	4.652E-04	-3.332	0.143	6.440

SPECIES: TYPE V - DISSOLVED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
015003	HUNTITE	2.940E-29	-28.532	29.421	25.760
046001	HYDRMAGNESIT	0.000E-01	-43.954	7.657	52.210
046002	MAGNESITE	2.464E-07	-6.608	7.898	6.169
028000	MELANTERITE	1.271E-08	-7.896	2.531	-2.860
046003	NESQUEHONITE	9.736E-10	-9.012	5.498	5.789
028000	SIDERITE	4.172E-06	-5.380	10.437	5.328
047003	PYROCROITE	8.817E-11	-10.055	-15.568	22.590
047000	RHODOCHROSIT	9.005E-06	-5.046	10.366	2.079
047000	MNSO4	9.734E-14	-13.012	-2.998	15.480
[redacted]03	GIBBSITE (C)	1.383E-02	-1.859	-9.254	22.800
[redacted]00	MASSICOT	2.667E-06	-5.574	-13.267	16.780
060001	LITHARGE	4.212E-06	-5.376	-13.068	16.380
060002	PBO, .3H2O	5.154E-06	-5.288	-12.980	0.000
060001	PB2OCO3	5.197E-06	-5.284	0.256	11.460
015001	GYPSUM	6.533E-05	-4.185	4.854	-0.261
060001	PB3O2SO4	5.110E-04	-3.292	-10.841	20.750
060002	PB4O3SO4	2.493E-08	-7.603	-22.845	35.070

AR302802

5060002	PB3O2CO3	3.717E-10	-9.430	-11.582	26.430
5046000	EPSOMITE	1.212E-07	-6.917	2.200	-2.820
2060004	PB(OH)2 (C)	1.754E-01	-0.756	-8.447	13.990
5060003	HYDCERRUSITE	4.840E-02	-1.315	17.460	0.000
2060005	PB2O(OH)2	1.527E-11	-10.816	-26.200	0.000
5060004	PB4(OH)6SO4	1.376E-06	-5.862	-21.100	0.000
2015000	LIME	5.152E-28	-27.288	-33.780	46.265
2[redacted]001	PORTLANDITE	1.458E-17	-16.836	-23.327	30.690
2028000	WUSTITE	1.363E-07	-6.865	-12.215	24.846
2046001	PERICLASE	1.386E-16	-15.858	-22.278	36.135
3028001	HERCYNITE	1.192E-09	-8.924	-28.827	78.360
3046000	SPINEL	9.715E-18	-17.013	-38.226	89.089
2003000	ALOH3(A)	2.758E-04	-3.559	-10.955	27.045
5003000	ALOHSO4	1.254E-05	-4.902	3.230	0.000
5003001	AL4(OH)10SO4	2.258E-09	-8.646	-22.700	0.000
5015000	ANHYDRITE	3.317E-05	-4.479	4.557	3.769
5015000	ARAGONITE	6.749E-07	-6.171	8.263	2.615
5046000	ARTINITE	4.990E-19	-18.302	-10.211	28.742
2003001	BOEHMITE	1.662E-02	-1.779	-9.176	28.130
2046000	BRUCITE	1.195E-11	-10.923	-17.341	25.840
5015001	CALCITE	9.909E-07	-6.004	8.430	2.585
3003000	A1203	6.514E-09	-8.186	-22.980	0.000
5015002	DOLOMITE	7.654E-13	-12.116	16.824	8.290

SPECIES: TYPE VI - SPECIES NOT CONSIDERED

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
813	ADS1PSI0	2.959E-03	-2.529	0.000	0.000
3301403	CO2 (g)	1.760E-03	-2.755	18.171	-0.530

PERCENTAGE DISTRIBUTION OF COMPONENTS AMONG dissolved and adsorbed species

Ca+2	100.0	PERCENT BOUND IN SPECIES #	150	Ca+2
Mg+2	100.0	PERCENT BOUND IN SPECIES #	460	Mg+2
ADS1TYP1	100.0	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
Fe+2	100.0	PERCENT BOUND IN SPECIES #	280	Fe+2
Mn+2	100.0	PERCENT BOUND IN SPECIES #	470	Mn+2
ADS1PSI0	27.1	PERCENT BOUND IN SPECIES #	8123302	=feOH2+
	5.9	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
	136.8	PERCENT BOUND IN SPECIES #	8126000	=feOPb+
ADS1TYP2	13.1	PERCENT BOUND IN SPECIES #	812	ADS1TYP2
	12.0	PERCENT BOUND IN SPECIES #	8127321	=feOHSO4-2
	11.5	PERCENT BOUND IN SPECIES #	8123302	=feOH2+
	57.8	PERCENT BOUND IN SPECIES #	8126000	=feOPb+
	5.2	PERCENT BOUND IN SPECIES #	8127320	=feSO4-
SO4-2	69.4	PERCENT BOUND IN SPECIES #	8127321	=feOHSO4-2
	30.4	PERCENT BOUND IN SPECIES #	8127320	=feSO4-
Al+3	76.2	PERCENT BOUND IN SPECIES #	30	Al+3
	14.4	PERCENT BOUND IN SPECIES #	303300	AlOH +2
	8.7	PERCENT BOUND IN SPECIES #	303301	Al(OH)2 +
H2O	5.8	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
	133.8	PERCENT BOUND IN SPECIES #	8126000	=feOPb+
CO3-2	79.9	PERCENT BOUND IN SPECIES #	3301401	H2CO3 AQ
	1.0	PERCENT BOUND IN SPECIES #	6001401	PbCO3 AQ
	16.6	PERCENT BOUND IN SPECIES #	6001402	PbHCO3 +
	2.4	PERCENT BOUND IN SPECIES #	3301400	HCO3 -
Pb+2	54.4	PERCENT BOUND IN SPECIES #	600	Pb+2
	1.9	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
	43.5	PERCENT BOUND IN SPECIES #	8126000	=feOPb+
H+1	5.8	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
	133.1	PERCENT BOUND IN SPECIES #	8126000	=feOPb+

EQUILIBRATED MASS DISTRIBUTION

IDX	NAME	DISSOLVED MOL/KG	DISSOLVED PERCENT	SORBED MOL/KG	SORBED PERCENT	PRECIPITATED MOL/KG	PRECIPITATED PERCENT
50	Ca+2	1.240E-03	100.0	7.073E-10	0.0	0.000E-01	0.0
60	Mg+2	1.049E-03	100.0	0.000E-01	0.0	0.000E-01	0.0
80	Fe+2	5.136E-05	100.0	0.000E-01	0.0	0.000E-01	0.0
70	Mn+2	1.305E-04	100.0	0.000E-01	0.0	0.000E-01	0.0
32	SO4-2	1.074E-05	0.0	4.680E-03	9.4	4.483E-02	90.5
30	Al+3	3.950E-07	0.3	0.000E-01	0.0	1.211E-04	99.7
2	H2O	2.960E-05	0.3	1.173E-02	99.7	0.000E-01	0.0
40	CO3-2	9.671E-05	0.9	0.000E-01	0.0	1.018E-02	99.1

00	Pb+2	1.973E-02	21.5	1.641E-02	17.9	5.548E-02	60.5
330	H+1	1.434E-04	-1.2	-1.196E-02	101.2	0.000E-01	0.0

CHARGE BALANCE: SPECIATED

SUM OF CATIONS = 6.390E-02 SUM OF ANIONS 8.036E-03

PERCENT DIFFERENCE = 7.766E+01 (ANIONS - CATIONS)/(ANIONS + CATIONS)

NONCARBONATE ALKALINITY = 0.000E-01

IONIC STRENGTH = : 2.000E-02

****** DIFFUSE LAYER ADSORPTION MODEL ********

**** Parameters For Adsorbent Number 1 ****

Electrostatic Variables: psi0 = 0.145385 sig0 = 0.152881
psib = 0.000000 sigb = 0.000000
psid = 0.000000 sigd = 0.000000

Adsorbent Concentration (g/l): 12.100

Specific Surface Area (sq. meters/g): 600.00

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:53:56

Saturation indices and stoichiometry of all minerals

ID #	NAME	Sat. Index	Stoichiometry (in parentheses) of each component
2003000	ALOH3(A)	-3.559	(1.000) 30 (3.000) 2 (-3.000)330
[illegible]3000	ALOHSO4	-4.902	(-1.000)330 (1.000) 30 (1.000)732 (1.000) 2
6003001	AL4(OH)10SO4	-8.646	(-10.000)330 (4.000) 30 (1.000)732 (10.000) 2
6015000	ANHYDRITE	-4.479	(1.000)150 (1.000)732
5015000	ARAGONITE	-6.171	(1.000)150 (1.000)140
5046000	ARTINITE	-18.302	(-2.000)330 (2.000)460 (1.000)140 (5.000) 2
2003001	BOEHMITE	-1.779	(-3.000)330 (1.000) 30 (2.000) 2
2046000	BRUCITE	-10.923	(1.000)460 (2.000) 2 (-2.000)330
5015001	CALCITE	-6.004	(1.000)150 (1.000)140
2003002	DIASPORE	0.000	(-3.000)330 (1.000) 30 (2.000) 2
5015002	DOLOMITE	-12.116	(1.000)150 (1.000)460 (2.000)140
6046000	EPSOMITE	-6.917	(1.000)460 (1.000)732 (7.000) 2
2003003	GIBBSITE (C)	-1.859	(-3.000)330 (1.000) 30 (3.000) 2
3003000	Al2O3	-8.186	(2.000) 30 (3.000) 2 (-6.000)330
6015001	GYPSUM	-4.185	(1.000)150 (1.000)732 (2.000) 2
5015003	HUNTITE	-28.532	(3.000)460 (1.000)150 (4.000)140
5046001	HYDRMAGNESIT	-43.954	(5.000)460 (4.000)140 (-2.000)330 (6.000) 2
5046002	MAGNESITE	-6.608	(1.000)460 (1.000)140
6028000	MELANTERITE	-7.896	(1.000)280 (1.000)732 (7.000) 2
5046003	NESQUEHONITE	-9.012	(1.000)460 (1.000)140 (3.000) 2
5028000	SIDERITE	-5.380	(1.000)280 (1.000)140
2047003	PYROCROITE	-10.055	(-2.000)330 (1.000)470 (2.000) 2
5047000	RHODOCHROSIT	-5.046	(1.000)470 (1.000)140
6047000	MNSO4	-13.012	(1.000)470 (1.000)732
5060000	CERRUSITE	0.000	(1.000)600 (1.000)140
2060000	MASSICOT	-5.574	(-2.000)330 (1.000)600 (1.000) 2
2060001	LITHARGE	-5.376	(-2.000)330 (1.000)600 (1.000) 2
[illegible]0002	PBO, .3H2O	-5.288	(-2.000)330 (1.000)600 (1.330) 2
5060001	PB2OCO3	-5.284	(-2.000)330 (2.000)600 (1.000) 2 (1.000)140
6060000	LARNAKITE	0.000	(-2.000)330 (2.000)600 (1.000)732 (1.000) 2
6060001	PB3O2SO4	-3.292	(-4.000)330 (3.000)600 (1.000)732 (2.000) 2
6060002	PB4O3SO4	-7.603	(-6.000)330 (4.000)600 (1.000)732 (3.000) 2
5060002	PB3O2CO3	-9.430	(-4.000)330 (3.000)600 (1.000)140 (2.000) 2
6060003	ANGLESITE	0.000	(1.000)600 (1.000)732
2060004	PB(OH)2 (C)	-0.756	(-2.000)330 (1.000)600 (2.000) 2
5060003	HYDCERRUSITE	-1.315	(-2.000)330 (3.000)600 (2.000)140 (2.000) 2
2060005	PB2O(OH)2	-10.816	(-4.000)330 (2.000)600 (3.000) 2
6060004	PB4(OH)6SO4	-5.862	(-6.000)330 (4.000)600 (1.000)732 (6.000) 2
2015000	LIME	-27.288	(-2.000)330 (1.000)150 (1.000) 2
2015001	PORTLANDITE	-16.836	(-2.000)330 (1.000)150 (2.000) 2
2028000	WUSTITE	-6.865	(-2.000)330 (0.947)280 (1.000) 2
2046001	PERICLASE	-15.858	(-2.000)330 (1.000)460 (1.000) 2
3028001	HERCYNITE	-8.924	(-8.000)330 (1.000)280 (2.000) 30 (4.000) 2
3046000	SPINEL	-17.013	(-8.000)330 (1.000)460 (2.000) 30 (4.000) 2

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:34:

RUNA2 C&R BATTERY
ADSORPTION, OPEN SYS, pCO2=.00035atm, pH=4.82, ION STR.=.02, ALLOW ALL SOLIDS

Temperature (Celsius): 16.60
Units of concentration: MG/L
Ionic strength: 0.020 molal; FIXED
If specified, total carbonate concentration represents total inorganic carbon.
Do not automatically terminate if charge imbalance exceeds 30%
Precipitation is allowed for all solids in the thermodynamic database and
the print option for solids is set to: 1
The maximum number of iterations is: 200
The method used to compute activity coefficients is: Davies equation
Intermediate output file
Adsorption model: Diffuse Layer
Number of adsorbing surfaces: 1

12.100 600.00 0.000 0.000 81
150 4.850E+01 -3.64
460 2.490E+01 -1.76
732 4.644E+03 -3.55
330 1.526E-02 -4.82
600 1.853E+04 -7.00
813 0.000E-01 0.00
812 2.720E-02 -3.42
811 6.800E-04 -5.03
30 3.200E+00 -3.93
280 2.800E+00 -4.30
70 7.000E+00 -3.89
140 0.000E-01 0.00

H2O HAS BEEN INSERTED AS A COMPONENT
3 2
301403 21.6159 -0.5300
330 4.8200 0.0000
6 1
813 0.0000 0.0000
2 12
123301 =feO- 0.0000 -8.9300 0.000 0.000-1.00 0.00 0.00 0.0000
00 3 1.000 812 -1.000 330 -1.000 813 0.000 0 0.000 0 0.000 0
0.000 0 0.000 0 0.000 0 0.000 0 0.000 0 0.000 0

0.000 0 0.000 0 0.000 0
123302 =feOH2+ 0.0000 7.2900 0.000 0.000 1.00 0.00 0.00 0.0000
00 3 1.000 812 1.000 330 1.000 813 0.000 0 0.000 0 0.000 0
0.000 0 0.000 0 0.000 0 0.000 0 0.000 0 0.000 0

0.000 0 0.000 0 0.000 0
113301 =FeO- 0.0000 -8.9300 0.000 0.000-1.00 0.00 0.00 0.0000
00 3 1.000 811 -1.000 330 -1.000 813 0.000 0 0.000 0 0.000 0
0.000 0 0.000 0 0.000 0 0.000 0 0.000 0 0.000 0

0.000 0 0.000 0 0.000 0
[redacted]02 =FeOH2+ 0.0000 7.2900 0.000 0.000 1.00 0.00 0.00 0.0000
00 3 1.000 811 1.000 330 1.000 813 0.000 0 0.000 0 0.000 0
0.000 0 0.000 0 0.000 0 0.000 0 0.000 0 0.000 0

0.000 0 0.000 0 0.000 0
116000 =FeOPb+ 0.0000 4.7100 0.000 0.000 1.00 0.00 0.00 0.0000
00 5 1.000 811 -1.000 330 1.000 813 1.000 600 1.000 2 0.000 0
0.000 0 0.000 0 0.000 0 0.000 0 0.000 0 0.000 0

AR302807

```
 0.000   0   0.000   0   0.000   0
8126000 =feOPb+          0.0000    0.3000   0.000   0.000 1.00 0.00 0.00   0.0000
0.00 5   1.000 812  -1.000 330   1.000 813   1.000 600   1.000   2   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0
```

302808

```
 0.000   0   0.000   0   0.000   0
8[illegible]00 =feOCa+          0.0000   -5.8500   0.000   0.000 1.00 0.00 0.00   0.0000
0.00 4   1.000 812  -1.000 330   1.000 813   1.000 150   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
8111500 =FeOHCa++        0.0000    4.9700   0.000   0.000 2.00 0.00 0.00   0.0000
0.00 3   1.000 811   1.000 150   2.000 813   0.000   0   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
8117320 =FeSO4-          0.0000    7.7800   0.000   0.000-1.00 0.00 0.00   0.0000
0.00 5   1.000 811   1.000 330  -1.000 813   1.000 732  -1.000   2   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
8127320 =feSO4-          0.0000    7.7800   0.000   0.000-1.00 0.00 0.00   0.0000
0.00 5   1.000 812   1.000 330  -1.000 813   1.000 732  -1.000   2   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
8117321 =FeOHSO4-2       0.0000    0.7900   0.000   0.000-2.00 0.00 0.00   0.0000
0.00 4   1.000 811  -2.000 813   1.000 732  -1.000   2   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
8127321 =feOHSO4-2       0.0000    0.7900   0.000   0.000-2.00 0.00 0.00   0.0000
0.00 4   1.000 812  -2.000 813   1.000 732  -1.000   2   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
```

NPUT DATA BEFORE TYPE MODIFICATIONS

ID	NAME	ACTIVITY GUESS	LOG GUESS	ANAL TOTAL
150	Ca+2	2.291E-04	-3.640	4.850E+01
460	Mg+2	1.738E-02	-1.760	2.490E+01
732	SO4-2	2.818E-04	-3.550	4.644E+03
330	H+1	1.514E-05	-4.820	1.526E-02
600	Pb+2	1.000E-07	-7.000	1.853E+04
813	ADS1PSI0	1.000E+00	0.000	0.000E-01
812	ADS1TYP2	3.802E-04	-3.420	2.720E-02
811	ADS1TYP1	9.333E-06	-5.030	6.800E-04
30	Al+3	1.175E-04	-3.930	3.200E+00
280	Fe+2	5.012E-05	-4.300	2.800E+00
470	Mn+2	1.288E-04	-3.890	7.000E+00
140	CO3-2	1.000E+00	0.000	0.000E-01
2	H2O	1.000E+00	0.000	0.000E-01

AR302808

ID	NAME	ANAL MOL	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DIFF F
150	Ca+2	4.850E+01	0.000E-01	2.291E-04	-3.64000	1.000000	0.0000	0.000E-0
460	Mg+2	2.490E+01	0.000E-01	1.738E-02	-1.76000	1.000000	0.0000	0.000E-0
[illegible]732	SO4-2	4.644E+03	0.000E-01	2.818E-04	-3.55000	1.000000	0.0000	0.000E-0
[illegible]330	H+1	1.526E-02	0.000E-01	1.514E-05	-4.82000	1.000000	4.8200	0.000E-0
600	Pb+2	1.853E+04	0.000E-01	1.000E-07	-7.00000	1.000000	0.0000	0.000E-0
813	ADS1PSI0	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0
812	ADS1TYP2	2.720E-02	0.000E-01	3.802E-04	-3.42000	1.000000	0.0000	0.000E-0
811	ADS1TYP1	6.800E-04	0.000E-01	9.333E-06	-5.03000	1.000000	0.0000	0.000E-0
30	Al+3	3.200E+00	0.000E-01	1.175E-04	-3.93000	1.000000	0.0000	0.000E-0
280	Fe+2	2.800E+00	0.000E-01	5.012E-05	-4.30000	1.000000	0.0000	0.000E-0

470	Mn+2	7.000E+00	0.000E-01	1.288E-04	-3.89000	1.000000	0.0000	0.000E-0
140	CO3-2	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0
2	H2O	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0

CHARGE BALANCE: UNSPECIATED

SUM OF CATIONS= 1.884E-01 SUM OF ANIONS = 9.899E-02

PERCENT DIFFERENCE = 3.112E+01 (ANIONS - CATIONS)/(ANIONS + CATIONS)

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:54:49

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
0	ADS1TYP1	6.800E-04	5.440E-03	-5.03000
1	Ca+2	1.239E-03	1.125E-02	-2.44951
2	ADS1TYP1	6.800E-04	3.393E-02	-7.03000
3	ADS1PSI0	6.231E-03	-4.977E-02	-2.00237
4	ADS1TYP2	2.720E-02	3.643E-02	-3.53378
5	ADS1PSI0	3.631E-03	-4.541E-03	-1.54964
6	ADS1PSI0	3.433E-03	-7.266E-04	-1.50370
7	ADS1PSI0	3.395E-03	-1.638E-05	-1.49464
8	ADS1PSI0	3.394E-03	-1.019E-08	-1.49442

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:33:31 A

ITERATIONS= 9: SOLID ANGLESITE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:55:10

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
9	ADS1PSI0	3.394E-03	-1.522E-02	-1.49442
10	SO4-2	-4.207E-02	7.738E-02	-3.63303
11	SO4-2	-4.207E-02	1.445E+00	-4.63303
12	ADS1TYP2	2.720E-02	5.364E-01	-1.47660
13	SO4-2	-4.207E-02	8.076E-02	-5.98693
14	ADS1PSI0	1.828E-02	-5.663E-02	-2.92946
15	ADS1PSI0	1.574E-02	-2.117E-02	-2.80007
16	ADS1PSI0	1.394E-02	-6.850E-03	-2.69475
17	ADS1PSI0	1.299E-02	-1.335E-03	-2.63361
18	ADS1PSI0	1.275E-02	-6.838E-05	-2.61753
19	ADS1PSI0	1.273E-02	-1.821E-07	-2.61666

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:55:29

ITERATIONS= 20: SOLID DIASPORE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:55:31

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
20	SO4-2	-4.207E-02	-2.575E-08	-6.04865

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:58:39

ITERATIONS= 21: SOLID LARNAKITE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:55:38

ARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
21	ADS1PSI0	1.273E-02	-8.755E-03	-2.61665
22	ADS1TYP1	6.800E-04	2.296E-05	-8.19869
23	ADS1PSI0	1.151E-02	-2.717E-05	-2.52917
24	ADS1PSI0	1.150E-02	-1.934E-08	-2.52885

ID	NAME	ANAL MOL	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DIFF F
150	Ca+2	1.239E-03	1.239E-03	7.127E-04	-3.14709	0.575360	0.2401	-9.922E-1
460	Mg+2	1.049E-03	1.048E-03	6.032E-04	-3.21952	0.575360	0.2401	0.000E-0
811	ADS1TYP1	6.800E-04	6.009E-09	6.009E-09	-8.22118	1.000000	0.0000	-3.135E-1
470	Mn+2	1.305E-04	1.304E-04	7.505E-05	-4.12467	0.575360	0.2401	1.299E-1
280	Fe+2	5.133E-05	5.132E-05	2.953E-05	-4.52973	0.575360	0.2401	0.000E-0
813	ADS1PSI0	1.150E-02	2.959E-03	2.959E-03	-2.52885	1.000000	0.0000	-1.784E-1
812	ADS1TYP2	2.720E-02	3.574E-03	3.574E-03	-2.44690	1.000000	0.0000	0.000E-0
732	SO4-2	4.950E-02	2.243E-06	1.290E-06	-5.88928	0.575360	0.2401	0.000E-0
140	CO3-2	0.000E-01	1.786E-12	1.027E-12	-11.98822	0.575360	0.2401	0.000E-0
30	Al+3	1.214E-04	3.010E-07	8.679E-08	-7.06152	0.288313	0.5401	0.000E-0
2	H2O	-7.471E-19	-2.265E-02	9.976E-01	-0.00106	1.000000	0.0011	-2.711E-2
600	Pb+2	9.156E-02	1.966E-02	1.131E-02	-1.94641	0.575360	0.2401	1.355E-2
330	H+1	1.550E-05	3.364E-02	1.514E-05	-4.82000	0.870933	4.8200	0.000E-0

SPECIES: TYPE I - COMPONENTS

ID	NAME	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DH
150	Ca+2	1.239E-03	0.0007127	-3.14709	0.575360	0.240	0.000
460	Mg+2	1.048E-03	0.0006032	-3.21952	0.575360	0.240	0.000
732	SO4-2	2.243E-06	0.0000013	-5.88928	0.575360	0.240	0.000
470	Mn+2	1.304E-04	0.0000750	-4.12467	0.575360	0.240	0.000
600	Pb+2	1.966E-02	0.0113133	-1.94641	0.575360	0.240	0.000
140	CO3-2	1.786E-12	0.0000000	-11.98822	0.575360	0.240	0.000
812	ADS1TYP2	3.574E-03	0.0035736	-2.44690	1.000000	0.000	0.000
811	ADS1TYP1	6.009E-09	0.0000000	-8.22118	1.000000	0.000	0.000
30	Al+3	3.010E-07	0.0000001	-7.06152	0.288313	0.540	0.000
280	Fe+2	5.132E-05	0.0000295	-4.52973	0.575360	0.240	0.000

SPECIES: TYPE II - COMPLEXES

ID	NAME	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DH
127321	=feOHSO4-2	3.255E-03	0.0032554	-2.48740	1.000000	0.790	0.000
801401	H2CO3 AQ	1.537E-05	0.0000154	-4.81137	1.004616	16.815	-2.247
807320	HSO4 -	1.729E-09	0.0000000	-8.82210	0.870933	1.947	4.910
800020	OH-	3.957E-10	0.0000000	-9.46263	0.870933	-14.222	13.345
503300	MgOH +	3.537E-11	0.0000000	-10.51141	0.870933	-12.051	15.935
501400	MgCO3 AQ	5.176E-13	0.0000000	-12.28404	1.004616	2.922	2.022
501401	MgHCO3 +	3.084E-09	0.0000000	-8.57088	0.870933	11.517	-2.430
507320	MgSO4 AQ	1.287E-07	0.0000001	-6.88852	1.004616	2.218	1.399
503300	CaOH +	6.684E-12	0.0000000	-11.23500	0.870933	-12.847	14.535
501400	CaHCO3 +	2.633E-09	0.0000000	-8.63958	0.870933	11.376	1.790
501401	CaCO3 AQ	8.779E-13	0.0000000	-12.05454	1.004616	3.079	4.030
507320	CaSO4 AQ	1.735E-07	0.0000002	-6.75860	1.004616	2.276	1.470
[illegible]00	AlOH +2	5.684E-08	0.0000000	-7.48542	0.575360	-5.003	11.899
503301	Al(OH)2 +	3.439E-08	0.0000000	-7.52364	0.870933	-10.040	0.000
503302	Al(OH)4 -	2.178E-12	0.0000000	-11.72199	0.870933	-23.876	44.060
507320	AlSO4 +	1.212E-10	0.0000000	-9.97648	0.870933	3.034	2.150
507321	Al(SO4)2 -	1.201E-14	0.0000000	-13.98041	0.870933	4.920	2.840
503303	Al(OH)3 AQ	2.473E-09	0.0000000	-8.60470	1.004616	-16.002	0.000
503300	FeOH +	3.705E-10	0.0000000	-9.49126	0.870933	-9.720	13.199
503301	Fe(OH)3 -1	2.204E-22	0.0000000	-21.71676	0.870933	-21.584	20.200

2807320	FeSO4 AQ	5.759E-09	0.0000000	-8.23764	1.004616	2.179	3.230
2803302	FeOH2 AQ	8.495E-17	0.0000000	-16.06883	1.004616	-21.179	28.565
4703300	MnOH +	7.216E-11	0.0000000	-10.20169	0.870933	-10.836	14.399
4703301	Mn(OH)3 -1	3.910E-25	0.0000000	-24.46785	0.870933	-34.740	0.000
4707320	MnSO4 AQ	1.577E-08	0.0000000	-7.80005	1.004616	2.212	2.170
4701400	MnHCO3 +	5.335E-10	0.0000000	-9.33289	0.870933	11.660	0.000
6001400	Pb(CO3)2-2	9.062E-16	0.0000000	-15.28286	0.575360	10.880	0.000
60[illegible]000	PbOH +	1.669E-05	0.0000145	-4.83747	0.870933	-7.650	0.000
6003301	Pb(OH)2 AQ	3.711E-10	0.0000000	-9.42853	1.004616	-17.122	0.000
6003302	Pb(OH)3 -	3.239E-16	0.0000000	-15.54960	0.870933	-28.000	0.000
6003303	Pb2OH +3	1.277E-05	0.0000037	-5.43388	0.288313	-5.820	0.000
6007320	PbSO4 AQ	8.172E-06	0.0000082	-5.08569	1.004616	2.748	0.000
6003304	Pb3(OH)4+2	1.712E-11	0.0000000	-11.00657	0.575360	-24.203	26.500
6001401	PbCO3 AQ	2.011E-07	0.0000002	-6.69463	1.004616	7.238	0.000
6003305	Pb(OH)4 -2	7.420E-23	0.0000000	-22.36966	0.575360	-39.459	0.000
6007321	Pb(SO4)2-2	9.663E-11	0.0000000	-10.25496	0.575360	3.710	0.000
6001402	PbHCO3 +	3.202E-06	0.0000028	-5.55463	0.870933	13.260	0.000
3301400	HCO3 -	4.610E-07	0.0000004	-6.39630	0.870933	10.472	-3.617
3123301	=feO-	9.375E-05	0.0000937	-4.02804	1.000000	-8.930	0.000
3123302	=feOH2+	3.121E-03	0.0031207	-2.50575	1.000000	7.290	0.000
3113301	=FeO-	1.576E-10	0.0000000	-9.80232	1.000000	-8.930	0.000
3113302	=FeOH2+	5.248E-09	0.0000000	-8.28003	1.000000	7.290	0.000
3116000	=FeOPb+	6.800E-04	0.0006800	-3.16750	1.000000	4.710	0.000
3126000	=feOPb+	1.573E-02	0.0157318	-1.80322	1.000000	0.300	0.000
3121500	=feOCa+	7.033E-10	0.0000000	-9.15284	1.000000	-5.850	0.000
3111500	=FeOHCa++	3.500E-12	0.0000000	-11.45597	1.000000	4.970	0.000
3117320	=FeSO4-	2.396E-09	0.0000000	-8.62054	1.000000	7.780	0.000
3127320	=feSO4-	1.425E-03	0.0014248	-2.84625	1.000000	7.780	0.000
3117321	=FeOHSO4-2	5.474E-09	0.0000000	-8.26168	1.000000	0.790	0.000

SPECIES: TYPE III - FIXED SOLIDS

	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
[illegible] 2	H2O	-2.265E-02	-1.645	0.001	0.000
301403	CO2 (g)	-1.924E-05	-4.716	21.627	-0.530
330	H+1	3.364E-02	-1.473	4.820	0.000

SPECIES: TYPE IV - PRECIPITATED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
060003	ANGLESITE	3.417E-02	-1.466	7.836	-2.150
003002	DIASPORE	1.210E-04	-3.917	-7.396	24.630
060000	LARNAKITE	1.063E-02	-1.973	0.143	6.440

SPECIES: TYPE V - DISSOLVED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
015003	HUNTITE	4.593E-32	-31.338	29.421	25.760
046001	HYDRMAGNESIT	0.000E-01	-46.760	7.657	52.210
046002	MAGNESITE	4.900E-08	-7.310	7.898	6.169
028000	MELANTERITE	1.272E-08	-7.896	2.531	-2.860
046003	NESQUEHONITE	1.937E-10	-9.713	5.498	5.789
028000	SIDERITE	8.295E-07	-6.081	10.437	5.328
047003	PYROCROITE	8.814E-11	-10.055	-15.568	22.590
047000	RHODOCHROSIT	1.790E-06	-5.747	10.366	2.079
[illegible]000	MNSO4	9.730E-14	-13.012	-2.998	15.480
[illegible]000	CERRUSITE	1.989E-01	-0.701	13.233	-4.860
060000	MASSICOT	2.667E-06	-5.574	-13.267	16.780
060001	LITHARGE	4.212E-06	-5.376	-13.068	16.380
060002	PBO, .3H2O	5.154E-06	-5.288	-12.980	0.000
060001	PB2OCO3	1.034E-06	-5.986	0.256	11.460
015001	*GYPSUM*	6.532E-05	-4.185	4.854	-0.261
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

5060002	PB4O3SO4	2.493E-08	-7.603	-22.845	35.070
5060002	PB3O2CO3	7.393E-11	-10.131	-11.582	26.430
2003003	GIBBSITE (C)	1.383E-02	-1.859	-9.254	22.800
2060004	PB(OH)2 (C)	1.755E-01	-0.756	-8.447	13.990
5060003	HYDCERRUSITE	1.915E-03	-2.718	17.460	0.000
2060005	PB2O(OH)2	1.528E-11	-10.816	-26.200	0.000
5060004	PB4(OH)6SO4	1.376E-06	-5.861	-21.100	0.000
20[redacted]00	LIME	5.150E-28	-27.288	-33.780	46.265
2015001	PORTLANDITE	1.458E-17	-16.836	-23.327	30.690
2028000	WUSTITE	1.362E-07	-6.866	-12.215	24.846
2046001	PERICLASE	1.385E-16	-15.858	-22.278	36.135
3028001	HERCYNITE	1.191E-09	-8.924	-28.827	78.360
3046000	SPINEL	9.709E-18	-17.013	-38.226	89.089
2003000	ALOH3(A)	2.758E-04	-3.559	-10.955	27.045
003000	ALOHSO4	1.254E-05	-4.902	3.230	0.000
003001	AL4(OH)10SO4	2.260E-09	-8.646	-22.700	0.000
015000	ANHYDRITE	3.316E-05	-4.479	4.557	3.769
015000	ARAGONITE	1.342E-07	-6.872	8.263	2.615
046000	ARTINITE	9.924E-20	-19.003	-10.211	28.742
003001	BOEHMITE	1.662E-02	-1.779	-9.176	28.130
046000	BRUCITE	1.195E-11	-10.923	-17.341	25.840
015001	CALCITE	1.970E-07	-6.706	8.430	2.585
003000	A1203	6.513E-09	-8.186	-22.980	0.000
015002	DOLOMITE	3.025E-14	-13.519	16.824	8.290
046000	EPSOMITE	1.213E-07	-6.916	2.200	-2.820

SPECIES: TYPE VI - SPECIES NOT CONSIDERED

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
813	ADS1PSI0	2.959E-03	-2.529	0.000	0.000

PERCENTAGE DISTRIBUTION OF COMPONENTS AMONG dissolved and adsorbed species

Ca+2	100.0	PERCENT BOUND IN SPECIES #	150	Ca+2
Mg+2	100.0	PERCENT BOUND IN SPECIES #	460	Mg+2
ADS1TYP1	100.0	PERCENT BOUND IN SPECIES #8116000		=FeOPb+
Mn+2	100.0	PERCENT BOUND IN SPECIES #	470	Mn+2
Fe+2	100.0	PERCENT BOUND IN SPECIES #	280	Fe+2
ADS1PSI0	27.1	PERCENT BOUND IN SPECIES #8123302		=feOH2+
	5.9	PERCENT BOUND IN SPECIES #8116000		=FeOPb+
	136.8	PERCENT BOUND IN SPECIES #8126000		=feOPb+
ADS1TYP2	13.1	PERCENT BOUND IN SPECIES #	812	ADS1TYP2
	12.0	PERCENT BOUND IN SPECIES #8127321		=feOHSO4-2
	11.5	PERCENT BOUND IN SPECIES #8123302		=feOH2+
	57.8	PERCENT BOUND IN SPECIES #8126000		=feOPb+
	5.2	PERCENT BOUND IN SPECIES #8127320		=feSO4-
SO4-2	69.4	PERCENT BOUND IN SPECIES #8127321		=feOHSO4-2
	30.4	PERCENT BOUND IN SPECIES #8127320		=feSO4-
CO3-2	79.9	PERCENT BOUND IN SPECIES #3301401		H2CO3 AQ
	1.0	PERCENT BOUND IN SPECIES #6001401		PbCO3 AQ
	16.6	PERCENT BOUND IN SPECIES #6001402		PbHCO3 +
	2.4	PERCENT BOUND IN SPECIES #3301400		HCO3 -
Al+3	76.2	PERCENT BOUND IN SPECIES #	30	Al+3
	14.4	PERCENT BOUND IN SPECIES #	303300	AlOH +2
	8.7	PERCENT BOUND IN SPECIES #	303301	Al(OH)2 +
H2O	5.8	PERCENT BOUND IN SPECIES #8116000		=FeOPb+
	133.8	PERCENT BOUND IN SPECIES #8126000		=feOPb+
Pb+2	54.4	PERCENT BOUND IN SPECIES #	600	Pb+2
	1.9	PERCENT BOUND IN SPECIES #8116000		=FeOPb+
	43.5	PERCENT BOUND IN SPECIES #8126000		=feOPb+
H+1	5.7	PERCENT BOUND IN SPECIES #8116000		=FeOPb+
	131.6	PERCENT BOUND IN SPECIES #8126000		=feOPb+

EQUILIBRATED MASS DISTRIBUTION

IDX	NAME	DISSOLVED MOL/KG	DISSOLVED PERCENT	SORBED MOL/KG	SORBED PERCENT	PRECIPITATED MOL/KG	PRECIPITATED PERCENT
[illegible]	Ca+2	1.239E-03	100.0	7.068E-10	0.0	0.000E-01	0.0
60	Mg+2	1.049E-03	100.0	0.000E-01	0.0	0.000E-01	0.0
70	Mn+2	1.305E-04	100.0	0.000E-01	0.0	0.000E-01	0.0
80	Fe+2	5.133E-05	100.0	0.000E-01	0.0	0.000E-01	0.0
32	SO4-2	1.074E-05	0.0	4.680E-03	9.5	4.480E-02	90.5
40	CO3-2	1.924E-05	100.0	0.000E-01	0.0	0.000E-01	0.0
30	Al+3	3.949E-07	0.3	0.000E-01	0.0	1.210E-04	99.7
[illegible]	H2O	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

0	Pb+2	1.972E-02	21.5	1.641E-02	17.9	5.544E-02	60.5
30	H+1	4.808E-06	0.0	-1.196E-02	100.0	0.000E-01	0.0

CHARGE BALANCE: SPECIATED

SUM OF CATIONS = 6.387E-02 SUM OF ANIONS 8.034E-03

PERCENT DIFFERENCE = 7.765E+01 (ANIONS - CATIONS)/(ANIONS + CATIONS)

NONCARBONATE ALKALINITY = 0.000E-01

IONIC STRENGTH = : 2.000E-02

****** DIFFUSE LAYER ADSORPTION MODEL ********

**** Parameters For Adsorbent Number 1 ****
Electrostatic Variables: psi0 = 0.145385 sig0 = 0.152881
psib = 0.000000 sigb = 0.000000
psid = 0.000000 sigd = 0.000000
Adsorbent Concentration (g/l): 12.100
Specific Surface Area (sq. meters/g): 600.00

Saturation indices and stoichiometry of all minerals

ID #	NAME	Sat. Index	Stoichiometry (in parentheses) of each component							
2003000	ALOH3(A)	-3.559	(1.000) 30	(3.000) 2	(-3.000)330					
[illegible]3000	ALOHSO4	-4.902	(-1.000)330	(1.000) 30	(1.000)732	(1.000) 2				
[illegible]3001	AL4(OH)10SO4	-8.646	(-10.000)330	(4.000) 30	(1.000)732	(10.000) 2				
6015000	ANHYDRITE	-4.479	(1.000)150	(1.000)732						
5015000	ARAGONITE	-6.872	(1.000)150	(1.000)140						
5046000	ARTINITE	-19.003	(-2.000)330	(2.000)460	(1.000)140	(5.000) 2				
2003001	BOEHMITE	-1.779	(-3.000)330	(1.000) 30	(2.000) 2					
2046000	BRUCITE	-10.923	(1.000)460	(2.000) 2	(-2.000)330					
5015001	CALCITE	-6.706	(1.000)150	(1.000)140						
2003002	DIASPORE	0.000	(-3.000)330	(1.000) 30	(2.000) 2					
5015002	DOLOMITE	-13.519	(1.000)150	(1.000)460	(2.000)140					
6046000	EPSOMITE	-6.916	(1.000)460	(1.000)732	(7.000) 2					
2003003	GIBBSITE (C)	-1.859	(-3.000)330	(1.000) 30	(3.000) 2					
3003000	A1203	-8.186	(2.000) 30	(3.000) 2	(-6.000)330					
6015001	GYPSUM	-4.185	(1.000)150	(1.000)732	(2.000) 2					
5015003	HUNTITE	-31.338	(3.000)460	(1.000)150	(4.000)140					
5046001	HYDRMAGNESIT	-46.760	(5.000)460	(4.000)140	(-2.000)330	(6.000) 2				
5046002	MAGNESITE	-7.310	(1.000)460	(1.000)140						
6028000	MELANTERITE	-7.896	(1.000)280	(1.000)732	(7.000) 2					
5046003	NESQUEHONITE	-9.713	(1.000)460	(1.000)140	(3.000) 2					
5028000	SIDERITE	-6.081	(1.000)280	(1.000)140						
2047003	PYROCROITE	-10.055	(-2.000)330	(1.000)470	(2.000) 2					
5047000	RHODOCHROSIT	-5.747	(1.000)470	(1.000)140						
6047000	MNSO4	-13.012	(1.000)470	(1.000)732						
5060000	CERRUSITE	-0.701	(1.000)600	(1.000)140						
2060000	MASSICOT	-5.574	(-2.000)330	(1.000)600	(1.000) 2					
2060001	LITHARGE	-5.376	(-2.000)330	(1.000)600	(1.000) 2					
[illegible]0002	PBO, .3H2O	-5.288	(-2.000)330	(1.000)600	(1.330) 2					
[illegible]0001	PB2OCO3	-5.986	(-2.000)330	(2.000)600	(1.000) 2	(1.000)140				
6060000	LARNAKITE	0.000	(-2.000)330	(2.000)600	(1.000)732	(1.000) 2				
6060001	PB3O2SO4	-3.292	(-4.000)330	(3.000)600	(1.000)732	(2.000) 2				
6060002	PB4O3SO4	-7.603	(-6.000)330	(4.000)600	(1.000)732	(3.000) 2				
5060002	PB3O2CO3	-10.131	(-4.000)330	(3.000)600	(1.000)140	(2.000) 2				
6060003	ANGLESITE	0.000	(1.000)600	(1.000)732						
2060004	PB(OH)2 (C)	-0.756	(-2.000)330	(1.000)600	(2.000) 2					
5060003	HYDCERRUSITE	-2.718	(-2.000)330	(3.000)600	(2.000)140	(2.000) 2				
2060005	PB2O(OH)2	-10.816	(-4.000)330	(2.000)600	(3.000) 2					
6060004	PB4(OH)6SO4	-5.861	(-6.000)330	(4.000)600	(1.000)732	(6.000) 2				
2015000	LIME	-27.288	(-2.000)330	(1.000)150	(1.000) 2					
2015001	PORTLANDITE	-16.836	(-2.000)330	(1.000)150	(2.000) 2					
2028000	WUSTITE	-6.866	(-2.000)330	(0.947)280	(1.000) 2					
2046001	PERICLASE	-15.858	(-2.000)330	(1.000)460	(1.000) 2					
3028001	HERCYNITE	-8.924	(-8.000)330	(1.000)280	(2.000) 30	(4.000) 2				
3046000	SPINEL	-17.013	(-8.000)330	(1.000)460	(2.000) 30	(4.000) 2				

```
PC  VERSION: MINTEQA2   DATE OF CALCULATIONS:  4-DEC-89  TIME: 21:55:58

RUNA3 C&R BATTERY
ADSORPTION, pCO2=.0035, pH=4.82, ION STR=.02, ALLOW ALL SOLIDS

-------------------------------------------------------------------------------

Temperature (Celsius):  16.60
Units of concentration: MG/L
Ionic strength:  0.020 molal; FIXED
If specified, total carbonate concentration represents total inorganic carbon.
Do not automatically terminate if charge imbalance exceeds 30%
Precipitation is allowed for all solids in the thermodynamic database and
  the print option for solids is set to: 1
The maximum number of iterations is: 200
The method used to compute activity coefficients is: Davies equation
Intermediate output file
Adsorption model: Diffuse Layer
Number of adsorbing surfaces: 1

-------------------------------------------------------------------------------

12.100  600.00 0.000 0.000 81
   150  4.850E+01   -3.64
   460  2.490E+01   -1.76
   732  4.644E+03   -3.55
   330  1.526E-02   -4.82
   600  1.853E+04   -7.00
   813  0.000E-01    0.00
   812  2.720E-02   -3.42
   811  6.800E-04   -5.03
    30  3.200E+00   -3.93
   280  2.800E+00   -4.30
   170  7.000E+00   -3.89
   140  0.000E-01    0.00

H2O HAS BEEN INSERTED AS A COMPONENT
 3   2
301403    20.6159    -0.5300
   330     4.8200     0.0000
 6   1
   813     0.0000     0.0000
 2  12
123301 =feO-            0.0000   -8.9300   0.000   0.000-1.00 0.00 0.00   0.0000
.00 3   1.000 812  -1.000 330  -1.000 813   0.000   0   0.000   0   0.000   0
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
123302 =feOH2+          0.0000    7.2900   0.000   0.000 1.00 0.00 0.00   0.0000
.00 3   1.000 812   1.000 330   1.000 813   0.000   0   0.000   0   0.000   0
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
113301 =FeO-            0.0000   -8.9300   0.000   0.000-1.00 0.00 0.00   0.0000
 00 3   1.000 811  -1.000 330  -1.000 813   0.000   0   0.000   0   0.000   0
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
113302 =FeOH2+          0.0000    7.2900   0.000   0.000 1.00 0.00 0.00   0.0000
 00 3   1.000 811   1.000 330   1.000 813   0.000   0   0.000   0   0.000   0
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
116000 =FeOPb+          0.0000    4.7100   0.000   0.000 1.00 0.00 0.00   0.0000
 00 5   1.000 811  -1.000 330   1.000 813   1.000 600   1.000   2   0.000   0
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0
```

```
 0.000   0   0.000   0   0.000   0
3126000 =feOPb+          0.0000    0.3000   0.000   0.000 1.00 0.00 0.00   0.0000
3.00 5   1.000 812  -1.000 330   1.000 813   1.000 600   1.000   2   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
3[redacted]00 =feOCa+          0.0000   -5.8500   0.000   0.000 1.00 0.00 0.00   0.0000
0.00 4   1.000 812  -1.000 330   1.000 813   1.000 150   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
3111500 =FeOHCa++        0.0000    4.9700   0.000   0.000 2.00 0.00 0.00   0.0000
0.00 3   1.000 811   1.000 150   2.000 813   0.000   0   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
3117320 =FeSO4-          0.0000    7.7800   0.000   0.000-1.00 0.00 0.00   0.0000
0.00 5   1.000 811   1.000 330  -1.000 813   1.000 732  -1.000   2   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
3127320 =feSO4-          0.0000    7.7800   0.000   0.000-1.00 0.00 0.00   0.0000
0.00 5   1.000 812   1.000 330  -1.000 813   1.000 732  -1.000   2   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
3117321 =FeOHSO4-2       0.0000    0.7900   0.000   0.000-2.00 0.00 0.00   0.0000
0.00 4   1.000 811  -2.000 813   1.000 732  -1.000   2   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
3127321 =feOHSO4-2       0.0000    0.7900   0.000   0.000-2.00 0.00 0.00   0.0000
0.[redacted]4   1.000 812  -2.000 813   1.000 732  -1.000   2   0.000   0   0.000   0
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
```

INPUT DATA BEFORE TYPE MODIFICATIONS

ID	NAME	ACTIVITY GUESS	LOG GUESS	ANAL TOTAL
150	Ca+2	2.291E-04	-3.640	4.850E+01
460	Mg+2	1.738E-02	-1.760	2.490E+01
732	SO4-2	2.818E-04	-3.550	4.644E+03
330	H+1	1.514E-05	-4.820	1.526E-02
600	Pb+2	1.000E-07	-7.000	1.853E+04
813	ADS1PSI0	1.000E+00	0.000	0.000E-01
812	ADS1TYP2	3.802E-04	-3.420	2.720E-02
811	ADS1TYP1	9.333E-06	-5.030	6.800E-04
30	Al+3	1.175E-04	-3.930	3.200E+00
280	Fe+2	5.012E-05	-4.300	2.800E+00
470	Mn+2	1.288E-04	-3.890	7.000E+00
140	CO3-2	1.000E+00	0.000	0.000E-01
2	H2O	1.000E+00	0.000	0.000E-01

AR302823

ID	NAME	ANAL MOL	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DIFF F
150	Ca+2	4.850E+01	0.000E-01	2.291E-04	-3.64000	1.000000	0.0000	0.000E-0
460	Mg+2	2.490E+01	0.000E-01	1.738E-02	-1.76000	1.000000	0.0000	0.000E-0
[redacted]32	SO4-2	4.644E+03	0.000E-01	2.818E-04	-3.55000	1.000000	0.0000	0.000E-0
330	H+1	1.526E-02	0.000E-01	1.514E-05	-4.82000	1.000000	4.8200	0.000E-0
600	Pb+2	1.853E+04	0.000E-01	1.000E-07	-7.00000	1.000000	0.0000	0.000E-0
813	ADS1PSI0	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0
812	ADS1TYP2	2.720E-02	0.000E-01	3.802E-04	-3.42000	1.000000	0.0000	0.000E-0
811	ADS1TYP1	6.800E-04	0.000E-01	9.333E-06	-5.03000	1.000000	0.0000	0.000E-0
30	Al+3	3.200E+00	0.000E-01	1.175E-04	-3.93000	1.000000	0.0000	0.000E-0
280	Fe+2	2.800E+00	0.000E-01	5.012E-05	-4.30000	1.000000	0.0000	0.000E-0

470	Mn+2	7.000E+00	0.000E-01	1.288E-04	-3.89000	1.000000	0.0000	0.000E-0
140	CO3-2	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0
2	H2O	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0

CHARGE BALANCE: UNSPECIATED

SUM OF CATIONS= 1.884E-01 SUM OF ANIONS = 9.899E-02

PERCENT DIFFERENCE = 3.112E+01 (ANIONS - CATIONS)/(ANIONS + CATIONS)

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
0	ADS1TYP1	6.800E-04	5.440E-03	-5.03000
1	Ca+2	1.239E-03	1.125E-02	-2.44951
2	ADS1TYP1	6.800E-04	3.393E-02	-7.03000
3	ADS1PSI0	6.231E-03	-4.978E-02	-2.00237
4	ADS1TYP2	2.720E-02	3.642E-02	-3.53393
5	ADS1PSI0	3.630E-03	-4.557E-03	-1.54938
6	ADS1PSI0	3.432E-03	-7.304E-04	-1.50333
7	ADS1PSI0	3.394E-03	-1.656E-05	-1.49423
8	ADS1PSI0	3.393E-03	-1.041E-08	-1.49401

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:56:59

ITERATIONS= 9: SOLID ANGLESITE PRECIPITATES

ARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
9	ADS1PSI0	3.393E-03	-1.522E-02	-1.49401
10	SO4-2	-4.207E-02	7.744E-02	-3.63256
11	SO4-2	-4.207E-02	1.448E+00	-4.63256
12	ADS1TYP2	2.720E-02	5.374E-01	-1.47636
13	SO4-2	-4.207E-02	8.099E-02	-5.98622
14	ADS1PSI0	1.828E-02	-5.677E-02	-2.92953
15	ADS1PSI0	1.574E-02	-2.123E-02	-2.80009
16	ADS1PSI0	1.394E-02	-6.874E-03	-2.69467
17	ADS1PSI0	1.298E-02	-1.343E-03	-2.63339
18	ADS1PSI0	1.274E-02	-6.914E-05	-2.61723
19	ADS1PSI0	1.273E-02	-1.861E-07	-2.61634

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:57:20

ITERATIONS= 20: SOLID DIASPORE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 11:57:12

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
20	SO4-2	-4.207E-02	-2.578E-08	-6.04807

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:57:26

ITERATIONS= 21: SOLID CERRUSITE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:47:28

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
21	ADS1PSI0	1.273E-02	-2.540E-02	-2.61634
22	ADS1PSI0	1.015E-02	-3.977E-03	-2.42090
23	ADS1PSI0	9.653E-03	-1.095E-03	-2.37763
24	ADS1PSI0	9.512E-03	-3.360E-05	-2.36497
25	ADS1PSI0	9.507E-03	-5.102E-08	-2.36452

ID	NAME	ANAL MOL	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DIFF F
150	Ca+2	1.239E-03	1.239E-03	7.126E-04	-3.14716	0.575360	0.2401	-9.145E-1
460	Mg+2	1.049E-03	1.048E-03	6.031E-04	-3.21958	0.575360	0.2401	0.000E-0
811	ADS1TYP1	6.800E-04	8.187E-09	8.187E-09	-8.08689	1.000000	0.0000	-3.399E-1
470	Mn+2	1.305E-04	1.304E-04	7.503E-05	-4.12474	0.575360	0.2401	0.000E-0
280	Fe+2	5.133E-05	5.132E-05	2.953E-05	-4.52978	0.575360	0.2401	0.000E-0
813	ADS1PSI0	9.507E-03	4.320E-03	4.320E-03	-2.36452	1.000000	0.0000	-9.437E-1
812	ADS1TYP2	2.720E-02	3.932E-03	3.932E-03	-2.40538	1.000000	0.0000	0.000E-0
732	SO4-2	4.950E-02	4.461E-06	2.567E-06	-5.59064	0.575360	0.2401	0.000E-0
30	Al+3	1.214E-04	3.010E-07	8.679E-08	-7.06152	0.288313	0.5401	0.000E-0
2	H2O	5.650E-22	-3.259E-02	9.976E-01	-0.00106	1.000000	0.0011	-2.043E-1
140	CO3-2	0.000E-01	1.786E-11	1.027E-11	-10.98822	0.575360	0.2401	0.000E-0
330	H+1	1.550E-05	5.522E-02	1.514E-05	-4.82000	0.870933	4.8200	0.000E-0
600	Pb+2	9.156E-02	9.886E-03	5.688E-03	-2.24505	0.575360	0.2401	0.000E-0

SPECIES: TYPE I - COMPONENTS

ID	NAME	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DH
150	Ca+2	1.239E-03	0.0007126	-3.14716	0.575360	0.240	0.000
460	Mg+2	1.048E-03	0.0006031	-3.21958	0.575360	0.240	0.000
732	SO4-2	4.461E-06	0.0000026	-5.59064	0.575360	0.240	0.000
470	Mn+2	1.304E-04	0.0000750	-4.12474	0.575360	0.240	0.000
600	Pb+2	9.886E-03	0.0056879	-2.24505	0.575360	0.240	0.000
140	CO3-2	1.786E-11	0.0000000	-10.98822	0.575360	0.240	0.000
812	ADS1TYP2	3.932E-03	0.0039321	-2.40538	1.000000	0.000	0.000
811	ADS1TYP1	8.187E-09	0.0000000	-8.08689	1.000000	0.000	0.000
30	Al+3	3.010E-07	0.0000001	-7.06152	0.288313	0.540	0.000
280	Fe+2	5.132E-05	0.0000295	-4.52978	0.575360	0.240	0.000

SPECIES: TYPE II - COMPLEXES

ID	NAME	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DH
127321	=feOHSO4-2	3.343E-03	0.0033425	-2.47592	1.000000	0.790	0.000
301401	H2CO3 AQ	1.537E-04	0.0001544	-3.81137	1.004616	16.815	-2.247
307320	HSO4 -	3.440E-09	0.0000000	-8.52346	0.870933	1.947	4.910
300020	OH-	3.957E-10	0.0000000	-9.46263	0.870933	-14.222	13.345
603300	MgOH +	3.536E-11	0.0000000	-10.51147	0.870933	-12.051	15.935
601400	MgCO3 AQ	5.175E-12	0.0000000	-11.28410	1.004616	2.922	2.022
601401	MgHCO3 +	3.084E-08	0.0000000	-7.57095	0.870933	11.517	-2.430
607320	MgSO4 AQ	2.559E-07	0.0000003	-6.58995	1.004616	2.218	1.399
503300	CaOH +	6.683E-12	0.0000000	-11.23507	0.870933	-12.847	14.535
501400	CaHCO3 +	2.632E-08	0.0000000	-7.63965	0.870933	11.376	1.790
501401	CaCO3 AQ	8.778E-12	0.0000000	-11.05460	1.004616	3.079	4.030
507320	CaSO4 AQ	3.451E-07	0.0000003	-6.46003	1.004616	2.276	1.470
313300	AlOH +2	5.684E-08	0.0000000	-7.48542	0.575360	-5.003	11.899
303301	Al(OH)2 +	3.439E-08	0.0000000	-7.52364	0.870933	-10.040	0.000
303302	Al(OH)4 -	2.178E-12	0.0000000	-11.72199	0.870933	-23.876	44.060
307320	AlSO4 +	2.411E-10	0.0000000	-9.67784	0.870933	3.034	2.150
307321	Al(SO4)2 -	4.752E-14	0.0000000	-13.38314	0.870933	4.920	2.840
303303	Al(OH)3 AQ	2.473E-09	0.0000000	-8.60470	1.004616	-16.002	0.000
303200	FeOH +	2.784E-10	0.0000000	-9.48131	0.870933	2.720	12.180

2803301	FeOH3 -1	2.204E-22	0.0000000	-21.71681	0.870933	-31.584	30.300
2807320	FeSO4 AQ	1.145E-08	0.0000000	-7.93905	1.004616	2.179	3.230
2803302	FeOH2 AQ	8.494E-17	0.0000000	-16.06888	1.004616	-21.179	28.565
4703300	MnOH +	7.215E-11	0.0000000	-10.20176	0.870933	-10.836	14.399
4703301	Mn(OH)3 -1	3.909E-25	0.0000000	-24.46792	0.870933	-34.740	0.000
4707320	MnSO4 AQ	3.137E-08	0.0000000	-7.50149	1.004616	2.212	2.170
4701400	MnHCO3 +	5.334E-09	0.0000000	-8.33296	0.870933	11.660	0.000
60[illegible]00	Pb(CO3)2-2	4.556E-14	0.0000000	-13.58149	0.575360	10.880	0.000
4003300	PbOH +	8.393E-06	0.0000073	-5.13611	0.870933	-7.650	0.000
4003301	Pb(OH)2 AQ	1.866E-10	0.0000000	-9.72717	1.004616	-17.122	0.000
4003302	Pb(OH)3 -	1.628E-16	0.0000000	-15.84823	0.870933	-28.000	0.000
4003303	Pb2OH +3	3.228E-06	0.0000009	-6.03115	0.288313	-5.820	0.000
4007320	PbSO4 AQ	8.172E-06	0.0000082	-5.08569	1.004616	2.748	0.000
4003304	Pb3(OH)4+2	2.176E-12	0.0000000	-11.90248	0.575360	-24.203	26.500
4001401	PbCO3 AQ	1.011E-06	0.0000010	-5.99327	1.004616	7.238	0.000
4003305	Pb(OH)4 -2	3.730E-23	0.0000000	-22.66829	0.575360	-39.459	0.000
4007321	Pb(SO4)2-2	1.922E-10	0.0000000	-9.95632	0.575360	3.710	0.000
4001402	PbHCO3 +	1.610E-05	0.0000140	-4.85327	0.870933	13.260	0.000
4301400	HCO3 -	4.610E-06	0.0000040	-5.39630	0.870933	10.472	-3.617
4123301	=feO-	7.065E-05	0.0000707	-4.15086	1.000000	-8.930	0.000
4123302	=feOH2+	5.013E-03	0.0050131	-2.29989	1.000000	7.290	0.000
4113301	=FeO-	1.471E-10	0.0000000	-9.83237	1.000000	-8.930	0.000
4113302	=FeOH2+	1.044E-08	0.0000000	-7.98140	1.000000	7.290	0.000
4116000	=FeOPb+	6.800E-04	0.0006800	-3.16751	1.000000	4.710	0.000
4126000	=feOPb+	1.271E-02	0.0127058	-1.89600	1.000000	0.300	0.000
4121500	=feOCa+	1.130E-09	0.0000000	-8.94705	1.000000	-5.850	0.000
4111500	=FeOHCa++	1.016E-11	0.0000000	-10.99307	1.000000	4.970	0.000
4117320	=FeSO4-	4.447E-09	0.0000000	-8.35195	1.000000	7.780	0.000
4127320	=feSO4-	2.136E-03	0.0021358	-2.67044	1.000000	7.780	0.000
4117321	=FeOHSO4-2	6.959E-09	0.0000000	-8.15743	1.000000	0.790	0.000

SPECIES: TYPE III - FIXED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
2	H2O	-3.259E-02	-1.487	0.001	0.000
3301403	CO2 (g)	-2.442E-02	-1.612	20.627	-0.530
330	H+1	5.522E-02	-1.258	4.820	0.000

SPECIES: TYPE IV - PRECIPITATED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
960003	ANGLESITE	4.400E-02	-1.357	7.836	-2.150
903002	DIASPORE	1.210E-04	-3.917	-7.396	24.630
960000	CERRUSITE	2.425E-02	-1.615	13.233	-4.860

SPECIES: TYPE V - DISSOLVED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
915003	HUNTITE	4.590E-28	-27.338	29.421	25.760
946001	HYDRMAGNESIT	0.000E-01	-42.761	7.657	52.210
946002	MAGNESITE	4.899E-07	-6.310	7.898	6.169
928000	MELANTERITE	2.529E-08	-7.597	2.531	-2.860
946003	NESQUEHONITE	1.936E-09	-8.713	5.498	5.789
928000	SIDERITE	8.294E-06	-5.081	10.437	5.328
947003	PYROCROITE	8.813E-11	-10.055	-15.568	22.590
9[illegible]00	RHODOCHROSIT	1.790E-05	-4.747	10.366	2.079
9[illegible]000	MNSO4	1.935E-13	-12.713	-2.998	15.480
915001	GYPSUM	1.299E-04	-3.886	4.854	-0.261
960000	MASSICOT	1.341E-06	-5.873	-13.267	16.780
960001	LITHARGE	2.118E-06	-5.674	-13.068	16.380
960002	PBO, .3H2O	2.591E-06	-5.586	-12.980	0.000
960001	PB2OCO3	2.613E-06	-5.583	0.256	11.460
960000	LARNAKITE	5.028E-01	-0.299	0.143	6.449

5060001	PB3O2SO4	1.292E-04	-3.889	-10.841	20.750
5060002	PB4O3SO4	3.168E-09	-8.499	-22.845	35.070
5060002	PB3O2CO3	9.395E-11	-10.027	-11.582	26.430
2003003	GIBBSITE (C)	1.383E-02	-1.859	-9.254	22.800
2060004	PB(OH)2 (C)	8.822E-02	-1.054	-8.447	13.990
5060003	HYDCERRUSITE	2.434E-02	-1.614	17.460	0.000
2060005	PB2O(OH)2	3.861E-12	-11.413	-26.200	0.000
5[redacted]04	PB4(OH)6SO4	1.749E-07	-6.757	-21.100	0.000
2015000	LIME	5.149E-28	-27.288	-33.780	46.265
2015001	PORTLANDITE	1.457E-17	-16.836	-23.327	30.690
2028000	WUSTITE	1.362E-07	-6.866	-12.215	24.846
2046001	PERICLASE	1.385E-16	-15.858	-22.278	36.135
3028001	HERCYNITE	1.191E-09	-8.924	-28.827	78.360
3046000	SPINEL	9.707E-18	-17.013	-38.226	89.089
2003000	ALOH3(A)	2.758E-04	-3.559	-10.955	27.045
5003000	ALOHSO4	2.493E-05	-4.603	3.230	0.000
5003001	AL4(OH)10SO4	4.494E-09	-8.347	-22.700	0.000
5015000	ANHYDRITE	6.594E-05	-4.181	4.557	3.769
5015000	ARAGONITE	1.342E-06	-5.872	8.263	2.615
5046000	ARTINITE	9.921E-19	-18.003	-10.211	28.742
2003001	BOEHMITE	1.662E-02	-1.779	-9.176	28.130
2046000	BRUCITE	1.195E-11	-10.923	-17.341	25.840
5015001	CALCITE	1.970E-06	-5.706	8.430	2.585
3003000	A1203	6.513E-09	-8.186	-22.980	0.000
5015002	DOLOMITE	3.025E-12	-11.519	16.824	8.290
5046000	EPSOMITE	2.411E-07	-6.618	2.200	-2.820

SPECIES: TYPE VI - SPECIES NOT CONSIDERED

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
813	ADS1PSI0	4.320E-03	-2.365	0.000	0.000

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:57:57

PERCENTAGE DISTRIBUTION OF COMPONENTS AMONG dissolved and adsorbed species

Ca+2	100.0	PERCENT BOUND IN SPECIES #	150	Ca+2
Mg+2	100.0	PERCENT BOUND IN SPECIES #	460	Mg+2
ADS1TYP1	100.0	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
Mn+2	100.0	PERCENT BOUND IN SPECIES #	470	Mn+2
Fe+2	100.0	PERCENT BOUND IN SPECIES #	280	Fe+2
ADS1PSI0	52.7	PERCENT BOUND IN SPECIES #	8123302	=feOH2+
	7.2	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
	133.6	PERCENT BOUND IN SPECIES #	8126000	=feOPb+
ADS1TYP2	14.5	PERCENT BOUND IN SPECIES #	812	ADS1TYP2
	12.3	PERCENT BOUND IN SPECIES #	8127321	=feOHSO4-2
	18.4	PERCENT BOUND IN SPECIES #	8123302	=feOH2+
	46.7	PERCENT BOUND IN SPECIES #	8126000	=feOPb+
	7.9	PERCENT BOUND IN SPECIES #	8127320	=feSO4-
SO4-2	60.9	PERCENT BOUND IN SPECIES #	8127321	=feOHSO4-2
	38.9	PERCENT BOUND IN SPECIES #	8127320	=feSO4-
Al+3	76.2	PERCENT BOUND IN SPECIES #	30	Al+3
	14.4	PERCENT BOUND IN SPECIES #	303300	AlOH +2
	8.7	PERCENT BOUND IN SPECIES #	303301	Al(OH)2 +
H2O	8.6	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
	160.4	PERCENT BOUND IN SPECIES #	8126000	=feOPb+
CO3-2	87.6	PERCENT BOUND IN SPECIES #	3301401	H2CO3 AQ
	9.2	PERCENT BOUND IN SPECIES #	6001402	PbHCO3 +
	2.6	PERCENT BOUND IN SPECIES #	3301400	HCO3 -
FeO-1	1.2	PERCENT BOUND IN SPECIES #	8123301	=feO-
	11.3	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
	212.1	PERCENT BOUND IN SPECIES #	8126000	=feOPb+
Pb+2	42.4	PERCENT BOUND IN SPECIES #	600	Pb+2
	2.9	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
	54.5	PERCENT BOUND IN SPECIES #	8126000	=feOPb+

---------- EQUILIBRATED MASS DISTRIBUTION ----------

X	NAME	DISSOLVED MOL/KG	DISSOLVED PERCENT	SORBED MOL/KG	SORBED PERCENT	PRECIPITATED MOL/KG	PRECIPITATED PERCENT
0	Ca+2	1.239E-03	100.0	1.140E-09	0.0	0.000E-01	0.0
0	Mg+2	1.049E-03	100.0	0.000E-01	0.0	0.000E-01	0.0
0	Mn+2	1.305E-04	100.0	0.000E-01	0.0	0.000E-01	0.0
0	Fe+2	5.133E-05	100.0	0.000E-01	0.0	0.000E-01	0.0
2	SO4-2	1.328E-05	0.0	5.478E-03	11.1	4.400E-02	88.9
0	Al+3	3.950E-07	0.3	0.000E-01	0.0	1.210E-04	99.7
2	H2O	1.176E-05	0.1	7.907E-03	99.9	0.000E-01	0.0
0	CO3-2	1.755E-04	0.7	0.000E-01	0.0	2.425E-02	99.3

AR302834

30	H+1	3.164E-04	-5.3	-6.307E-03	105.3	0.000E-01	0.0
00	Pb+2	9.926E-03	10.8	1.339E-02	14.6	6.825E-02	74.5

CHARGE BALANCE: SPECIATED

SUM OF CATIONS = 4.316E-02 SUM OF ANIONS 8.905E-03

PERCENT DIFFERENCE = 6.579E+01 (ANIONS - CATIONS)/(ANIONS + CATIONS)

NONCARBONATE ALKALINITY = 0.000E-01

IONIC STRENGTH = : 2.000E-02

****** DIFFUSE LAYER ADSORPTION MODEL ********

**** Parameters For Adsorbent Number 1 ****
Electrostatic Variables: psi0 = 0.135937 sig0 = 0.126354
psib = 0.000000 sigb = 0.000000
psid = 0.000000 sigd = 0.000000
Adsorbent Concentration (g/l): 12.100
Specific Surface Area (sq. meters/g): 600.00

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:57:38

Saturation indices and stoichiometry of all minerals

ID #	NAME	Sat. Index	Stoichiometry (in parentheses) of each component
2003000	ALOH3(A)	-3.559	(1.000) 30 (3.000) 2 (-3.000)330
[illegible]3000	ALOHSO4	-4.603	(-1.000)330 (1.000) 30 (1.000)732 (1.000) 2
6003001	AL4(OH)10SO4	-8.347	(-10.000)330 (4.000) 30 (1.000)732 (10.000) 2
6015000	ANHYDRITE	-4.181	(1.000)150 (1.000)732
5015000	ARAGONITE	-5.872	(1.000)150 (1.000)140
5046000	ARTINITE	-18.003	(-2.000)330 (2.000)460 (1.000)140 (5.000) 2
2003001	BOEHMITE	-1.779	(-3.000)330 (1.000) 30 (2.000) 2
2046000	BRUCITE	-10.923	(1.000)460 (2.000) 2 (-2.000)330
5015001	CALCITE	-5.706	(1.000)150 (1.000)140
2003002	DIASPORE	0.000	(-3.000)330 (1.000) 30 (2.000) 2
5015002	DOLOMITE	-11.519	(1.000)150 (1.000)460 (2.000)140
6046000	EPSOMITE	-6.618	(1.000)460 (1.000)732 (7.000) 2
2003003	GIBBSITE (C)	-1.859	(-3.000)330 (1.000) 30 (3.000) 2
3003000	A1203	-8.186	(2.000) 30 (3.000) 2 (-6.000)330
6015001	GYPSUM	-3.886	(1.000)150 (1.000)732 (2.000) 2
5015003	HUNTITE	-27.338	(3.000)460 (1.000)150 (4.000)140
5046001	HYDRMAGNESIT	-42.761	(5.000)460 (4.000)140 (-2.000)330 (6.000) 2
5046002	MAGNESITE	-6.310	(1.000)460 (1.000)140
6028000	MELANTERITE	-7.597	(1.000)280 (1.000)732 (7.000) 2
5046003	NESQUEHONITE	-8.713	(1.000)460 (1.000)140 (3.000) 2
5028000	SIDERITE	-5.081	(1.000)280 (1.000)140
2047003	PYROCROITE	-10.055	(-2.000)330 (1.000)470 (2.000) 2
5047000	RHODOCHROSIT	-4.747	(1.000)470 (1.000)140
6047000	MNSO4	-12.713	(1.000)470 (1.000)732
5060000	CERRUSITE	0.000	(1.000)600 (1.000)140
2060000	MASSICOT	-5.873	(-2.000)330 (1.000)600 (1.000) 2
2060001	LITHARGE	-5.674	(-2.000)330 (1.000)600 (1.000) 2
[illegible]0002	PBO, .3H20	-5.586	(-2.000)330 (1.000)600 (1.330) 2
[illegible]0001	PB2OCO3	-5.583	(-2.000)330 (2.000)600 (1.000) 2 (1.000)140
6060000	LARNAKITE	-0.299	(-2.000)330 (2.000)600 (1.000)732 (1.000) 2
6060001	PB3O2SO4	-3.889	(-4.000)330 (3.000)600 (1.000)732 (2.000) 2
6060002	PB4O3SO4	-8.499	(-6.000)330 (4.000)600 (1.000)732 (3.000) 2
5060002	PB3O2CO3	-10.027	(-4.000)330 (3.000)600 (1.000)140 (2.000) 2
6060003	ANGLESITE	0.000	(1.000)600 (1.000)732
2060004	PB(OH)2 (C)	-1.054	(-2.000)330 (1.000)600 (2.000) 2
5060003	HYDCERRUSITE	-1.614	(-2.000)330 (3.000)600 (2.000)140 (2.000) 2
2060005	PB2O(OH)2	-11.413	(-4.000)330 (2.000)600 (3.000) 2
6060004	PB4(OH)6SO4	-6.757	(-6.000)330 (4.000)600 (1.000)732 (6.000) 2
2015000	LIME	-27.288	(-2.000)330 (1.000)150 (1.000) 2
2015001	PORTLANDITE	-16.836	(-2.000)330 (1.000)150 (2.000) 2
2028000	WUSTITE	-6.866	(-2.000)330 (0.947)280 (1.000) 2
2046001	PERICLASE	-15.858	(-2.000)330 (1.000)460 (1.000) 2
3028001	HERCYNITE	-8.924	(-8.000)330 (1.000)280 (2.000) 30 (4.000) 2
3046000	SPINEL	-17.013	(-8.000)330 (1.000)460 (2.000) 30 (4.000) 2

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:57:49

RUNA4 C&R BATTERY
ADSORPTION, pCO2=.035, pH=4.82, ION STR=.02, ALLOW ALL SOLIDS

Temperature (Celsius): 16.60
Units of concentration: MG/L
Ionic strength: 0.020 molal; FIXED
If specified, total carbonate concentration represents total inorganic carbon.
Do not automatically terminate if charge imbalance exceeds 30%
Precipitation is allowed for all solids in the thermodynamic database and
the print option for solids is set to: 1
The maximum number of iterations is: 200
The method used to compute activity coefficients is: Davies equation
Intermediate output file
Adsorption model: Diffuse Layer
Number of adsorbing surfaces: 1

```
12.100  600.00 0.000 0.000 81
   150  4.850E+01    -3.64
   460  2.490E+01    -1.76
   732  4.644E+03    -3.55
   330  1.526E-02    -4.82
   600  1.853E+04    -7.00
   813  0.000E-01     0.00
   812  2.720E-02    -3.42
   811  6.800E-04    -5.03
    30  3.200E+00    -3.93
   280  2.800E+00    -4.30
   [illegible]70  7.000E+00    -3.89
   [illegible]40  0.000E-01     0.00

H2O HAS BEEN INSERTED AS A COMPONENT
 3   2
301403    19.6159    -0.5300
   330     4.8200     0.0000
 6   1
   813     0.0000     0.0000
 2  12
123301 =feO-           0.0000   -8.9300   0.000   0.000-1.00 0.00 0.00   0.0000
.00 3   1.000 812  -1.000 330  -1.000 813   0.000   0   0.000   0   0.000   0
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
123302 =feOH2+         0.0000    7.2900   0.000   0.000 1.00 0.00 0.00   0.0000
 00 3   1.000 812   1.000 330   1.000 813   0.000   0   0.000   0   0.000   0
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
113301 =FeO-           0.0000   -8.9300   0.000   0.000-1.00 0.00 0.00   0.0000
 00 3   1.000 811  -1.000 330  -1.000 813   0.000   0   0.000   0   0.000   0
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
[illegible]02 =FeOH2+         0.0000    7.2900   0.000   0.000 1.00 0.00 0.00   0.0000
[illegible]3   1.000 811   1.000 330   1.000 813   0.000   0   0.000   0   0.000   0
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
116000 =FeOPb+         0.0000    4.7100   0.000   0.000 1.00 0.00 0.00   0.0000
 00 5   1.000 811  -1.000 330   1.000 813   1.000 600   1.000   2   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0
```

AR302837

```
 0.000   0   0.000   0   0.000   0
126000 =feOPb+          0.0000    0.3000   0.000   0.000 1.00 0.00 0.00   0.0000
.00 5   1.000 812  -1.000 330   1.000 813   1.000 600   1.000   2   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
[redacted] =feOCa+          0.0000   -5.8500   0.000   0.000 1.00 0.00 0.00   0.0000
.00 4   1.000 812  -1.000 330   1.000 813   1.000 150   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
111500 =FeOHCa++        0.0000    4.9700   0.000   0.000 2.00 0.00 0.00   0.0000
.00 3   1.000 811   1.000 150   2.000 813   0.000   0   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
117320 =FeSO4-          0.0000    7.7800   0.000   0.000-1.00 0.00 0.00   0.0000
.00 5   1.000 811   1.000 330  -1.000 813   1.000 732  -1.000   2   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
127320 =feSO4-          0.0000    7.7800   0.000   0.000-1.00 0.00 0.00   0.0000
.00 5   1.000 812   1.000 330  -1.000 813   1.000 732  -1.000   2   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
117321 =FeOHSO4-2       0.0000    0.7900   0.000   0.000-2.00 0.00 0.00   0.0000
.00 4   1.000 811  -2.000 813   1.000 732  -1.000   2   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
127321 =feOHSO4-2       0.0000    0.7900   0.000   0.000-2.00 0.00 0.00   0.0000
[redacted]   1.000 812  -2.000 813   1.000 732  -1.000   2   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
```

NPUT DATA BEFORE TYPE MODIFICATIONS

ID	NAME	ACTIVITY GUESS	LOG GUESS	ANAL TOTAL
150	Ca+2	2.291E-04	-3.640	4.850E+01
460	Mg+2	1.738E-02	-1.760	2.490E+01
732	SO4-2	2.818E-04	-3.550	4.644E+03
330	H+1	1.514E-05	-4.820	1.526E-02
600	Pb+2	1.000E-07	-7.000	1.853E+04
813	ADS1PSI0	1.000E+00	0.000	0.000E-01
812	ADS1TYP2	3.802E-04	-3.420	2.720E-02
811	ADS1TYP1	9.333E-06	-5.030	6.800E-04
30	Al+3	1.175E-04	-3.930	3.200E+00
280	Fe+2	5.012E-05	-4.300	2.800E+00
470	Mn+2	1.288E-04	-3.890	7.000E+00
140	CO3-2	1.000E+00	0.000	0.000E-01
2	H2O	1.000E+00	0.000	0.000E-01

AR302838

ID	NAME	ANAL MOL	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DIFF F
150	Ca+2	4.850E+01	0.000E-01	2.291E-04	-3.64000	1.000000	0.0000	0.000E-0
460	Mg+2	2.490E+01	0.000E-01	1.738E-02	-1.76000	1.000000	0.0000	0.000E-0
[redacted]2	SO4-2	4.644E+03	0.000E-01	2.818E-04	-3.55000	1.000000	0.0000	0.000E-0
330	H+1	1.526E-02	0.000E-01	1.514E-05	-4.82000	1.000000	4.8200	0.000E-0
600	Pb+2	1.853E+04	0.000E-01	1.000E-07	-7.00000	1.000000	0.0000	0.000E-0
813	ADS1PSI0	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0
812	ADS1TYP2	2.720E-02	0.000E-01	3.802E-04	-3.42000	1.000000	0.0000	0.000E-0
811	ADS1TYP1	6.800E-04	0.000E-01	9.333E-06	-5.03000	1.000000	0.0000	0.000E-0
30	Al+3	3.200E+00	0.000E-01	1.175E-04	-3.93000	1.000000	0.0000	0.000E-0
280	Fe+2	2.800E+00	0.000E-01	5.012E-05	-4.30000	1.000000	0.0000	0.000E-0

470	Mn+2	7.000E+00	0.000E-01	1.288E-04	-3.89000	1.000000	0.0000	0.000E-0
140	CO3-2	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0
2	H2O	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0

CHARGE BALANCE: UNSPECIATED

SUM OF CATIONS= 1.884E-01 SUM OF ANIONS = 9.899E-02

PERCENT DIFFERENCE = 3.112E+01 (ANIONS - CATIONS)/(ANIONS + CATIONS)

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:58:31

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
0	ADS1TYP1	6.800E-04	5.440E-03	-5.03000
1	Ca+2	1.239E-03	1.125E-02	-2.44957
2	ADS1TYP1	6.800E-04	3.392E-02	-7.03000
3	ADS1PSI0	6.230E-03	-4.983E-02	-2.00232
4	ADS1TYP2	2.720E-02	3.635E-02	-3.53549
5	ADS1PSI0	3.619E-03	-4.713E-03	-1.54678
6	ADS1PSI0	3.416E-03	-7.672E-04	-1.49972
7	ADS1PSI0	3.377E-03	-1.836E-05	-1.49016
8	ADS1PSI0	3.376E-03	-1.275E-08	-1.48992

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:58:50

ITERATIONS= 9: SOLID ANGLESITE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:58:52

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
9	ADS1PSI0	3.376E-03	-1.519E-02	-1.48992
10	SO4-2	-4.207E-02	7.799E-02	-3.62789
11	SO4-2	-4.207E-02	1.477E+00	-4.62789
12	ADS1TYP2	2.720E-02	5.478E-01	-1.47406
13	SO4-2	-4.207E-02	8.340E-02	-5.97926
14	ADS1PSI0	1.829E-02	-5.825E-02	-2.93023
15	ADS1PSI0	1.574E-02	-2.185E-02	-2.80029
16	ADS1PSI0	1.392E-02	-7.115E-03	-2.69392
17	ADS1PSI0	1.295E-02	-1.422E-03	-2.63124
18	ADS1PSI0	1.270E-02	-7.711E-05	-2.61421
19	ADS1PSI0	1.268E-02	-2.319E-07	-2.61323

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:59:11

ITERATIONS= 20: SOLID CERRUSITE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:59:13

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
20	ADS1PSI0	1.268E-02	-2.192E-01	-2.61322
21	ADS1TYP2	2.720E-02	5.811E-02	-2.24411
22	ADS1PSI0	7.529E-03	-4.510E-02	-2.16413
23	ADS1PSI0	6.404E-03	-1.587E-02	-2.02576
24	ADS1PSI0	5.689E-03	-4.547E-03	-1.92512
25	ADS1PSI0	5.388E-03	-5.898E-04	-1.87900
26	ADS1PSI0	5.339E-03	-1.348E-05	-1.87136
27	ADS1PSI0	5.338E-03	-6.594E-09	-1.87118

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:59:25

ITERATIONS= 28: SOLID DIASPORE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:59:27

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY

ID	NAME	ANAL MOL	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DIFF F
150	Ca+2	1.239E-03	1.235E-03	7.107E-04	-3.14833	0.575360	0.2401	0.000E-0
460	Mg+2	1.049E-03	1.046E-03	6.017E-04	-3.22065	0.575360	0.2401	0.000E-0
811	ADS1TYP1	6.800E-04	2.628E-08	2.628E-08	-7.58033	1.000000	0.0000	-3.011E-1
470	Mn+2	1.305E-04	1.301E-04	7.485E-05	-4.12583	0.575360	0.2401	0.000E-0
280	Fe+2	5.133E-05	5.122E-05	2.947E-05	-4.53065	0.575360	0.2401	0.000E-0
813	ADS1PSI0	5.338E-03	1.345E-02	1.345E-02	-1.87118	1.000000	0.0000	-1.763E-1
812	ADS1TYP2	2.720E-02	3.162E-03	3.162E-03	-2.50009	1.000000	0.0000	0.000E-0
30	Al+3	1.214E-04	3.010E-07	8.679E-08	-7.06152	0.288313	0.5401	0.000E-0
732	SO4-2	4.950E-02	4.461E-05	2.567E-05	-4.59064	0.575360	0.2401	0.000E-0
2	H2O	5.650E-22	-4.296E-02	9.976E-01	-0.00106	1.000000	0.0011	-2.863E-1
600	Pb+2	9.156E-02	9.886E-04	5.688E-04	-3.24505	0.575360	0.2401	0.000E-0
140	CO3-2	0.000E-01	1.786E-10	1.027E-10	-9.98822	0.575360	0.2401	0.000E-0
330	H+1	1.550E-05	7.733E-02	1.514E-05	-4.82000	0.870933	4.8200	1.355E-2

SPECIES: TYPE I - COMPONENTS

ID	NAME	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DH
150	Ca+2	1.235E-03	0.0007107	-3.14833	0.575360	0.240	0.000
460	Mg+2	1.046E-03	0.0006017	-3.22065	0.575360	0.240	0.000
732	SO4-2	4.461E-05	0.0000257	-4.59064	0.575360	0.240	0.000
470	Mn+2	1.301E-04	0.0000748	-4.12583	0.575360	0.240	0.000
600	Pb+2	9.886E-04	0.0005688	-3.24505	0.575360	0.240	0.000
140	CO3-2	1.786E-10	0.0000000	-9.98822	0.575360	0.240	0.000
[illegible]12	ADS1TYP2	3.162E-03	0.0031617	-2.50009	1.000000	0.000	0.000
811	ADS1TYP1	2.628E-08	0.0000000	-7.58033	1.000000	0.000	0.000
30	Al+3	3.010E-07	0.0000001	-7.06152	0.288313	0.540	0.000
280	Fe+2	5.122E-05	0.0000295	-4.53065	0.575360	0.240	0.000

SPECIES: TYPE II - COMPLEXES

ID	NAME	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DH
27321	=feOHSO4-2	2.771E-03	0.0027714	-2.55730	1.000000	0.790	0.000
01401	H2CO3 AQ	1.537E-03	0.0015440	-2.81137	1.004616	16.815	-2.247
07320	HSO4 -	3.440E-08	0.0000000	-7.52346	0.870933	1.947	4.910
00020	OH-	3.957E-10	0.0000000	-9.46263	0.870933	-14.222	13.345
03300	MgOH +	3.528E-11	0.0000000	-10.51254	0.870933	-12.051	15.935
01400	MgCO3 AQ	5.162E-11	0.0000000	-10.28517	1.004616	2.922	2.022
01401	MgHCO3 +	3.076E-07	0.0000003	-6.57201	0.870933	11.517	-2.430
07320	MgSO4 AQ	2.553E-06	0.0000026	-5.59101	1.004616	2.218	1.399
03300	CaOH +	6.665E-12	0.0000000	-11.23624	0.870933	-12.847	14.535
01400	CaHCO3 +	2.625E-07	0.0000002	-6.64082	0.870933	11.376	1.790
01401	CaCO3 AQ	8.754E-11	0.0000000	-10.05577	1.004616	3.079	4.030
07320	CaSO4 AQ	3.442E-06	0.0000035	-5.46120	1.004616	2.276	1.470
03300	AlOH +2	5.684E-08	0.0000000	-7.48542	0.575360	-5.003	11.899
03301	Al(OH)2 +	3.439E-08	0.0000000	-7.52364	0.870933	-10.040	0.000
03302	Al(OH)4 -	2.178E-12	0.0000000	-11.72199	0.870933	-23.876	44.060
07320	AlSO4 +	2.411E-09	0.0000000	-8.67784	0.870933	3.034	2.150
[illegible]21	Al(SO4)2 -	4.752E-12	0.0000000	-11.38314	0.870933	4.920	2.840
03303	Al(OH)3 AQ	2.473E-09	0.0000000	-8.60470	1.004616	-16.002	0.000
03300	FeOH +	3.697E-10	0.0000000	-9.49218	0.870933	-9.720	13.199
03301	FeOH3 -1	2.200E-22	0.0000000	-21.71768	0.870933	-31.584	30.300
07320	FeSO4 AQ	1.143E-07	0.0000001	-6.93993	1.004616	2.178	3.330
03302	FeOH2 AQ	8.477E-17	0.0000000	-16.06975	1.004616	-21.179	28.565
03300	MnOH +	7.197E-11	0.0000000	-10.20286	0.870933	-10.836	14.399
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

4707320	MnSO4 AQ	3.129E-07	0.0000003	-6.50258	1.004616	2.212	2.170
4701400	MnHCO3 +	5.321E-08	0.0000000	-7.33406	0.870933	11.660	0.000
6001400	Pb(CO3)2-2	4.556E-13	0.0000000	-12.58149	0.575360	10.880	0.000
6003300	PbOH +	8.393E-07	0.0000007	-6.13611	0.870933	-7.650	0.000
6003301	Pb(OH)2 AQ	1.866E-11	0.0000000	-10.72717	1.004616	-17.122	0.000
6003302	Pb(OH)3 -	1.628E-17	0.0000000	-16.84823	0.870933	-28.000	0.000
60[redacted]03	Pb2OH +3	3.228E-08	0.0000000	-8.03115	0.288313	-5.820	0.000
60[redacted]20	PbSO4 AQ	8.172E-06	0.0000082	-5.08569	1.004616	2.748	0.000
6003304	Pb3(OH)4+2	2.176E-15	0.0000000	-14.90248	0.575360	-24.203	26.500
6001401	PbCO3 AQ	1.011E-06	0.0000010	-5.99327	1.004616	7.238	0.000
6003305	Pb(OH)4 -2	3.730E-24	0.0000000	-23.66829	0.575360	-39.459	0.000
6007321	Pb(SO4)2-2	1.922E-09	0.0000000	-8.95632	0.575360	3.710	0.000
6001402	PbHCO3 +	1.610E-05	0.0000140	-4.85327	0.870933	13.260	0.000
8301400	HCO3 -	4.610E-05	0.0000402	-4.39630	0.870933	10.472	-3.617
8123301	=feO-	1.824E-05	0.0000182	-4.73890	1.000000	-8.930	0.000
8123302	=feOH2+	1.255E-02	0.0125526	-1.90127	1.000000	7.290	0.000
8113301	=FeO-	1.517E-10	0.0000000	-9.81915	1.000000	-8.930	0.000
8113302	=FeOH2+	1.043E-07	0.0000001	-6.98151	1.000000	7.290	0.000
8116000	=FeOPb+	6.798E-04	0.0006798	-3.16762	1.000000	4.710	0.000
8126000	=feOPb+	3.181E-03	0.0031815	-2.49737	1.000000	0.300	0.000
8121500	=feOCa+	2.821E-09	0.0000000	-8.54959	1.000000	-5.850	0.000
8111500	=FeOHCa++	3.155E-10	0.0000000	-9.50102	1.000000	4.970	0.000
8117320	=FeSO4-	4.584E-08	0.0000000	-7.33873	1.000000	7.780	0.000
8127320	=feSO4-	5.515E-03	0.0055147	-2.25848	1.000000	7.780	0.000
8117321	=FeOHSO4-2	2.304E-08	0.0000000	-7.63754	1.000000	0.790	0.000

SPECIES: TYPE III - FIXED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
2	H2O	-4.296E-02	-1.367	0.001	0.000
8301403	CO2 (g)	-4.714E-02	-1.327	19.627	-0.530
[redacted]30	H+1	-7.733E-02	-1.112	4.820	0.000

SPECIES: TYPE IV - PRECIPITATED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
0060003	ANGLESITE	4.115E-02	-1.386	7.836	-2.150
0060000	CERRUSITE	4.554E-02	-1.342	13.233	-4.860
0003002	DIASPORE	1.210E-04	-3.917	-7.396	24.630

SPECIES: TYPE V - DISSOLVED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
0015003	HUNTITE	4.544E-24	-23.343	29.421	25.760
0046001	HYDRMAGNESIT	0.000E-01	-38.766	7.657	52.210
0046002	MAGNESITE	4.887E-06	-5.311	7.898	6.169
0028000	MELANTERITE	2.524E-07	-6.598	2.531	-2.860
0046003	NESQUEHONITE	1.932E-08	-7.714	5.498	5.789
0028000	SIDERITE	8.278E-05	-4.082	10.437	5.328
0047003	PYROCROITE	8.791E-11	-10.056	-15.568	22.590
0047000	RHODOCHROSIT	1.786E-04	-3.748	10.366	2.079
0047000	MNSO4	1.930E-12	-11.714	-2.998	15.480
0003000	A1203	6.513E-09	-8.186	-22.980	0.000
0060000	MASSICOT	1.341E-07	-6.873	-13.267	16.780
6[redacted]01	LITHARGE	2.118E-07	-6.674	-13.068	16.380
[redacted]02	PBO, .3H2O	2.591E-07	-6.586	-12.980	0.000
0060001	PB2OCO3	2.613E-07	-6.583	0.256	11.460
0060000	LARNAKITE	5.028E-02	-1.299	0.143	6.440
0060001	PB3O2SO4	1.292E-06	-5.889	-10.841	20.750
0060002	PB4O3SO4	3.168E-12	-11.499	-22.845	35.070
0060002	PB3O2CO3	9.395E-13	-12.027	-11.582	26.430
0003003	GIBBSITE (C)	1.383E-02	-1.859	-9.254	22.800

5060003	HYDCERRUSITE	2.434E-03	-2.614	17.460	0.000
2060005	PB2O(OH)2	3.861E-14	-13.413	-26.200	0.000
5060004	PB4(OH)6SO4	1.749E-10	-9.757	-21.100	0.000
2015000	LIME	5.135E-28	-27.289	-33.780	46.265
2015001	PORTLANDITE	1.454E-17	-16.838	-23.327	30.690
2028000	WUSTITE	1.360E-07	-6.867	-12.215	24.846
20[redacted]01	PERICLASE	1.382E-16	-15.860	-22.278	36.135
30[redacted]01	HERCYNITE	1.189E-09	-8.925	-28.827	78.360
3046000	SPINEL	9.683E-18	-17.014	-38.226	89.089
2003000	ALOH3(A)	2.758E-04	-3.559	-10.955	27.045
5003000	ALOHSO4	2.493E-04	-3.603	3.230	0.000
5003001	AL4(OH)10SO4	4.494E-08	-7.347	-22.700	0.000
5015000	ANHYDRITE	6.576E-04	-3.182	4.557	3.769
5015000	ARAGONITE	1.338E-05	-4.874	8.263	2.615
5046000	ARTINITE	9.873E-18	-17.006	-10.211	28.742
2003001	BOEHMITE	1.662E-02	-1.779	-9.176	28.130
2046000	BRUCITE	1.192E-11	-10.924	-17.341	25.840
5015001	CALCITE	1.964E-05	-4.707	8.430	2.585
5015001	GYPSUM	1.296E-03	-2.888	4.854	-0.261
5015002	DOLOMITE	3.009E-10	-9.522	16.824	8.290
5046000	EPSOMITE	2.405E-06	-5.619	2.200	-2.820

SPECIES: TYPE VI - SPECIES NOT CONSIDERED

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
813	ADS1PSI0	1.345E-02	-1.871	0.000	0.000

PERCENTAGE DISTRIBUTION OF COMPONENTS AMONG dissolved and adsorbed species

Ca+2	99.7	PERCENT BOUND IN SPECIES #	150	Ca+2
Mg+2	99.7	PERCENT BOUND IN SPECIES #	460	Mg+2
ADS1TYP1	100.0	PERCENT BOUND IN SPECIES #8116000		=FeOPb+
Mn+2	99.7	PERCENT BOUND IN SPECIES #	470	Mn+2
Fe+2	99.8	PERCENT BOUND IN SPECIES #	280	Fe+2
ADS1PSI0	235.1	PERCENT BOUND IN SPECIES #8123302		=feOH2+
	12.7	PERCENT BOUND IN SPECIES #8116000		=FeOPb+
	59.6	PERCENT BOUND IN SPECIES #8126000		=feOPb+
ADS1TYP2	11.6	PERCENT BOUND IN SPECIES #	812	ADS1TYP2
	10.2	PERCENT BOUND IN SPECIES #8127321		=feOHSO4-2
	46.1	PERCENT BOUND IN SPECIES #8123302		=feOH2+
	11.7	PERCENT BOUND IN SPECIES #8126000		=feOPb+
	20.3	PERCENT BOUND IN SPECIES #8127320		=feSO4-
Al+3	75.8	PERCENT BOUND IN SPECIES #	30	Al+3
	14.3	PERCENT BOUND IN SPECIES #	303300	AlOH +2
	8.7	PERCENT BOUND IN SPECIES #	303301	Al(OH)2 +
O4-2	33.2	PERCENT BOUND IN SPECIES #8127321		=feOHSO4-2
	66.1	PERCENT BOUND IN SPECIES #8127320		=feSO4-
[redacted]	62.6	PERCENT BOUND IN SPECIES #8127321		=feOHSO4-2
	124.7	PERCENT BOUND IN SPECIES #8127320		=feSO4-
b+2	20.3	PERCENT BOUND IN SPECIES #	600	Pb+2
	13.9	PERCENT BOUND IN SPECIES #8116000		=FeOPb+
	65.2	PERCENT BOUND IN SPECIES #8126000		=feOPb+
O3-2	96.0	PERCENT BOUND IN SPECIES #3301401		H2CO3 AQ
	1.0	PERCENT BOUND IN SPECIES #6001402		PbHCO3 +
	2.9	PERCENT BOUND IN SPECIES #3301400		HCO3 -
+1	17.7	PERCENT BOUND IN SPECIES #3301401		H2CO3 AQ
	72.5	PERCENT BOUND IN SPECIES #8123302		=feOH2+
	31.8	PERCENT BOUND IN SPECIES #8127320		=feSO4-

EQUILIBRATED MASS DISTRIBUTION

)X	NAME	DISSOLVED MOL/KG	DISSOLVED PERCENT	SORBED MOL/KG	SORBED PERCENT	PRECIPITATED MOL/KG	PRECIPITATED PERCENT
[redacted]	Ca+2	1.239E-03	100.0	3.137E-09	0.0	0.000E-01	0.0
50	Mg+2	1.049E-03	100.0	0.000E-01	0.0	0.000E-01	0.0
70	Mn+2	1.305E-04	100.0	0.000E-01	0.0	0.000E-01	0.0
10	Fe+2	5.133E-05	100.0	0.000E-01	0.0	0.000E-01	0.0
10	Al+3	3.972E-07	0.3	0.000E-01	0.0	1.210E-04	99.7
12	SO4-2	5.924E-05	0.1	8.286E-03	16.7	4.115E-02	83.1
12	H2O	1.006E-06	0.0	-4.425E-03	100.0	0.000E-01	0.0

140	CO3-2	1.601E-03	3.4	0.000E-01	0.0	4.554E-02	96.6
330	H+1	3.136E-03	18.1	1.419E-02	81.9	0.000E-01	0.0

CHARGE BALANCE: SPECIATED

SUM OF CATIONS = 2.335E-02 SUM OF ANIONS 1.121E-02

PERCENT DIFFERENCE = 3.513E+01 (ANIONS - CATIONS)/(ANIONS + CATIONS)

NONCARBONATE ALKALINITY = 0.000E-01

IONIC STRENGTH = : 2.000E-02

******* DIFFUSE LAYER ADSORPTION MODEL ********

**** Parameters For Adsorbent Number 1 ****
Electrostatic Variables: psi0 = 0.107575 sig0 = 0.070945
psib = 0.000000 sigb = 0.000000
psid = 0.000000 sigd = 0.000000
Adsorbent Concentration (g/l): 12.100
Specific Surface Area (sq. meters/g): 600.00

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:59:33

Saturation indices and stoichiometry of all minerals

ID #	NAME	Sat. Index	Stoichiometry (in parentheses) of each component
2003000	ALOH3(A)	-3.559	(1.000) 30 (3.000) 2 (-3.000)330
[illegible]3000	ALOHSO4	-3.603	(-1.000)330 (1.000) 30 (1.000)732 (1.000) 2
6003001	AL4(OH)10SO4	-7.347	(-10.000)330 (4.000) 30 (1.000)732 (10.000) 2
6015000	ANHYDRITE	-3.182	(1.000)150 (1.000)732
5015000	ARAGONITE	-4.874	(1.000)150 (1.000)140
5046000	ARTINITE	-17.006	(-2.000)330 (2.000)460 (1.000)140 (5.000) 2
2003001	BOEHMITE	-1.779	(-3.000)330 (1.000) 30 (2.000) 2
2046000	BRUCITE	-10.924	(1.000)460 (2.000) 2 (-2.000)330
5015001	CALCITE	-4.707	(1.000)150 (1.000)140
2003002	DIASPORE	0.000	(-3.000)330 (1.000) 30 (2.000) 2
5015002	DOLOMITE	-9.522	(1.000)150 (1.000)460 (2.000)140
6046000	EPSOMITE	-5.619	(1.000)460 (1.000)732 (7.000) 2
2003003	GIBBSITE (C)	-1.859	(-3.000)330 (1.000) 30 (3.000) 2
3003000	Al2O3	-8.186	(2.000) 30 (3.000) 2 (-6.000)330
6015001	GYPSUM	-2.888	(1.000)150 (1.000)732 (2.000) 2
5015003	HUNTITE	-23.343	(3.000)460 (1.000)150 (4.000)140
5046001	HYDRMAGNESIT	-38.766	(5.000)460 (4.000)140 (-2.000)330 (6.000) 2
5046002	MAGNESITE	-5.311	(1.000)460 (1.000)140
6028000	MELANTERITE	-6.598	(1.000)280 (1.000)732 (7.000) 2
5046003	NESQUEHONITE	-7.714	(1.000)460 (1.000)140 (3.000) 2
5028000	SIDERITE	-4.082	(1.000)280 (1.000)140
2047003	PYROCROITE	-10.056	(-2.000)330 (1.000)470 (2.000) 2
5047000	RHODOCHROSIT	-3.748	(1.000)470 (1.000)140
6047000	MNSO4	-11.714	(1.000)470 (1.000)732
5060000	CERRUSITE	0.000	(1.000)600 (1.000)140
2060000	MASSICOT	-6.873	(-2.000)330 (1.000)600 (1.000) 2
2060001	LITHARGE	-6.674	(-2.000)330 (1.000)600 (1.000) 2
[illegible]0002	PBO, .3H2O	-6.586	(-2.000)330 (1.000)600 (1.330) 2
5060001	PB2OCO3	-6.583	(-2.000)330 (2.000)600 (1.000) 2 (1.000)140
6060000	LARNAKITE	-1.299	(-2.000)330 (2.000)600 (1.000)732 (1.000) 2
6060001	PB3O2SO4	-5.889	(-4.000)330 (3.000)600 (1.000)732 (2.000) 2
6060002	PB4O3SO4	-11.499	(-6.000)330 (4.000)600 (1.000)732 (3.000) 2
5060002	PB3O2CO3	-12.027	(-4.000)330 (3.000)600 (1.000)140 (2.000) 2
6060003	ANGLESITE	0.000	(1.000)600 (1.000)732
2060004	PB(OH)2 (C)	-2.054	(-2.000)330 (1.000)600 (2.000) 2
5060003	HYDCERRUSITE	-2.614	(-2.000)330 (3.000)600 (2.000)140 (2.000) 2
2060005	PB2O(OH)2	-13.413	(-4.000)330 (2.000)600 (3.000) 2
6060004	PB4(OH)6SO4	-9.757	(-6.000)330 (4.000)600 (1.000)732 (6.000) 2
2015000	LIME	-27.289	(-2.000)330 (1.000)150 (1.000) 2
2015001	PORTLANDITE	-16.838	(-2.000)330 (1.000)150 (2.000) 2
2028000	WUSTITE	-6.867	(-2.000)330 (0.947)280 (1.000) 2
2046001	PERICLASE	-15.860	(-2.000)330 (1.000)460 (1.000) 2
3028001	HERCYNITE	-8.925	(-8.000)330 (1.000)280 (2.000) 30 (4.000) 2
3046000	SPINEL	-17.014	(-8.000)330 (1.000)460 (2.000) 30 (4.000) 2

```
 PC  VERSION: MINTEQA2   DATE OF CALCULATIONS:  4-DEC-89  TIME: 19:59: 2


RUNB1 C&R BATTERY
ADSORPTION, pH=4.08, pCO2=.0035atm, ION STR=.02, ALLOW ALL SOLIDS

--------------------------------------------------------------------------------
 Temperature (Celsius):  16.60
 Units of concentration: MG/L
 Ionic strength:  0.020 molal; FIXED
 If specified, total carbonate concentration represents total inorganic carbon.
 Do not automatically terminate if charge imbalance exceeds 30%
 Precipitation is allowed for all solids in the thermodynamic database and
   the print option for solids is set to: 1
 The maximum number of iterations is: 200
 The method used to compute activity coefficients is: Davies equation
 Intermediate output file
 Adsorption model: Diffuse Layer
 Number of adsorbing surfaces: 1

--------------------------------------------------------------------------------

 12.100  600.00 0.000 0.000 81
    150  4.850E+01   -3.64
    460  2.490E+01   -1.76
    732  4.644E+03   -3.55
    330  8.383E-02   -4.08
    600  1.853E+04   -7.00
    813  0.000E-01    0.00
    812  2.720E-02   -3.42
    811  6.800E-04   -5.03
     30  3.200E+00   -3.93
     80  2.800E+00   -4.30
    470  7.000E+00   -3.89
    140  0.000E-01    0.00

 H2O HAS BEEN INSERTED AS A COMPONENT
  3   2
3301403    20.6159    -0.5300
    330     4.0800     0.0000
  6   1
    813     0.0000     0.0000
  2  12
3123301 =feO-           0.0000   -8.9300   0.000   0.000-1.00 0.00 0.00   0.0000
0.00 3   1.000 812  -1.000 330  -1.000 813   0.000   0   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

  0.000   0   0.000   0   0.000   0
3123302 =feOH2+         0.0000    7.2900   0.000   0.000 1.00 0.00 0.00   0.0000
0.00 3   1.000 812   1.000 330   1.000 813   0.000   0   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

  0.000   0   0.000   0   0.000   0
3113301 =FeO-           0.0000   -8.9300   0.000   0.000-1.00 0.00 0.00   0.0000
0.00 3   1.000 811  -1.000 330  -1.000 813   0.000   0   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

  0.000   0   0.000   0   0.000   0
3113302 =FeOH2+         0.0000    7.2900   0.000   0.000 1.00 0.00 0.00   0.0000
0.00 3   1.000 811   1.000 330   1.000 813   0.000   0   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

  0.000   0   0.000   0   0.000   0
3116000 =FeOPb+         0.0000    4.7100   0.000   0.000 1.00 0.00 0.00   0.0000
0.00 5   1.000 811  -1.000 330   1.000 813   1.000 600   1.000   2   0.000   0
```

```
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
126000 =feOPb+          0.0000    0.3000   0.000   0.000 1.00 0.00 0.00   0.0000
 00 5   1.000 812  -1.000 330   1.000 813   1.000 600   1.000   2   0.000   0
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 [illegible]00   0   0.000   0   0.000   0
121500 =feOCa+          0.0000   -5.8500   0.000   0.000 1.00 0.00 0.00   0.0000
 00 4   1.000 812  -1.000 330   1.000 813   1.000 150   0.000   0   0.000   0
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
111500 =FeOHCa++        0.0000    4.9700   0.000   0.000 2.00 0.00 0.00   0.0000
 00 3   1.000 811   1.000 150   2.000 813   0.000   0   0.000   0   0.000   0
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
117320 =FeSO4-          0.0000    7.7800   0.000   0.000-1.00 0.00 0.00   0.0000
 00 5   1.000 811   1.000 330  -1.000 813   1.000 732  -1.000   2   0.000   0
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
127320 =feSO4-          0.0000    7.7800   0.000   0.000-1.00 0.00 0.00   0.0000
 00 5   1.000 812   1.000 330  -1.000 813   1.000 732  -1.000   2   0.000   0
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
117321 =FeOHSO4-2       0.0000    0.7900   0.000   0.000-2.00 0.00 0.00   0.0000
 00 4   1.000 811  -2.000 813   1.000 732  -1.000   2   0.000   0   0.000   0
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
1[illegible]21 =feOHSO4-2       0.0000    0.7900   0.000   0.000-2.00 0.00 0.00   0.0000
 00 4   1.000 812  -2.000 813   1.000 732  -1.000   2   0.000   0   0.000   0
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
```

INPUT DATA BEFORE TYPE MODIFICATIONS

ID	NAME	ACTIVITY GUESS	LOG GUESS	ANAL TOTAL
150	Ca+2	2.291E-04	-3.640	4.850E+01
460	Mg+2	1.738E-02	-1.760	2.490E+01
732	SO4-2	2.818E-04	-3.550	4.644E+03
330	H+1	8.318E-05	-4.080	8.383E-02
600	Pb+2	1.000E-07	-7.000	1.853E+04
813	ADS1PSI0	1.000E+00	0.000	0.000E-01
812	ADS1TYP2	3.802E-04	-3.420	2.720E-02
811	ADS1TYP1	9.333E-06	-5.030	6.800E-04
30	Al+3	1.175E-04	-3.930	3.200E+00
280	Fe+2	5.012E-05	-4.300	2.800E+00
470	Mn+2	1.288E-04	-3.890	7.000E+00
140	CO3-2	1.000E+00	0.000	0.000E-01
2	H2O	1.000E+00	0.000	0.000E-01

AR302853

ID	NAME	ANAL MOL	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DIFF F
150	Ca+2	4.850E+01	0.000E-01	2.291E-04	-3.64000	1.000000	0.0000	0.000E-0
[illegible]60	Mg+2	2.490E+01	0.000E-01	1.738E-02	-1.76000	1.000000	0.0000	0.000E-0
[illegible]32	SO4-2	4.644E+03	0.000E-01	2.818E-04	-3.55000	1.000000	0.0000	0.000E-0
330	H+1	8.383E-02	0.000E-01	8.318E-05	-4.08000	1.000000	4.0800	0.000E-0
600	Pb+2	1.853E+04	0.000E-01	1.000E-07	-7.00000	1.000000	0.0000	0.000E-0
813	ADS1PSI0	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0
812	ADS1TYP2	2.720E-02	0.000E-01	3.802E-04	-3.42000	1.000000	0.0000	0.000E-0
811	ADS1TYP1	6.800E-04	0.000E-01	9.333E-06	-5.03000	1.000000	0.0000	0.000E-0
30	Al+3	3.200E+00	0.000E-01	1.175E-04	-3.93000	1.000000	0.0000	0.000E-0

280	Fe+2	2.800E+00	0.000E-01	5.012E-05	-4.30000	1.000000	0.0000	0.000E-0
470	Mn+2	7.000E+00	0.000E-01	1.288E-04	-3.89000	1.000000	0.0000	0.000E-0
140	CO3-2	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0
2	H2O	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0

CHARGE BALANCE: UNSPECIATED

SUM OF CATIONS= 1.885E-01 SUM OF ANIONS = 9.899E-02

PERCENT DIFFERENCE = 3.114E+01 (ANIONS - CATIONS)/(ANIONS + CATIONS)

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 19:59:44

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
0	ADS1PSI0	0.000E-01	6.322E-01	0.00000
1	Mg+2	1.049E-03	4.174E-03	-2.76000
2	Ca+2	1.239E-03	7.710E-03	-2.74421
3	ADS1PSI0	5.127E-03	-1.546E-01	-1.83715
4	ADS1PSI0	3.906E-03	-6.470E-02	-1.60978
5	ADS1PSI0	3.098E-03	-2.261E-02	-1.42035
6	ADS1PSI0	2.528E-03	-6.866E-03	-1.25946
7	ADS1PSI0	2.303E-03	-1.227E-03	-1.18767
8	ADS1PSI0	2.250E-03	-5.102E-05	-1.16998
9	ADS1PSI0	2.248E-03	-9.029E-08	-1.16922

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20: 0: 5

ITERATIONS= 10: SOLID ANGLESITE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20: 0: 7

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
10	SO4-2	-4.207E-02	5.839E-02	-2.73178
11	SO4-2	-4.207E-02	1.667E-01	-3.73178
12	SO4-2	-4.207E-02	2.873E+00	-4.73178
13	ADS1TYP2	2.720E-02	1.353E+00	-1.54003
14	ADS1TYP2	2.720E-02	2.526E-01	-1.73282
15	ADS1PSI0	2.279E-02	-1.129E-01	-3.12092
16	ADS1PSI0	1.824E-02	-4.881E-02	-2.92790
17	ADS1PSI0	1.535E-02	-1.882E-02	-2.77824
18	ADS1PSI0	1.337E-02	-6.044E-03	-2.65893
19	ADS1PSI0	1.240E-02	-1.121E-03	-2.59357
20	ADS1PSI0	1.218E-02	-4.844E-05	-2.57795
21	ADS1PSI0	1.217E-02	-9.013E-08	-2.57725

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20: 0:28

ITERATIONS= 22: SOLID DIASPORE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20: 0:30

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
22	SO4-2	-4.207E-02	-1.267E-08	-6.21743

ID	NAME	ANAL MOL	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DIFF F
150	Ca+2	1.239E-03	1.239E-03	7.128E-04	-3.14706	0.575360	0.2401	5.088E-1
460	Mg+2	1.049E-03	1.049E-03	6.033E-04	-3.21949	0.575360	0.2401	0.000E-0
732	SO4-2	4.950E-02	1.053E-06	6.061E-07	-6.21743	0.575360	0.2401	-3.434E-1
470	Mn+2	1.305E-04	1.304E-04	7.505E-05	-4.12464	0.575360	0.2401	0.000E-0
280	Fe+2	5.133E-05	5.133E-05	2.953E-05	-4.52970	0.575360	0.2401	0.000E-0
813	ADS1PSI0	1.217E-02	2.647E-03	2.647E-03	-2.57725	1.000000	0.0000	3.019E-1
812	ADS1TYP2	2.720E-02	3.197E-03	3.197E-03	-2.49531	1.000000	0.0000	0.000E-0
811	ADS1TYP1	6.800E-04	1.734E-08	1.734E-08	-7.76101	1.000000	0.0000	1.179E-1
30	Al+3	1.214E-04	4.996E-05	1.440E-05	-4.84151	0.288313	0.5401	0.000E-0
140	CO3-2	0.000E-01	5.913E-13	3.402E-13	-12.46823	0.575360	0.2401	0.000E-0
2	H2O	-2.260E-21	-4.949E-04	9.976E-01	-0.00106	1.000000	0.0011	1.364E-1
600	Pb+2	9.156E-02	4.186E-02	2.409E-02	-1.61825	0.575360	0.2401	0.000E-0
330	H+1	8.515E-05	-1.150E-02	8.318E-05	-4.08000	0.870933	4.0800	1.355E-2

SPECIES: TYPE I - COMPONENTS

ID	NAME	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DH
150	Ca+2	1.239E-03	0.0007128	-3.14706	0.575360	0.240	0.000
460	Mg+2	1.049E-03	0.0006033	-3.21949	0.575360	0.240	0.000
732	SO4-2	1.053E-06	0.0000006	-6.21743	0.575360	0.240	0.000
470	Mn+2	1.304E-04	0.0000751	-4.12464	0.575360	0.240	0.000
600	Pb+2	4.186E-02	0.0240851	-1.61825	0.575360	0.240	0.000
140	CO3-2	5.913E-13	0.0000000	-12.46823	0.575360	0.240	0.000
812	ADS1TYP2	3.197E-03	0.0031966	-2.49531	1.000000	0.000	0.000
811	ADS1TYP1	1.734E-08	0.0000000	-7.76101	1.000000	0.000	0.000
30	Al+3	4.996E-05	0.0000144	-4.84151	0.288313	0.540	0.000
280	Fe+2	5.133E-05	0.0000295	-4.52970	0.575360	0.240	0.000

SPECIES: TYPE II - COMPLEXES

ID	NAME	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DH
3127321	=feOHSO4-2	1.709E-03	0.0017093	-2.76719	1.000000	0.790	0.000
3301401	H2CO3 AQ	1.537E-04	0.0001544	-3.81137	1.004616	16.815	-2.247
3307320	HSO4 -	4.464E-09	0.0000000	-8.41026	0.870933	1.947	4.910
3300020	OH-	7.201E-11	0.0000000	-10.20263	0.870933	-14.222	13.345
1603300	MgOH +	6.436E-12	0.0000000	-11.25138	0.870933	-12.051	15.935
1601400	MgCO3 AQ	1.714E-13	0.0000000	-12.76401	1.004616	2.922	2.022
1601401	MgHCO3 +	5.613E-09	0.0000000	-8.31086	0.870933	11.517	-2.430
1607320	MgSO4 AQ	6.044E-08	0.0000001	-7.21665	1.004616	2.218	1.399
1503300	CaOH +	1.216E-12	0.0000000	-11.97497	0.870933	-12.847	14.535
1501400	CaHCO3 +	4.791E-09	0.0000000	-8.37955	0.870933	11.376	1.790
1501401	CaCO3 AQ	2.907E-13	0.0000000	-12.53450	1.004616	3.079	4.030
1507320	CaSO4 AQ	8.152E-08	0.0000001	-7.08672	1.004616	2.276	1.470
1303300	AlOH +2	1.716E-06	0.0000010	-6.00542	0.575360	-5.003	11.899
1303301	Al(OH)2 +	1.890E-07	0.0000002	-6.78364	0.870933	-10.040	0.000
1303302	Al(OH)4 -	3.963E-13	0.0000000	-12.46199	0.870933	-23.876	44.060
1307320	AlSO4 +	9.449E-09	0.0000000	-8.08463	0.870933	3.034	2.150
1307321	Al(SO4)2 -	4.398E-13	0.0000000	-12.41673	0.870933	4.920	2.840
1303303	Al(OH)3 AQ	2.473E-09	0.0000000	-8.60470	1.004616	-16.002	0.000
2803300	FeOH +	6.742E-11	0.0000000	-10.23123	0.870933	-9.720	13.199
2803301	FeOH3 -1	1.328E-24	0.0000000	-23.93674	0.870933	-31.584	30.300
2807320	FeSO4 AQ	2.705E-09	0.0000000	-8.56577	1.004616	2.179	3.230
2803302	FeOH2 AQ	2.813E-18	0.0000000	-17.54881	1.004616	-21.179	28.565

703300	MnOH +	1.313E-11	0.0000000	-10.94167	0.870933	-10.836	14.399
703301	Mn(OH)3 -1	2.356E-27	0.0000000	-26.68783	0.870933	-34.740	0.000
707320	MnSO4 AQ	7.410E-09	0.0000000	-8.12819	1.004616	2.212	2.170
701400	MnHCO3 +	9.708E-10	0.0000000	-9.07287	0.870933	11.660	0.000
001400	Pb(CO3)2-2	2.115E-16	0.0000000	-15.91470	0.575360	10.880	0.000
003300	PbOH +	6.467E-06	0.0000056	-5.24931	0.870933	-7.650	0.000
003301	Pb(OH)2 AQ	2.616E-11	0.0000000	-10.58038	1.004616	-17.122	0.000
003302	Pb(OH)3 -	4.155E-18	0.0000000	-17.44144	0.870933	-28.000	0.000
003303	Pb2OH +3	1.053E-05	0.0000030	-5.51757	0.288313	-5.820	0.000
007320	PbSO4 AQ	8.172E-06	0.0000082	-5.08569	1.004616	2.748	0.000
003304	Pb3(OH)4+2	1.811E-13	0.0000000	-12.98210	0.575360	-24.203	26.500
001401	PbCO3 AQ	1.418E-07	0.0000001	-6.84648	1.004616	7.238	0.000
003305	Pb(OH)4 -2	1.732E-25	0.0000000	-25.00150	0.575360	-39.459	0.000
007321	Pb(SO4)2-2	4.539E-11	0.0000000	-10.58312	0.575360	3.710	0.000
001402	PbHCO3 +	1.240E-05	0.0000108	-4.96648	0.870933	13.260	0.000
301400	HCO3 -	8.389E-07	0.0000007	-6.13630	0.870933	10.472	-3.617
123301	=feO-	1.706E-05	0.0000171	-4.76806	1.000000	-8.930	0.000
123302	=feOH2+	1.372E-02	0.0137228	-1.86256	1.000000	7.290	0.000
113301	=FeO-	9.252E-11	0.0000000	-10.03376	1.000000	-8.930	0.000
113302	=FeOH2+	7.443E-08	0.0000001	-7.12825	1.000000	7.290	0.000
116000	=FeOPb+	6.799E-04	0.0006799	-3.16757	1.000000	4.710	0.000
126000	=feOPb+	4.877E-03	0.0048767	-2.31187	1.000000	0.300	0.000
121500	=feOCa+	1.024E-10	0.0000000	-9.98961	1.000000	-5.850	0.000
111500	=FeOHCa++	8.081E-12	0.0000000	-11.09256	1.000000	4.970	0.000
117320	=FeSO4-	1.995E-08	0.0000000	-7.70013	1.000000	7.780	0.000
127320	=feSO4-	3.678E-03	0.0036776	-2.43443	1.000000	7.780	0.000
117321	=FeOHSO4-2	9.271E-09	0.0000000	-8.03288	1.000000	0.790	0.000

SPECIES: TYPE III - FIXED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
2	H2O	-4.949E-04	-3.305	0.001	0.000
3 03	CO2 (g)	-1.671E-04	-3.777	20.627	-0.530
330	H+1	-1.150E-02	-1.939	4.080	0.000

SPECIES: TYPE IV - PRECIPITATED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
060003	ANGLESITE	4.410E-02	-1.356	7.836	-2.150
003002	DIASPORE	6.955E-05	-4.158	-7.396	24.630

SPECIES: TYPE V - DISSOLVED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
015001	GYPSUM	3.069E-05	-4.513	4.854	-0.261
015003	HUNTITE	5.523E-34	-33.258	29.421	25.760
046001	HYDRMAGNESIT	0.000E-01	-50.160	7.657	52.210
046002	MAGNESITE	1.623E-08	-7.790	7.898	6.169
028000	MELANTERITE	5.973E-09	-8.224	2.531	-2.860
046003	NESQUEHONITE	6.413E-11	-10.193	5.498	5.789
028000	SIDERITE	2.747E-07	-6.561	10.437	5.328
047003	PYROCROITE	2.919E-12	-11.535	-15.568	22.590
047000	RHODOCHROSIT	5.929E-07	-6.227	10.366	2.079
047000	MNSO4	4.571E-14	-13.340	-2.998	15.480
060000	CERRUSITE	1.402E-01	-0.853	13.233	-4.860
060000	MASSICOT	1.880E-07	-6.726	-13.267	16.780
060001	LITHARGE	2.969E-07	-6.527	-13.068	16.380
060002	PBO, .3H2O	3.634E-07	-6.440	-12.980	0.000
060001	PB2OCO3	5.137E-08	-7.289	0.256	11.460
060000	LARNAKITE	7.049E-02	-1.152	0.143	6.440
060001	PB3O2SO4	2.540E-06	-5.595	-10.841	20.750
060002	PB4O3SO4	8.733E-12	-11.059	-22.845	35.070
060002	PB3O2CO3	2.590E-13	-12.587	-11.582	26.430

2003003	GIBBSITE (C)	1.383E-02	-1.859	-9.254	22.800
2060004	PB(OH)2 (C)	1.237E-02	-1.908	-8.447	13.990
5060003	HYDCERRUSITE	6.709E-05	-4.173	17.460	0.000
2060005	PB2O(OH)2	7.591E-14	-13.120	-26.200	0.000
6060004	PB4(OH)6SO4	4.821E-10	-9.317	-21.100	0.000
2015000	LIME	1.705E-29	-28.768	-33.780	46.265
2015001	PORTLANDITE	4.827E-19	-18.316	-23.327	30.690
2[redacted]000	WUSTITE	4.512E-09	-8.346	-12.215	24.846
2046001	PERICLASE	4.588E-18	-17.338	-22.278	36.135
3028001	HERCYNITE	3.944E-11	-10.404	-28.827	78.360
3046000	SPINEL	3.215E-19	-18.493	-38.226	89.089
2003000	ALOH3(A)	2.758E-04	-3.559	-10.955	27.045
6003000	ALOHSO4	1.778E-04	-3.750	3.230	0.000
6003001	AL4(OH)10SO4	3.205E-08	-7.494	-22.700	0.000
6015000	ANHYDRITE	1.557E-05	-4.808	4.557	3.769
5015000	ARAGONITE	4.443E-08	-7.352	8.263	2.615
5046000	ARTINITE	1.088E-21	-20.963	-10.211	28.742
2003001	BOEHMITE	1.662E-02	-1.779	-9.176	28.130
2046000	BRUCITE	3.957E-13	-12.403	-17.341	25.840
5015001	CALCITE	6.524E-08	-7.186	8.430	2.585
3003000	A1203	6.513E-09	-8.186	-22.980	0.000
5015002	DOLOMITE	3.318E-15	-14.479	16.824	8.290
6046000	EPSOMITE	5.696E-08	-7.244	2.200	-2.820

SPECIES: TYPE VI - SPECIES NOT CONSIDERED

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
813	ADS1PSI0	2.647E-03	-2.577	0.000	0.000

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20: 0:35

PERCENTAGE DISTRIBUTION OF COMPONENTS AMONG dissolved and adsorbed species

Ca	100.0	PERCENT BOUND IN SPECIES #	150	Ca+2
Mg+2	100.0	PERCENT BOUND IN SPECIES #	460	Mg+2
SO4-2	31.7	PERCENT BOUND IN SPECIES #	8127321	=feOHSO4-2
	68.2	PERCENT BOUND IN SPECIES #	8127320	=feSO4-
Mn+2	100.0	PERCENT BOUND IN SPECIES #	470	Mn+2
Fe+2	100.0	PERCENT BOUND IN SPECIES #	280	Fe+2
ADS1PSI0	112.8	PERCENT BOUND IN SPECIES #	8123302	=feOH2+
	5.6	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
	40.1	PERCENT BOUND IN SPECIES #	8126000	=feOPb+
ADS1TYP2	11.8	PERCENT BOUND IN SPECIES #	812	ADS1TYP2
	6.3	PERCENT BOUND IN SPECIES #	8127321	=feOHSO4-2
	50.5	PERCENT BOUND IN SPECIES #	8123302	=feOH2+
	17.9	PERCENT BOUND IN SPECIES #	8126000	=feOPb+
	13.5	PERCENT BOUND IN SPECIES #	8127320	=feSO4-
ADS1TYP1	100.0	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
Al+3	96.3	PERCENT BOUND IN SPECIES #	30	Al+3
	3.3	PERCENT BOUND IN SPECIES #	303300	AlOH +2
C	92.0	PERCENT BOUND IN SPECIES #	3301401	H2CO3 AQ
	7.4	PERCENT BOUND IN SPECIES #	6001402	PbHCO3 +
H2O	3.4	PERCENT BOUND IN SPECIES #	6003300	PbOH +
	5.6	PERCENT BOUND IN SPECIES #	6003303	Pb2OH +3
	360.2	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
	>1000.	PERCENT BOUND IN SPECIES #	8126000	=feOPb+
Pb+2	88.2	PERCENT BOUND IN SPECIES #	600	Pb+2
	1.4	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
	10.3	PERCENT BOUND IN SPECIES #	8126000	=feOPb+
H+1	2.5	PERCENT BOUND IN SPECIES #	3301401	H2CO3 AQ
	113.1	PERCENT BOUND IN SPECIES #	8123302	=feOH2+
	30.3	PERCENT BOUND IN SPECIES #	8127320	=feSO4-

---------- EQUILIBRATED MASS DISTRIBUTION ----------

X	NAME	DISSOLVED MOL/KG	DISSOLVED PERCENT	SORBED MOL/KG	SORBED PERCENT	PRECIPITATED MOL/KG	PRECIPITATED PERCENT
0	Ca+2	1.239E-03	100.0	1.105E-10	0.0	0.000E-01	0.0
0	Mg+2	1.049E-03	100.0	0.000E-01	0.0	0.000E-01	0.0
2	SO4-2	9.391E-06	0.0	5.387E-03	10.9	4.410E-02	89.1
0	Mn+2	1.305E-04	100.0	0.000E-01	0.0	0.000E-01	0.0
0	Fe+2	5.133E-05	100.0	0.000E-01	0.0	0.000E-01	0.0
0	Al+3	5.188E-05	42.7	0.000E-01	0.0	6.955E-05	57.3
0	CO3-2	1.671E-04	100.0	0.000E-01	0.0	0.000E-01	0.0

AR302862

2	H2O	1.910E-05	10.1	1.697E-04	89.9	0.000E-01	0.0
500	Pb+2	4.191E-02	45.8	5.557E-03	6.1	4.410E-02	48.2
330	H+1	3.015E-04	2.5	1.183E-02	97.5	0.000E-01	0.0

CHARGE BALANCE: SPECIATED

SUM OF CATIONS = 1.082E-01 SUM OF ANIONS 7.116E-03

PERCENT DIFFERENCE = 8.766E+01 (ANIONS - CATIONS)/(ANIONS + CATIONS)

NONCARBONATE ALKALINITY = 0.000E-01

IONIC STRENGTH = : 2.000E-02

******* DIFFUSE LAYER ADSORPTION MODEL ********

**** Parameters For Adsorbent Number 1 ****
Electrostatic Variables: psi0 = 0.148167 sig0 = 0.161691
psib = 0.000000 sigb = 0.000000
psid = 0.000000 sigd = 0.000000
Adsorbent Concentration (g/l): 12.100
Specific Surface Area (sq. meters/g): 600.00

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20: 0:36

Saturation indices and stoichiometry of all minerals

ID #	NAME	Sat. Index	Stoichiometry (in parentheses) of each component
[redacted]3000	ALOH3(A)	-3.559	(1.000) 30 (3.000) 2 (-3.000)330
6003000	ALOHSO4	-3.750	(-1.000)330 (1.000) 30 (1.000)732 (1.000) 2
6003001	AL4(OH)10SO4	-7.494	(-10.000)330 (4.000) 30 (1.000)732 (10.000) 2
6015000	ANHYDRITE	-4.808	(1.000)150 (1.000)732
5015000	ARAGONITE	-7.352	(1.000)150 (1.000)140
5046000	ARTINITE	-20.963	(-2.000)330 (2.000)460 (1.000)140 (5.000) 2
2003001	BOEHMITE	-1.779	(-3.000)330 (1.000) 30 (2.000) 2
2046000	BRUCITE	-12.403	(1.000)460 (2.000) 2 (-2.000)330
5015001	CALCITE	-7.186	(1.000)150 (1.000)140
2003002	DIASPORE	0.000	(-3.000)330 (1.000) 30 (2.000) 2
5015002	DOLOMITE	-14.479	(1.000)150 (1.000)460 (2.000)140
6046000	EPSOMITE	-7.244	(1.000)460 (1.000)732 (7.000) 2
2003003	GIBBSITE (C)	-1.859	(-3.000)330 (1.000) 30 (3.000) 2
3003000	A1203	-8.186	(2.000) 30 (3.000) 2 (-6.000)330
6015001	GYPSUM	-4.513	(1.000)150 (1.000)732 (2.000) 2
5015003	HUNTITE	-33.258	(3.000)460 (1.000)150 (4.000)140
5046001	HYDRMAGNESIT	-50.160	(5.000)460 (4.000)140 (-2.000)330 (6.000) 2
5046002	MAGNESITE	-7.790	(1.000)460 (1.000)140
6028000	MELANTERITE	-8.224	(1.000)280 (1.000)732 (7.000) 2
5046003	NESQUEHONITE	-10.193	(1.000)460 (1.000)140 (3.000) 2
5028000	SIDERITE	-6.561	(1.000)280 (1.000)140
2047003	PYROCROITE	-11.535	(-2.000)330 (1.000)470 (2.000) 2
5047000	RHODOCHROSIT	-6.227	(1.000)470 (1.000)140
6047000	MNSO4	-13.340	(1.000)470 (1.000)732
5060000	CERRUSITE	-0.853	(1.000)600 (1.000)140
2060000	MASSICOT	-6.726	(-2.000)330 (1.000)600 (1.000) 2
[redacted]0001	LITHARGE	-6.527	(-2.000)330 (1.000)600 (1.000) 2
2060002	PBO, .3H2O	-6.440	(-2.000)330 (1.000)600 (1.330) 2
5060001	PB2OC03	-7.289	(-2.000)330 (2.000)600 (1.000) 2 (1.000)140
6060000	LARNAKITE	-1.152	(-2.000)330 (2.000)600 (1.000)732 (1.000) 2
6060001	PB3O2SO4	-5.595	(-4.000)330 (3.000)600 (1.000)732 (2.000) 2
6060002	PB4O3SO4	-11.059	(-6.000)330 (4.000)600 (1.000)732 (3.000) 2
5060002	PB3O2CO3	-12.587	(-4.000)330 (3.000)600 (1.000)140 (2.000) 2
6060003	ANGLESITE	0.000	(1.000)600 (1.000)732
2060004	PB(OH)2 (C)	-1.908	(-2.000)330 (1.000)600 (2.000) 2
5060003	HYDCERRUSITE	-4.173	(-2.000)330 (3.000)600 (2.000)140 (2.000) 2
2060005	PB2O(OH)2	-13.120	(-4.000)330 (2.000)600 (3.000) 2
6060004	PB4(OH)6SO4	-9.317	(-6.000)330 (4.000)600 (1.000)732 (6.000) 2
2015000	LIME	-28.768	(-2.000)330 (1.000)150 (1.000) 2
2015001	PORTLANDITE	-18.316	(-2.000)330 (1.000)150 (2.000) 2
2028000	WUSTITE	-8.346	(-2.000)330 (0.947)280 (1.000) 2
2046001	PERICLASE	-17.338	(-2.000)330 (1.000)460 (1.000) 2
3028001	HERCYNITE	-10.404	(-8.000)330 (1.000)280 (2.000) 30 (4.000) 2
3046000	SPINEL	-18.493	(-8.000)330 (1.000)460 (2.000) 30 (4.000) 2

```
 PC  VERSION: MINTEQA2   DATE OF CALCULATIONS:  4-DEC-89  TIME: 20: 0:48

RUNB2 C&R BATTERY
ADSORPTION, pH=4.82, pCO2=.0035atm, ION STR=.02, ALLOW ALL SOLIDS

--------------------------------------------------------------------------------
 Temperature (Celsius):  16.60
 Units of concentration: MG/L
 Ionic strength:  0.020 molal; FIXED
 If specified, total carbonate concentration represents total inorganic carbon.
 Do not automatically terminate if charge imbalance exceeds 30%
 Precipitation is allowed for all solids in the thermodynamic database and
   the print option for solids is set to: 1
 The maximum number of iterations is: 200
 The method used to compute activity coefficients is: Davies equation
 Intermediate output file
 Adsorption model: Diffuse Layer
 Number of adsorbing surfaces: 1
--------------------------------------------------------------------------------

 12.100  600.00 0.000 0.000 81
    150  4.850E+01   -3.64
    460  2.490E+01   -1.76
    732  4.644E+03   -3.55
    330  1.526E-02   -4.82
    600  1.853E+04   -7.00
    813  0.000E-01    0.00
    812  2.720E-02   -3.42
    811  6.800E-04   -5.03
     30  3.200E+00   -3.93
    280  2.800E+00   -4.30
     70  7.000E+00   -3.89
    140  0.000E-01    0.00

 H2O HAS BEEN INSERTED AS A COMPONENT
  3   2
 301403    20.6159    -0.5300
    330     4.8200     0.0000
  6   1
    813     0.0000     0.0000
  2  12
 123301 =feO-          0.0000   -8.9300   0.000   0.000-1.00 0.00 0.00   0.0000
 .00 3   1.000 812  -1.000 330  -1.000 813   0.000   0   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

  0.000   0   0.000   0   0.000   0
 123302 =feOH2+        0.0000    7.2900   0.000   0.000 1.00 0.00 0.00   0.0000
 .00 3   1.000 812   1.000 330   1.000 813   0.000   0   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

  0.000   0   0.000   0   0.000   0
 113301 =FeO-          0.0000   -8.9300   0.000   0.000-1.00 0.00 0.00   0.0000
 .00 3   1.000 811  -1.000 330  -1.000 813   0.000   0   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

  0.000   0   0.000   0   0.000   0
 1[illegible]02 =FeOH2+        0.0000    7.2900   0.000   0.000 1.00 0.00 0.00   0.0000
 .00 3   1.000 811   1.000 330   1.000 813   0.000   0   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

  0.000   0   0.000   0   0.000   0
 116000 =FeOPb+        0.0000    4.7100   0.000   0.000 1.00 0.00 0.00   0.0000
 .00 5   1.000 811  -1.000 330   1.000 813   1.000 600   1.000   2   0.000   0
```

AR302865

```
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
8126000 =feOPb+           0.0000     0.3000    0.000    0.000 1.00 0.00 0.00    0.0000
0.00 5    1.000 812   -1.000 330    1.000 813    1.000 600    1.000    2    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

[redacted]00    0    0.000    0    0.000    0
8121500 =feOCa+           0.0000    -5.8500    0.000    0.000 1.00 0.00 0.00    0.0000
0.00 4    1.000 812   -1.000 330    1.000 813    1.000 150    0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
8111500 =FeOHCa++         0.0000     4.9700    0.000    0.000 2.00 0.00 0.00    0.0000
0.00 3    1.000 811    1.000 150    2.000 813    0.000    0    0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
8117320 =FeSO4-           0.0000     7.7800    0.000    0.000-1.00 0.00 0.00    0.0000
0.00 5    1.000 811    1.000 330   -1.000 813    1.000 732   -1.000    2    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
8127320 =feSO4-           0.0000     7.7800    0.000    0.000-1.00 0.00 0.00    0.0000
0.00 5    1.000 812    1.000 330   -1.000 813    1.000 732   -1.000    2    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
8117321 =FeOHSO4-2        0.0000     0.7900    0.000    0.000-2.00 0.00 0.00    0.0000
0.00 4    1.000 811   -2.000 813    1.000 732   -1.000    2    0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
[redacted]21 =feOHSO4-2       0.0000     0.7900    0.000    0.000-2.00 0.00 0.00    0.0000
0.00 4    1.000 812   -2.000 813    1.000 732   -1.000    2    0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
```

NPUT DATA BEFORE TYPE MODIFICATIONS

ID	NAME	ACTIVITY GUESS	LOG GUESS	ANAL TOTAL
150	Ca+2	2.291E-04	-3.640	4.850E+01
460	Mg+2	1.738E-02	-1.760	2.490E+01
732	SO4-2	2.818E-04	-3.550	4.644E+03
330	H+1	1.514E-05	-4.820	1.526E-02
600	Pb+2	1.000E-07	-7.000	1.853E+04
813	ADS1PSI0	1.000E+00	0.000	0.000E-01
812	ADS1TYP2	3.802E-04	-3.420	2.720E-02
811	ADS1TYP1	9.333E-06	-5.030	6.800E-04
30	Al+3	1.175E-04	-3.930	3.200E+00
280	Fe+2	5.012E-05	-4.300	2.800E+00
470	Mn+2	1.288E-04	-3.890	7.000E+00
140	CO3-2	1.000E+00	0.000	0.000E-01
2	H2O	1.000E+00	0.000	0.000E-01

AR302866

ID	NAME	ANAL MOL	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DIFF F
150	Ca+2	4.850E+01	0.000E-01	2.291E-04	-3.64000	1.000000	0.0000	0.000E-0
[redacted]60	Mg+2	2.490E+01	0.000E-01	1.738E-02	-1.76000	1.000000	0.0000	0.000E-0
[redacted]732	SO4-2	4.644E+03	0.000E-01	2.818E-04	-3.55000	1.000000	0.0000	0.000E-0
330	H+1	1.526E-02	0.000E-01	1.514E-05	-4.82000	1.000000	4.8200	0.000E-0
600	Pb+2	1.853E+04	0.000E-01	1.000E-07	-7.00000	1.000000	0.0000	0.000E-0
813	ADS1PSI0	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0
812	ADS1TYP2	2.720E-02	0.000E-01	3.802E-04	-3.42000	1.000000	0.0000	0.000E-0
811	ADS1TYP1	6.800E-04	0.000E-01	9.333E-06	-5.03000	1.000000	0.0000	0.000E-0
30	Al+3	3.200E+00	0.000E-01	1.175E-04	-3.93000	1.000000	0.0000	0.000E-0

280	Fe+2	2.800E+00	0.000E-01	5.012E-05	-4.30000	1.000000	0.0000	0.000E-0
470	Mn+2	7.000E+00	0.000E-01	1.288E-04	-3.89000	1.000000	0.0000	0.000E-0
140	CO3-2	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0
2	H2O	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0

CHARGE BALANCE: UNSPECIATED

SUM OF CATIONS= 1.884E-01 SUM OF ANIONS = 9.899E-02

PERCENT DIFFERENCE = 3.112E+01 (ANIONS - CATIONS)/(ANIONS + CATIONS)

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20: 1:30

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
0	ADS1TYP1	6.800E-04	5.440E-03	-5.03000
1	Ca+2	1.239E-03	1.125E-02	-2.44951
2	ADS1TYP1	6.800E-04	3.393E-02	-7.03000
3	ADS1PSI0	6.231E-03	-4.978E-02	-2.00237
4	ADS1TYP2	2.720E-02	3.642E-02	-3.53393
5	ADS1PSI0	3.630E-03	-4.557E-03	-1.54938
6	ADS1PSI0	3.432E-03	-7.304E-04	-1.50333
7	ADS1PSI0	3.394E-03	-1.656E-05	-1.49423
8	ADS1PSI0	3.393E-03	-1.041E-08	-1.49401

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20: 1:49

ITERATIONS= 9: SOLID ANGLESITE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20: 1:50

ARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
9	ADS1PSI0	3.393E-03	-1.522E-02	-1.49401
10	SO4-2	-4.207E-02	7.744E-02	-3.63256
11	SO4-2	-4.207E-02	1.448E+00	-4.63256
12	ADS1TYP2	2.720E-02	5.374E-01	-1.47636
13	SO4-2	-4.207E-02	8.099E-02	-5.98622
14	ADS1PSI0	1.828E-02	-5.677E-02	-2.92953
15	ADS1PSI0	1.574E-02	-2.123E-02	-2.80009
16	ADS1PSI0	1.394E-02	-6.874E-03	-2.69467
17	ADS1PSI0	1.298E-02	-1.343E-03	-2.63339
18	ADS1PSI0	1.274E-02	-6.914E-05	-2.61723
19	ADS1PSI0	1.273E-02	-1.861E-07	-2.61634

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20: 2: 9

ITERATIONS= 20: SOLID DIASPORE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20: 2:12

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
20	SO4-2	-4.207E-02	-2.578E-08	-6.04807

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20: 2:15

ITERATIONS= 21: SOLID CERRUSITE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20: 2:18

ARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
21	ADS1PSI0	1.273E-02	-2.540E-02	-2.61634
22	ADS1PSI0	1.015E-02	-3.977E-03	-2.42090
23	ADS1PSI0	9.653E-03	-1.095E-03	-2.37763
24	ADS1PSI0	9.512E-03	-3.360E-05	-2.36497
25	ADS1PSI0	9.507E-03	-5.102E-08	-2.36452

ID	NAME	ANAL MOL	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DIFF F
150	Ca+2	1.239E-03	1.239E-03	7.126E-04	-3.14716	0.575360	0.2401	-9.145E-1
460	Mg+2	1.049E-03	1.048E-03	6.031E-04	-3.21958	0.575360	0.2401	0.000E-0
811	ADS1TYP1	6.800E-04	8.187E-09	8.187E-09	-8.08689	1.000000	0.0000	-3.399E-1
470	Mn+2	1.305E-04	1.304E-04	7.503E-05	-4.12474	0.575360	0.2401	0.000E-0
280	Fe+2	5.133E-05	5.132E-05	2.953E-05	-4.52978	0.575360	0.2401	0.000E-0
813	ADS1PSI0	9.507E-03	4.320E-03	4.320E-03	-2.36452	1.000000	0.0000	-9.437E-1
812	ADS1TYP2	2.720E-02	3.932E-03	3.932E-03	-2.40538	1.000000	0.0000	0.000E-0
732	SO4-2	4.950E-02	4.461E-06	2.567E-06	-5.59064	0.575360	0.2401	0.000E-0
30	Al+3	1.214E-04	3.010E-07	8.679E-08	-7.06152	0.288313	0.5401	0.000E-0
2	H2O	5.650E-22	-3.259E-02	9.976E-01	-0.00106	1.000000	0.0011	-2.043E-1
140	CO3-2	0.000E-01	1.786E-11	1.027E-11	-10.98822	0.575360	0.2401	0.000E-0
330	H+1	1.550E-05	5.522E-02	1.514E-05	-4.82000	0.870933	4.8200	0.000E-0
600	Pb+2	9.156E-02	9.886E-03	5.688E-03	-2.24505	0.575360	0.2401	0.000E-0

SPECIES: TYPE I - COMPONENTS

ID	NAME	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DH
150	Ca+2	1.239E-03	0.0007126	-3.14716	0.575360	0.240	0.000
460	Mg+2	1.048E-03	0.0006031	-3.21958	0.575360	0.240	0.000
732	SO4-2	4.461E-06	0.0000026	-5.59064	0.575360	0.240	0.000
470	Mn+2	1.304E-04	0.0000750	-4.12474	0.575360	0.240	0.000
600	Pb+2	9.886E-03	0.0056879	-2.24505	0.575360	0.240	0.000
140	CO3-2	1.786E-11	0.0000000	-10.98822	0.575360	0.240	0.000
812	ADS1TYP2	3.932E-03	0.0039321	-2.40538	1.000000	0.000	0.000
811	ADS1TYP1	8.187E-09	0.0000000	-8.08689	1.000000	0.000	0.000
30	Al+3	3.010E-07	0.0000001	-7.06152	0.288313	0.540	0.000
280	Fe+2	5.132E-05	0.0000295	-4.52978	0.575360	0.240	0.000

SPECIES: TYPE II - COMPLEXES

ID	NAME	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DH
127321	=feOHSO4-2	3.343E-03	0.0033425	-2.47592	1.000000	0.790	0.000
301401	H2CO3 AQ	1.537E-04	0.0001544	-3.81137	1.004616	16.815	-2.247
307320	HSO4 -	3.440E-09	0.0000000	-8.52346	0.870933	1.947	4.910
300020	OH-	3.957E-10	0.0000000	-9.46263	0.870933	-14.222	13.345
503300	MgOH +	3.536E-11	0.0000000	-10.51147	0.870933	-12.051	15.935
501400	MgCO3 AQ	5.175E-12	0.0000000	-11.28410	1.004616	2.922	2.022
501401	MgHCO3 +	3.084E-08	0.0000000	-7.57095	0.870933	11.517	-2.430
507320	MgSO4 AQ	2.559E-07	0.0000003	-6.58995	1.004616	2.218	1.399
503300	CaOH +	6.683E-12	0.0000000	-11.23507	0.870933	-12.847	14.535
501400	CaHCO3 +	2.632E-08	0.0000000	-7.63965	0.870933	11.376	1.790
501401	CaCO3 AQ	8.778E-12	0.0000000	-11.05460	1.004616	3.079	4.030
507320	CaSO4 AQ	3.451E-07	0.0000003	-6.46003	1.004616	2.276	1.470
303300	AlOH +2	5.684E-08	0.0000000	-7.48542	0.575360	-5.003	11.899
303301	Al(OH)2 +	3.439E-08	0.0000000	-7.52364	0.870933	-10.040	0.000
303302	Al(OH)4 -	2.178E-12	0.0000000	-11.72199	0.870933	-23.876	21.060
307320	AlSO4 +	2.411E-10	0.0000000	-9.67784	0.870933	3.034	2.150
307321	Al(SO4)2 -	4.752E-14	0.0000000	-13.38314	0.870933	4.920	2.840

303300	FeOH +	3.704E-10	0.0000000	-9.49131	0.870933	-9.720	13.199
303301	FeOH3 -1	2.204E-22	0.0000000	-21.71681	0.870933	-31.584	30.300
307320	FeSO4 AQ	1.145E-08	0.0000000	-7.93905	1.004616	2.179	3.230
303302	FeOH2 AQ	8.494E-17	0.0000000	-16.06888	1.004616	-21.179	28.565
703300	MnOH +	7.215E-11	0.0000000	-10.20176	0.870933	-10.836	14.399
703301	Mn(OH)3 -1	3.909E-25	0.0000000	-24.46792	0.870933	-34.740	0.000
707320	MnSO4 AQ	3.137E-08	0.0000000	-7.50149	1.004616	2.212	2.170
701300	MnHCO3 +	5.334E-09	0.0000000	-8.33296	0.870933	11.660	0.000
001400	Pb(CO3)2-2	4.556E-14	0.0000000	-13.58149	0.575360	10.880	0.000
003300	PbOH +	8.393E-06	0.0000073	-5.13611	0.870933	-7.650	0.000
003301	Pb(OH)2 AQ	1.866E-10	0.0000000	-9.72717	1.004616	-17.122	0.000
003302	Pb(OH)3 -	1.628E-16	0.0000000	-15.84823	0.870933	-28.000	0.000
003303	Pb2OH +3	3.228E-06	0.0000009	-6.03115	0.288313	-5.820	0.000
007320	PbSO4 AQ	8.172E-06	0.0000082	-5.08569	1.004616	2.748	0.000
003304	Pb3(OH)4+2	2.176E-12	0.0000000	-11.90248	0.575360	-24.203	26.500
001401	PbCO3 AQ	1.011E-06	0.0000010	-5.99327	1.004616	7.238	0.000
003305	Pb(OH)4 -2	3.730E-23	0.0000000	-22.66829	0.575360	-39.459	0.000
007321	Pb(SO4)2-2	1.922E-10	0.0000000	-9.95632	0.575360	3.710	0.000
001402	PbHCO3 +	1.610E-05	0.0000140	-4.85327	0.870933	13.260	0.000
301400	HCO3 -	4.610E-06	0.0000040	-5.39630	0.870933	10.472	-3.617
123301	=feO-	7.065E-05	0.0000707	-4.15086	1.000000	-8.930	0.000
123302	=feOH2+	5.013E-03	0.0050131	-2.29989	1.000000	7.290	0.000
113301	=FeO-	1.471E-10	0.0000000	-9.83237	1.000000	-8.930	0.000
113302	=FeOH2+	1.044E-08	0.0000000	-7.98140	1.000000	7.290	0.000
116000	=FeOPb+	6.800E-04	0.0006800	-3.16751	1.000000	4.710	0.000
126000	=feOPb+	1.271E-02	0.0127058	-1.89600	1.000000	0.300	0.000
121500	=feOCa+	1.130E-09	0.0000000	-8.94705	1.000000	-5.850	0.000
111500	=FeOHCa++	1.016E-11	0.0000000	-10.99307	1.000000	4.970	0.000
117320	=FeSO4-	4.447E-09	0.0000000	-8.35195	1.000000	7.780	0.000
127320	=feSO4-	2.136E-03	0.0021358	-2.67044	1.000000	7.780	0.000
117321	=FeOHSO4-2	6.959E-09	0.0000000	-8.15743	1.000000	0.790	0.000

SPECIES: TYPE III - FIXED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
2	H2O	-3.259E-02	-1.487	0.001	0.000
301403	CO2 (g)	-2.442E-02	-1.612	20.627	-0.530
330	H+1	5.522E-02	-1.258	4.820	0.000

SPECIES: TYPE IV - PRECIPITATED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
060003	ANGLESITE	4.400E-02	-1.357	7.836	-2.150
003002	DIASPORE	1.210E-04	-3.917	-7.396	24.630
060000	CERRUSITE	2.425E-02	-1.615	13.233	-4.860

SPECIES: TYPE V - DISSOLVED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
015003	HUNTITE	4.590E-28	-27.338	29.421	25.760
046001	HYDRMAGNESIT	0.000E-01	-42.761	7.657	52.210
046002	MAGNESITE	4.899E-07	-6.310	7.898	6.169
028000	MELANTERITE	2.529E-08	-7.597	2.531	-2.860
046003	NESQUEHONITE	1.936E-09	-8.713	5.498	5.789
028000	SIDERITE	8.294E-06	-5.081	10.437	5.328
0[illegible]3	PYROCROITE	8.813E-11	-10.055	-15.568	22.590
047000	RHODOCHROSIT	1.790E-05	-4.747	10.366	2.079
047000	MNSO4	1.935E-13	-12.713	-2.998	15.480
015001	GYPSUM	1.299E-04	-3.886	4.854	-0.261
060000	MASSICOT	1.341E-06	-5.873	-13.267	16.780
060001	LITHARGE	2.118E-06	-5.674	-13.068	16.380
060002	PBO, .3H2O	2.591E-06	-5.586	-12.980	0.000

5060000	LARNAKITE	5.028E-01	-0.299	0.143	6.440
5060001	PB3O2SO4	1.292E-04	-3.889	-10.841	20.750
5060002	PB4O3SO4	3.168E-09	-8.499	-22.845	35.070
5060002	PB3O2CO3	9.395E-11	-10.027	-11.582	26.430
2003003	GIBBSITE (C)	1.383E-02	-1.859	-9.254	22.800
2060004	PB(OH)2 (C)	8.822E-02	-1.054	-8.447	13.990
5060003	HYDCERRUSITE	2.434E-02	-1.614	17.460	0.000
2[redacted]05	PB2O(OH)2	3.861E-12	-11.413	-26.200	0.000
5060004	PB4(OH)6SO4	1.749E-07	-6.757	-21.100	0.000
2015000	LIME	5.149E-28	-27.288	-33.780	46.265
2015001	PORTLANDITE	1.457E-17	-16.836	-23.327	30.690
2028000	WUSTITE	1.362E-07	-6.866	-12.215	24.846
2046001	PERICLASE	1.385E-16	-15.858	-22.278	36.135
3028001	HERCYNITE	1.191E-09	-8.924	-28.827	78.360
3046000	SPINEL	9.707E-18	-17.013	-38.226	89.089
2003000	ALOH3(A)	2.758E-04	-3.559	-10.955	27.045
5003000	ALOHSO4	2.493E-05	-4.603	3.230	0.000
5003001	AL4(OH)10SO4	4.494E-09	-8.347	-22.700	0.000
5015000	ANHYDRITE	6.594E-05	-4.181	4.557	3.769
5015000	ARAGONITE	1.342E-06	-5.872	8.263	2.615
5046000	ARTINITE	9.921E-19	-18.003	-10.211	28.742
5003001	BOEHMITE	1.662E-02	-1.779	-9.176	28.130
5046000	BRUCITE	1.195E-11	-10.923	-17.341	25.840
5015001	CALCITE	1.970E-06	-5.706	8.430	2.585
5003000	A1203	6.513E-09	-8.186	-22.980	0.000
5015002	DOLOMITE	3.025E-12	-11.519	16.824	8.290
5046000	EPSOMITE	2.411E-07	-6.618	2.200	-2.820

SPECIES: TYPE VI - SPECIES NOT CONSIDERED

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
813	ADS1PSI0	4.320E-03	-2.365	0.000	0.000

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20: 2:27

PERCENTAGE DISTRIBUTION OF COMPONENTS AMONG dissolved and adsorbed species

a	100.0	PERCENT BOUND IN SPECIES #	150	Ca+2
g+2	100.0	PERCENT BOUND IN SPECIES #	460	Mg+2
DS1TYP1	100.0	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
n+2	100.0	PERCENT BOUND IN SPECIES #	470	Mn+2
e+2	100.0	PERCENT BOUND IN SPECIES #	280	Fe+2
DS1PSI0	52.7	PERCENT BOUND IN SPECIES #	8123302	=feOH2+
	7.2	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
	133.6	PERCENT BOUND IN SPECIES #	8126000	=feOPb+
DS1TYP2	14.5	PERCENT BOUND IN SPECIES #	812	ADS1TYP2
	12.3	PERCENT BOUND IN SPECIES #	8127321	=feOHSO4-2
	18.4	PERCENT BOUND IN SPECIES #	8123302	=feOH2+
	46.7	PERCENT BOUND IN SPECIES #	8126000	=feOPb+
	7.9	PERCENT BOUND IN SPECIES #	8127320	=feSO4-
O4-2	60.9	PERCENT BOUND IN SPECIES #	8127321	=feOHSO4-2
	38.9	PERCENT BOUND IN SPECIES #	8127320	=feSO4-
l+3	76.2	PERCENT BOUND IN SPECIES #	30	Al+3
	14.4	PERCENT BOUND IN SPECIES #	303300	AlOH +2
	8.7	PERCENT BOUND IN SPECIES #	303301	Al(OH)2 +
20	8.6	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
	160.4	PERCENT BOUND IN SPECIES #	8126000	=feOPb+
O3-2	87.6	PERCENT BOUND IN SPECIES #	3301401	H2CO3 AQ
	9.2	PERCENT BOUND IN SPECIES #	6001402	PbHCO3 +
	2.6	PERCENT BOUND IN SPECIES #	3301400	HCO3 -
+1	1.2	PERCENT BOUND IN SPECIES #	8123301	=feO-
	11.3	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
	212.1	PERCENT BOUND IN SPECIES #	8126000	=feOPb+
b+2	42.4	PERCENT BOUND IN SPECIES #	600	Pb+2
	2.9	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
	54.5	PERCENT BOUND IN SPECIES #	8126000	=feOPb+

---------- EQUILIBRATED MASS DISTRIBUTION ----------

DX	NAME	DISSOLVED		SORBED		PRECIPITATED	
		MOL/KG	PERCENT	MOL/KG	PERCENT	MOL/KG	PERCENT
60	Ca+2	1.239E-03	100.0	1.140E-09	0.0	0.000E-01	0.0
60	Mg+2	1.049E-03	100.0	0.000E-01	0.0	0.000E-01	0.0
70	Mn+2	1.305E-04	100.0	0.000E-01	0.0	0.000E-01	0.0
80	Fe+2	5.133E-05	100.0	0.000E-01	0.0	0.000E-01	0.0
82	SO4-2	1.328E-05	0.0	5.478E-03	11.1	4.400E-02	88.9
80	Al+3	3.950E-07	0.3	0.000E-01	0.0	1.210E-04	99.7

140	CO3-2	1.755E-04	0.7	0.000E-01	0.0	2.425E-02	99.3
330	H+1	3.164E-04	-5.3	-6.307E-03	105.3	0.000E-01	0.0
600	Pb+2	9.926E-03	10.8	1.339E-02	14.6	6.825E-02	74.5

CHARGE BALANCE: SPECIATED

SUM OF CATIONS = 4.316E-02 SUM OF ANIONS 8.905E-03

PERCENT DIFFERENCE = 6.579E+01 (ANIONS - CATIONS)/(ANIONS + CATIONS)

NONCARBONATE ALKALINITY = 0.000E-01

IONIC STRENGTH = : 2.000E-02

****** DIFFUSE LAYER ADSORPTION MODEL ********

**** Parameters For Adsorbent Number 1 ****

Electrostatic Variables: psi0 = 0.135937 sig0 = 0.126354
psib = 0.000000 sigb = 0.000000
psid = 0.000000 sigd = 0.000000

Adsorbent Concentration (g/l): 12.100

Specific Surface Area (sq. meters/g): 600.00

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20: 2:28

Saturation indices and stoichiometry of all minerals

ID #	NAME	Sat. Index	Stoichiometry (in parentheses) of each component								
[illegible]3000	ALOH3(A)	-3.559	(1.000)	30	(3.000)	2	(-3.000)	330			
[illegible]3000	ALOHSO4	-4.603	(-1.000)	330	(1.000)	30	(1.000)	732	(1.000)	2	
6003001	AL4(OH)10SO4	-8.347	(-10.000)	330	(4.000)	30	(1.000)	732	(10.000)	2	
6015000	ANHYDRITE	-4.181	(1.000)	150	(1.000)	732					
5015000	ARAGONITE	-5.872	(1.000)	150	(1.000)	140					
5046000	ARTINITE	-18.003	(-2.000)	330	(2.000)	460	(1.000)	140	(5.000)	2	
2003001	BOEHMITE	-1.779	(-3.000)	330	(1.000)	30	(2.000)	2			
2046000	BRUCITE	-10.923	(1.000)	460	(2.000)	2	(-2.000)	330			
5015001	CALCITE	-5.706	(1.000)	150	(1.000)	140					
2003002	DIASPORE	0.000	(-3.000)	330	(1.000)	30	(2.000)	2			
5015002	DOLOMITE	-11.519	(1.000)	150	(1.000)	460	(2.000)	140			
6046000	EPSOMITE	-6.618	(1.000)	460	(1.000)	732	(7.000)	2			
2003003	GIBBSITE (C)	-1.859	(-3.000)	330	(1.000)	30	(3.000)	2			
3003000	A1203	-8.186	(2.000)	30	(3.000)	2	(-6.000)	330			
6015001	GYPSUM	-3.886	(1.000)	150	(1.000)	732	(2.000)	2			
5015003	HUNTITE	-27.338	(3.000)	460	(1.000)	150	(4.000)	140			
5046001	HYDRMAGNESIT	-42.761	(5.000)	460	(4.000)	140	(-2.000)	330	(6.000)	2	
5046002	MAGNESITE	-6.310	(1.000)	460	(1.000)	140					
6028000	MELANTERITE	-7.597	(1.000)	280	(1.000)	732	(7.000)	2			
5046003	NESQUEHONITE	-8.713	(1.000)	460	(1.000)	140	(3.000)	2			
5028000	SIDERITE	-5.081	(1.000)	280	(1.000)	140					
2047003	PYROCROITE	-10.055	(-2.000)	330	(1.000)	470	(2.000)	2			
5047000	RHODOCHROSIT	-4.747	(1.000)	470	(1.000)	140					
6047000	MNSO4	-12.713	(1.000)	470	(1.000)	732					
5060000	CERRUSITE	0.000	(1.000)	600	(1.000)	140					
2060000	MASSICOT	-5.873	(-2.000)	330	(1.000)	600	(1.000)	2			
[illegible]0001	LITHARGE	-5.674	(-2.000)	330	(1.000)	600	(1.000)	2			
[illegible]0002	PBO, .3H2O	-5.586	(-2.000)	330	(1.000)	600	(1.330)	2			
5060001	PB2OCO3	-5.583	(-2.000)	330	(2.000)	600	(1.000)	2	(1.000)	140	
6060000	LARNAKITE	-0.299	(-2.000)	330	(2.000)	600	(1.000)	732	(1.000)	2	
6060001	PB3O2SO4	-3.889	(-4.000)	330	(3.000)	600	(1.000)	732	(2.000)	2	
6060002	PB4O3SO4	-8.499	(-6.000)	330	(4.000)	600	(1.000)	732	(3.000)	2	
5060002	PB3O2CO3	-10.027	(-4.000)	330	(3.000)	600	(1.000)	140	(2.000)	2	
6060003	ANGLESITE	0.000	(1.000)	600	(1.000)	732					
2060004	PB(OH)2 (C)	-1.054	(-2.000)	330	(1.000)	600	(2.000)	2			
5060003	HYDCERRUSITE	-1.614	(-2.000)	330	(3.000)	600	(2.000)	140	(2.000)	2	
2060005	PB2O(OH)2	-11.413	(-4.000)	330	(2.000)	600	(3.000)	2			
6060004	PB4(OH)6SO4	-6.757	(-6.000)	330	(4.000)	600	(1.000)	732	(6.000)	2	
2015000	LIME	-27.288	(-2.000)	330	(1.000)	150	(1.000)	2			
2015001	PORTLANDITE	-16.836	(-2.000)	330	(1.000)	150	(2.000)	2			
2028000	WUSTITE	-6.866	(-2.000)	330	(0.947)	280	(1.000)	2			
2046001	PERICLASE	-15.858	(-2.000)	330	(1.000)	460	(1.000)	2			
3028001	HERCYNITE	-8.924	(-8.000)	330	(1.000)	280	(2.000)	30	(4.000)	2	
3046000	SPINEL	-17.013	(-8.000)	330	(1.000)	460	(2.000)	30	(4.000)	2	

```
 PC  VERSION: MINTEQA2   DATE OF CALCULATIONS:  4-DEC-89  TIME: 20: 2:39


UNB3 C&R BATTERY
DSORPTION, pH=5.56, pCO2=.0035atm, ION STR=.02, ALLOW ALL SOLIDS

-----------------------------------------------------------------------------
Temperature (Celsius):  16.60
Units of concentration: MG/L
Ionic strength:  0.020 molal; FIXED
If specified, total carbonate concentration represents total inorganic carbon.
Do not automatically terminate if charge imbalance exceeds 30%
Precipitation is allowed for all solids in the thermodynamic database and
  the print option for solids is set to: 1
The maximum number of iterations is: 200
The method used to compute activity coefficients is: Davies equation
Intermediate output file
Adsorption model: Diffuse Layer
Number of adsorbing surfaces: 1

-----------------------------------------------------------------------------

12.100   600.00 0.000 0.000 81
   150   4.850E+01    -3.64
   460   2.490E+01    -1.76
   732   4.644E+03    -3.55
   330   2.776E-03    -5.56
   600   1.853E+04    -7.00
   813   0.000E-01     0.00
   812   2.720E-02    -3.42
   811   6.800E-04    -5.03
    30   3.200E+00    -3.93
    80   2.800E+00    -4.30
   470   7.000E+00    -3.89
   140   0.000E-01     0.00

H2O HAS BEEN INSERTED AS A COMPONENT
 3   2
301403    20.6159    -0.5300
   330     5.5600     0.0000
 6   1
   813     0.0000     0.0000
 2  12
123301 =feO-           0.0000    -8.9300   0.000   0.000-1.00 0.00 0.00   0.0000
.00 3   1.000 812  -1.000 330  -1.000 813   0.000   0   0.000   0   0.000   0
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
123302 =feOH2+         0.0000     7.2900   0.000   0.000 1.00 0.00 0.00   0.0000
.00 3   1.000 812   1.000 330   1.000 813   0.000   0   0.000   0   0.000   0
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
113301 =FeO-           0.0000    -8.9300   0.000   0.000-1.00 0.00 0.00   0.0000
.00 3   1.000 811  -1.000 330  -1.000 813   0.000   0   0.000   0   0.000   0
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 .000   0   0.000   0   0.000   0
113302 =FeOH2+         0.0000     7.2900   0.000   0.000 1.00 0.00 0.00   0.0000
.00 3   1.000 811   1.000 330   1.000 813   0.000   0   0.000   0   0.000   0
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
116000 =FeOPb+         0.0000     4.7100   0.000   0.000 1.00 0.00 0.00   0.0000
.00 5   1.000 811  -1.000 330   1.000 813   1.000 600   1.000   2   0.000   0
```

AR302880

```
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
3126000 =feOPb+           0.0000    0.3000    0.000    0.000 1.00 0.00 0.00    0.0000
0.00 5    1.000 812   -1.000 330    1.000 813    1.000 600    1.000    2    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

[redacted]00    0    0.000    0    0.000    0
3121500 =feOCa+           0.0000   -5.8500    0.000    0.000 1.00 0.00 0.00    0.0000
0.00 4    1.000 812   -1.000 330    1.000 813    1.000 150    0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
3111500 =FeOHCa++         0.0000    4.9700    0.000    0.000 2.00 0.00 0.00    0.0000
0.00 3    1.000 811    1.000 150    2.000 813    0.000    0    0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
3117320 =FeSO4-           0.0000    7.7800    0.000    0.000-1.00 0.00 0.00    0.0000
0.00 5    1.000 811    1.000 330   -1.000 813    1.000 732   -1.000    2    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
3127320 =feSO4-           0.0000    7.7800    0.000    0.000-1.00 0.00 0.00    0.0000
0.00 5    1.000 812    1.000 330   -1.000 813    1.000 732   -1.000    2    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
3117321 =FeOHSO4-2        0.0000    0.7900    0.000    0.000-2.00 0.00 0.00    0.0000
0.00 4    1.000 811   -2.000 813    1.000 732   -1.000    2    0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
3[redacted]21 =feOHSO4-2     0.0000    0.7900    0.000    0.000-2.00 0.00 0.00    0.0000
0.[redacted]4    1.000 812   -2.000 813    1.000 732   -1.000    2    0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
```

INPUT DATA BEFORE TYPE MODIFICATIONS

ID	NAME	ACTIVITY GUESS	LOG GUESS	ANAL TOTAL
150	Ca+2	2.291E-04	-3.640	4.850E+01
460	Mg+2	1.738E-02	-1.760	2.490E+01
732	SO4-2	2.818E-04	-3.550	4.644E+03
330	H+1	2.754E-06	-5.560	2.776E-03
600	Pb+2	1.000E-07	-7.000	1.853E+04
813	ADS1PSI0	1.000E+00	0.000	0.000E-01
812	ADS1TYP2	3.802E-04	-3.420	2.720E-02
811	ADS1TYP1	9.333E-06	-5.030	6.800E-04
30	Al+3	1.175E-04	-3.930	3.200E+00
280	Fe+2	5.012E-05	-4.300	2.800E+00
470	Mn+2	1.288E-04	-3.890	7.000E+00
140	CO3-2	1.000E+00	0.000	0.000E-01
2	H2O	1.000E+00	0.000	0.000E-01

AR302881

ID	NAME	ANAL MOL	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DIFF F
150	Ca+2	4.850E+01	0.000E-01	2.291E-04	-3.64000	1.000000	0.0000	0.000E-0
[redacted]60	Mg+2	2.490E+01	0.000E-01	1.738E-02	-1.76000	1.000000	0.0000	0.000E-0
[redacted]32	SO4-2	4.644E+03	0.000E-01	2.818E-04	-3.55000	1.000000	0.0000	0.000E-0
330	H+1	2.776E-03	0.000E-01	2.754E-06	-5.56000	1.000000	5.5600	0.000E-0
600	Pb+2	1.853E+04	0.000E-01	1.000E-07	-7.00000	1.000000	0.0000	0.000E-0
813	ADS1PSI0	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0
812	ADS1TYP2	2.720E-02	0.000E-01	3.802E-04	-3.42000	1.000000	0.0000	0.000E-0
811	ADS1TYP1	6.800E-04	0.000E-01	9.333E-06	-5.03000	1.000000	0.0000	0.000E-0
30	Al+3	3.200E+00	0.000E-01	1.175E-04	-3.93000	1.000000	0.0000	0.000E-0

280	Fe+2	2.800E+00	0.000E-01	5.012E-05	-4.30000	1.000000	0.0000	0.000E-0
470	Mn+2	7.000E+00	0.000E-01	1.288E-04	-3.89000	1.000000	0.0000	0.000E-0
140	CO3-2	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0
2	H2O	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0

CHARGE BALANCE: UNSPECIATED

SUM OF CATIONS= 1.884E-01 SUM OF ANIONS = 9.899E-02

PERCENT DIFFERENCE = 3.112E+01 (ANIONS - CATIONS)/(ANIONS + CATIONS)

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20: 3:21

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
0	Al+3	1.214E-04	2.710E-03	-3.93000
1	Al+3	1.214E-04	3.921E-04	-4.93000
2	SO4-2	4.950E-02	4.532E-01	-1.75432
3	ADS1TYP2	2.720E-02	8.947E-02	-3.19182
4	ADS1PSI0	6.370E-03	-3.878E-02	-2.02120
5	ADS1PSI0	5.302E-03	-6.208E-03	-1.86546
6	ADS1PSI0	5.055E-03	-1.333E-03	-1.82516
7	ADS1PSI0	4.984E-03	-4.862E-05	-1.81325
8	ADS1PSI0	4.981E-03	-8.111E-08	-1.81279

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20: 3:40

ITERATIONS= 9: SOLID ANGLESITE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20: 3:42

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
9	ADS1PSI0	4.981E-03	-1.930E-02	-1.81279
10	ADS1PSI0	1.351E-03	9.482E-02	-0.81146
11	ADS1PSI0	4.973E-03	8.316E-02	-1.81146
12	ADS1PSI0	1.595E-02	-2.053E-02	-2.81146
13	SO4-2	-4.207E-02	-1.880E-01	-6.54264
14	SO4-2	-4.207E-02	-7.836E-02	-6.30388
15	SO4-2	-4.207E-02	-2.681E-02	-6.11320
16	ADS1TYP1	6.800E-04	1.349E-04	-8.74018
17	ADS1TYP1	6.800E-04	1.193E-05	-8.77217
18	ADS1TYP1	6.800E-04	1.165E-07	-8.77544
19	ADS1TYP1	6.800E-04	1.144E-11	-8.77547

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20: 4: 1

ITERATIONS= 20: SOLID DIASPORE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20: 4: 3

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
20	SO4-2	-4.207E-02	-6.205E-09	-5.94960

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20: 4: 7

ITERATIONS= 21: SOLID CERRUSITE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20: 4:10

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
21	ADS1PSI0	1.529E-02	-4.951E-01	-2.77488
22	ADS1PSI0	8.164E-03	-2.046E-01	-2.23353
23	ADS1TYP2	2.720E-02	4.674E-02	-2.13475
24	ADS1PSI0	5.596E-03	-3.418E-02	-1.91106
25	ADS1PSI0	4.875E-03	-1.148E-02	-1.79469
26	ADS1PSI0	4.461E-03	-2.614E-03	-1.72012
27	ADS1PSI0	4.324E-03	-2.210E-04	-1.69411
28	ADS1PSI0	4.311E-03	-1.765E-06	-1.69162
29	ADS1PSI0	4.311E-03	-1.150E-10	-1.69160

ID	NAME	ANAL MOL	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DIFF F
150	Ca+2	1.239E-03	1.228E-03	7.068E-04	-3.15073	0.575360	0.2401	1.042E-1
460	Mg+2	1.049E-03	1.041E-03	5.988E-04	-3.22272	0.575360	0.2401	0.000E-0
811	ADS1TYP1	6.800E-04	9.554E-09	9.554E-09	-8.01981	1.000000	0.0000	1.781E-1
470	Mn+2	1.305E-04	1.295E-04	7.450E-05	-4.12786	0.575360	0.2401	0.000E-0
280	Fe+2	5.133E-05	5.099E-05	2.933E-05	-4.53262	0.575360	0.2401	9.535E-2
813	ADS1PSI0	4.311E-03	2.034E-02	2.034E-02	-1.69160	1.000000	0.0000	-1.054E-1
812	ADS1TYP2	2.720E-02	4.076E-03	4.076E-03	-2.38981	1.000000	0.0000	0.000E-0
732	SO4-2	4.950E-02	1.347E-04	7.751E-05	-4.11064	0.575360	0.2401	0.000E-0
30	Al+3	1.214E-04	1.814E-09	5.230E-10	-9.28152	0.288313	0.5401	0.000E-0
2	H2O	-7.062E-23	-4.232E-02	9.976E-01	-0.00106	1.000000	0.0011	-6.437E-1
140	CO3-2	0.000E-01	5.393E-10	3.103E-10	-9.50822	0.575360	0.2401	0.000E-0
330	H+1	2.820E-06	7.987E-02	2.754E-06	-5.56000	0.870933	5.5600	-1.355E-2
600	Pb+2	9.156E-02	3.274E-04	1.883E-04	-3.72505	0.575360	0.2401	0.000E-0

SPECIES: TYPE I - COMPONENTS

ID	NAME	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DH
150	Ca+2	1.228E-03	0.0007068	-3.15073	0.575360	0.240	0.000
460	Mg+2	1.041E-03	0.0005988	-3.22272	0.575360	0.240	0.000
732	SO4-2	1.347E-04	0.0000775	-4.11064	0.575360	0.240	0.000
470	Mn+2	1.295E-04	0.0000745	-4.12786	0.575360	0.240	0.000
600	Pb+2	3.274E-04	0.0001883	-3.72505	0.575360	0.240	0.000
140	CO3-2	5.393E-10	0.0000000	-9.50822	0.575360	0.240	0.000
812	ADS1TYP2	4.076E-03	0.0040756	-2.38981	1.000000	0.000	0.000
811	ADS1TYP1	9.554E-09	0.0000000	-8.01981	1.000000	0.000	0.000
30	Al+3	1.814E-09	0.0000000	-9.28152	0.288313	0.540	0.000
280	Fe+2	5.099E-05	0.0000293	-4.53262	0.575360	0.240	0.000

SPECIES: TYPE II - COMPLEXES

ID	NAME	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DH
127321	=feOHSO4-2	4.719E-03	0.0047186	-2.32619	1.000000	0.790	0.000
301401	H2CO3 AQ	1.537E-04	0.0001544	-3.81137	1.004616	16.815	-2.247
307320	HSO4 -	1.890E-08	0.0000000	-7.78346	0.870933	1.947	4.910
300020	OH-	2.175E-09	0.0000000	-8.72263	0.870933	-14.222	13.345
503300	MgOH +	1.929E-10	0.0000000	-9.77461	0.870933	-12.051	15.935
501400	MgCO3 AQ	1.552E-10	0.0000000	-9.80724	1.004616	2.922	2.022
[illegible]01	MgHCO3 +	1.682E-07	0.0000001	-6.83409	0.870933	11.517	-2.430
[illegible]320	MgSO4 AQ	7.672E-06	0.0000077	-5.11309	1.004616	2.218	1.399
503300	CaOH +	3.642E-11	0.0000000	-10.49864	0.870933	-12.847	14.535
501400	CaHCO3 +	1.435E-07	0.0000001	-6.90322	0.870933	11.376	1.790
501401	CaCO3 AQ	2.629E-10	0.0000000	-9.57817	1.004616	3.079	0.000
507320	CaSO4 AQ	1.034E-05	0.0000104	-4.98360	1.004616	2.276	1.470
503300	AlOH +2	1.882E-09	0.0000000	-8.96542	0.575360	-5.003	11.899
503301	Al(OH)2 +	6.257E-09	0.0000000	-8.26364	0.870933	-10.040	0.000

303302	Al(OH)4 -	1.197E-11	0.0000000	-10.92199	0.870933	23.878	44.080
307320	AlSO4 +	4.387E-11	0.0000000	-10.41784	0.870933	3.034	2.150
307321	Al(SO4)2 -	2.611E-13	0.0000000	-12.64314	0.870933	4.920	2.840
303303	Al(OH)3 AQ	2.473E-09	0.0000000	-8.60470	1.004616	-16.002	0.000
2803300	FeOH +	2.022E-09	0.0000000	-8.75414	0.870933	-9.720	13.199
2803301	FeOH3 -1	3.634E-20	0.0000000	-19.49964	0.870933	-31.584	30.300
2807320	FeSO4 AQ	3.436E-07	0.0000003	-6.46189	1.004616	2.179	3.230
28[illegible]02	FeOH2 AQ	2.549E-15	0.0000000	-14.59171	1.004616	-21.179	28.565
47[illegible]300	MnOH +	3.937E-10	0.0000000	-9.46488	0.870933	-10.836	14.399
4703301	Mn(OH)3 -1	6.441E-23	0.0000000	-22.25104	0.870933	-34.740	0.000
4707320	MnSO4 AQ	9.406E-07	0.0000009	-6.02461	1.004616	2.212	2.170
4701400	MnHCO3 +	2.910E-08	0.0000000	-7.59608	0.870933	11.660	0.000
6001400	Pb(CO3)2-2	1.376E-12	0.0000000	-12.10149	0.575360	10.880	0.000
6003300	PbOH +	1.527E-06	0.0000013	-5.87611	0.870933	-7.650	0.000
6003301	Pb(OH)2 AQ	1.866E-10	0.0000000	-9.72717	1.004616	-17.122	0.000
6003302	Pb(OH)3 -	8.949E-16	0.0000000	-15.10823	0.870933	-28.000	0.000
6003303	Pb2OH +3	1.945E-08	0.0000000	-8.25115	0.288313	-5.820	0.000
6007320	PbSO4 AQ	8.172E-06	0.0000082	-5.08569	1.004616	2.748	0.000
6003304	Pb3(OH)4+2	7.204E-14	0.0000000	-13.38248	0.575360	-24.203	26.500
6001401	PbCO3 AQ	1.011E-06	0.0000010	-5.99327	1.004616	7.238	0.000
6003305	Pb(OH)4 -2	1.127E-21	0.0000000	-21.18829	0.575360	-39.459	0.000
6007321	Pb(SO4)2-2	5.804E-09	0.0000000	-8.47632	0.575360	3.710	0.000
6001402	PbHCO3 +	2.929E-06	0.0000026	-5.59327	0.870933	13.260	0.000
3301400	HCO3 -	2.533E-05	0.0000221	-4.65630	0.870933	10.472	-3.617
3123301	=feO-	8.546E-05	0.0000855	-4.06821	1.000000	-8.930	0.000
3123302	=feOH2+	4.452E-03	0.0044524	-2.35141	1.000000	7.290	0.000
3113301	=FeO-	2.004E-10	0.0000000	-9.69821	1.000000	-8.930	0.000
3113302	=FeOH2+	1.044E-08	0.0000000	-7.98141	1.000000	7.290	0.000
3116000	=FeOPb+	6.800E-04	0.0006800	-3.16752	1.000000	4.710	0.000
3126000	=feOPb+	1.128E-02	0.0112845	-1.94752	1.000000	0.300	0.000
3121500	=feOCa+	3.005E-08	0.0000000	-7.52214	1.000000	-5.850	0.000
3111500	=FeOHCa++	2.608E-10	0.0000000	-9.58373	1.000000	4.970	0.000
3117320	=FeSO4-	6.056E-09	0.0000000	-8.21779	1.000000	7.780	0.000
31[illegible]320	=feSO4-	2.584E-03	0.0025835	-2.58779	1.000000	7.780	0.000
31[illegible]321	=FeOHSO4-2	1.106E-08	0.0000000	-7.95619	1.000000	0.790	0.000

SPECIES: TYPE III - FIXED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
2	H2O	-4.232E-02	-1.373	0.001	0.000
301403	CO2 (g)	-3.741E-02	-1.427	20.627	-0.530
330	H+1	7.987E-02	-1.098	5.560	0.000

SPECIES: TYPE IV - PRECIPITATED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
060003	ANGLESITE	4.203E-02	-1.376	7.836	-2.150
003002	DIASPORE	1.214E-04	-3.916	-7.396	24.630
060000	CERRUSITE	3.723E-02	-1.429	13.233	-4.860

SPECIES: TYPE V - DISSOLVED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
015003	HUNTITE	3.705E-22	-21.431	29.421	25.760
046001	HYDRMAGNESIT	4.205E-36	-35.376	7.657	52.210
046002	MAGNESITE	1.469E-05	-4.833	7.898	6.169
[illegible]00	MELANTERITE	7.587E-07	-6.120	2.531	-2.860
046003	NESQUEHONITE	5.806E-08	-7.236	5.498	5.789
028000	SIDERITE	2.489E-04	-3.604	10.437	5.328
047003	PYROCROITE	2.642E-09	-8.578	-15.568	22.590
047000	RHODOCHROSIT	5.367E-04	-3.270	10.366	2.079
047000	MNSO4	5.802E-12	-11.236	-2.998	15.480
015001	GYPSUM	3.891E-03	-2.410	4.854	-0.261

2060000	MASSICOT	1.341E-06	-5.873	-13.267	16.780
2060001	LITHARGE	2.118E-06	-5.674	-13.068	16.380
2060002	PBO, .3H2O	2.591E-06	-5.586	-12.980	0.000
3060001	PB2OCO3	2.613E-06	-5.583	0.256	11.460
3060000	LARNAKITE	5.028E-01	-0.299	0.143	6.440
3060001	PB3O2SO4	1.292E-04	-3.889	-10.841	20.750
3060002	PB4O3SO4	3.168E-09	-8.499	-22.845	35.070
3[redacted]02	PB3O2CO3	9.395E-11	-10.027	-11.582	26.430
2003003	GIBBSITE (C)	1.383E-02	-1.859	-9.254	22.800
2060004	PB(OH)2 (C)	8.822E-02	-1.054	-8.447	13.990
3060003	HYDCERRUSITE	2.434E-02	-1.614	17.460	0.000
2060005	PB2O(OH)2	3.861E-12	-11.413	-26.200	0.000
3060004	PB4(OH)6SO4	1.749E-07	-6.757	-21.100	0.000
2015000	LIME	1.542E-26	-25.812	-33.780	46.265
2015001	PORTLANDITE	4.365E-16	-15.360	-23.327	30.690
2028000	WUSTITE	4.089E-06	-5.388	-12.215	24.846
2046001	PERICLASE	4.153E-15	-14.382	-22.278	36.135
3028001	HERCYNITE	3.573E-08	-7.447	-28.827	78.360
3046000	SPINEL	2.910E-16	-15.536	-38.226	89.089
2003000	ALOH3(A)	2.758E-04	-3.559	-10.955	27.045
3003000	ALOHSO4	2.493E-05	-4.603	3.230	0.000
3003001	AL4(OH)10SO4	4.494E-09	-8.347	-22.700	0.000
3015000	ANHYDRITE	1.975E-03	-2.704	4.557	3.769
3015000	ARAGONITE	4.018E-05	-4.396	8.263	2.615
3046000	ARTINITE	8.918E-16	-15.050	-10.211	28.742
2003001	BOEHMITE	1.662E-02	-1.779	-9.176	28.130
2046000	BRUCITE	3.582E-10	-9.446	-17.341	25.840
3015001	CALCITE	5.900E-05	-4.229	8.430	2.585
3003000	A1203	6.513E-09	-8.186	-22.980	0.000
3015002	DOLOMITE	2.716E-09	-8.566	16.824	8.290
3046000	EPSOMITE	7.230E-06	-5.141	2.200	-2.820

[redacted]PECIES: TYPE VI - SPECIES NOT CONSIDERED

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
813	ADS1PSI0	2.034E-02	-1.692	0.000	0.000

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20: 4:22

PERCENTAGE DISTRIBUTION OF COMPONENTS AMONG dissolved and adsorbed species

Ca	99.2	PERCENT BOUND IN SPECIES #	150	Ca+2
Mg+2	99.3	PERCENT BOUND IN SPECIES #	460	Mg+2
ADS1TYP1	100.0	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
Mn+2	99.3	PERCENT BOUND IN SPECIES #	470	Mn+2
Fe+2	99.3	PERCENT BOUND IN SPECIES #	280	Fe+2
ADS1PSI0	103.3	PERCENT BOUND IN SPECIES #	8123302	=feOH2+
	15.8	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
	261.8	PERCENT BOUND IN SPECIES #	8126000	=feOPb+
ADS1TYP2	15.0	PERCENT BOUND IN SPECIES #	812	ADS1TYP2
	17.3	PERCENT BOUND IN SPECIES #	8127321	=feOHSO4-2
	16.4	PERCENT BOUND IN SPECIES #	8123302	=feOH2+
	41.5	PERCENT BOUND IN SPECIES #	8126000	=feOPb+
	9.5	PERCENT BOUND IN SPECIES #	8127320	=feSO4-
SO4-2	1.8	PERCENT BOUND IN SPECIES #	732	SO4-2
	63.2	PERCENT BOUND IN SPECIES #	8127321	=feOHSO4-2
	34.6	PERCENT BOUND IN SPECIES #	8127320	=feSO4-
Al+3	14.5	PERCENT BOUND IN SPECIES #	30	Al+3
	15.1	PERCENT BOUND IN SPECIES #	303300	AlOH +2
	50.1	PERCENT BOUND IN SPECIES #	303301	Al(OH)2 +
	19.8	PERCENT BOUND IN SPECIES #	303303	Al(OH)3 AQ
H2O	14.6	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
	242.0	PERCENT BOUND IN SPECIES #	8126000	=feOPb+
HCO3-2	83.8	PERCENT BOUND IN SPECIES #	3301401	H2CO3 AQ
	1.6	PERCENT BOUND IN SPECIES #	6001402	PbHCO3 +
	13.8	PERCENT BOUND IN SPECIES #	3301400	HCO3 -
H+1	1.8	PERCENT BOUND IN SPECIES #	8123301	=feO-
	14.5	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
	241.1	PERCENT BOUND IN SPECIES #	8126000	=feOPb+
Pb+2	2.7	PERCENT BOUND IN SPECIES #	600	Pb+2
	5.5	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
	91.7	PERCENT BOUND IN SPECIES #	8126000	=feOPb+

EQUILIBRATED MASS DISTRIBUTION

	NAME	DISSOLVED MOL/KG	DISSOLVED PERCENT	SORBED MOL/KG	SORBED PERCENT	PRECIPITATED MOL/KG	PRECIPITATED PERCENT
60	Ca+2	1.239E-03	100.0	3.031E-08	0.0	0.000E-01	0.0
50	Mg+2	1.049E-03	100.0	0.000E-01	0.0	0.000E-01	0.0
70	Mn+2	1.305E-04	100.0	0.000E-01	0.0	0.000E-01	0.0
80	Fe+2	5.133E-05	100.0	0.000E-01	0.0	0.000E-01	0.0
92	SO4-2	1.622E-04	0.2	7.202E-02	14.8	4.208E-02	84.9

AR302892

30	Al+3	1.248E-08	0.0	0.000E-01	0.0	1.214E-04	100.0
2	H2O	1.574E-06	0.0	4.662E-03	100.0	0.000E-01	0.0
40	CO3-2	1.833E-04	0.5	0.000E-01	0.0	3.723E-02	99.5
30	H+1	3.344E-04	-7.1	-5.014E-03	107.1	0.000E-01	0.0
00	Pb+2	3.410E-04	0.4	1.196E-02	13.1	7.926E-02	86.6

HARGE BALANCE: SPECIATED

SUM OF CATIONS = 2.198E-02 SUM OF ANIONS 1.240E-02

PERCENT DIFFERENCE = 2.786E+01 (ANIONS - CATIONS)/(ANIONS + CATIONS)

NONCARBONATE ALKALINITY = 0.000E-01

IONIC STRENGTH = : 2.000E-02

****** DIFFUSE LAYER ADSORPTION MODEL ********

**** Parameters For Adsorbent Number 1 ****
Electrostatic Variables: psi0 = 0.097251 sig0 = 0.057291
psib = 0.000000 sigb = 0.000000
psid = 0.000000 sigd = 0.000000
Adsorbent Concentration (g/l): 12.100
Specific Surface Area (sq. meters/g): 600.00

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20: 4:23

Saturation indices and stoichiometry of all minerals

ID #	NAME	Sat. Index	Stoichiometry (in parentheses) of each component
3000	ALOH3(A)	-3.559	(1.000) 30 (3.000) 2 (-3.000)330
6003000	ALOHSO4	-4.603	(-1.000)330 (1.000) 30 (1.000)732 (1.000) 2
6003001	AL4(OH)10SO4	-8.347	(-10.000)330 (4.000) 30 (1.000)732 (10.000) 2
6015000	ANHYDRITE	-2.704	(1.000)150 (1.000)732
5015000	ARAGONITE	-4.396	(1.000)150 (1.000)140
5046000	ARTINITE	-15.050	(-2.000)330 (2.000)460 (1.000)140 (5.000) 2
2003001	BOEHMITE	-1.779	(-3.000)330 (1.000) 30 (2.000) 2
2046000	BRUCITE	-9.446	(1.000)460 (2.000) 2 (-2.000)330
5015001	CALCITE	-4.229	(1.000)150 (1.000)140
2003002	DIASPORE	0.000	(-3.000)330 (1.000) 30 (2.000) 2
5015002	DOLOMITE	-8.566	(1.000)150 (1.000)460 (2.000)140
6046000	EPSOMITE	-5.141	(1.000)460 (1.000)732 (7.000) 2
2003003	GIBBSITE (C)	-1.859	(-3.000)330 (1.000) 30 (3.000) 2
3003000	A1203	-8.186	(2.000) 30 (3.000) 2 (-6.000)330
6015001	GYPSUM	-2.410	(1.000)150 (1.000)732 (2.000) 2
5015003	HUNTITE	-21.431	(3.000)460 (1.000)150 (4.000)140
5046001	HYDRMAGNESIT	-35.376	(5.000)460 (4.000)140 (-2.000)330 (6.000) 2
5046002	MAGNESITE	-4.833	(1.000)460 (1.000)140
6028000	MELANTERITE	-6.120	(1.000)280 (1.000)732 (7.000) 2
5046003	NESQUEHONITE	-7.236	(1.000)460 (1.000)140 (3.000) 2
5028000	SIDERITE	-3.604	(1.000)280 (1.000)140
2047003	PYROCROITE	-8.578	(-2.000)330 (1.000)470 (2.000) 2
5047000	RHODOCHROSIT	-3.270	(1.000)470 (1.000)140
6047000	MNSO4	-11.236	(1.000)470 (1.000)732
5060000	CERRUSITE	0.000	(1.000)600 (1.000)140
2060000	MASSICOT	-5.873	(-2.000)330 (1.000)600 (1.000) 2
0001	LITHARGE	-5.674	(-2.000)330 (1.000)600 (1.000) 2
2060002	PBO, .3H2O	-5.586	(-2.000)330 (1.000)600 (1.330) 2
5060001	PB2OCO3	-5.583	(-2.000)330 (2.000)600 (1.000) 2 (1.000)140
6060000	LARNAKITE	-0.299	(-2.000)330 (2.000)600 (1.000)732 (1.000) 2
6060001	PB3O2SO4	-3.889	(-4.000)330 (3.000)600 (1.000)732 (2.000) 2
6060002	PB4O3SO4	-8.499	(-6.000)330 (4.000)600 (1.000)732 (3.000) 2
5060002	PB3O2CO3	-10.027	(-4.000)330 (3.000)600 (1.000)140 (2.000) 2
6060003	ANGLESITE	0.000	(1.000)600 (1.000)732
2060004	PB(OH)2 (C)	-1.054	(-2.000)330 (1.000)600 (2.000) 2
5060003	HYDCERRUSITE	-1.614	(-2.000)330 (3.000)600 (2.000)140 (2.000) 2
2060005	PB2O(OH)2	-11.413	(-4.000)330 (2.000)600 (3.000) 2
6060004	PB4(OH)6SO4	-6.757	(-6.000)330 (4.000)600 (1.000)732 (6.000) 2
2015000	LIME	-25.812	(-2.000)330 (1.000)150 (1.000) 2
2015001	PORTLANDITE	-15.360	(-2.000)330 (1.000)150 (2.000) 2
2028000	WUSTITE	-5.388	(-2.000)330 (0.947)280 (1.000) 2
2046001	PERICLASE	-14.382	(-2.000)330 (1.000)460 (1.000) 2
3028001	HERCYNITE	-7.447	(-8.000)330 (1.000)280 (2.000) 30 (4.000) 2
3046000	SPINEL	-15.536	(-8.000)330 (1.000)460 (2.000) 30 (4.000) 2

```
 PC  VERSION: MINTEQA2   DATE OF CALCULATIONS:  4-DEC-89  TIME: 20:20:29

FUNC1 C&R BATTERY
ADSORPTION, pH=4.82, pCO2=.0035, ION STR.=.1, ALLOW ALL SOLIDS

-------------------------------------------------------------------------------
Temperature (Celsius):  16.60
Units of concentration: MG/L
Ionic strength:  0.100 molal; FIXED
If specified, total carbonate concentration represents total inorganic carbon.
Do not automatically terminate if charge imbalance exceeds 30%
Precipitation is allowed for all solids in the thermodynamic database and
  the print option for solids is set to: 1
The maximum number of iterations is: 200
The method used to compute activity coefficients is: Davies equation
Intermediate output file
Adsorption model: Diffuse Layer
Number of adsorbing surfaces: 1
-------------------------------------------------------------------------------

12.100  600.00 0.000 0.000 81
   150  4.850E+01    -3.64
   460  2.490E+01    -1.76
   732  4.644E+03    -3.55
   330  1.526E-02    -4.82
   600  1.853E+04    -7.00
   813  0.000E-01     0.00
   812  2.720E-02    -3.42
   811  6.800E-04    -5.03
    30  3.200E+00    -3.93
   280  2.800E+00    -4.30
   770  7.000E+00    -3.89
   140  0.000E-01     0.00

 H2O HAS BEEN INSERTED AS A COMPONENT
  3   2
3301403    20.6159     -0.5300
   330      4.8200      0.0000
  6   1
   813      0.0000      0.0000
  2  12
3123301 =feO-            0.0000    -8.9300   0.000   0.000-1.00 0.00 0.00   0.0000
0.00 3   1.000 812  -1.000 330  -1.000 813   0.000   0   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

  0.000   0   0.000   0   0.000   0
3123302 =feOH2+          0.0000     7.2900   0.000   0.000 1.00 0.00 0.00   0.0000
0.00 3   1.000 812   1.000 330   1.000 813   0.000   0   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

  0.000   0   0.000   0   0.000   0
3113301 =FeO-            0.0000    -8.9300   0.000   0.000-1.00 0.00 0.00   0.0000
0.00 3   1.000 811  -1.000 330  -1.000 813   0.000   0   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

  0.000   0   0.000   0   0.000   0
3113302 =FeOH2+          0.0000     7.2900   0.000   0.000 1.00 0.00 0.00   0.0000
0.00 3   1.000 811   1.000 330   1.000 813   0.000   0   0.000   0   0.000   0
 0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

  0.000   0   0.000   0   0.000   0
3116000 =FeOPb+          0.0000     4.7100   0.000   0.000 1.00 0.00 0.00   0.0000
0.00 5   1.000 811  -1.000 330   1.000 813   1.000 600   1.000   2   0.000   0
```

AR302895

```
 0.000    0    0.000    0    0.000    0
3126000 =feOPb+          0.0000    0.3000    0.000    0.000 1.00 0.00 0.00    0.0000
0.00 5    1.000 812  -1.000 330    1.000 813    1.000 600    1.000    2    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
3[illegible]00 =feOCa+          0.0000   -5.8500    0.000    0.000 1.00 0.00 0.00    0.0000
0.00 4    1.000 812  -1.000 330    1.000 813    1.000 150    0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
3111500 =FeOHCa++        0.0000    4.9700    0.000    0.000 2.00 0.00 0.00    0.0000
0.00 3    1.000 811    1.000 150    2.000 813    0.000    0    0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
3117320 =FeSO4-          0.0000    7.7800    0.000    0.000-1.00 0.00 0.00    0.0000
0.00 5    1.000 811    1.000 330   -1.000 813    1.000 732   -1.000    2    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
3127320 =feSO4-          0.0000    7.7800    0.000    0.000-1.00 0.00 0.00    0.0000
0.00 5    1.000 812    1.000 330   -1.000 813    1.000 732   -1.000    2    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
3117321 =FeOHSO4-2       0.0000    0.7900    0.000    0.000-2.00 0.00 0.00    0.0000
0.00 4    1.000 811   -2.000 813    1.000 732   -1.000    2    0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
3[illegible]321 =feOHSO4-2       0.0000    0.7900    0.000    0.000-2.00 0.00 0.00    0.0000
[illegible]4    1.000 812   -2.000 813    1.000 732   -1.000    2    0.000    0    0.000    0
0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
```

NPUT DATA BEFORE TYPE MODIFICATIONS

ID	NAME	ACTIVITY GUESS	LOG GUESS	ANAL TOTAL
150	Ca+2	2.291E-04	-3.640	4.850E+01
460	Mg+2	1.738E-02	-1.760	2.490E+01
732	SO4-2	2.818E-04	-3.550	4.644E+03
330	H+1	1.514E-05	-4.820	1.526E-02
600	Pb+2	1.000E-07	-7.000	1.853E+04
813	ADS1PSI0	1.000E+00	0.000	0.000E-01
812	ADS1TYP2	3.802E-04	-3.420	2.720E-02
811	ADS1TYP1	9.333E-06	-5.030	6.800E-04
30	Al+3	1.175E-04	-3.930	3.200E+00
280	Fe+2	5.012E-05	-4.300	2.800E+00
470	Mn+2	1.288E-04	-3.890	7.000E+00
140	CO3-2	1.000E+00	0.000	0.000E-01
2	H2O	1.000E+00	0.000	0.000E-01

AR302896

ID	NAME	ANAL MOL	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DIFF F
150	Ca+2	4.850E+01	0.000E-01	2.291E-04	-3.64000	1.000000	0.0000	0.000E-0
460	Mg+2	2.490E+01	0.000E-01	1.738E-02	-1.76000	1.000000	0.0000	0.000E-0
[illegible]32	SO4-2	4.644E+03	0.000E-01	2.818E-04	-3.55000	1.000000	0.0000	0.000E-0
330	H+1	1.526E-02	0.000E-01	1.514E-05	-4.82000	1.000000	4.8200	0.000E-0
600	Pb+2	1.853E+04	0.000E-01	1.000E-07	-7.00000	1.000000	0.0000	0.000E-0
813	ADS1PSI0	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0
812	ADS1TYP2	2.720E-02	0.000E-01	3.802E-04	-3.42000	1.000000	0.0000	0.000E-0
811	ADS1TYP1	6.800E-04	0.000E-01	9.333E-06	-5.03000	1.000000	0.0000	0.000E-0
30	Al+3	3.200E+00	0.000E-01	1.175E-04	-3.93000	1.000000	0.0000	0.000E-0

280	Fe+2	2.800E+00	0.000E-01	5.012E-05	-4.30000	1.000000	0.0000	0.000E-0
470	Mn+2	7.000E+00	0.000E-01	1.288E-04	-3.89000	1.000000	0.0000	0.000E-0
140	CO3-2	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0
2	H2O	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0

CHARGE BALANCE: UNSPECIATED

SUM OF CATIONS= 1.884E-01 SUM OF ANIONS = 9.899E-02

PERCENT DIFFERENCE = -3.112E+01 (ANIONS - CATIONS)/(ANIONS + CATIONS)

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20:21:11

ARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
0	ADS1TYP1	6.800E-04	5.440E-03	-5.03000
1	Al+3	1.214E-04	1.931E-04	-4.93000
2	ADS1TYP1	6.800E-04	3.567E-02	-7.03000
3	ADS1PSI0	2.203E-02	-1.831E-01	-2.39513
4	ADS1PSI0	1.368E-02	-1.217E-01	-1.98703
5	ADS1PSI0	1.049E-02	-5.788E-02	-1.76264
6	ADS1PSI0	8.315E-03	-2.329E-02	-1.56914
7	ADS1PSI0	7.016E-03	-7.612E-03	-1.43072
8	ADS1PSI0	6.399E-03	-1.425E-03	-1.35691
9	ADS1PSI0	6.252E-03	-7.036E-05	-1.33848
10	ADS1PSI0	6.244E-03	-1.717E-07	-1.33753

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20:21:34

ITERATIONS= 11: SOLID ANGLESITE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20:21:36

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
11	ADS1PSI0	6.244E-03	-1.565E-02	-1.33753
12	SO4-2	-4.207E-02	4.283E-02	-3.51888
13	SO4-2	-4.207E-02	1.789E-01	-3.51888
14	SO4-2	-4.207E-02	2.269E+00	-5.51888
15	ADS1TYP2	2.720E-02	6.251E-01	-1.67453
16	ADS1PSI0	5.042E-02	-4.749E-01	-3.11160
17	SO4-2	-4.207E-02	1.042E-01	-5.75888
18	ADS1PSI0	3.405E-02	-8.713E-02	-2.77136
19	ADS1PSI0	2.874E-02	-3.545E-02	-2.62465
20	ADS1PSI0	2.454E-02	-1.415E-02	-2.48819
21	ADS1PSI0	2.154E-02	-4.828E-03	-2.37565
22	ADS1PSI0	2.006E-02	-8.642E-04	-2.31451
23	ADS1PSI0	1.976E-02	-2.855E-05	-2.30171
24	ADS1PSI0	1.975E-02	-3.045E-08	-2.30128

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20:21:59

ITERATIONS= 25: SOLID DIASPORE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20:22: 2

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
25	SO4-2	-4.207E-02	-2.071E-08	-5.80406

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20:22: 5

ITERATIONS= 26: SOLID CERRUSITE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20:22: 8

ARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

TER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
26	ADS1PSI0	1.975E-02	-9.201E-03	-2.30128
27	ADS1TYP1	6.800E-04	3.735E-05	-8.21073
28	ADS1TYP1	6.800E-04	-6.234E-07	-8.24008
29	ADS1TYP1	6.800E-04	1.420E-10	-8.23987

ID	NAME	ANAL MOL	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DIFF F
150	Ca+2	1.239E-03	1.239E-03	4.540E-04	-3.34293	0.366533	0.4359	5.548E-1
460	Mg+2	1.049E-03	1.048E-03	3.843E-04	-3.41536	0.366533	0.4359	0.000E-0
811	ADS1TYP1	6.800E-04	5.756E-09	5.756E-09	-8.23987	1.000000	0.0000	-3.302E-1
470	Mn+2	1.305E-04	1.304E-04	4.781E-05	-4.32052	0.366533	0.4359	0.000E-0
280	Fe+2	5.133E-05	5.132E-05	1.881E-05	-4.72557	0.366533	0.4359	0.000E-0
813	ADS1PSI0	1.779E-02	6.144E-03	6.144E-03	-2.21153	1.000000	0.0000	-8.247E-1
812	ADS1TYP2	2.720E-02	3.307E-03	3.307E-03	-2.48051	1.000000	0.0000	0.000E-0
732	SO4-2	4.950E-02	7.002E-06	2.567E-06	-5.59064	0.366533	0.4359	0.000E-0
30	Al+3	1.214E-04	8.303E-07	8.679E-08	-7.06152	0.104533	0.9807	0.000E-0
2	H2O	5.650E-22	-2.695E-02	9.976E-01	-0.00106	1.000000	0.0011	-1.626E-1
140	CO3-2	0.000E-01	2.803E-11	1.027E-11	-10.98822	0.366533	0.4359	0.000E-0
330	H+1	1.550E-05	3.565E-02	1.514E-05	-4.82000	0.778087	4.8200	1.355E-2
600	Pb+2	9.156E-02	1.552E-02	5.688E-03	-2.24505	0.366533	0.4359	0.000E-0

SPECIES: TYPE I - COMPONENTS

ID	NAME	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DH
150	Ca+2	1.239E-03	0.0004540	-3.34293	0.366533	0.436	0.000
460	Mg+2	1.048E-03	0.0003843	-3.41536	0.366533	0.436	0.000
732	SO4-2	7.002E-06	0.0000026	-5.59064	0.366533	0.436	0.000
470	Mn+2	1.304E-04	0.0000478	-4.32052	0.366533	0.436	0.000
600	Pb+2	1.552E-02	0.0056879	-2.24505	0.366533	0.436	0.000
140	CO3-2	2.803E-11	0.0000000	-10.98822	0.366533	0.436	0.000
812	ADS1TYP2	3.307E-03	0.0033074	-2.48051	1.000000	0.000	0.000
811	ADS1TYP1	5.756E-09	0.0000000	-8.23987	1.000000	0.000	0.000
30	Al+3	8.303E-07	0.0000001	-7.06152	0.104533	0.981	0.000
280	Fe+2	5.132E-05	0.0000188	-4.72557	0.366533	0.436	0.000

SPECIES: TYPE II - COMPLEXES

ID	NAME	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DH
27321	=FeOHSO4-2	1.390E-03	0.0013899	-2.85703	1.000000	0.790	0.000
01401	H2CO3 AQ	1.509E-04	0.0001544	-3.81137	1.023293	16.807	-2.247
07320	HSO4 -	3.850E-09	0.0000000	-8.52346	0.778087	1.996	4.910
00020	OH-	4.429E-10	0.0000000	-9.46263	0.778087	-14.173	13.345
03300	MgOH +	2.522E-11	0.0000000	-10.70725	0.778087	-12.002	15.935
01400	MgCO3 AQ	3.237E-12	0.0000000	-11.47989	1.023293	2.914	2.022
01401	MgHCO3 +	2.199E-08	0.0000000	-7.76673	0.778087	11.566	-2.430
07320	MgSO4 AQ	1.601E-07	0.0000002	-6.78573	1.023293	2.210	1.399
03300	CaOH +	4.766E-12	0.0000000	-11.43085	0.778087	-12.798	14.535
01400	CaHCO3 +	1.877E-08	0.0000000	-7.83543	0.778087	11.425	1.790
01401	CaCO3 AQ	5.491E-12	0.0000000	-11.25038	1.023293	3.071	4.030
07320	CaSO4 AQ	2.159E-07	0.0000002	-6.65581	1.023293	2.268	1.470
03300	AlOH +2	8.922E-08	0.0000000	-7.48542	0.366533	-4.807	11.899
03301	Al(OH)2 +	3.849E-08	0.0000000	-7.52364	0.778087	-9.991	0.000
03302	Al(OH)4 -	2.438E-12	0.0000000	-11.72199	0.778087	-23.827	44.060
07320	AlSO4 +	2.699E-10	0.0000000	-9.67784	0.778087	3.083	4.910
07321	Al(SO4)2 -	5.319E-14	0.0000000	-13.38314	0.778087	4.969	2.840
03303	Al(OH)3 AQ	2.428E-09	0.0000000	-8.60470	1.023293	-16.010	0.000
03300	FeOH +	2.648E-10	0.0000000	-9.68710	0.778087	-9.671	13.480

[illegible]	FeOH3 -1	1.572E-22	0.0000000	-21.91260	0.778087	-31.333	30.300
507320	FeSO4 AQ	7.164E-09	0.0000000	-8.13484	1.023293	2.171	3.230
803302	Fe(OH)2 AQ	5.313E-17	0.0000000	-16.26467	1.023293	-21.187	28.565
703300	MnOH +	5.146E-11	0.0000000	-10.39754	0.778087	-10.787	14.399
703301	Mn(OH)3 -1	2.788E-25	0.0000000	-24.66370	0.778087	-34.691	0.000
707320	MnSO4 AQ	1.962E-08	0.0000000	-7.69727	1.023293	2.204	2.170
701400	MnHCO3 +	3.804E-09	0.0000000	-8.52874	0.778087	11.709	0.000
[illegible]00	Pb(CO3)2-2	7.151E-14	0.0000000	-13.58149	0.366533	11.076	0.000
[illegible]300	PbOH +	9.394E-06	0.0000073	-5.13611	0.778087	-7.601	0.000
003301	Pb(OH)2 AQ	1.832E-10	0.0000000	-9.72717	1.023293	-17.130	0.000
003302	Pb(OH)3 -	1.823E-16	0.0000000	-15.84823	0.778087	-27.951	0.000
003303	Pb2OH +3	8.904E-06	0.0000009	-6.03115	0.104533	-5.379	0.000
007320	PbSO4 AQ	8.023E-06	0.0000082	-5.08569	1.023293	2.740	0.000
003304	Pb3(OH)4+2	3.415E-12	0.0000000	-11.90248	0.366533	-24.007	26.500
001401	PbCO3 AQ	9.925E-07	0.0000010	-5.99327	1.023293	7.230	0.000
003305	Pb(OH)4 -2	5.856E-23	0.0000000	-22.66829	0.366533	-39.263	0.000
007321	Pb(SO4)2-2	3.017E-10	0.0000000	-9.95632	0.366533	3.906	0.000
001402	PbHCO3 +	1.802E-05	0.0000140	-4.85327	0.778087	13.309	0.000
301400	HCO3 -	5.160E-06	0.0000040	-5.39630	0.778087	10.521	-3.617
123301	=feO-	4.178E-05	0.0000418	-4.37898	1.000000	-8.930	0.000
123302	=feOH2+	5.997E-03	0.0059974	-2.22204	1.000000	7.290	0.000
113301	=FeO-	7.272E-11	0.0000000	-10.13834	1.000000	-8.930	0.000
113302	=FeOH2+	1.044E-08	0.0000000	-7.98140	1.000000	7.290	0.000
116000	=FeOPb+	6.800E-04	0.0006800	-3.16750	1.000000	4.710	0.000
126000	=feOPb+	1.520E-02	0.0152004	-1.81814	1.000000	0.300	0.000
121500	=feOCa+	8.611E-10	0.0000000	-9.06497	1.000000	-5.850	0.000
111500	=FeOHCa++	9.207E-12	0.0000000	-11.03586	1.000000	4.970	0.000
117320	=FeSO4-	2.198E-09	0.0000000	-8.65792	1.000000	7.780	0.000
127320	=feSO4-	1.263E-03	0.0012631	-2.89856	1.000000	7.780	0.000
117321	=FeOHSO4-2	2.419E-09	0.0000000	-8.61639	1.000000	0.790	0.000

SPECIES: TYPE III - FIXED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
[illegible] 2	H2O	-2.695E-02	-1.569	0.001	0.000
301403	CO2 (g)	-1.346E-02	-1.871	20.627	-0.530
330	H+1	3.565E-02	-1.448	4.820	0.000

SPECIES: TYPE IV - PRECIPITATED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
060003	ANGLESITE	4.683E-02	-1.330	7.836	-2.150
503002	DIASPORE	1.205E-04	-3.919	-7.396	24.630
060000	CERRUSITE	1.329E-02	-1.877	13.233	-4.860

SPECIES: TYPE V - DISSOLVED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
015003	HUNTITE	7.563E-29	-28.121	29.421	25.760
046001	HYDRMAGNESIT	0.000E-01	-43.739	7.657	52.210
146002	MAGNESITE	3.121E-07	-6.506	7.898	6.169
128000	MELANTERITE	1.611E-08	-7.793	2.531	-2.860
146003	NESQUEHONITE	1.234E-09	-8.909	5.498	5.789
128000	SIDERITE	5.284E-06	-5.277	10.437	5.328
147003	PYROCROITE	5.615E-11	-10.251	-15.568	22.590
[illegible]000	RHODOCHROSIT	1.140E-05	-4.943	10.366	2.079
[illegible]00	MNSO4	1.233E-13	-12.909	-2.998	15.480
115001	GYPSUM	8.277E-05	-4.082	4.854	-0.261
160000	MASSICOT	1.341E-06	-5.873	-13.267	16.780
060001	LITHARGE	2.118E-06	-5.674	-13.068	16.380
160002	PBO, .3H2O	2.591E-06	-5.586	-12.980	0.000
160001	PB2OCO3	2.613E-06	-5.583	0.256	11.460
160000	LARNAKITE	5.028E-01	-0.299	0.143	6.440

AR302905

[illegible]	PB3O2SO4	1.292E-04	-3.889	10.841	28.750
3060002	PB4O3SO4	3.168E-09	-8.499	-22.845	35.070
3060002	PB3O2CO3	9.395E-11	-10.027	-11.582	26.430
2003003	GIBBSITE (C)	1.383E-02	-1.859	-9.254	22.800
2060004	PB(OH)2 (C)	8.822E-02	-1.054	-8.447	13.990
3060003	HYDCERRUSITE	2.434E-02	-1.614	17.460	0.000
3060005	PB2O(OH)2	3.861E-12	-11.413	-26.200	0.000
3[illegible]04	PB4(OH)6SO4	1.749E-07	-6.757	-21.100	0.000
3[illegible]000	LIME	3.280E-28	-27.484	-33.780	46.265
3015001	PORTLANDITE	9.286E-18	-17.032	-23.327	30.690
3028000	WUSTITE	8.889E-08	-7.051	-12.215	24.846
2046001	PERICLASE	8.826E-17	-16.054	-22.278	36.135
3028001	HERCYNITE	7.587E-10	-9.120	-28.827	78.360
3046000	SPINEL	6.185E-18	-17.209	-38.226	89.089
3003000	ALOH3(A)	2.758E-04	-3.559	-10.955	27.045
3003000	ALOHSO4	2.493E-05	-4.603	3.230	0.000
3003001	AL4(OH)10SO4	4.494E-09	-8.347	-22.700	0.000
3015000	ANHYDRITE	4.201E-05	-4.377	4.557	3.769
3015000	ARAGONITE	8.547E-07	-6.068	8.263	2.615
3046000	ARTINITE	4.027E-19	-18.395	-10.211	28.742
3003001	BOEHMITE	1.662E-02	-1.779	-9.176	28.130
3046000	BRUCITE	7.611E-12	-11.119	-17.341	25.840
3015001	CALCITE	1.255E-06	-5.901	8.430	2.585
3003000	A1203	6.513E-09	-8.186	-22.980	0.000
3015002	DOLOMITE	1.228E-12	-11.911	16.824	8.290
3046000	EPSOMITE	1.536E-07	-6.814	2.200	-2.820

SPECIES: TYPE VI - SPECIES NOT CONSIDERED

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
813	ADSIPSI0	6.144E-03	-2.212	0.000	0.000

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20:22:16

PERCENTAGE DISTRIBUTION OF COMPONENTS AMONG dissolved and adsorbed species

Ca	100.0	PERCENT BOUND IN SPECIES #	150	Ca+2
Mg+2	100.0	PERCENT BOUND IN SPECIES #	460	Mg+2
ADS1TYP1	100.0	PERCENT BOUND IN SPECIES #8116000		=FeOPb+
Mn+2	100.0	PERCENT BOUND IN SPECIES #	470	Mn+2
Fe+2	100.0	PERCENT BOUND IN SPECIES #	280	Fe+2
ADS1PSI0	33.7	PERCENT BOUND IN SPECIES #8123302		=feOH2+
	3.8	PERCENT BOUND IN SPECIES #8116000		=FeOPb+
	85.4	PERCENT BOUND IN SPECIES #8126000		=feOPb+
ADS1TYP2	12.2	PERCENT BOUND IN SPECIES #	812	ADS1TYP2
	5.1	PERCENT BOUND IN SPECIES #8127321		=feOHSO4-2
	22.0	PERCENT BOUND IN SPECIES #8123302		=feOH2+
	55.9	PERCENT BOUND IN SPECIES #8126000		=feOPb+
	4.6	PERCENT BOUND IN SPECIES #8127320		=feSO4-
O4-2	52.1	PERCENT BOUND IN SPECIES #8127321		=feOHSO4-2
	47.3	PERCENT BOUND IN SPECIES #8127320		=feSO4-
l+3	86.4	PERCENT BOUND IN SPECIES #	30	Al+3
	9.3	PERCENT BOUND IN SPECIES #	303300	AlOH +2
	4.0	PERCENT BOUND IN SPECIES #	303301	Al(OH)2 +
EO	5.1	PERCENT BOUND IN SPECIES #8116000		=FeOPb+
	114.8	PERCENT BOUND IN SPECIES #8126000		=feOPb+
O3-2	86.2	PERCENT BOUND IN SPECIES #3301401		H2CO3 AQ
	10.3	PERCENT BOUND IN SPECIES #6001402		PbHCO3 +
	2.9	PERCENT BOUND IN SPECIES #3301400		HCO3 -
-1	8.1	PERCENT BOUND IN SPECIES #8116000		=FeOPb+
	181.9	PERCENT BOUND IN SPECIES #8126000		=feOPb+
b+2	49.3	PERCENT BOUND IN SPECIES #	600	Pb+2
	2.2	PERCENT BOUND IN SPECIES #8116000		=FeOPb+
	48.3	PERCENT BOUND IN SPECIES #8126000		=feOPb+

---------- EQUILIBRATED MASS DISTRIBUTION ----------

X	NAME	DISSOLVED MOL/KG	DISSOLVED PERCENT	SORBED MOL/KG	SORBED PERCENT	PRECIPITATED MOL/KG	PRECIPITATED PERCENT
	Ca+2	1.239E-03	100.0	8.703E-10	0.0	0.000E-01	0.0
0	Mg+2	1.049E-03	100.0	0.000E-01	0.0	0.000E-01	0.0
0	Mn+2	1.305E-04	100.0	0.000E-01	0.0	0.000E-01	0.0
0	Fe+2	5.133E-05	100.0	0.000E-01	0.0	0.000E-01	0.0
2	SO4-2	1.543E-05	0.0	2.653E-03	5.4	4.683E-02	94.6
0	Al+3	9.607E-07	0.8	0.000E-01	0.0	1.205E-04	99.2
2	H2O	1.847E-05	0.1	1.323E-02	99.9	0.000E-01	0.0
0	CO3-2	1.751E-04	1.3	0.000E-01	0.0	1.329E-02	98.7

AR302907

030	H+1	3.065E-04	-3.7	-8.662E-03	103.7	0.000E-01	0.0
200	Pb+2	1.557E-02	17.0	1.588E-02	17.3	6.011E-02	65.6

CHARGE BALANCE: SPECIATED

SUM OF CATIONS = 5.793E-02 SUM OF ANIONS 4.104E-03

PERCENT DIFFERENCE = 8.677E+01 (ANIONS - CATIONS)/(ANIONS + CATIONS)

NONCARBONATE ALKALINITY = 0.000E-01

IONIC STRENGTH = : 1.000E-01

****** DIFFUSE LAYER ADSORPTION MODEL ********

**** Parameters For Adsorbent Number 1 ****

Electrostatic Variables: psi0 = 0.127142 sig0 = 0.236475
psib = 0.000000 sigb = 0.000000
psid = 0.000000 sigd = 0.000000

Adsorbent Concentration (g/l): 12.100

Specific Surface Area (sq. meters/g): 600.00

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20:22:17

aturation indices and stoichiometry of all minerals

ID #	NAME	Sat. Index	Stoichiometry (in parentheses) of each component
[illegible]3000	ALOH3(A)	-3.559	(1.000) 30 (3.000) 2 (-3.000)330
6003000	ALOHSO4	-4.603	(-1.000)330 (1.000) 30 (1.000)732 (1.000) 2
6003001	AL4(OH)10SO4	-8.347	(-10.000)330 (4.000) 30 (1.000)732 (10.000) 2
6015000	ANHYDRITE	-4.377	(1.000)150 (1.000)732
5015000	ARAGONITE	-6.068	(1.000)150 (1.000)140
5046000	ARTINITE	-18.395	(-2.000)330 (2.000)460 (1.000)140 (5.000) 2
2003001	BOEHMITE	-1.779	(-3.000)330 (1.000) 30 (2.000) 2
2046000	BRUCITE	-11.119	(1.000)460 (2.000) 2 (-2.000)330
5015001	CALCITE	-5.901	(1.000)150 (1.000)140
2003002	DIASPORE	0.000	(-3.000)330 (1.000) 30 (2.000) 2
5015002	DOLOMITE	-11.911	(1.000)150 (1.000)460 (2.000)140
6046000	EPSOMITE	-6.814	(1.000)460 (1.000)732 (7.000) 2
2003003	GIBBSITE (C)	-1.859	(-3.000)330 (1.000) 30 (3.000) 2
3003000	A1203	-8.186	(2.000) 30 (3.000) 2 (-6.000)330
6015001	GYPSUM	-4.082	(1.000)150 (1.000)732 (2.000) 2
5015003	HUNTITE	-28.121	(3.000)460 (1.000)150 (4.000)140
5046001	HYDRMAGNESIT	-43.739	(5.000)460 (4.000)140 (-2.000)330 (6.000) 2
5046002	MAGNESITE	-6.506	(1.000)460 (1.000)140
6028000	MELANTERITE	-7.793	(1.000)280 (1.000)732 (7.000) 2
5046003	NESQUEHONITE	-8.909	(1.000)460 (1.000)140 (3.000) 2
5028000	SIDERITE	-5.277	(1.000)280 (1.000)140
2047003	PYROCROITE	-10.251	(-2.000)330 (1.000)470 (2.000) 2
5047000	RHODOCHROSIT	-4.943	(1.000)470 (1.000)140
6047000	MNSO4	-12.909	(1.000)470 (1.000)732
5060000	CERRUSITE	0.000	(1.000)600 (1.000)140
2060000	MASSICOT	-5.873	(-2.000)330 (1.000)600 (1.000) 2
[illegible]001	LITHARGE	-5.674	(-2.000)330 (1.000)600 (1.000) 2
2060002	PBO, .3H2O	-5.586	(-2.000)330 (1.000)600 (1.330) 2
5060001	PB2OCO3	-5.583	(-2.000)330 (2.000)600 (1.000) 2 (1.000)140
6060000	LARNAKITE	-0.299	(-2.000)330 (2.000)600 (1.000)732 (1.000) 2
6060001	PB3O2SO4	-3.889	(-4.000)330 (3.000)600 (1.000)732 (2.000) 2
6060002	PB4O3SO4	-8.499	(-6.000)330 (4.000)600 (1.000)732 (3.000) 2
5060002	PB3O2CO3	-10.027	(-4.000)330 (3.000)600 (1.000)140 (2.000) 2
6060003	ANGLESITE	0.000	(1.000)600 (1.000)732
2060004	PB(OH)2 (C)	-1.054	(-2.000)330 (1.000)600 (2.000) 2
5060003	HYDCERRUSITE	-1.614	(-2.000)330 (3.000)600 (2.000)140 (2.000) 2
2060005	PB2O(OH)2	-11.413	(-4.000)330 (2.000)600 (3.000) 2
6060004	PB4(OH)6SO4	-6.757	(-6.000)330 (4.000)600 (1.000)732 (6.000) 2
2015000	LIME	-27.484	(-2.000)330 (1.000)150 (1.000) 2
2015001	PORTLANDITE	-17.032	(-2.000)330 (1.000)150 (2.000) 2
2028000	WUSTITE	-7.051	(-2.000)330 (0.947)280 (1.000) 2
2046001	PERICLASE	-16.054	(-2.000)330 (1.000)460 (1.000) 2
3028001	HERCYNITE	-9.120	(-8.000)330 (1.000)280 (2.000) 30 (4.000) 2
3046000	SPINEL	-17.209	(-8.000)330 (1.000)460 (2.000) 30 (4.000) 2

```
PC  VERSION: MINTEQA2   DATE OF CALCULATIONS:  4-DEC-89  TIME: 20:22:28

RUNC2 C&R BATTERY
ADSORPTION, pH=4.82, pCO2=.0035, ION STR.=.02, ALLOW ALL SOLIDS

-----------------------------------------------------------------------
 Temperature (Celsius):  16.60
 Units of concentration: MG/L
 Ionic strength:  0.020 molal; FIXED
 If specified, total carbonate concentration represents total inorganic carbon.
 Do not automatically terminate if charge imbalance exceeds 30%
 Precipitation is allowed for all solids in the thermodynamic database and
   the print option for solids is set to: 1
 The maximum number of iterations is: 200
 The method used to compute activity coefficients is: Davies equation
 Intermediate output file
 Adsorption model: Diffuse Layer
 Number of adsorbing surfaces: 1

-----------------------------------------------------------------------

 12.100  600.00 0.000 0.000 81
    150  4.850E+01    -3.64
    460  3.490E+01    -1.76
    732  4.644E+03    -3.55
    330  1.526E-02    -4.82
    600  1.853E+04    -7.00
    813  0.000E-01     0.00
    812  2.720E-02    -3.42
    811  6.800E-04    -5.03
     30  3.200E+00    -3.93
     80  2.800E+00    -4.30
    470  7.000E+00    -3.89
    140  0.000E-01     0.00

 H2O HAS BEEN INSERTED AS A COMPONENT
  3   2
 301403    20.6159     -0.5300
    330     4.8200      0.0000
  6   1
    813     0.0000      0.0000
  2  12
 123301 =feO-            0.0000    -8.9300    0.000    0.000-1.00 0.00 0.00    0.0000
 .00 3   1.000 812  -1.000 330  -1.000 813   0.000    0   0.000    0   0.000    0
 0.000    0   0.000    0   0.000    0   0.000    0   0.000    0   0.000    0

  0.000    0   0.000    0   0.000    0
 123302 =feOH2+          0.0000     7.2900    0.000    0.000 1.00 0.00 0.00    0.0000
 .00 3   1.000 812   1.000 330   1.000 813   0.000    0   0.000    0   0.000    0
 0.000    0   0.000    0   0.000    0   0.000    0   0.000    0   0.000    0

  0.000    0   0.000    0   0.000    0
 113301 =FeO-            0.0000    -8.9300    0.000    0.000-1.00 0.00 0.00    0.0000
 .00 3   1.000 811  -1.000 330  -1.000 813   0.000    0   0.000    0   0.000    0
 0.000    0   0.000    0   0.000    0   0.000    0   0.000    0   0.000    0

  0.000    0   0.000    0   0.000    0
 113302 =FeOH2+          0.0000     7.2900    0.000    0.000 1.00 0.00 0.00    0.0000
 .00 3   1.000 811   1.000 330   1.000 813   0.000    0   0.000    0   0.000    0
 0.000    0   0.000    0   0.000    0   0.000    0   0.000    0   0.000    0

  0.000    0   0.000    0   0.000    0
 116000 =FeOPb+          0.0000     4.7100    0.000    0.000 1.00 0.00 0.00    0.0000
 .00 5   1.000 811  -1.000 330   1.000 813   1.000 600   1.000    2   0.000    0
```

AR302910

```
 0.000    0    0.000    0    0.000    0
1126000 =feOPb+           0.0000    0.3000    0.000    0.000 1.00 0.00 0.00    0.0000
0.00 5    1.000 812  -1.000 330    1.000 813    1.000 600    1.000    2    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 [redacted]00    0    0.000    0    0.000    0
[redacted]1126000 =feOCa+           0.0000   -5.8500    0.000    0.000 1.00 0.00 0.00    0.0000
0.00 4    1.000 812  -1.000 330    1.000 813    1.000 150    0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
3111500 =FeOHCa++         0.0000    4.9700    0.000    0.000 2.00 0.00 0.00    0.0000
1.00 3    1.000 811    1.000 150    2.000 813    0.000    0    0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
1117320 =FeSO4-           0.0000    7.7800    0.000    0.000-1.00 0.00 0.00    0.0000
1.00 5    1.000 811    1.000 330   -1.000 813    1.000 732   -1.000    2    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
1127320 =feSO4-           0.0000    7.7800    0.000    0.000-1.00 0.00 0.00    0.0000
1.00 5    1.000 812    1.000 330   -1.000 813    1.000 732   -1.000    2    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
1117321 =FeOHSO4-2        0.0000    0.7900    0.000    0.000-2.00 0.00 0.00    0.0000
1.00 4    1.000 811   -2.000 813    1.000 732   -1.000    2    0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
1[redacted]21 =feOHSO4-2      0.0000    0.7900    0.000    0.000-2.00 0.00 0.00    0.0000
1.[redacted]4    1.000 812   -2.000 813    1.000 732   -1.000    2    0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
```

NPUT DATA BEFORE TYPE MODIFICATIONS

ID	NAME	ACTIVITY GUESS	LOG GUESS	ANAL TOTAL
150	Ca+2	2.291E-04	-3.640	4.850E+01
460	Mg+2	1.738E-02	-1.760	2.490E+01
732	SO4-2	2.818E-04	-3.550	4.644E+03
330	H+1	1.514E-05	-4.820	1.526E-02
600	Pb+2	1.000E-07	-7.000	1.853E+04
813	ADS1PSI0	1.000E+00	0.000	0.000E-01
812	ADS1TYP2	3.802E-04	-3.420	2.720E-02
811	ADS1TYP1	9.333E-06	-5.030	6.800E-04
30	Al+3	1.175E-04	-3.930	3.200E+00
280	Fe+2	5.012E-05	-4.300	2.800E+00
470	Mn+2	1.288E-04	-3.890	7.000E+00
140	CO3-2	1.000E+00	0.000	0.000E-01
2	H2O	1.000E+00	0.000	0.000E-01

AR302911

ID	NAME	ANAL MOL	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DIFF F
150	Ca+2	4.850E+01	0.000E-01	2.291E-04	-3.64000	1.000000	0.0000	0.000E-0
[redacted]60	Mg+2	2.490E+01	0.000E-01	1.738E-02	-1.76000	1.000000	0.0000	0.000E-0
[redacted]32	SO4-2	4.644E+03	0.000E-01	2.818E-04	-3.55000	1.000000	0.0000	0.000E-0
330	H+1	1.526E-02	0.000E-01	1.514E-05	-4.82000	1.000000	4.8200	0.000E-0
600	Pb+2	1.853E+04	0.000E-01	1.000E-07	-7.00000	1.000000	0.0000	0.000E-0
813	ADS1PSI0	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0
812	ADS1TYP2	2.720E-02	0.000E-01	3.802E-04	-3.42000	1.000000	0.0000	0.000E-0
811	ADS1TYP1	6.800E-04	0.000E-01	9.333E-06	-5.03000	1.000000	0.0000	0.000E-0
30	Al+3	3.200E+00	0.000E-01	1.175E-04	-3.93000	1.000000	0.0000	0.000E-0

280	Fe+2	2.800E+00	0.000E-01	5.012E-05	-4.30000	1.000000	0.0000	0.000E-0
470	Mn+2	7.000E+00	0.000E-01	1.288E-04	-3.89000	1.000000	0.0000	0.000E-0
140	CO3-2	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0
2	H2O	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0

CHARGE BALANCE: UNSPECIATED

SUM OF CATIONS= 1.884E-01 SUM OF ANIONS = 9.899E-02

PERCENT DIFFERENCE = 3.112E+01 (ANIONS - CATIONS)/(ANIONS + CATIONS)

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20:23:10

ARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
0	ADS1TYP1	6.800E-04	5.440E-03	-5.03000
1	Ca+2	1.239E-03	1.125E-02	-2.44951
2	ADS1TYP1	6.800E-04	3.393E-02	-7.03000
3	ADS1PSI0	6.231E-03	-4.978E-02	-2.00237
4	ADS1TYP2	2.720E-02	3.642E-02	-3.53393
5	ADS1PSI0	3.630E-03	-4.557E-03	-1.54938
6	ADS1PSI0	3.432E-03	-7.304E-04	-1.50333
7	ADS1PSI0	3.394E-03	-1.656E-05	-1.49423
8	ADS1PSI0	3.393E-03	-1.041E-08	-1.49401

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-69 TIME: 20:23:29

ITERATIONS= 9: SOLID ANGLESITE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20:23:31

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
9	ADS1PSI0	3.393E-03	-1.522E-02	-1.49401
10	SO4-2	-4.207E-02	7.744E-02	-3.63256
11	SO4-2	-4.207E-02	1.448E+00	-4.63256
12	ADS1TYP2	2.720E-02	5.374E-01	-1.47636
13	SO4-2	-4.207E-02	8.099E-02	-5.98622
14	ADS1PSI0	1.828E-02	-5.677E-02	-2.92953
15	ADS1PSI0	1.574E-02	-2.123E-02	-2.80009
16	ADS1PSI0	1.394E-02	-6.874E-03	-2.69467
17	ADS1PSI0	1.298E-02	-1.343E-03	-2.63339
18	ADS1PSI0	1.274E-02	-6.914E-05	-2.61723
19	ADS1PSI0	1.273E-02	-1.861E-07	-2.61634

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20:23:50

ITERATIONS= 20: SOLID DIASPORE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20:23:52

ARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

TER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
20	SO4-2	-4.207E-02	-2.578E-08	-6.04807

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20:23:56

ITERATIONS= 21: SOLID CERRUSITE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20:23:59

ARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
21	ADS1PSI0	1.273E-02	-2.540E-02	-2.61634
22	ADS1PSI0	1.015E-02	-3.977E-03	-2.42090
23	ADS1PSI0	9.653E-03	-1.095E-03	-2.37763
24	ADS1PSI0	9.512E-03	-3.360E-05	-2.36497
25	ADS1PSI0	9.507E-03	-5.102E-08	-2.36452

ID	NAME	ANAL MOL	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DIFF F
150	Ca+2	1.239E-03	1.239E-03	7.126E-04	-3.14716	0.575360	0.2401	-9.145E-1
460	Mg+2	1.049E-03	1.048E-03	6.031E-04	-3.21958	0.575360	0.2401	0.000E-0
811	ADS1TYP1	6.800E-04	8.187E-09	8.187E-09	-8.08689	1.000000	0.0000	-3.399E-1
470	Mn+2	1.305E-04	1.304E-04	7.503E-05	-4.12474	0.575360	0.2401	0.000E-0
280	Fe+2	5.133E-05	5.132E-05	2.953E-05	-4.52978	0.575360	0.2401	0.000E-0
813	ADS1PSI0	9.507E-03	4.320E-03	4.320E-03	-2.36452	1.000000	0.0000	-9.437E-1
812	ADS1TYP2	2.720E-02	3.932E-03	3.932E-03	-2.40538	1.000000	0.0000	0.000E-0
732	SO4-2	4.950E-02	4.461E-06	2.567E-06	-5.59064	0.575360	0.2401	0.000E-0
30	Al+3	1.214E-04	3.010E-07	8.679E-08	-7.06152	0.288313	0.5401	0.000E-0
2	H2O	5.650E-22	-3.259E-02	9.976E-01	-0.00106	1.000000	0.0011	-2.043E-1
140	CO3-2	0.000E-01	1.786E-11	1.027E-11	-10.98822	0.575360	0.2401	0.000E-0
330	H+1	1.550E-05	5.522E-02	1.514E-05	-4.82000	0.870933	4.8200	0.000E-0
600	Pb+2	9.156E-02	9.886E-03	5.688E-03	-2.24505	0.575360	0.2401	0.000E-0

SPECIES: TYPE I - COMPONENTS

ID	NAME	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DH
150	Ca+2	1.239E-03	0.0007126	-3.14716	0.575360	0.240	0.000
460	Mg+2	1.048E-03	0.0006031	-3.21958	0.575360	0.240	0.000
732	SO4-2	4.461E-06	0.0000026	-5.59064	0.575360	0.240	0.000
470	Mn+2	1.304E-04	0.0000750	-4.12474	0.575360	0.240	0.000
600	Pb+2	9.886E-03	0.0056879	-2.24505	0.575360	0.240	0.000
140	CO3-2	1.786E-11	0.0000000	-10.98822	0.575360	0.240	0.000
812	ADS1TYP2	3.932E-03	0.0039321	-2.40538	1.000000	0.000	0.000
811	ADS1TYP1	8.187E-09	0.0000000	-8.08689	1.000000	0.000	0.000
30	Al+3	3.010E-07	0.0000001	-7.06152	0.288313	0.540	0.000
280	Fe+2	5.132E-05	0.0000295	-4.52978	0.575360	0.240	0.000

SPECIES: TYPE II - COMPLEXES

ID	NAME	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DH
127321	=FeOHSO4-2	3.343E-03	0.0033425	-2.47592	1.000000	0.790	0.000
301401	H2CO3 AQ	1.537E-04	0.0001544	-3.81137	1.004616	16.815	-2.247
307320	HSO4 -	3.440E-09	0.0000000	-8.52346	0.870933	1.947	4.910
300020	OH-	3.957E-10	0.0000000	-9.46263	0.870933	-14.222	13.345
303300	MgOH +	3.536E-11	0.0000000	-10.51147	0.870933	-12.051	15.935
301400	MgCO3 AQ	5.175E-12	0.0000000	-11.28410	1.004616	2.922	2.022
301401	MgHCO3 +	3.084E-08	0.0000000	-7.57095	0.870933	11.517	-2.430
307320	MgSO4 AQ	2.559E-07	0.0000003	-6.58995	1.004616	2.218	1.399
303300	CaOH +	6.683E-12	0.0000000	-11.23507	0.870933	-12.847	14.535
301400	CaHCO3 +	2.632E-08	0.0000000	-7.63965	0.870933	11.376	1.790
[illegible]01	CaCO3 AQ	8.778E-12	0.0000000	-11.05460	1.004616	3.079	4.030
[illegible]20	CaSO4 AQ	3.451E-07	0.0000003	-6.46003	1.004616	2.276	1.470
303300	AlOH +2	5.684E-08	0.0000000	-7.48542	0.575360	-5.003	11.899
303301	Al(OH)2 +	3.439E-08	0.0000000	-7.52364	0.870933	-10.040	0.000
303302	Al(OH)4 -	2.178E-12	0.0000000	-11.72199	0.870933	-23.876	44.060
307320	AlSO4 +	2.411E-10	0.0000000	-9.67784	0.870933	3.034	2.280
307321	Al(SO4)2 -	4.752E-14	0.0000000	-13.38314	0.870933	4.920	2.840
303303	Al(OH)3 AQ	2.473E-09	0.0000000	-8.60470	1.004616	-16.002	0.000

AR302919

[illegible]	FeOH +	3.704E-10	0.0000000	-9.49131	0.870933	-9.720	13.199
1303301	FeOH3 -1	2.204E-22	0.0000000	-21.71681	0.870933	-31.584	30.300
1307320	FeSO4 AQ	1.145E-08	0.0000000	-7.93905	1.004616	2.179	3.230
1303302	FeOH2 AQ	8.494E-17	0.0000000	-16.06888	1.004616	-21.179	28.365
+703300	MnOH +	7.215E-11	0.0000000	-10.20176	0.870933	-10.836	14.399
+703301	Mn(OH)3 -1	3.909E-25	0.0000000	-24.46792	0.870933	-34.740	0.000
+707320	MnSO4 AQ	3.137E-08	0.0000000	-7.50149	1.004616	2.212	2.170
+7[illegible]00	MnHCO3 +	5.334E-09	0.0000000	-8.33296	0.870933	11.660	0.000
[illegible]400	Pb(CO3)2-2	4.556E-14	0.0000000	-13.58149	0.575360	10.880	0.000
003300	PbOH +	8.393E-06	0.0000073	-5.13611	0.870933	-7.650	0.000
003301	Pb(OH)2 AQ	1.866E-10	0.0000000	-9.72717	1.004616	-17.122	0.000
003302	Pb(OH)3 -	1.628E-16	0.0000000	-15.84823	0.870933	-28.000	0.000
003303	Pb2OH +3	3.228E-06	0.0000009	-6.03115	0.288313	-5.820	0.000
007320	PbSO4 AQ	8.172E-06	0.0000082	-5.08569	1.004616	2.748	0.000
003304	Pb3(OH)4+2	2.176E-12	0.0000000	-11.90248	0.575360	-24.203	26.500
001401	PbCO3 AQ	1.011E-06	0.0000010	-5.99327	1.004616	7.238	0.000
003305	Pb(OH)4 -2	3.730E-23	0.0000000	-22.66829	0.575360	-39.459	0.000
007321	Pb(SO4)2-2	1.922E-10	0.0000000	-9.95632	0.575360	3.710	0.000
001402	PbHCO3 +	1.610E-05	0.0000140	-4.85327	0.870933	13.260	0.000
301400	HCO3 -	4.610E-06	0.0000040	-5.39630	0.870933	10.472	-3.617
123301	=feO-	7.065E-05	0.0000707	-4.15086	1.000000	-8.930	0.000
123302	=feOH2+	5.013E-03	0.0050131	-2.29989	1.000000	7.290	0.000
113301	=FeO-	1.471E-10	0.0000000	-9.83237	1.000000	-8.930	0.000
113302	=FeOH2+	1.044E-08	0.0000000	-7.98140	1.000000	7.290	0.000
116000	=FeOPb+	6.800E-04	0.0006800	-3.16751	1.000000	4.710	0.000
126000	=feOPb+	1.271E-02	0.0127058	-1.89600	1.000000	0.300	0.000
121500	=feOCa+	1.130E-09	0.0000000	-8.94705	1.000000	-5.850	0.000
111500	=FeOHCa++	1.016E-11	0.0000000	-10.99307	1.000000	4.970	0.000
117320	=FeSO4-	4.447E-09	0.0000000	-8.35195	1.000000	7.780	0.000
127320	=feSO4-	2.136E-03	0.0021358	-2.67044	1.000000	7.780	0.000
117321	=FeOHSO4-2	6.959E-09	0.0000000	-8.15743	1.000000	0.790	0.000

[illegible]PECIES: TYPE III - FIXED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
2	H2O	-3.259E-02	-1.487	0.001	0.000
301403	CO2 (g)	-2.442E-02	-1.612	20.627	-0.530
330	H+1	5.522E-02	-1.258	4.820	0.000

SPECIES: TYPE IV - PRECIPITATED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
060003	ANGLESITE	4.400E-02	-1.357	7.836	-2.150
003002	DIASPORE	1.210E-04	-3.917	-7.396	24.630
060000	CERRUSITE	2.425E-02	-1.615	13.233	-4.860

SPECIES: TYPE V - DISSOLVED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
015003	HUNTITE	4.590E-28	-27.338	29.421	25.760
046001	HYDRMAGNESIT	0.000E-01	-42.761	7.657	52.210
046002	MAGNESITE	4.899E-07	-6.310	7.898	6.169
028000	MELANTERITE	2.529E-08	-7.597	2.531	-2.860
046003	NESQUEHONITE	1.936E-09	-8.713	5.498	5.789
028000	SIDERITE	8.294E-06	-5.081	10.437	5.328
[illegible]03	PYROCROITE	8.813E-11	-10.055	-15.568	22.590
[illegible]00	RHODOCHROSIT	1.790E-05	-4.747	10.366	2.079
[illegible]7000	MNSO4	1.935E-13	-12.713	-2.998	15.480
015001	GYPSUM	1.299E-04	-3.886	4.854	-0.261
060000	MASSICOT	1.341E-06	-5.873	-13.267	16.780
060001	LITHARGE	2.118E-06	-5.674	-13.068	16.380
060002	PBO, .3H2O	2.591E-06	-5.586	-12.980	0.000
60001	PB2OCO3	2.613E-06	-5.583	0.256	11.460

AR302920

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3060001	PB3O2SO4	1.292E-04	-3.889	-10.841	20.750
3060002	PB4O3SO4	3.168E-09	-8.499	-22.845	35.070
5060002	PB3O2CO3	9.395E-11	-10.027	-11.582	26.430
2003003	GIBBSITE (C)	1.383E-02	-1.859	-9.254	22.800
3060004	PB(OH)2 (C)	8.822E-02	-1.054	-8.447	13.990
3060003	HYDCERRUSITE	2.434E-02	-1.614	17.460	0.000
3[illegible]005	PB2O(OH)2	3.861E-12	-11.413	-26.200	0.000
[illegible]004	PB4(OH)6SO4	1.749E-07	-6.757	-21.100	0.000
3015000	LIME	5.149E-28	-27.288	-33.780	46.265
2015001	PORTLANDITE	1.457E-17	-16.836	-23.327	30.690
3028000	WUSTITE	1.362E-07	-6.866	-12.215	24.846
1046001	PERICLASE	1.385E-16	-15.858	-22.278	36.135
3028001	HERCYNITE	1.191E-09	-8.924	-28.827	78.360
1046000	SPINEL	9.707E-18	-17.013	-38.226	89.089
2003000	ALOH3(A)	2.758E-04	-3.559	-10.955	27.045
1003000	ALOHSO4	2.493E-05	-4.603	3.230	0.000
5003001	AL4(OH)10SO4	4.494E-09	-8.347	-22.700	0.000
1015000	ANHYDRITE	6.594E-05	-4.181	4.557	3.769
2015000	ARAGONITE	1.342E-06	-5.872	8.263	2.615
1046000	ARTINITE	9.921E-19	-18.003	-10.211	28.742
3003001	BOEHMITE	1.662E-02	-1.779	-9.176	28.130
2046000	BRUCITE	1.195E-11	-10.923	-17.341	25.840
5015001	CALCITE	1.970E-06	-5.706	8.430	2.585
3003000	A1203	6.513E-09	-8.186	-22.980	0.000
5015002	DOLOMITE	3.025E-12	-11.519	16.824	8.290
1046000	EPSOMITE	2.411E-07	-6.618	2.200	-2.820

SPECIES: TYPE VI - SPECIES NOT CONSIDERED

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
813	ADS1PSI0	4.320E-03	-2.365	0.000	0.000

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20:24: 7

PERCENTAGE DISTRIBUTION OF COMPONENTS AMONG dissolved and adsorbed species

Ca	100.0	PERCENT BOUND IN SPECIES #	150	Ca+2
Mg+2	100.0	PERCENT BOUND IN SPECIES #	460	Mg+2
ADS1TYP1	100.0	PERCENT BOUND IN SPECIES #8116000		=FeOPb+
Mn+2	100.0	PERCENT BOUND IN SPECIES #	470	Mn+2
Fe+2	100.0	PERCENT BOUND IN SPECIES #	280	Fe+2
ADS1PSI0	52.7	PERCENT BOUND IN SPECIES #8123302		=feOH2+
	7.2	PERCENT BOUND IN SPECIES #8116000		=FeOPb+
	133.5	PERCENT BOUND IN SPECIES #8126000		=feOPb+
ADS1TYP2	14.5	PERCENT BOUND IN SPECIES #	812	ADS1TYP2
	12.3	PERCENT BOUND IN SPECIES #8127321		=feOHSO4-2
	18.4	PERCENT BOUND IN SPECIES #8123302		=feOH2+
	46.7	PERCENT BOUND IN SPECIES #8126000		=feOPb+
	7.9	PERCENT BOUND IN SPECIES #8127320		=feSO4-
SO4-2	60.9	PERCENT BOUND IN SPECIES #8127321		=feOHSO4-2
	38.9	PERCENT BOUND IN SPECIES #8127320		=feSO4-
Al+3	76.2	PERCENT BOUND IN SPECIES #	30	Al+3
	14.4	PERCENT BOUND IN SPECIES #	303300	AlOH +2
	8.7	PERCENT BOUND IN SPECIES #	303301	Al(OH)2 +
H2O	8.6	PERCENT BOUND IN SPECIES #8116000		=FeOPb+
	160.4	PERCENT BOUND IN SPECIES #8126000		=feOPb+
CO3-2	87.6	PERCENT BOUND IN SPECIES #3301401		H2CO3 AQ
	9.2	PERCENT BOUND IN SPECIES #6001402		PbHCO3 +
	2.6	PERCENT BOUND IN SPECIES #3301400		HCO3 -
H+1	1.2	PERCENT BOUND IN SPECIES #8123301		=feO-
	11.3	PERCENT BOUND IN SPECIES #8116000		=FeOPb+
	212.1	PERCENT BOUND IN SPECIES #8126000		=feOPb+
Pb+2	42.4	PERCENT BOUND IN SPECIES #	600	Pb+2
	2.9	PERCENT BOUND IN SPECIES #8116000		=FeOPb+
	54.5	PERCENT BOUND IN SPECIES #8126000		=feOPb+

---------- EQUILIBRATED MASS DISTRIBUTION ----------

IDX	NAME	DISSOLVED MOL/KG	DISSOLVED PERCENT	SORBED MOL/KG	SORBED PERCENT	PRECIPITATED MOL/KG	PRECIPITATED PERCENT
150	Ca+2	1.239E-03	100.0	1.140E-09	0.0	0.000E-01	0.0
460	Mg+2	1.049E-03	100.0	0.000E-01	0.0	0.000E-01	0.0
470	Mn+2	1.305E-04	100.0	0.000E-01	0.0	0.000E-01	0.0
280	Fe+2	5.133E-05	100.0	0.000E-01	0.0	0.000E-01	0.0
732	SO4-2	1.328E-05	0.0	5.478E-03	11.1	4.400E-02	88.9
30	Al+3	3.950E-07	0.3	0.000E-01	0.0	1.210E-04	99.7
2	H2O	1.176E-05	0.1	7.907E-03	99.9	0.000E-01	0.0

AR302922

40	CO3-2	1.755E-04	0.7	0.000E-01	0.0	2.425E-02	99.3
30	H+1	3.164E-04	-5.3	-6.307E-03	105.3	0.000E-01	0.0
20	Pb+2	9.926E-03	10.8	1.339E-02	14.6	6.825E-02	74.5

CHARGE BALANCE: SPECIATED

SUM OF CATIONS = 4.316E-02 SUM OF ANIONS 8.905E-03

PERCENT DIFFERENCE = 6.579E+01 (ANIONS - CATIONS)/(ANIONS + CATIONS)

NONCARBONATE ALKALINITY = 0.000E-01

IONIC STRENGTH = : 2.000E-02

****** DIFFUSE LAYER ADSORPTION MODEL ********

**** Parameters For Adsorbent Number 1 ****
Electrostatic Variables: psi0 = 0.135937 sig0 = 0.126354
psib = 0.000000 sigb = 0.000000
psid = 0.000000 sigd = 0.000000
Adsorbent Concentration (g/l): 12.100
Specific Surface Area (sq. meters/g): 600.00

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20:24: 8

Saturation indices and stoichiometry of all minerals

ID #	NAME	Sat. Index	Stoichiometry (in parentheses) of each component
[illegible]3000	ALOH3(A)	-3.559	(1.000) 30 (3.000) 2 (-3.000)330
[illegible]6003000	ALOHSO4	-4.603	(-1.000)330 (1.000) 30 (1.000)732 (1.000) 2
6003001	AL4(OH)10SO4	-8.347	(-10.000)330 (4.000) 30 (1.000)732 (10.000) 2
6015000	ANHYDRITE	-4.181	(1.000)150 (1.000)732
5015000	ARAGONITE	-5.872	(1.000)150 (1.000)140
5046000	ARTINITE	-18.003	(-2.000)330 (2.000)460 (1.000)140 (5.000) 2
2003001	BOEHMITE	-1.779	(-3.000)330 (1.000) 30 (2.000) 2
2046000	BRUCITE	-10.923	(1.000)460 (2.000) 2 (-2.000)330
5015001	CALCITE	-5.706	(1.000)150 (1.000)140
2003002	DIASPORE	0.000	(-3.000)330 (1.000) 30 (2.000) 2
5015002	DOLOMITE	-11.519	(1.000)150 (1.000)460 (2.000)140
6046000	EPSOMITE	-6.618	(1.000)460 (1.000)732 (7.000) 2
2003003	GIBBSITE (C)	-1.859	(-3.000)330 (1.000) 30 (3.000) 2
3003000	A1203	-8.186	(2.000) 30 (3.000) 2 (-6.000)330
6015001	GYPSUM	-3.886	(1.000)150 (1.000)732 (2.000) 2
5015003	HUNTITE	-27.338	(3.000)460 (1.000)150 (4.000)140
5046001	HYDRMAGNESIT	-42.761	(5.000)460 (4.000)140 (-2.000)330 (6.000) 2
5046002	MAGNESITE	-6.310	(1.000)460 (1.000)140
6028000	MELANTERITE	-7.597	(1.000)280 (1.000)732 (7.000) 2
5046003	NESQUEHONITE	-8.713	(1.000)460 (1.000)140 (3.000) 2
5028000	SIDERITE	-5.081	(1.000)280 (1.000)140
2047003	PYROCROITE	-10.055	(-2.000)330 (1.000)470 (2.000) 2
5047000	RHODOCHROSIT	-4.747	(1.000)470 (1.000)140
6047000	MNSO4	-12.713	(1.000)470 (1.000)732
5060000	CERRUSITE	0.000	(1.000)600 (1.000)140
2060000	MASSICOT	-5.873	(-2.000)330 (1.000)600 (1.000) 2
[illegible]0001	LITHARGE	-5.674	(-2.000)330 (1.000)600 (1.000) 2
[illegible]0002	PBO, .3H2O	-5.586	(-2.000)330 (1.000)600 (1.330) 2
5060001	PB2OCO3	-5.583	(-2.000)330 (2.000)600 (1.000) 2 (1.000)140
6060000	LARNAKITE	-0.299	(-2.000)330 (2.000)600 (1.000)732 (1.000) 2
6060001	PB3O2SO4	-3.889	(-4.000)330 (3.000)600 (1.000)732 (2.000) 2
6060002	PB4O3SO4	-8.499	(-6.000)330 (4.000)600 (1.000)732 (3.000) 2
5060002	PB3O2CO3	-10.027	(-4.000)330 (3.000)600 (1.000)140 (2.000) 2
6060003	ANGLESITE	0.000	(1.000)600 (1.000)732
2060004	PB(OH)2 (C)	-1.054	(-2.000)330 (1.000)600 (2.000) 2
5060003	HYDCERRUSITE	-1.614	(-2.000)330 (3.000)600 (2.000)140 (2.000) 2
2060005	PB2O(OH)2	-11.413	(-4.000)330 (2.000)600 (3.000) 2
6060004	PB4(OH)6SO4	-6.757	(-6.000)330 (4.000)600 (1.000)732 (6.000) 2
2015000	LIME	-27.288	(-2.000)330 (1.000)150 (1.000) 2
2015001	PORTLANDITE	-16.836	(-2.000)330 (1.000)150 (2.000) 2
2028000	WUSTITE	-6.866	(-2.000)330 (0.947)280 (1.000) 2
2046001	PERICLASE	-15.858	(-2.000)330 (1.000)460 (1.000) 2
3028001	HERCYNITE	-8.924	(-8.000)330 (1.000)280 (2.000) 30 (4.000) 2
3046000	SPINEL	-17.013	(-8.000)330 (1.000)460 (2.000) 30 (4.000) 2

```
 PC  VERSION: MINTEQA2   DATE OF CALCULATIONS:  4-DEC-89  TIME: 20:24:20

RUNC3 C&R BATTERY
DSORPTION, pH=4.82, pCO2=.0035, ION STR.=.001, ALLOW ALL SOLIDS

-------------------------------------------------------------------------------
Temperature (Celsius):  16.60
Units of concentration: MG/L
Ionic strength:  0.001 molal; FIXED
If specified, total carbonate concentration represents total inorganic carbon.
Do not automatically terminate if charge imbalance exceeds 30%
Precipitation is allowed for all solids in the thermodynamic database and
  the print option for solids is set to: 1
The maximum number of iterations is: 200
The method used to compute activity coefficients is: Davies equation
Intermediate output file
Adsorption model: Diffuse Layer
Number of adsorbing surfaces: 1

-------------------------------------------------------------------------------

12.100  600.00 0.000 0.000 81
   150  4.850E+01   -3.64
   460  2.490E+01   -1.76
   732  4.644E+03   -3.55
   330  1.526E-02   -4.82
   600  1.853E+04   -7.00
   813  0.000E-01    0.00
   812  2.720E-02   -3.42
   811  6.800E-04   -5.03
    30  3.200E+00   -3.93
    80  2.800E+00   -4.30
   770  7.000E+00   -3.89
   140  0.000E-01    0.00

H2O HAS BEEN INSERTED AS A COMPONENT
 3   2
301403    20.6159    -0.5300
   330     4.8200     0.0000
 6   1
   813     0.0000     0.0000
 2  12
123301 =feO-            0.0000   -8.9300   0.000   0.000-1.00 0.00 0.00   0.0000
.00 3   1.000 812  -1.000 330  -1.000 813   0.000   0   0.000   0   0.000   0
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
123302 =feOH2+          0.0000    7.2900   0.000   0.000 1.00 0.00 0.00   0.0000
.00 3   1.000 812   1.000 330   1.000 813   0.000   0   0.000   0   0.000   0
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
113301 =FeO-            0.0000   -8.9300   0.000   0.000-1.00 0.00 0.00   0.0000
.00 3   1.000 811  -1.000 330  -1.000 813   0.000   0   0.000   0   0.000   0
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
113302 =FeOH2+          0.0000    7.2900   0.000   0.000 1.00 0.00 0.00   0.0000
.00 3   1.000 811   1.000 330   1.000 813   0.000   0   0.000   0   0.000   0
0.000   0   0.000   0   0.000   0   0.000   0   0.000   0   0.000   0

 0.000   0   0.000   0   0.000   0
116000 =FeOPb+          0.0000    4.7100   0.000   0.000 1.00 0.00 0.00   0.0000
.00 5   1.000 811  -1.000 330   1.000 813   1.000 600   1.000   2   0.000   0
```

AR302925

```
 0.000    0    0.000    0    0.000    0
1.26000 =feOPb+          0.0000    0.3000    0.000    0.000 1.00 0.00 0.00    0.0000
1.00 5    1.000 812  -1.000 330    1.000 813    1.000 600    1.000    2    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
3[illegible]000 =feOCa+          0.0000   -5.8500    0.000    0.000 1.00 0.00 0.00    0.0000
0.00 4    1.000 812  -1.000 330    1.000 813    1.000 150    0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
3111500 =FeOHCa++        0.0000    4.9700    0.000    0.000 2.00 0.00 0.00    0.0000
0.00 3    1.000 811    1.000 150    2.000 813    0.000    0    0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
3117320 =FeSO4-          0.0000    7.7800    0.000    0.000-1.00 0.00 0.00    0.0000
0.00 5    1.000 811    1.000 330   -1.000 813    1.000 732   -1.000    2    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
3127320 =feSO4-          0.0000    7.7800    0.000    0.000-1.00 0.00 0.00    0.0000
0.00 5    1.000 812    1.000 330   -1.000 813    1.000 732   -1.000    2    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
3117321 =FeOHSO4-2       0.0000    0.7900    0.000    0.000-2.00 0.00 0.00    0.0000
1.00 4    1.000 811   -2.000 813    1.000 732   -1.000    2    0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
1[illegible]7321 =feOHSO4-2      0.0000    0.7900    0.000    0.000-2.00 0.00 0.00    0.0000
2.00 4    1.000 812   -2.000 813    1.000 732   -1.000    2    0.000    0    0.000    0
0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
```

NPUT DATA BEFORE TYPE MODIFICATIONS

ID	NAME	ACTIVITY GUESS	LOG GUESS	ANAL TOTAL
150	Ca+2	2.291E-04	-3.640	4.850E+01
460	Mg+2	1.738E-02	-1.760	2.490E+01
732	SO4-2	2.818E-04	-3.550	4.644E+03
330	H+1	1.514E-05	-4.820	1.526E-02
600	Pb+2	1.000E-07	-7.000	1.853E+04
813	ADS1PSI0	1.000E+00	0.000	0.000E-01
812	ADS1TYP2	3.802E-04	-3.420	2.720E-02
811	ADS1TYP1	9.333E-06	-5.030	6.800E-04
30	Al+3	1.175E-04	-3.930	3.200E+00
280	Fe+2	5.012E-05	-4.300	2.800E+00
470	Mn+2	1.288E-04	-3.890	7.000E+00
140	CO3-2	1.000E+00	0.000	0.000E-01
2	H2O	1.000E+00	0.000	0.000E-01

AR302926

ID	NAME	ANAL MOL	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DIFF F
150	Ca+2	4.850E+01	0.000E-01	2.291E-04	-3.64000	1.000000	0.0000	0.000E-0
[illegible]60	Mg+2	2.490E+01	0.000E-01	1.738E-02	-1.76000	1.000000	0.0000	0.000E-0
[illegible]32	SO4-2	4.644E+03	0.000E-01	2.818E-04	-3.55000	1.000000	0.0000	0.000E-0
330	H+1	1.526E-02	0.000E-01	1.514E-05	-4.82000	1.000000	4.8200	0.000E-0
600	Pb+2	1.853E+04	0.000E-01	1.000E-07	-7.00000	1.000000	0.0000	0.000E-0
813	ADS1PSI0	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0
812	ADS1TYP2	2.720E-02	0.000E-01	3.802E-04	-3.42000	1.000000	0.0000	0.000E-0
811	ADS1TYP1	6.800E-04	0.000E-01	9.333E-06	-5.03000	1.000000	0.0000	0.000E-0
30	Al+3	3.200E+00	0.000E-01	1.175E-04	-3.93000	1.000000	0.0000	0.000E-0

280	Fe+2	2.800E+00	0.000E-01	3.012E-05	-4.52100	1.000000	0.0000	0.000E-0
470	Mn+2	7.000E+00	0.000E-01	1.288E-04	-3.89000	1.000000	0.0000	0.000E-0
140	CO3-2	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0
2	H2O	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0

CHARGE BALANCE: UNSPECIATED

SUM OF CATIONS= 1.884E-01 SUM OF ANIONS = 9.899E-02

PERCENT DIFFERENCE = 3.112E+01 (ANIONS - CATIONS)/(ANIONS + CATIONS)

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20:25: 2

ARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
0	ADS1TYP1	6.800E-04	5.440E-03	-5.03000
1	Ca+2	1.239E-03	1.462E-02	-2.29626
2	ADS1TYP2	2.720E-02	9.965E-02	-3.19518
3	ADS1PSI0	1.292E-03	-5.770E-02	-1.93826
4	ADS1TYP1	6.800E-04	1.256E-03	-9.03000
5	ADS1TYP2	2.720E-02	-2.042E-02	-4.47969
6	ADS1PSI0	1.175E-03	-2.088E-02	-1.85789
7	ADS1PSI0	9.846E-04	-4.747E-03	-1.70931
8	ADS1PSI0	9.312E-04	-6.116E-04	-1.66284
9	ADS1PSI0	9.204E-04	-1.944E-05	-1.65311
10	ADS1PSI0	9.201E-04	-1.437E-08	-1.65287

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20:25:24

ITERATIONS= 11: SOLID ANGLESITE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20:25:25

ARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
11	ADS1PSI0	9.201E-04	-1.485E-02	-1.63287
12	Al+3	1.214E-04	7.404E-04	-3.43749
13	Al+3	1.214E-04	6.919E-04	-3.43418
14	ADS1TYP2	2.720E-02	5.596E-01	-1.45858
15	ADS1TYP2	2.720E-02	3.857E-02	-2.23078
16	ADS1PSI0	4.796E-03	-2.339E-02	-3.06826
17	ADS1PSI0	4.212E-03	-7.277E-03	-2.95559
18	ADS1PSI0	3.961E-03	-1.257E-03	-2.90243
19	ADS1PSI0	3.907E-03	-5.180E-05	-2.89037
20	ADS1PSI0	3.904E-03	-9.319E-08	-2.88984

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20:25:44

ITERATIONS= 21: SOLID DIASPORE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20:23:46

ARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
21	SO4-2	-4.207E-02	-2.751E-08	-6.29245

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20:25:50

ITERATIONS= 22: SOLID CERRUSITE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20:25:52

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
22	ADS1PSI0	3.904E-03	-6.624E-02	-2.38984
23	ADS1PSI0	2.800E-03	-2.317E-02	-2.60206
24	ADS1PSI0	2.555E-03	-7.359E-03	-2.52321
25	ADS1PSI0	2.394E-03	-1.170E-03	-2.46674
26	ADS1PSI0	2.360E-03	-4.948E-05	-2.45457
27	ADS1PSI0	2.359E-03	-8.475E-08	-2.45403

ID	NAME	ANAL MOL	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DIFF F
150	Ca+2	1.239E-03	1.238E-03	1.075E-03	-2.96846	0.868356	0.0613	-3.716E-1
460	Mg+2	1.049E-03	1.048E-03	9.102E-04	-3.04088	0.868356	0.0613	0.000E-0
811	ADS1TYP1	6.800E-04	1.006E-08	1.006E-08	-7.99738	1.000000	0.0000	-2.850E-1
470	Mn+2	1.305E-04	1.304E-04	1.132E-04	-3.94604	0.868356	0.0613	0.000E-0
280	Fe+2	5.133E-05	5.131E-05	4.456E-05	-4.35107	0.868356	0.0613	0.000E-0
813	ADS1PSI0	2.359E-03	3.515E-03	3.515E-03	-2.45403	1.000000	0.0000	-2.6E9E-1
812	ADS1TYP2	2.720E-02	4.096E-03	4.096E-03	-2.38761	1.000000	0.0000	0.000E-0
732	SO4-2	4.950E-02	2.956E-06	2.567E-06	-5.59064	0.868356	0.0613	0.000E-0
30	Al+3	1.214E-04	1.192E-07	8.679E-08	-7.06152	0.727897	0.1379	0.000E-0
2	H2O	5.650E-22	-3.592E-02	9.976E-01	-0.00106	1.000000	0.0011	4.384E-1
140	CO3-2	0.000E-01	1.183E-11	1.027E-11	-10.98822	0.868356	0.0613	0.000E-0
330	H+1	1.550E-05	6.905E-02	1.514E-05	-4.82000	0.965327	4.8200	-1.355E-2
600	Pb+2	9.156E-02	6.550E-03	5.688E-03	-2.24505	0.868356	0.0613	0.000E-0

SPECIES: TYPE I - COMPONENTS

ID	NAME	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DH
150	Ca+2	1.238E-03	0.0010753	-2.96846	0.868356	0.061	0.000
460	Mg+2	1.048E-03	0.0009102	-3.04088	0.868356	0.061	0.000
732	SO4-2	2.956E-06	0.0000026	-5.59064	0.868356	0.061	0.000
470	Mn+2	1.304E-04	0.0001132	-3.94604	0.868356	0.061	0.000
600	Pb+2	6.550E-03	0.0056879	-2.24505	0.868356	0.061	0.000
140	CO3-2	1.183E-11	0.0000000	-10.98822	0.868356	0.061	0.000
812	ADS1TYP2	4.096E-03	0.0040962	-2.38761	1.000000	0.000	0.000
811	ADS1TYP1	1.006E-08	0.0000000	-7.99738	1.000000	0.000	0.000
30	Al+3	1.192E-07	0.0000001	-7.06152	0.727897	0.138	0.000
280	Fe+2	5.131E-05	0.0000446	-4.35107	0.868356	0.061	0.000

SPECIES: TYPE II - COMPLEXES

ID	NAME	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DH
0127321	=FeOHSO4-2	5.259E-03	0.0052586	-2.27913	1.000000	0.790	0.000
3301401	H2CO3 AQ	1.544E-04	0.0001544	-3.81137	1.000230	16.817	-2.247
3307320	HSO4 -	3.104E-09	0.0000000	-8.52346	0.965327	1.903	4.910
3300020	OH-	3.570E-10	0.0000000	-9.46263	0.965327	-14.266	13.345
4603300	MgOH +	4.815E-11	0.0000000	-10.33277	0.965327	-12.096	15.935
4601400	MgCO3 AQ	7.843E-12	0.0000000	-11.10541	1.000230	2.924	2.022
4601401	MgHCO3 +	4.198E-08	0.0000000	-7.39225	0.965327	11.472	-2.430
4607320	MgSO4 AQ	3.878E-07	0.0000004	-6.41125	1.000230	2.220	1.399
1503300	CaOH +	9.098E-12	0.0000000	-11.05638	0.965327	-12.892	14.535
1501400	CaHCO3 +	3.584E-08	0.0000000	-7.46096	0.965327	11.331	1.790
1[illegible]401	CaCO3 AQ	1.330E-11	0.0000000	-10.87591	1.000230	3.081	4.030
1507320	CaSO4 AQ	5.231E-07	0.0000005	-6.28134	1.000230	2.278	1.470
303300	AlOH +2	3.766E-08	0.0000000	-7.48542	0.868356	-5.182	11.899
303301	Al(OH)2 +	3.102E-08	0.0000000	-7.52364	0.965327	-10.085	0.000
303302	Al(OH)4 -	1.965E-12	0.0000000	-11.72199	0.965327	-23.921	0.000
307320	AlSO4 +	2.175E-10	0.0000000	-9.67784	0.965327	2.990	2.150
307321	Al(SO4)2 -	4.287E-14	0.0000000	-13.38314	0.965327	4.875	2.840

AR302934

303303	Al(OH)3 AQ	2.484E-09	0.0000000	-8.60470	1.000230	-16.000	0.000
1803300	FeOH +	5.043E-10	0.0000000	-9.31260	0.965327	-9.765	13.199
1803301	FeOH3 -1	3.001E-22	0.0000000	-21.53810	0.965327	-31.629	33.300
1307320	FeSO4 AQ	1.736E-08	0.0000000	-7.76035	1.000230	2.181	3.330
1303302	Fe(OH)2 AQ	1.287E-16	0.0000000	-15.89017	1.000230	-21.177	28.365
1703300	MnOH +	9.823E-11	0.0000000	-10.02306	0.965327	-10.881	14.399
1703301	Mn(OH)3 -1	5.322E-25	0.0000000	-24.28923	0.965327	-34.785	0.000
1[redacted]0	MnSO4 AQ	4.755E-08	0.0000000	-7.32279	1.000230	2.214	2.170
1701400	MnHCO3 +	7.262E-09	0.0000000	-8.15426	0.965327	11.615	0.000
1001400	Pb(CO3)2-2	3.019E-14	0.0000000	-13.58149	0.868356	10.701	0.000
1003300	PbOH +	7.572E-06	0.0000073	-5.13611	0.965327	-7.695	0.000
1003301	Pb(OH)2 AQ	1.874E-10	0.0000000	-9.72717	1.000230	-17.120	0.000
1003302	Pb(OH)3 -	1.469E-16	0.0000000	-15.84823	0.965327	-28.045	0.000
1003303	Pb2OH +3	1.279E-06	0.0000009	-6.03115	0.727897	-6.222	0.000
1007320	PbSO4 AQ	8.208E-06	0.0000082	-5.08569	1.000230	2.750	0.000
1003304	Pb3(OH)4+2	1.442E-12	0.0000000	-11.90248	0.868356	-24.382	26.500
1001401	PbCO3 AQ	1.015E-06	0.0000010	-5.99327	1.000230	7.240	0.000
1003305	Pb(OH)4 -2	2.472E-23	0.0000000	-22.66829	0.868356	-39.638	0.000
1007321	Pb(SO4)2-2	1.273E-10	0.0000000	-9.95632	0.868356	3.531	0.000
1201402	PbHCO3 +	1.452E-05	0.0000140	-4.85327	0.965327	13.215	0.000
1301400	HCO3 -	4.159E-06	0.0000040	-5.39630	0.965327	10.427	-3.617
1133301	=feO-	9.045E-05	0.0000905	-4.04358	1.000000	-8.930	0.000
1123302	=feOH2+	4.250E-03	0.0042497	-2.37164	1.000000	7.290	0.000
1113301	=FeO-	2.222E-10	0.0000000	-9.65335	1.000000	-8.930	0.000
1113302	=FeOH2+	1.044E-08	0.0000000	-7.98141	1.000000	7.290	0.000
1116000	=FeOPb+	6.800E-04	0.0006800	-3.16752	1.000000	4.710	0.000
1126000	=feOPb+	1.077E-02	0.0107708	-1.96775	1.000000	0.300	0.000
1121500	=feOCa+	1.445E-09	0.0000000	-8.84011	1.000000	-5.850	0.000
1111500	=FeOHCa++	1.248E-11	0.0000000	-10.90390	1.000000	4.970	0.000
1117320	=FeSO4-	6.715E-09	0.0000000	-8.17293	1.000000	7.780	0.000
1127320	=feSO4-	2.734E-03	0.0027342	-2.56316	1.000000	7.780	0.000
1117321	=FeOHSO4-2	1.292E-08	0.0000000	-7.88890	1.000000	0.790	0.000

SPECIES: TYPE III - FIXED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
2	H2O	-3.592E-02	-1.445	0.001	0.000
301403	CO2 (g)	-3.221E-02	-1.492	20.627	-0.530
330	H+1	6.905E-02	-1.161	4.820	0.000

SPECIES: TYPE IV - PRECIPITATED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
060003	ANGLESITE	4.149E-02	-1.382	7.836	-2.150
003002	DIASPORE	1.212E-04	-3.916	-7.396	24.630
060000	CERRUSITE	3.204E-02	-1.494	13.233	-4.860

SPECIES: TYPE V - DISSOLVED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
015003	HUNTITE	2.380E-27	-26.623	29.421	25.760
046001	HYDRMAGNESIT	0.000E-01	-41.867	7.657	52.210
046002	MAGNESITE	7.393E-07	-6.131	7.898	6.169
028000	MELANTERITE	3.816E-08	-7.418	2.531	-2.860
046003	NESQUEHONITE	2.922E-09	-8.534	5.498	5.789
0[redacted]00	SIDERITE	1.252E-05	-4.903	10.437	5.328
047003	PYROCROITE	1.330E-10	-9.876	-15.568	22.590
047000	RHODOCHROSIT	2.701E-05	-4.568	10.366	2.079
047000	MNSO4	2.920E-13	-12.535	-2.998	15.480
015001	GYPSUM	1.960E-04	-3.708	4.854	-0.261
060000	MASSICOT	1.341E-06	-5.873	-13.267	16.780
060001	LITHARGE	2.118E-06	-5.674	-13.068	16.380
060002	PBO. .3H2O	2.591E-06	-5.586	-12.980	0.000

060001	PB2OCO3	2.613E-06	-5.583	0.256	11.460
060000	LARNAKITE	5.028E-01	-0.299	0.143	6.440
060001	PB3O2SO4	1.292E-04	-3.889	-10.841	20.750
060002	PB4O3SO4	3.168E-09	-8.499	-22.845	35.070
060002	PB3O2CO3	9.395E-11	-10.027	-11.582	26.430
003003	GIBBSITE (C)	1.383E-02	-1.859	-9.254	22.800
060004	PB(OH)2 (C)	8.822E-02	-1.054	-8.447	13.990
[redacted]3	HYDCERRUSITE	2.434E-02	-1.614	17.460	0.000
060005	PB2O(OH)2	3.861E-12	-11.413	-26.200	0.000
060004	PB4(OH)6SO4	1.749E-07	-6.757	-21.100	0.000
015000	LIME	7.770E-28	-27.110	-33.780	46.265
015001	PORTLANDITE	2.199E-17	-16.658	-23.327	30.690
028000	WUSTITE	2.012E-07	-6.696	-12.215	24.846
046001	PERICLASE	2.090E-16	-15.680	-22.278	36.135
028001	HERCYNITE	1.797E-09	-8.745	-28.827	78.360
046000	SPINEL	1.465E-17	-16.834	-38.226	89.089
003000	ALOH3(A)	2.758E-04	-3.559	-10.955	27.045
003000	ALOHSO4	2.493E-05	-4.603	3.230	0.000
003001	AL4(OH)10SO4	4.494E-09	-8.347	-22.700	0.000
015000	ANHYDRITE	9.950E-05	-4.002	4.557	3.769
015000	ARAGONITE	2.024E-06	-5.694	8.263	2.615
046000	ARTINITE	2.259E-18	-17.646	-10.211	28.742
003001	BOEHMITE	1.662E-02	-1.779	-9.176	28.130
046000	BRUCITE	1.803E-11	-10.744	-17.341	25.840
015001	CALCITE	2.972E-06	-5.527	8.430	2.585
003000	A1203	6.513E-09	-8.186	-22.980	0.000
015002	DOLOMITE	6.887E-12	-11.162	16.824	8.290
046000	EPSOMITE	3.639E-07	-6.439	2.200	-2.820

SPECIES: TYPE VI - SPECIES NOT CONSIDERED

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
[redacted]3	ADS1PSI0	3.515E-03	-2.454	0.000	0.000

PERCENTAGE DISTRIBUTION OF COMPONENTS AMONG dissolved and adsorbed species

Ca	100.0	PERCENT BOUND IN SPECIES #	150	Ca+2
Mg+2	100.0	PERCENT BOUND IN SPECIES #	460	Mg+2
ADS1TYP1	100.0	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
Mn+2	100.0	PERCENT BOUND IN SPECIES #	470	Mn+2
Fe+2	100.0	PERCENT BOUND IN SPECIES #	280	Fe+2
ADS1PSI0	180.2	PERCENT BOUND IN SPECIES #	8123302	=feOH2+
	28.8	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
	456.7	PERCENT BOUND IN SPECIES #	8126000	=feOPb+
ADS1TYP2	15.1	PERCENT BOUND IN SPECIES #	812	ADS1TYP2
	19.3	PERCENT BOUND IN SPECIES #	8127321	=feOHSO4-2
	15.6	PERCENT BOUND IN SPECIES #	8123302	=feOH2+
	39.6	PERCENT BOUND IN SPECIES #	8126000	=feOPb+
	10.1	PERCENT BOUND IN SPECIES #	8127320	=feSO4-
SO4-2	65.7	PERCENT BOUND IN SPECIES #	8127321	=feOHSO4-2
	34.2	PERCENT BOUND IN SPECIES #	8127320	=feSO4-
Al+3	62.6	PERCENT BOUND IN SPECIES #	30	Al+3
	19.8	PERCENT BOUND IN SPECIES #	303300	AlOH +2
	16.3	PERCENT BOUND IN SPECIES #	303301	Al(OH)2 +
	1.3	PERCENT BOUND IN SPECIES #	303303	Al(OH)3 AQ
H2O	19.6	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
	310.7	PERCENT BOUND IN SPECIES #	8126000	=feOPb+
CO3-2	88.6	PERCENT BOUND IN SPECIES #	3301401	H2CO3 AQ
	8.3	PERCENT BOUND IN SPECIES #	6001402	PbHCO3 +
	2.4	PERCENT BOUND IN SPECIES #	3301400	HCO3 -
H+1	2.1	PERCENT BOUND IN SPECIES #	8123301	=feO-
	16.0	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
	254.1	PERCENT BOUND IN SPECIES #	8126000	=feOPb+
Pb+2	36.3	PERCENT BOUND IN SPECIES #	600	Pb+2
	3.8	PERCENT BOUND IN SPECIES #	8116000	=FeOPb+
	59.7	PERCENT BOUND IN SPECIES #	8126000	=feOPb+

EQUILIBRATED MASS DISTRIBUTION

IDX	NAME	DISSOLVED MOL/KG	DISSOLVED PERCENT	SORBED MOL/KG	SORBED PERCENT	PRECIPITATED MOL/KG	PRECIPITATED PERCENT
150	Ca+2	1.239E-03	100.0	1.458E-09	0.0	0.000E-01	0.0
460	Mg+2	1.049E-03	100.0	0.000E-01	0.0	0.000E-01	0.0
470	Mn+2	1.305E-04	100.0	0.000E-01	0.0	0.000E-01	0.0
280	Fe+2	5.133E-05	100.0	0.000E-01	0.0	0.000E-01	0.0
132	SO4-2	1.214E-05	0.0	7.993E-03	16.1	4.149E-02	83.8
130	Al+3	1.906E-07	0.2	0.000E-01	0.0	1.212E-04	99.8

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
40	CO3-2	1.741E-04	0.5	0.000E-01	0.0	3.204E-02	99.5
30	H+1	3.185E-04	-7.5	-4.557E-03	107.5	0.000E-01	0.0
00	Pb+2	6.584E-03	7.2	1.145E-02	12.5	7.353E-02	30.3

CHARGE BALANCE: SPECIATED

SUM OF CATIONS = 3.378E-02 SUM OF ANIONS 1.335E-02

PERCENT DIFFERENCE = 4.334E+01 (ANIONS - CATIONS)/(ANIONS + CATIONS)

NONCARBONATE ALKALINITY = 0.000E-01

IONIC STRENGTH = : 1.000E-03

****** DIFFUSE LAYER ADSORPTION MODEL ********

**** Parameters For Adsorbent Number 1 ****

Electrostatic Variables: psi0 = 0.141083 sig0 = 0.031346
psib = 0.000000 sigb = 0.000000
psid = 0.000000 sigd = 0.000000

Adsorbent Concentration (g/l): 12.100

Specific Surface Area (sq. meters/g): 600.00

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 20:26: 3

Saturation indices and stoichiometry of all minerals

ID #	NAME	Sat. Index	Stoichiometry (in parentheses) of each component
[redacted]3000	ALOH3(A)	-3.559	(1.000) 30 (3.000) 2 (-3.000)330
[redacted]3000	ALOHSO4	-4.603	(-1.000)330 (1.000) 30 (1.000)732 (1.000) 2
6003001	AL4(OH)10SO4	-8.347	(-10.000)330 (4.000) 30 (1.000)732 (10.000) 2
6015000	ANHYDRITE	-4.002	(1.000)150 (1.000)732
5015000	ARAGONITE	-5.694	(1.000)150 (1.000)140
5046000	ARTINITE	-17.646	(-2.000)330 (2.000)460 (1.000)140 (5.000) 2
3003001	BOEHMITE	-1.779	(-3.000)330 (1.000) 30 (2.000) 2
2046000	BRUCITE	-10.744	(1.000)460 (2.000) 2 (-2.000)330
5015001	CALCITE	-5.527	(1.000)150 (1.000)140
2003002	DIASPORE	0.000	(-3.000)330 (1.000) 30 (2.000) 2
5015002	DOLOMITE	-11.162	(1.000)150 (1.000)460 (2.000)140
6046000	EPSOMITE	-6.439	(1.000)460 (1.000)732 (7.000) 2
2003003	GIBBSITE (C)	-1.859	(-3.000)330 (1.000) 30 (3.000) 2
3003000	A1203	-8.186	(2.000) 30 (3.000) 2 (-6.000)330
6015001	GYPSUM	-3.708	(1.000)150 (1.000)732 (2.000) 2
5015003	HUNTITE	-26.623	(3.000)460 (1.000)150 (4.000)140
5046001	HYDRMAGNESIT	-41.867	(5.000)460 (4.000)140 (-2.000)330 (6.000) 2
5046002	MAGNESITE	-6.131	(1.000)460 (1.000)140
6028000	MELANTERITE	-7.418	(1.000)280 (1.000)732 (7.000) 2
5046003	NESQUEHONITE	-8.534	(1.000)460 (1.000)140 (3.000) 2
5028000	SIDERITE	-4.903	(1.000)280 (1.000)140
2047003	PYROCROITE	-9.876	(-2.000)330 (1.000)470 (2.000) 2
5047000	RHODOCHROSIT	-4.568	(1.000)470 (1.000)140
6047000	MNSO4	-12.535	(1.000)470 (1.000)732
5060000	CERRUSITE	0.000	(1.000)600 (1.000)140
2060000	MASSICOT	-5.873	(-2.000)330 (1.000)600 (1.000) 2
[redacted]2001	LITHARGE	-5.674	(-2.000)330 (1.000)600 (1.000) 2
[redacted]2002	PBO, .3H20	-5.586	(-2.000)330 (1.000)600 (1.330) 2
5060001	PB2OCO3	-5.583	(-2.000)330 (2.000)600 (1.000) 2 (1.000)140
6060000	LARNAKITE	-0.299	(-2.000)330 (2.000)600 (1.000)732 (1.000) 2
6060001	PB3O2SO4	-3.889	(-4.000)330 (3.000)600 (1.000)732 (2.000) 2
6060002	PB4O3SO4	-8.499	(-6.000)330 (4.000)600 (1.000)732 (3.000) 2
5060002	PB3O2CO3	-10.027	(-4.000)330 (3.000)600 (1.000)140 (2.000) 2
6060003	ANGLESITE	0.000	(1.000)600 (1.000)732
2060004	PB(OH)2 (C)	-1.054	(-2.000)330 (1.000)600 (2.000) 2
5060003	HYDCERRUSITE	-1.614	(-2.000)330 (3.000)600 (2.000)140 (2.000) 2
2060005	PB2O(OH)2	-11.413	(-4.000)330 (2.000)600 (3.000) 2
6060004	PB4(OH)6SO4	-6.757	(-6.000)330 (4.000)600 (1.000)732 (6.000) 2
2015000	LIME	-27.110	(-2.000)330 (1.000)150 (1.000) 2
2015001	PORTLANDITE	-16.658	(-2.000)330 (1.000)150 (2.000) 2
2028000	WUSTITE	-6.696	(-2.000)330 (0.947)280 (1.000) 2
2046001	PERICLASE	-15.680	(-2.000)330 (1.000)460 (1.000) 2
3028001	HERCYNITE	-8.745	(-8.000)330 (1.000)280 (2.000) 30 (4.000) 2
3046000	SPINEL	-16.834	(-8.000)330 (1.000)460 (2.000) 30 (4.000) 2

```
PC  VERSION: MINTEQA2   DATE OF CALCULATIONS:  4-DEC-89   TIME: 21:12:30

JAC - WORST CASE SCENARIO   C&R BATTERY
ADSORPTION, pH = 4.08, pCO2 = .00035 atm, ALLOW ALL SOLIDS, ION STR=.02

-------------------------------------------------------------------------------
Temperature (Celsius):  16.60
Units of concentration: MG/L
Ionic strength:  0.020 molal; FIXED
If specified, total carbonate concentration represents total inorganic carbon.
Do not automatically terminate if charge imbalance exceeds 30%
Precipitation is allowed for all solids in the thermodynamic database and
  the print option for solids is set to: 1
The maximum number of iterations is: 200
The method used to compute activity coefficients is: Davies equation
Intermediate output file
Adsorption model: Diffuse Layer
Number of adsorbing surfaces: 1

-------------------------------------------------------------------------------

 13.120  600.00 0.000 0.000 81
    150  4.850E+01    -3.64
    460  2.490E+01    -1.76
    732  4.644E+03    -3.55
    330  8.383E-02    -4.08
    600  1.853E+04    -7.00
    813  0.000E-01     0.00
    812  2.720E-02    -3.42
    811  6.800E-04    -3.03
     30  3.200E+00    -3.93
    [illegible]80  2.800E+00    -4.30
    [illegible]70  7.000E+00    -3.89
    140  0.000E-01     0.00

 H2O HAS BEEN INSERTED AS A COMPONENT
  3   2
1301403     21.6159     -0.5300
    330      4.0800      0.0000
  5   1
    813      0.0000      0.2000
  2  12
 123301 =feO-            0.0000    -8.9300   0.000   0.000-1.00 0.00 0.00    0.0000
 .00 3   1.000 812  -1.000 330  -1.000 813   0.000    0   0.000    0   0.000    0
 0.000    0   0.000    0   0.000    0   0.000    0   0.000    0   0.000    0

  0.000    0   0.000    0   0.000    0
 3123302 =feOH2+           0.0000     7.2900   0.000   0.000 1.00 0.00 0.00    0.0000
 .00 3   1.000 812   1.000 330   1.000 813   0.000    0   0.000    0   0.000    0
 0.000    0   0.000    0   0.000    0   0.000    0   0.000    0   0.000    0

  0.000    0   0.000    0   0.000    0
 3113301 =FeO-           0.0000    -8.9300   0.000   0.000-1.00 0.00 0.00    0.0000
 .00 3   1.000 811  -1.000 330  -1.000 813   0.000    0   0.000    0   0.000    0
 0.000    0   0.000    0   0.000    0   0.000    0   0.000    0   0.000    0

  0.000    0   0.000    0   0.000    0
 3[illegible]02 =FeOH2+           0.0000     7.2900   0.000   0.000 1.00 0.00 0.00    0.0000
 .00 3   1.000 811   1.000 330   1.000 813   0.000    0   0.000    0   0.000    0
 0.000    0   0.000    0   0.000    0   0.000    0   0.000    0   0.000    0

  0.000    0   0.000    0   0.000    0
 3116000 =FeOPb+           0.0000     4.7100   0.000   0.000 1.00 0.00 0.00    0.0000
 .00 5   1.000 811  -1.000 330   1.000 813   1.000 600   1.000    2   0.000    0
```

AR302940

```
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
b126000 =feOPb+          0.0000    0.3000    0.000    0.000 1.00 0.00 0.00    0.0000
0.00 5    1.000 812   -1.000 330    1.000 813    1.000 600    1.000    2    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 [redacted]00    0    0.000    0    0.000    0
b121500 =feOCa+          0.0000   -5.8500    0.000    0.000 1.00 0.00 0.00    0.0000
0.00 4    1.000 812   -1.000 330    1.000 813    1.000 150    0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
b111500 =FeOHCa++        0.0000    4.9700    0.000    0.000 2.00 0.00 0.00    0.0000
0.00 3    1.000 811    1.000 150    2.000 813    0.000    0    0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
b117320 =FeSO4-          0.0000    7.7800    0.000    0.000-1.00 0.00 0.00    0.0000
0.00 5    1.000 811    1.000 330   -1.000 813    1.000 732   -1.000    2    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
b127320 =feSO4-          0.0000    7.7800    0.000    0.000-1.00 0.00 0.00    0.0000
0.00 5    1.000 812    1.000 330   -1.000 813    1.000 732   -1.000    2    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
b117321 =FeOHSO4-2       0.0000    0.7900    0.000    0.000-2.00 0.00 0.00    0.0000
0.00 4    1.000 811   -2.000 813    1.000 732   -1.000    2    0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
b[redacted]21 =feOHSO4-2     0.0000    0.7900    0.000    0.000-2.00 0.00 0.00    0.0000
0.00 4    1.000 812   -2.000 813    1.000 732   -1.000    2    0.000    0    0.000    0
 0.000    0    0.000    0    0.000    0    0.000    0    0.000    0    0.000    0

 0.000    0    0.000    0    0.000    0
```

NPUT DATA BEFORE TYPE MODIFICATIONS

ID	NAME	ACTIVITY GUESS	LOG GUESS	ANAL TOTAL
150	Ca+2	2.291E-04	-3.640	4.850E+01
460	Mg+2	1.738E-02	-1.760	2.490E+01
732	SO4-2	2.818E-04	-3.550	4.644E+03
330	H+1	8.318E-05	-4.080	8.383E-02
600	Pb+2	1.000E-07	-7.000	1.853E+04
813	ADS1PSI0	1.000E+00	0.000	0.000E-01
812	ADS1TYP2	3.802E-04	-3.420	2.720E-02
811	ADS1TYP1	9.333E-06	-5.030	6.800E-04
30	Al+3	1.175E-04	-3.930	3.200E+00
280	Fe+2	5.012E-05	-4.300	2.800E+00
470	Mn+2	1.288E-04	-3.890	7.000E+00
140	CO3-2	1.000E+00	0.000	0.000E-01
2	H2O	1.000E+00	0.000	0.000E-01

AR302941

ID	NAME	ANAL MOL	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DIFF F
150	Ca+2	4.850E+01	0.000E-01	2.291E-04	-3.64000	1.000000	0.0000	0.000E-0
[redacted]0	Mg+2	2.490E+01	0.000E-01	1.738E-02	-1.76000	1.000000	0.0000	0.000E-0
732	SO4-2	4.644E+03	0.000E-01	2.818E-04	-3.55000	1.000000	0.0000	0.000E-0
330	H+1	8.383E-02	0.000E-01	8.318E-05	-4.08000	1.000000	4.0800	0.000E-0
600	Pb+2	1.853E+04	0.000E-01	1.000E-07	-7.00000	1.000000	0.0000	0.000E-0
813	ADS1PSI0	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0
812	ADS1TYP2	2.720E-02	0.000E-01	3.802E-04	-3.42000	1.000000	0.0000	0.000E-0
811	ADS1TYP1	6.800E-04	0.000E-01	9.333E-06	-5.03000	1.000000	0.0000	0.000E-0
30	Al+3	3.200E+00	0.000E-01	1.175E-04	-3.93000	1.000000	0.0000	0.000E-0

470	Mn+2	7.000E+00	0.000E-01	1.288E-04	-3.89000	1.000000	0.0000	0.000E-0
140	CO3-2	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0
2	H2O	0.000E-01	0.000E-01	1.000E+00	0.00000	1.000000	0.0000	0.000E-0

CHARGE BALANCE: UNSPECIATED

SUM OF CATIONS= 1.885E-01 SUM OF ANIONS = 9.899E-02

PERCENT DIFFERENCE = 3.114E+01 (ANIONS - CATIONS)/(ANIONS + CATIONS)

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:13:13

ARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
0	ADS1PSI0	0.000E-01	6.322E-01	0.00000
1	Mg+2	1.049E-03	4.174E-03	-2.76000
2	Ca+2	1.239E-03	7.710E-03	-2.74420
3	ADS1PSI0	5.127E-03	-1.546E-01	-1.83715
4	ADS1PSI0	3.907E-03	-6.469E-02	-1.60983
5	ADS1PSI0	3.098E-03	-2.260E-02	-1.42039
6	ADS1PSI0	2.528E-03	-6.862E-03	-1.25947
7	ADS1PSI0	2.304E-03	-1.226E-03	-1.18771
8	ADS1PSI0	2.251E-03	-5.094E-05	-1.17003
9	ADS1PSI0	2.248E-03	-9.002E-08	-1.16927

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:13:33

ITERATIONS= 10: SOLID ANGLESITE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:13:35

PARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
10	SO4-2	4.207E-02	5.839E-02	-2.73187
11	SO4-2	4.207E-02	1.668E-01	-3.73187
12	SO4-2	4.207E-02	2.874E+00	-4.73187
13	ADS1TYP2	2.720E-02	1.353E+00	-1.53999
14	ADS1TYP2	2.720E-02	2.526E-01	-1.73279
15	ADS1PSI0	2.279E-02	-1.129E-01	-3.12097
16	ADS1PSI0	1.825E-02	-4.882E-02	-2.92796
17	ADS1PSI0	1.535E-02	-1.882E-02	-2.77830
18	ADS1PSI0	1.337E-02	-6.045E-03	-2.65898
19	ADS1PSI0	1.240E-02	-1.121E-03	-2.59361
20	ADS1PSI0	1.218E-02	-4.847E-05	-2.57799
21	ADS1PSI0	1.217E-02	-9.025E-08	-2.57729

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:13:56

ITERATIONS= 22; SOLID DIASPORE PRECIPITATES

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:13:58

ARAMETERS OF THE COMPONENT MOST OUT OF BALANCE:

ITER	NAME	TOTAL MOL	DIFF FXN	LOG ACTVTY
22	SO4-2	-4.207E-02	-1.267E-08	-6.21754

ID	NAME	ANAL MOL	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DIFF F)
150	Ca+2	1.239E-03	1.239E-03	7.128E-04	-3.14705	0.575360	0.2401	-7.752E-1
460	Mg+2	1.049E-03	1.049E-03	6.033E-04	-3.21949	0.575360	0.2401	0.000E-0
732	SO4-2	4.950E-02	1.053E-06	6.060E-07	-6.21754	0.575360	0.2401	-3.450E-1
470	Mn+2	1.305E-04	1.304E-04	7.505E-05	-4.12464	0.575360	0.2401	-1.682E-1
280	Fe+2	5.133E-05	5.133E-05	2.953E-05	-4.52970	0.575360	0.2401	0.000E-0
813	ADS1PSI0	1.217E-02	2.647E-03	2.647E-03	-2.57729	1.000000	0.0000	3.248E-1
812	ADS1TYP2	2.720E-02	3.197E-03	3.197E-03	-2.49529	1.000000	0.0000	0.000E-0
811	ADS1TYP1	6.800E-04	1.734E-08	1.734E-08	-7.76107	1.000000	0.0000	1.359E-1
30	Al+3	1.214E-04	4.996E-05	1.440E-05	-4.84151	0.288313	0.5401	0.000E-0
140	CO3-2	0.000E-01	5.913E-14	3.402E-14	-13.46823	0.575360	0.2401	0.000E-0
2	H2O	-2.260E-21	-3.459E-04	9.976E-01	-0.00106	1.000000	0.0011	1.368E-1
600	Pb+2	9.156E-02	4.187E-02	2.409E-02	-1.61815	0.575360	0.2401	0.000E-0
330	H+1	8.515E-05	-1.151E-02	8.318E-05	-4.08000	0.870933	4.0800	-1.355E-2

SPECIES: TYPE I - COMPONENTS

ID	NAME	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DH
150	Ca+2	1.239E-03	0.0007128	-3.14705	0.575360	0.240	0.000
460	Mg+2	1.049E-03	0.0006033	-3.21949	0.575360	0.240	0.000
732	SO4-2	1.053E-06	0.0000006	-6.21754	0.575360	0.240	0.000
470	Mn+2	1.304E-04	0.0000751	-4.12464	0.575360	0.240	0.000
600	Pb+2	4.187E-02	0.0240908	-1.61815	0.575360	0.240	0.000
140	CO3-2	5.913E-14	0.0000000	-13.46823	0.575360	0.240	0.000
812	ADS1TYP2	3.197E-03	0.0031967	-2.49529	1.000000	0.000	0.000
811	ADS1TYP1	1.734E-08	0.0000000	-7.76107	1.000000	0.000	0.000
30	Al+3	4.996E-05	0.0000144	-4.84151	0.288313	0.540	0.000
280	Fe+2	5.133E-05	0.0000295	-4.52970	0.575360	0.240	0.000

SPECIES: TYPE II - COMPLEXES

ID	NAME	CALC MOL	ACTIVITY	LOG ACTVTY	GAMMA	NEW LOGK	DH
127321	=FeOHSO4-2	1.709E-03	0.0017093	-2.76719	1.000000	0.790	0.000
301401	H2CO3 AQ	1.537E-05	0.0000154	-4.81137	1.004616	16.815	-2.247
307320	HSO4 -	4.463E-09	0.0000000	-8.41036	0.870933	1.947	4.910
300020	OH-	7.201E-11	0.0000000	-10.20263	0.870933	-14.222	13.345
603300	MgOH +	6.436E-12	0.0000000	-11.25138	0.870933	-12.051	15.935
601400	MgCO3 AQ	1.714E-14	0.0000000	-13.76401	1.004616	2.922	2.022
601401	MgHCO3 +	5.613E-10	0.0000000	-9.31085	0.870933	11.517	-2.430
607320	MgSO4 AQ	6.043E-08	0.0000001	-7.21675	1.004616	2.218	1.399
503300	CaOH +	1.216E-12	0.0000000	-11.97497	0.870933	-12.847	14.535
501400	CaHCO3 +	4.791E-10	0.0000000	-9.37955	0.870933	11.376	1.790
501401	CaCO3 AQ	2.907E-14	0.0000000	-13.53450	1.004616	3.079	4.030
507320	CaSO4 AQ	8.150E-08	0.0000001	-7.08683	1.004616	2.276	1.470
303300	AlOH +2	1.716E-06	0.0000010	-6.00542	0.575360	-5.003	11.899
303301	Al(OH)2 +	1.890E-07	0.0000002	-6.78364	0.870933	-10.040	0.000
303302	Al(OH)4 -	3.963E-13	0.0000000	-12.46199	0.870933	-23.876	44.060
307320	AlSO4 +	9.447E-09	0.0000000	-8.08474	0.870933	3.034	2.150
307321	Al(SO4)2 -	4.396E-13	0.0000000	-12.41693	0.870933	4.920	2.840
303303	Al(OH)3 AQ	2.473E-09	0.0000000	-8.60470	1.004616	-16.002	0.000
803300	FeOH +	6.742E-11	0.0000000	-10.23123	0.870933	-9.720	13.1[illegible]
803301	FeOH3 -1	1.328E-24	0.0000000	-23.93674	0.870933	-31.584	30.300
807320	FeSO4 AQ	2.705E-09	0.0000000	-8.56588	1.004616	2.179	3.230
803302	Fe(OH)2 AQ	2.813E-19	0.0000000	-17.54981	1.004616	-21.170	60.560

4703300	MnOH +	1.313E-11	0.0000000	-10.94167	0.870933	-10.836	14.533
4703301	Mn(OH)3 -1	2.356E-27	0.0000000	-26.68783	0.870933	-34.740	0.000
4707320	MnSO4 AQ	7.408E-09	0.0000000	-8.13829	1.004616	2.212	2.170
4701400	MnHCO3 +	9.708E-11	0.0000000	-10.07286	0.870933	11.660	0.000
3001400	Pb(CO3)2-2	2.116E-18	0.0000000	-17.91460	0.575360	10.880	0.000
3003300	PbOH +	6.469E-06	0.0000056	-5.24921	0.870933	-7.650	0.000
3003301	Pb(OH)2 AQ	2.617E-11	0.0000000	-10.58027	1.004616	-17.122	0.000
[redacted]002	Pb(OH)3 -	4.156E-18	0.0000000	-17.44134	0.870933	-28.000	0.000
[redacted]303	Pb2OH +3	1.054E-05	0.0000030	-5.51736	0.288313	-5.820	0.000
3007320	PbSO4 AQ	8.172E-06	0.0000082	-5.08569	1.004616	2.748	0.000
3003304	Pb3(OH)4+2	1.812E-13	0.0000000	-12.98179	0.575360	-24.203	26.500
3001401	PbCO3 AQ	1.418E-08	0.0000000	-7.84637	1.004616	7.238	0.000
3003305	Pb(OH)4 -2	1.732E-25	0.0000000	-25.00140	0.575360	-39.459	0.000
3007321	Pb(SO4)2-2	4.538E-11	0.0000000	-10.58322	0.575360	3.710	0.000
3001402	PbHCO3 +	1.241E-06	0.0000011	-5.96637	0.870933	13.260	0.000
3301400	HCO3 -	8.389E-08	0.0000001	-7.13630	0.870933	10.472	-3.617
3123301	=feO-	1.706E-05	0.0000171	-4.76800	1.000000	-8.930	0.000
3123302	=feOH2+	1.372E-02	0.0137221	-1.86258	1.000000	7.290	0.000
3113301	=FeO-	9.252E-11	0.0000000	-10.03378	1.000000	-8.930	0.000
3113302	=FeOH2+	7.441E-08	0.0000001	-7.12836	1.000000	7.290	0.000
3116000	=FeOPb+	6.799E-04	0.0006799	-3.16757	1.000000	4.710	0.000
3126000	=feOPb+	4.878E-03	0.0048776	-2.31179	1.000000	0.300	0.000
3121500	=feOCa+	1.024E-10	0.0000000	-9.98963	1.000000	-5.850	0.000
3111500	=FeOHCa++	8.078E-12	0.0000000	-11.09270	1.000000	4.970	0.000
3117320	=FeSO4-	1.994E-08	0.0000000	-7.70025	1.000000	7.780	0.000
3127320	=feSO4-	3.677E-03	0.0036772	-2.43448	1.000000	7.780	0.000
3117321	=FeOHSO4-2	9.269E-09	0.0000000	-8.03296	1.000000	0.790	0.000

SPECIES: TYPE III - FIXED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
2	H2O	-3.459E-04	-3.461	0.001	0.000
3[redacted]03	CO2 (g)	-1.671E-05	-4.777	21.627	-0.530
[redacted]330	H+1	-1.151E-02	-1.939	4.080	0.000

SPECIES: TYPE IV - PRECIPITATED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
060003	ANGLESITE	4.410E-02	-1.356	7.836	-2.150
1003002	DIASPORE	6.955E-05	-4.158	-7.396	24.630

SPECIES: TYPE V - DISSOLVED SOLIDS

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
015001	GYPSUM	3.068E-05	-4.513	4.654	-0.261
015003	HUNTITE	5.524E-38	-37.258	29.421	25.760
046001	HYDRMAGNESIT	0.000E-01	-54.160	7.657	52.210
046002	MAGNESITE	1.623E-09	-8.790	7.898	6.169
028000	MELANTERITE	5.972E-09	-8.224	2.531	-2.860
046003	NESQUEHONITE	6.413E-12	-11.193	5.498	5.789
028000	SIDERITE	2.747E-08	-7.561	10.437	5.328
047003	PYROCROITE	2.919E-12	-11.535	-15.568	22.590
047000	RHODOCHROSIT	5.929E-08	-7.227	10.366	2.079
047000	MNSO4	4.570E-14	-13.340	-2.998	15.480
060000	CERRUSITE	1.402E-02	-1.853	13.233	-4.860
0[redacted]00	MASSICOT	1.880E-07	-6.726	-13.267	16.780
0[redacted]01	LITHARGE	2.970E-07	-6.527	-13.068	16.380
060002	PBO, .3H2O	3.634E-07	-6.440	-12.980	0.000
060001	PB2OCO3	5.139E-09	-8.289	0.256	11.460
060000	LARNAKITE	7.051E-02	-1.152	0.143	6.440
060001	PB3O2SO4	2.541E-06	-5.595	-10.841	20.750
060002	PB4O3SO4	8.739E-12	-11.059	-22.845	35.070
060002	PB3O2CO3	2.592E-14	-13.586	-11.582	26.430

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2060004	PB(OH)2 (C)	1.237E-02	-1.908	-8.447	13.990
3060003	HYDCERRUSITE	6.714E-07	-6.173	17.460	0.000
2060005	PB2O(OH)2	7.595E-14	-13.119	-26.200	0.000
3060004	PB4(OH)6SO4	4.825E-10	-9.317	-21.100	0.000
2015000	LIME	1.705E-29	-28.768	-33.780	46.265
2015001	PORTLANDITE	4.827E-19	-18.316	-23.327	30.690
30[illegible]00	WUSTITE	4.512E-09	-8.346	-12.215	24.846
3046001	PERICLASE	4.588E-18	-17.338	-22.278	36.135
3028001	HERCYNITE	3.944E-11	-10.404	-28.827	78.360
3046000	SPINEL	3.215E-19	-18.493	-38.226	89.089
3003000	ALOH3(A)	2.758E-04	-3.559	-10.955	27.045
3003000	ALOHSO4	1.778E-04	-3.750	3.230	0.000
3003001	AL4(OH)10SO4	3.205E-08	-7.494	-22.700	0.000
3215000	ANHYDRITE	1.557E-05	-4.808	4.557	3.769
3015000	ARAGONITE	4.443E-09	-8.352	8.263	2.615
3046000	ARTINITE	1.088E-22	-21.963	-10.211	28.742
3003001	BOEHMITE	1.662E-02	-1.779	-9.176	28.130
3046000	BRUCITE	3.957E-13	-12.403	-17.341	25.840
3015001	CALCITE	6.524E-09	-8.186	8.430	2.585
3003000	A1203	6.513E-09	-8.186	-22.980	0.000
3015002	DOLOMITE	3.318E-17	-16.479	16.824	8.290
3046000	EPSOMITE	5.695E-08	-7.245	2.200	-2.820

SPECIES: TYPE VI - SPECIES NOT CONSIDERED

ID	NAME	CALC MOL	LOG MOL	NEW LOGK	DH
813	ADS1PSI0	2.647E-03	-2.577	0.000	0.000

PERCENTAGE DISTRIBUTION OF COMPONENTS AMONG dissolved and adsorbed species

Ca	100.0	PERCENT BOUND IN SPECIES # 150	Ca+2
Mg+2	100.0	PERCENT BOUND IN SPECIES # 460	Mg+2
SO4-2	31.7	PERCENT BOUND IN SPECIES #8127321	=feOHSO4-2
	68.1	PERCENT BOUND IN SPECIES #8127320	=feSO4-
Mn+2	100.0	PERCENT BOUND IN SPECIES # 470	Mn+2
Fe+2	100.0	PERCENT BOUND IN SPECIES # 280	Fe+2
ADS1PSI0	112.8	PERCENT BOUND IN SPECIES #8123302	=feOH2+
	5.6	PERCENT BOUND IN SPECIES #8116000	=FeOPb+
	40.1	PERCENT BOUND IN SPECIES #8126000	=feOPb+
ADS1TYP2	11.8	PERCENT BOUND IN SPECIES # 812	ADS1TYP2
	6.3	PERCENT BOUND IN SPECIES #8127321	=feOHSO4-2
	50.4	PERCENT BOUND IN SPECIES #8123302	=feOH2+
	17.9	PERCENT BOUND IN SPECIES #8126000	=feOPb+
	13.5	PERCENT BOUND IN SPECIES #8127320	=feSO4-
ADS1TYP1	100.0	PERCENT BOUND IN SPECIES #8116000	=FeOPb+
Al+3	96.3	PERCENT BOUND IN SPECIES # 30	Al+3
	3.3	PERCENT BOUND IN SPECIES # 303300	AlOH +2
CO3	92.0	PERCENT BOUND IN SPECIES #3301401	H2CO3 AQ
	7.4	PERCENT BOUND IN SPECIES #6001402	PbHCO3 +
H2O	3.4	PERCENT BOUND IN SPECIES #6003300	PbOH +
	5.5	PERCENT BOUND IN SPECIES #6003303	Pb2OH +3
	357.7	PERCENT BOUND IN SPECIES #8116000	=FeOPb+
	>1000.	PERCENT BOUND IN SPECIES #8126000	=feOPb+
Pb+2	88.2	PERCENT BOUND IN SPECIES # 600	Pb+2
	1.4	PERCENT BOUND IN SPECIES #8116000	=FeOPb+
	10.3	PERCENT BOUND IN SPECIES #8126000	=feOPb+
H+1	115.9	PERCENT BOUND IN SPECIES #8123302	=feOH2+
	31.1	PERCENT BOUND IN SPECIES #8127320	=feSO4-

---------- EQUILIBRATED MASS DISTRIBUTION ----------

DX	NAME	DISSOLVED MOL/KG	DISSOLVED PERCENT	SORBED MOL/KG	SORBED PERCENT	PRECIPITATED MOL/KG	PRECIPITATED PERCENT
50	Ca+2	1.239E-03	100.0	1.105E-10	0.0	0.000E-01	0.0
60	Mg+2	1.049E-03	100.0	0.000E-01	0.0	0.000E-01	0.0
32	SO4-2	9.391E-06	0.0	5.387E-03	10.9	4.410E-02	89.1
70	Mn+2	1.305E-04	100.0	0.000E-01	0.0	0.000E-01	0.0
80	Fe+2	5.133E-05	100.0	0.000E-01	0.0	0.000E-01	0.0
30	Al+3	5.188E-05	42.7	0.000E-01	0.0	6.955E-05	57.3
40	CO3-2	1.671E-05	100.0	0.000E-01	0.0	0.000E-01	0.0
2	H2O	1.911E-05	10.1	1.709E-04	89.9	0.000E-01	0.0

500	Pb+2	4.191E-02	45.8	5.357E-03	6.1	4.410E-02	48.2
130	H+1	1.296E-05	0.1	1.182E-02	99.9	0.000E-01	0.0

CHARGE BALANCE: SPECIATED

SUM OF CATIONS = 1.082E-01 SUM OF ANIONS 7.115E-03

PERCENT DIFFERENCE = 8.766E+01 (ANIONS - CATIONS)/(ANIONS + CATIONS)

NONCARBONATE ALKALINITY = 0.000E-01

IONIC STRENGTH = : 2.000E-02

****** DIFFUSE LAYER ADSORPTION MODEL ********

**** Parameters For Adsorbent Number 1 ****
Electrostatic Variables: psi0 = 0.148169 sig0 = 0.161699
psib = 0.000000 sigb = 0.000000
psid = 0.000000 sigd = 0.000000
Adsorbent Concentration (g/l): 12.100
Specific Surface Area (sq. meters/g): 600.00

PC VERSION: MINTEQA2 DATE OF CALCULATIONS: 4-DEC-89 TIME: 21:14: 4

Saturation indices and stoichiometry of all minerals

ID #	NAME	Sat. Index	Stoichiometry (in parentheses) of each component									
[redacted]3000	ALOH3(A)	-3.559	(1.000)	30	(3.000)	2	(-3.000)	330				
[redacted]000	ALOHSO4	-3.750	(-1.000)	330	(1.000)	30	(1.000)	732	(1.000)	2		
6003001	AL4(OH)10SO4	-7.494	(-10.000)	330	(4.000)	30	(1.000)	732	(10.000)	2		
6015000	ANHYDRITE	-4.808	(1.000)	150	(1.000)	732						
5015000	ARAGONITE	-8.352	(1.000)	150	(1.000)	140						
5046000	ARTINITE	-21.963	(-2.000)	330	(2.000)	460	(1.000)	140	(5.000)	2		
2003001	BOEHMITE	-1.779	(-3.000)	330	(1.000)	30	(2.000)	2				
2046000	BRUCITE	-12.403	(1.000)	460	(2.000)	2	(-2.000)	330				
5015001	CALCITE	-8.186	(1.000)	150	(1.000)	140						
2003002	DIASPORE	0.000	(-3.000)	330	(1.000)	30	(2.000)	2				
5015002	DOLOMITE	-16.479	(1.000)	150	(1.000)	460	(2.000)	140				
6046000	EPSOMITE	-7.245	(1.000)	460	(1.000)	732	(7.000)	2				
2003003	GIBBSITE (C)	-1.859	(-3.000)	330	(1.000)	30	(3.000)	2				
3003000	A1203	-9.186	(2.000)	30	(3.000)	2	(-6.000)	330				
6015001	GYPSUM	-4.513	(1.000)	150	(1.000)	732	(2.000)	2				
5015003	HUNTITE	-37.258	(3.000)	460	(1.000)	150	(4.000)	140				
5046001	HYDRMAGNESIT	-54.160	(5.000)	460	(4.000)	140	(-2.000)	330	(6.000)	2		
5046002	MAGNESITE	-8.790	(1.000)	460	(1.000)	140						
6028000	MELANTERITE	-8.224	(1.000)	280	(1.000)	732	(7.000)	2				
5046003	NESQUEHONITE	-11.193	(1.000)	460	(1.000)	140	(3.000)	2				
5028000	SIDERITE	-7.561	(1.000)	280	(1.000)	140						
2047003	PYROCROITE	-11.535	(-2.000)	330	(1.000)	470	(2.000)	2				
5047000	RHODOCHROSIT	-7.227	(1.000)	470	(1.000)	140						
6047000	MNSO4	-13.340	(1.000)	470	(1.000)	732						
5060000	CERRUSITE	-1.853	(1.000)	600	(1.000)	140						
2060000	MASSICOT	-6.726	(-2.000)	330	(1.000)	600	(1.000)	2				
[redacted]0001	LITHARGE	-6.527	(-2.000)	330	(1.000)	600	(1.000)	2				
[redacted]0002	PBO, .3H20	-6.440	(-2.000)	330	(1.000)	600	(1.330)	2				
5060001	PB2OCO3	-8.289	(-2.000)	330	(2.000)	600	(1.000)	2	(1.000)	140		
6060000	LARNAKITE	-1.152	(-2.000)	330	(2.000)	600	(1.000)	732	(1.000)	2		
6060001	PB3O2SO4	-5.595	(-4.000)	330	(3.000)	600	(1.000)	732	(2.000)	2		
6060002	PB4O3SO4	-11.059	(-6.000)	330	(4.000)	600	(1.000)	732	(3.000)	2		
5060002	PB3O2CO3	-13.586	(-4.000)	330	(3.000)	600	(1.000)	140	(2.000)	2		
6060003	ANGLESITE	0.000	(1.000)	600	(1.000)	732						
2060004	PB(OH)2 (C)	-1.908	(-2.000)	330	(1.000)	600	(2.000)	2				
5060003	HYDCERRUSITE	-6.173	(-2.000)	330	(3.000)	600	(2.000)	140	(2.000)	2		
2060005	PB2O(OH)2	-13.119	(-4.000)	330	(2.000)	600	(3.000)	2				
6060004	PB4(OH)6SO4	-9.317	(-6.000)	330	(4.000)	600	(1.000)	732	(6.000)	2		
2015000	LIME	-28.768	(-2.000)	330	(1.000)	150	(1.000)	2				
2015001	PORTLANDITE	-18.316	(-2.000)	330	(1.000)	150	(2.000)	2				
2028000	WUSTITE	-8.346	(-2.000)	330	(0.947)	280	(1.000)	2				
2046001	PERICLASE	-17.338	(-2.000)	330	(1.000)	460	(1.000)	2				
3028001	HERCYNITE	-10.404	(-8.000)	330	(1.000)	280	(2.000)	30	(4.000)	2		
3046000	SPINEL	-18.493	(-8.000)	330	(1.000)	460	(2.000)	30	(4.000)	2		

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

VERSION 3.3, DECEMBER 1988

Developed by Phillip Mineart and Atul Salhotra of
Woodward-Clyde Consultants, Oakland, California
In cooperation with:
Hydrogeologic, Inc., Herndon, Virginia,
Geotrans, Inc., Herndon, Virginia,
and
Aqua Terra Consultants, Mountain View, California

1
Run options
--- -------

RUN1A C&R BATTERY AVERAGE CASE-NO ACTION

MAXIMUM CONC. AT 10M RECEPTOR
Chemical simulated is Pb

Option Chosen — Saturated and unsaturated zone models
Run was — DETERMIN
Run was transient
Reject runs if Y coordinate outside plume
Reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model
1
1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.352E+05
Dissolved phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.221E+09
Overall chemical decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.358E+05
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	370.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	280.
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	0.250E+08
Reference temperature	C	CONSTANT	16.6	0.000E+00	0.000E+00	40.0
Normalized distribution coefficient	ml/g	CONSTANT	104.	0.000E+00	0.000E+00	0.331E+06
Distribution coefficient	--	DERIVED	0.200	0.000E+00	0.000E+00	0.166E+05
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	100.
Air diffusion coefficient	cm2/s	CONSTANT	0.645E-01	0.645E-02	0.000E+00	1.00
Reference temperature for air diffusion	C	CONSTANT	25.0	0.000E+00	15.0	30.0
Molecular weight	g/M	CONSTANT	207.	0.000E+00	0.000E+00	0.100E+05
Mole fraction of solute	--	CONSTANT	0.100	0.100E-01	0.100E-02	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000E+00	0.230E-01	0.000E+00	10.0
Henry's law constant	atm-m^3/M	CONSTANT	0.100E-06	0.000E+00	0.000E+00	1.00
RFD value for drinking water	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
ADIF value for fish consumption	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
CCC for aquatic organisms	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.610E-02	0.700E-02	0.254E-04	0.688
Area of waste disposal unit	m^2	DERIVED	0.277E+05	2.16	-0.884	12.3
Duration of pulse	yr	CONSTANT	0.258E+04	3.00	0.100	0.100E+31
Spread of contaminant source	m	DERIVED	21.7	0.000E+00	0.100E-02	0.600E+05
Recharge rate	m/yr	CONSTANT	0.610E-02	0.760E-02	0.254E-04	0.668
Source decay constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	10.0
Initial concentration at landfill	mg/l	CONSTANT	1.00	0.100E-01	0.000E+00	10.0
Length scale of facility	m	CONSTANT	213.	1.00	1.00	0.100E+06
Width scale of facility	m	CONSTANT	130.	1.00	1.00	0.100E+06

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	7
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

COORDINATE DATA, Computer generated

1

GRID SPACING PARAMETERS

XSTART: 0.0
XO: 8.2
DX: 0.5
XFAC: 1.5
DXMAX: 2.0

AR302954

MATERIAL NUMBER FOR EACH LAYER
1 1 1 1 1 1 1

1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	0.320E-01	2.92	0.000E+00	3.50
Unsaturated zone porosity	--	CONSTANT	0.380	0.200E-01	0.200	0.700
Air entry pressure head	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	1.00
Depth of the unsaturated zone	m	CONSTANT	8.20	1.00	0.610	366.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.880E-01	0.900E-02	0.000E+00	0.115
Brook and Corey exponent, EN	--	CONSTANT	0.500	0.100	0.000E+00	1.00
ALFA coefficient	1/cm	CONSTANT	0.900E-02	0.970E-01	0.000E+00	0.150
Van Genuchten exponent, ENN	--	CONSTANT	1.23	0.610E-01	1.00	1.50

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

NLAY	- Number of different layers used		1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	10.0
WTFUN	- Weighting factor	--	1.2

OPTIONS CHOSEN

Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations

AR302955

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Thickness of layer	m	CONSTANT	8.20	1.00	0.000E+00	500.
Longitudinal dispersivity of layer	m	CONSTANT	0.400	0.400E-01	0.000E+00	10.0
Percent organic matter	--	CONSTANT	1.08	7.77	0.000E+00	11.0
Bulk density of soil for layer	g/cc	CONSTANT	1.70	0.200E-01	0.795	2.12
Biological decay coefficient	1/yr	CONSTANT	0.000E+00	0.200E-01	0.000E+00	5.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Particle diameter	cm	CONSTANT	0.630E-03	0.630E-04	0.400E-03	0.100
Aquifer porosity	--	CONSTANT	0.380	0.000E+00	0.300	0.560
Bulk density	g/cc	CONSTANT	1.70	0.000E+00	1.16	1.80
Aquifer thickness	m	CONSTANT	30.2	78.6	3.00	560.
Source thickness (mixing zone depth)	m	DERIVED	0.000E+00	0.600	2.00	10.0
Conductivity (hydraulic)	m/yr	CONSTANT	0.389E+04	0.758E+04	31.6	0.151E+06
Gradient (hydraulic)		CONSTANT	0.460E-03	0.310E-01	0.100E-04	0.100
Groundwater seepage velocity	m/yr	DERIVED	0.000E+00	0.000E+00	0.100E-01	0.925E+04
Retardation coefficient	--	DERIVED	1.00	0.100	1.00	0.352E+06
Longitudinal dispersivity	m	CONSTANT	1.00	0.700	0.100	324.
Transverse dispersivity	m	CONSTANT	0.125	0.000E+00	0.100	41.0
Vertical dispersivity	m	DERIVED	0.950	0.950E-01	0.380	250.
Temperature of aquifer	C	CONSTANT	16.6	5.29	5.00	30.0
pH	--	CONSTANT	4.82	1.28	0.300	14.0
Organic carbon content (fraction)		CONSTANT	1.00	0.300E-03	0.100E-02	0.100E-01
Well distance from site	m	CONSTANT	10.0	0.000E+00	15.2	0.160E+04
Angle off center	degree	CONSTANT	0.000E+00	0.000E+00	0.000E+00	45.0
Well vertical distance	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	560.

1

TIME	CONCENTRATION
0.406E+04	0.52771E-01
0.407E+04	0.52825E-01
0.408E+04	0.52875E-01
0.409E+04	0.52923E-01
0.410E+04	0.52969E-01
0.411E+04	0.53011E-01
0.412E+04	0.53031E-01
0.413E+04	0.53066E-01
0.414E+04	0.53098E-01
0.415E+04	0.53127E-01
0.416E+04	0.53153E-01
0.417E+04	0.53131E-01
0.418E+04	0.53144E-01
0.419E+04	0.53153E-01
0.420E+04	0.53218E-01
0.421E+04	0.53224E-01
0.422E+04	0.53227E-01
0.450E+04	0.51627E-01
0.500E+04	0.40638E-01
0.600E+04	0.12716E-01

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

VERSION 3.3, DECEMBER 1988

Developed by Phillip Mineart and Atul Salhotra of
Woodward-Clyde Consultants, Oakland, California
In cooperation with:
Hydrogeologic, Inc., Herndon, Virginia,
Geotrans, Inc., Herndon, Virginia,
and
Aqua Terra Consultants, Mountain View, California

1
Run options
--- -------

RUN1B C&R BATTERY AVERAGE CASE-NO ACTION

TIME TO REACH MCL AT 10M RECEPTOR
Chemical simulated is Pb

Option Chosen	*Saturated and unsaturated zone models*
Run was	DETERMIN

Run was transient
Reject runs if Y coordinate outside plume
Reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS	LIMITS

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Solid phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.352E+05
Dissolved phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.221E+09
Overall chemical decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.358E+05
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	370.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	280.
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	0.250E+08
Reference temperature	C	CONSTANT	16.6	0.000E+00	0.000E+00	40.0
Normalized distribution coefficient	ml/g	CONSTANT	104.	0.000E+00	0.000E+00	0.331E+06
Distribution coefficient	--	DERIVED	0.200	0.000E+00	0.000E+00	0.166E+05
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	100.
Air diffusion coefficient	cm2/s	CONSTANT	0.645E-01	0.645E-02	0.000E+00	1.00
Reference temperature for air diffusion	C	CONSTANT	25.0	0.000E+00	15.0	30.0
Molecular weight	g/M	CONSTANT	207.	0.000E+00	0.000E+00	0.100E+05
Mole fraction of solute	--	CONSTANT	0.100	0.100E-01	0.100E-02	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000E+00	0.230E-01	0.000E+00	10.0
Henry's law constant	atm-m^3/M	CONSTANT	0.100E-06	0.000E+00	0.000E+00	1.00
RFD value for drinking water	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
ADIF value for fish consumption	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
CCC for aquatic organisms	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.610E-02	0.700E-02	0.254E-04	0.688
Area of waste disposal unit	m^2	DERIVED	0.277E+05	2.16	-0.884	12.3
Duration of pulse	yr	CONSTANT	0.258E+04	3.00	0.100	0.100E+31
Spread of contaminant source	m	DERIVED	21.7	0.000E+00	0.100E-02	0.600E+05
Recharge rate	m/yr	CONSTANT	0.610E-02	0.760E-02	0.254E-04	0.668
Source decay constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	10.0
Initial concentration at landfill	mg/l	CONSTANT	1.00	0.100E-01	0.000E+00	10.0
Length scale of facility	m	CONSTANT	213.	1.00	1.00	0.100E+06
Width scale of facility	m	CONSTANT	130.	1.00	1.00	0.100E+06

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	7
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1

OPTIONS CHOSEN
Van Genuchten functional coefficients
User defined coordinate system

COORDINATE DATA, Computer generated

GRID SPACING PARAMETERS

XSTART:	0.0
XO:	8.2
DX:	0.5
XFAC:	1.5
DXMAX:	2.0

MATERIAL NUMBER FOR EACH LAYER
1 1 1 1 1 1 1

1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	0.320E-01	2.92	0.000E+00	3.50
Unsaturated zone porosity	--	CONSTANT	0.380	0.200E-01	0.200	0.700
Air entry pressure head	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	1.00
Depth of the unsaturated zone	m	CONSTANT	8.20	1.00	0.610	366.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Residual water content	--	CONSTANT	0.880E-01	0.900E-02	0.000E+00	0.115
Brook and Corey exponent,EN	--	CONSTANT	0.500	0.100	0.000E+00	1.00
ALFA coefficient	1/cm	CONSTANT	0.900E-02	0.970E-01	0.000E+00	0.150
Van Genuchten exponent, ENN	--	CONSTANT	1.23	0.610E-01	1.00	1.50

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

NLAY	- Number of different layers used		1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	10.0
WTFUN	- Weighting factor	--	1.2

OPTIONS CHOSEN

Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS	LIMITS

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Thickness of layer	m	CONSTANT	8.20	1.00	0.000E+00	500.
Longitudinal dispersivity of layer	m	CONSTANT	0.400	0.400E-01	0.000E+00	10.0
Percent organic matter	--	CONSTANT	1.08	7.77	0.000E+00	11.0
Bulk density of soil for layer	g/cc	CONSTANT	1.70	0.200E-01	0.795	2.12
Biological decay coefficient	1/yr	CONSTANT	0.000E+00	0.200E-01	0.000E+00	5.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Particle diameter	cm	CONSTANT	0.630E-03	0.630E-04	0.400E-03	0.100
Aquifer porosity	--	CONSTANT	0.380	0.000E+00	0.300	0.560
Bulk density	g/cc	CONSTANT	1.70	0.000E+00	1.16	1.80
Aquifer thickness	m	CONSTANT	30.2	78.6	3.00	560.
Source thickness (mixing zone depth)	m	DERIVED	0.000E+00	0.600	2.00	10.0
Conductivity (hydraulic)	m/yr	CONSTANT	0.389E+04	0.758E+04	31.6	0.151E+06
Gradient (hydraulic)		CONSTANT	0.460E-03	0.310E-01	0.100E-04	0.100
Groundwater seepage velocity	m/yr	DERIVED	0.000E+00	0.000E+00	0.100E-01	0.925E+04
Retardation coefficient	--	DERIVED	1.00	0.100	1.00	0.352E+06
Longitudinal dispersivity	m	CONSTANT	1.00	0.700	0.100	324.
Transverse dispersivity	m	CONSTANT	0.125	0.000E+00	0.100	41.0
Vertical dispersivity	m	DERIVED	0.950	0.950E-01	0.380	250.
Temperature of aquifer	C	CONSTANT	16.6	5.29	5.00	30.0
pH	--	CONSTANT	4.82	1.28	0.300	14.0
Organic carbon content (fraction)		CONSTANT	1.00	0.300E-03	0.100E-02	0.100E-01
Well distance from site	m	CONSTANT	10.0	0.000E+00	15.2	0.160E+04
Angle off center	degree	CONSTANT	0.000E+00	0.000E+00	0.000E+00	45.0
Well vertical distance	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	560.

1

TIME	CONCENTRATION
0.117E+04	0.32515E-06
0.118E+04	0.44806E-06
0.119E+04	0.60837E-06
0.200E+04	0.54795E-02
0.121E+04	0.10772E-05
0.122E+04	0.14515E-05
0.123E+04	0.22884E-05
0.124E+04	0.34710E-05
0.125E+04	0.51031E-05
0.126E+04	0.72765E-05
0.127E+04	0.10105E-04
0.128E+04	0.13706E-04
0.129E+04	0.18199E-04
0.130E+04	0.23705E-04
0.131E+04	0.30344E-04
0.132E+04	0.38234E-04
0.133E+04	0.47486E-04
0.134E+04	0.58205E-04
0.500E+04	0.40638E-01
0.600E+04	0.12716E-01

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

VERSION 3.3, DECEMBER 1988

Developed by Phillip Mineart and Atul Salhotra of
Woodward-Clyde Consultants, Oakland, California
In cooperation with:
Hydrogeologic, Inc., Herndon, Virginia,
Geotrans, Inc., Herndon, Virginia,
and
Aqua Terra Consultants, Mountain View, California

1
Run options
--- -------

RUN1C C&R BATTERY AVERAGE CASE-NO ACTION

MAXIMUM CONC. AT 100M RECEPTOR
Chemical simulated is Pb

Option Chosen — Saturated and unsaturated zone models
Run was — DETERMIN
Run was transient
Reject runs if Y coordinate outside plume
Reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model
1
1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	DISTRIBUTION	LIMITS

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.352E+05
Dissolved phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.221E+09
Overall chemical decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.358E+05
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	370.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	280.
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	0.250E+08
Reference temperature	C	CONSTANT	16.6	0.000E+00	0.000E+00	40.0
Normalized distribution coefficient	ml/g	CONSTANT	104.	0.000E+00	0.000E+00	0.331E+06
Distribution coefficient	--	DERIVED	0.200	0.000E+00	0.000E+00	0.166E+05
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	100.
Air diffusion coefficient	cm2/s	CONSTANT	0.645E-01	0.645E-02	0.000E+00	1.00
Reference temperature for air diffusion	C	CONSTANT	25.0	0.000E+00	15.0	30.0
Molecular weight	g/M	CONSTANT	207.	0.000E+00	0.000E+00	0.100E+05
Mole fraction of solute	--	CONSTANT	0.100	0.100E-01	0.100E-02	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000E+00	0.230E-01	0.000E+00	10.0
Henry's law constant	atm-m^3/M	CONSTANT	0.100E-06	0.000E+00	0.000E+00	1.00
RFD value for drinking water	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
ADIF value for fish consumption	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
CCC for aquatic organisms	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.610E-02	0.700E-02	0.254E-04	0.688
Area of waste disposal unit	m^2	DERIVED	0.277E+05	2.16	-0.884	12.3
Duration of pulse	yr	CONSTANT	0.258E+04	3.00	0.100	0.100E+31
Spread of contaminant source	m	DERIVED	21.7	0.000E+00	0.100E-02	0.600E+05
Recharge rate	m/yr	CONSTANT	0.610E-02	0.760E-02	0.254E-04	0.668
Source decay constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	10.0
Initial concentration at landfill	mg/l	CONSTANT	1.00	0.100E-01	0.000E+00	10.0
Length scale of facility	m	CONSTANT	213.	1.00	1.00	0.100E+06
Width scale of facility	m	CONSTANT	130.	1.00	1.00	0.100E+06

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	7
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1

OPTIONS CHOSEN
--- ---
Van Genuchten functional coefficients
User defined coordinate system

COORDINATE DATA, Computer generated

GRID SPACING PARAMETERS

XSTART:	0.0
XO:	8.2
DX:	0.5
XFAC:	1.5
DXMAX:	2.0

MATERIAL NUMBER FOR EACH LAYER
1 1 1 1 1 1 1

1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	0.320E-01	2.92	0.000E+00	3.50
Unsaturated zone porosity	--	CONSTANT	0.380	0.200E-01	0.200	0.700
Air entry pressure head	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	1.00
Depth of the unsaturated zone	m	CONSTANT	8.20	1.00	0.610	366.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.880E-01	0.900E-02	0.000E+00	0.115
Brook and Corey exponent, EN	--	CONSTANT	0.500	0.100	0.000E+00	1.00
ALFA coefficient	1/cm	CONSTANT	0.900E-02	0.970E-01	0.000E+00	0.150
Van Genuchten exponent, ENN	--	CONSTANT	1.23	0.610E-01	1.00	1.50

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

NLAY	- Number of different layers used		1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	10.0
WTFUN	- Weighting factor	--	1.2

OPTIONS CHOSEN

Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Thickness of layer	m	CONSTANT	8.20	1.00	0.000E+00	500.
Longitudinal dispersivity of layer	m	CONSTANT	0.400	0.400E-01	0.000E+00	10.0
Percent organic matter	--	CONSTANT	1.08	7.77	0.000E+00	11.0
Bulk density of soil for layer	g/cc	CONSTANT	1.70	0.200E-01	0.795	2.12
Biological decay coefficient	1/yr	CONSTANT	0.000E+00	0.200E-01	0.000E+00	5.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Particle diameter	cm	CONSTANT	0.630E-03	0.630E-04	0.400E-03	0.100
Aquifer porosity	--	CONSTANT	0.380	0.000E+00	0.300	0.560
Bulk density	g/cc	CONSTANT	1.70	0.000E+00	1.16	1.80
Aquifer thickness	m	CONSTANT	30.2	78.6	3.00	560.
Source thickness (mixing zone depth)	m	DERIVED	0.000E+00	0.600	2.00	10.0
Conductivity (hydraulic)	m/yr	CONSTANT	0.389E+04	0.758E+04	31.6	0.151E+06
Gradient (hydraulic)		CONSTANT	0.460E-03	0.310E-01	0.100E-04	0.100
Groundwater seepage velocity	m/yr	DERIVED	0.000E+00	0.000E+00	0.100E-01	0.925E+04
Retardation coefficient	--	DERIVED	1.00	0.100	1.00	0.352E+06
Longitudinal dispersivity	m	CONSTANT	10.0	0.700	0.100	324.
Transverse dispersivity	m	CONSTANT	1.25	0.000E+00	0.100	41.0
Vertical dispersivity	m	DERIVED	0.950	0.950E-01	0.380	250.
Temperature of aquifer	C	CONSTANT	16.6	5.29	5.00	30.0
pH	--	CONSTANT	4.82	1.28	0.300	14.0
Organic carbon content (fraction)		CONSTANT	1.00	0.300E-03	0.100E-02	0.100E-01
Well distance from site	m	CONSTANT	100.	0.000E+00	15.2	0.160E+04
Angle off center	degree	CONSTANT	0.000E+00	0.000E+00	0.000E+00	45.0
Well vertical distance	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	560.

1

TIME	CONCENTRATION
0.100E+05	0.14703E-01
0.101E+05	0.14775E-01
0.102E+05	0.14827E-01
0.103E+05	0.14867E-01
0.104E+05	0.14889E-01
0.105E+05	0.14895E-01
0.106E+05	0.14889E-01
0.107E+05	0.14867E-01
0.108E+05	0.14832E-01
0.109E+05	0.14785E-01
0.110E+05	0.14724E-01
0.111E+05	0.14653E-01
0.112E+05	0.14571E-01
0.113E+05	0.14477E-01
0.114E+05	0.14375E-01
0.115E+05	0.14263E-01
0.116E+05	0.14142E-01
0.117E+05	0.14014E-01
0.118E+05	0.13878E-01
0.119E+05	0.13736E-01

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

VERSION 3.3, DECEMBER 1988

Developed by Phillip Mineart and Atul Salhotra of
Woodward-Clyde Consultants, Oakland, California
In cooperation with:
Hydrogeologic, Inc., Herndon, Virginia,
Geotrans, Inc., Herndon, Virginia,
and
Aqua Terra Consultants, Mountain View, California

1
Run options
--- -------

RUN1D C&R BATTERY AVERAGE CASE-NO ACTION

TIME TO REACH MCL AT 100M RECEPTOR
Chemical simulated is Pb

Option Chosen — Saturated and unsaturated zone models
Run was — DETERMIN
Run was transient
Reject runs if Y coordinate outside plume
Reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model
1
1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Solid phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.352E+05
Dissolved phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.221E+09
Overall chemical decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.358E+05
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	370.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	280.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	0.250E+08
Reference temperature	C	CONSTANT	16.6	0.000E+00	0.000E+00	40.0
Normalized distribution coefficient	ml/g	CONSTANT	104.	0.000E+00	0.000E+00	0.331E+06
Distribution coefficient	--	DERIVED	0.200	0.000E+00	0.000E+00	0.166E+05
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	100.
Air diffusion coefficient	cm2/s	CONSTANT	0.645E-01	0.645E-02	0.000E+00	1.00
Reference temperature for air diffusion	C	CONSTANT	25.0	0.000E+00	15.0	30.0
Molecular weight	g/M	CONSTANT	207.	0.000E+00	0.000E+00	0.100E+05
Mole fraction of solute	--	CONSTANT	0.100	0.100E-01	0.100E-02	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000E+00	0.230E-01	0.000E+00	10.0
Henry's law constant	atm-m^3/M	CONSTANT	0.100E-06	0.000E+00	0.000E+00	1.00
RFD value for drinking water	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
ADIF value for fish consumption	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
CCC for aquatic organisms	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.610E-02	0.700E-02	0.254E-04	0.688
Area of waste disposal unit	m^2	DERIVED	0.277E+05	2.16	-0.884	12.3
Duration of pulse	yr	CONSTANT	0.258E+04	3.00	0.100	0.100E+31
Spread of contaminant source	m	DERIVED	21.7	0.000E+00	0.100E-02	0.600E+05
Recharge rate	m/yr	CONSTANT	0.610E-02	0.760E-02	0.254E-04	0.668
Source decay constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	10.0
Initial concentration at landfill	mg/l	CONSTANT	1.00	0.100E-01	0.000E+00	10.0
Length scale of facility	m	CONSTANT	213.	1.00	1.00	0.100E+06
Width scale of facility	m	CONSTANT	130.	1.00	1.00	0.100E+06

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	7
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1

1

OPTIONS CHOSEN
------ ------
Van Genuchten functional coefficients
User defined coordinate system

COORDINATE DATA, Computer generated

1

GRID SPACING PARAMETERS

XSTART:	0.0
XO:	8.2
DX:	0.5
XFAC:	1.5
DXMAX:	2.0

MATERIAL [redacted]ER FOR EACH LAYER
1 1 1 1 1 1 1

1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	0.320E-01	2.92	0.000E+00	3.50
Unsaturated zone porosity	--	CONSTANT	0.380	0.200E-01	0.200	0.700
Air entry pressure head	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	1.00
Depth of the unsaturated zone	m	CONSTANT	6.10	1.00	0.610	366.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.880E-01	0.900E-02	0.000E+00	0.115
Brook and Corey exponent,EN	--	CONSTANT	0.500	0.100	0.000E+00	1.00
ALFA coefficient	1/cm	CONSTANT	0.900E-02	0.970E-01	0.000E+00	0.150
Van Genuchten exponent, ENN	--	CONSTANT	1.23	0.610E-01	1.00	1.50

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

NLAY	- Number of different layers used		1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	10.0
WTFUN	- Weighting factor	--	1.2

OPTIONS CHOSEN

Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations

RH302967

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS	LIMITS

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Thickness of layer	m	CONSTANT	8.20	1.00	0.000E+00	500.
Longitudinal dispersivity of layer	m	CONSTANT	0.400	0.400E-01	0.000E+00	10.0
Percent organic matter	--	CONSTANT	1.08	7.77	0.000E+00	11.0
Bulk density of soil for layer	g/cc	CONSTANT	1.70	0.200E-01	0.795	2.12
Biological decay coefficient	1/yr	CONSTANT	0.000E+00	0.200E-01	0.000E+00	5.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Particle diameter	cm	CONSTANT	0.630E-03	0.630E-04	0.400E-03	0.100
Aquifer porosity	--	CONSTANT	0.380	0.000E+00	0.300	0.560
Bulk density	g/cc	CONSTANT	1.70	0.000E+00	1.16	1.80
Aquifer thickness	m	CONSTANT	30.2	78.6	3.00	560.
Source thickness (mixing zone depth)	m	DERIVED	0.000E+00	0.600	2.00	10.0
Conductivity (hydraulic)	m/yr	CONSTANT	0.389E+04	0.758E+04	31.6	0.151E+06
Gradient (hydraulic)		CONSTANT	0.460E-03	0.310E-01	0.100E-04	0.100
Groundwater seepage velocity	m/yr	DERIVED	0.000E+00	0.000E+00	0.100E-01	0.925E+04
Retardation coefficient	--	DERIVED	1.00	0.100	1.00	0.352E+06
Longitudinal dispersivity	m	CONSTANT	10.0	0.700	0.100	324.
Transverse dispersivity	m	CONSTANT	1.25	0.000E+00	0.100	41.0
Vertical dispersivity	m	DERIVED	0.950	0.950E-01	0.380	250.
Temperature of aquifer	C	CONSTANT	16.6	5.29	5.00	30.0
pH	--	CONSTANT	4.82	1.28	0.300	14.0
Organic carbon content (fraction)		CONSTANT	1.00	0.300E-03	0.100E-02	0.100E-01
Well distance from site	m	CONSTANT	100.	0.000E+00	15.2	0.160E+04
Angle off center	degree	CONSTANT	0.000E+00	0.000E+00	0.000E+00	45.0
Well vertical distance	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	560.

1

TIME	CONCENTRATION
0.330E+04	0.22592E-05
0.331E+04	0.23775E-05
0.332E+04	0.25012E-05
0.333E+04	0.26303E-05
0.334E+04	0.27651E-05
0.335E+04	0.29052E-05
0.336E+04	0.30520E-05
0.337E+04	0.32050E-05
0.338E+04	0.33646E-05
0.339E+04	0.35309E-05
0.340E+04	0.37042E-05
0.380E+04	0.19796E-04
0.381E+04	0.20535E-04
0.382E+04	0.21288E-04
0.383E+04	0.22073E-04
0.384E+04	0.22882E-04
0.385E+04	0.23715E-04
0.386E+04	0.24573E-04
0.387E+04	0.25459E-04
0.110E+05	0.14724E-01

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

VERSION 3.3, DECEMBER 1988

Developed by Phillip Mineart and Atul Salhotra of
Woodward-Clyde Consultants, Oakland, California
In cooperation with:
Hydrogeologic, Inc., Herndon, Virginia,
Geotrans, Inc., Herndon, Virginia,
and
Aqua Terra Consultants, Mountain View, California

1
Run options
--- -------

RUN2A C&R BATTERY AVE. CASE-10,000 ACTION LEVEL

MAXIMUM CONC. AT 10M RECEPTOR
Chemical simulated is Pb

Option Chosen	Saturated and unsaturated zone models
Run was	DETERMIN
Run was transient	
Reject runs if Y coordinate outside plume	
Reject runs if Z coordinate outside plume	
Gaussian source used in saturated zone model	

1
1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.352E+05
Dissolved phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.221E+09
Overall chemical decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.358E+05
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	370.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	280.
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	0.250E+08
Reference temperature	C	CONSTANT	16.6	0.000E+00	0.000E+00	40.0
Normalized distribution coefficient	ml/g 7	CONSTANT	752.	0.000E+00	0.000E+00	0.331
Distribution coefficient	--	DERIVED	0.200	0.000E+00	0.000E+00	0.166E+05
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	100.
Air diffusion coefficient	cm2/s	CONSTANT	0.645E-01	0.645E-02	0.000E+00	1.00
Reference temperature for air diffusion	C	CONSTANT	25.0	0.000E+00	15.0	30.0
Molecular weight	g/M	CONSTANT	207.	0.000E+00	0.000E+00	0.100E+05
Mole fraction of solute	--	CONSTANT	0.100	0.100E-01	0.100E-02	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000E+00	0.230E-01	0.000E+00	10.0
Henry's law constant	atm-m^3/M	CONSTANT	0.100E-06	0.000E+00	0.000E+00	1.00
RFD value for drinking water	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
ADIF value for fish consumption	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
CCC for aquatic organisms	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.610E-02	0.700E-02	0.254E-04	0.688
Area of waste disposal unit	m^2	DERIVED	0.277E+05	2.16	-0.884	12.3
Duration of pulse	yr	CONSTANT	0.450E+04	3.00	0.100	0.100E+31
Spread of contaminant source	m	DERIVED	21.7	0.000E+00	0.100E-02	0.600E+05
Recharge rate	m/yr	CONSTANT	0.610E-02	0.760E-02	0.254E-04	0.668
Source decay constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	10.0
Initial concentration at landfill	mg/l	CONSTANT	1.00	0.100E-01	0.000E+00	10.0
Length scale of facility	m	CONSTANT	213.	1.00	1.00	0.100E+06
Width scale of facility	m	CONSTANT	130.	1.00	1.00	0.100E+06

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	7
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

COORDINATE DATA, Computer generated

GRID SPACING PARAMETERS

XSTART:	0.0
XO:	8.2
DX:	0.5
XFAC:	1.5
DXMAX:	2.0

AR302970

MATERIAL NUMBER FOR EACH LAYER
1 1 1 1 1 1 1

1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	0.320E-01	2.92	0.000E+00	3.50
Unsaturated zone porosity	--	CONSTANT	0.380	0.200E-01	0.200	0.700
Air entry pressure head	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	1.00
Depth of the unsaturated zone	m	CONSTANT	8.20	1.00	0.610	366.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.880E-01	0.900E-02	0.000E+00	0.115
Brook and Corey exponent, EN	--	CONSTANT	0.500	0.100	0.000E+00	1.00
ALFA coefficient	1/cm	CONSTANT	0.900E-02	0.970E-01	0.000E+00	0.150
Van Genuchten exponent, ENN	--	CONSTANT	1.23	0.610E-01	1.00	1.50

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

NLAY	- Number of different layers used		1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	10.0
WTFUN	- Weighting factor	--	1.2

OPTIONS CHOSEN

Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations

1

AR302971

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Thickness of layer	m	CONSTANT	8.20	1.00	0.000E+00	500.
Longitudinal dispersivity of layer	m	CONSTANT	0.400	0.400E-01	0.000E+00	10.0
Percent organic matter	--	CONSTANT	0.747	7.77	0.000E+00	11.0
Bulk density of soil for layer	g/cc	CONSTANT	1.70	0.200E-01	0.795	2.12
Biological decay coefficient	1/yr	CONSTANT	0.000E+00	0.200E-01	0.000E+00	5.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Particle diameter	cm	CONSTANT	0.630E-03	0.630E-04	0.400E-03	0.100
Aquifer porosity	--	CONSTANT	0.380	0.000E+00	0.300	0.560
Bulk density	g/cc	CONSTANT	1.70	0.000E+00	1.16	1.80
Aquifer thickness	m	CONSTANT	30.2	78.6	3.00	560.
Source thickness (mixing zone depth)	m	DERIVED	0.000E+00	0.600	2.00	10.0
Conductivity (hydraulic)	m/yr	CONSTANT	0.389E+04	0.758E+04	31.6	0.151E+06
Gradient (hydraulic)		CONSTANT	0.460E-03	0.310E-01	0.100E-04	0.100
Groundwater seepage velocity	m/yr	DERIVED	0.000E+00	0.000E+00	0.100E-01	0.925E+04
Retardation coefficient	--	DERIVED	1.00	0.100	1.00	0.352E+06
Longitudinal dispersivity	m	CONSTANT	1.00	0.700	0.100	324.
Transverse dispersivity	m	CONSTANT	0.125	0.000E+00	0.100	41.0
Vertical dispersivity	m	DERIVED	0.950	0.950E-01	0.380	250.
Temperature of aquifer	C	CONSTANT	16.6	5.29	5.00	30.0
pH	--	CONSTANT	4.82	1.28	0.300	14.0
Organic carbon content (fraction)		CONSTANT	1.00	0.300E-03	0.100E-02	0.100E-01
Well distance from site	m	CONSTANT	10.0	0.000E+00	15.2	0.160E+04
Angle off center	degree	CONSTANT	0.000E+00	0.000E+00	0.000E+00	45.0
Well vertical distance	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	560.

1

TIME	CONCENTRATION
0.140E+05	0.22955E-01
0.141E+05	0.23304E-01
0.142E+05	0.23636E-01
0.143E+05	0.23950E-01
0.144E+05	0.24247E-01
0.145E+05	0.24525E-01
0.146E+05	0.24785E-01
0.147E+05	0.25025E-01
0.148E+05	0.25247E-01
0.149E+05	0.25450E-01
0.150E+05	0.25633E-01
0.151E+05	0.25797E-01
0.152E+05	0.25940E-01
0.153E+05	0.26064E-01
0.154E+05	0.26168E-01
0.156E+05	0.26318E-01
0.157E+05	0.26364E-01
0.158E+05	0.26391E-01
0.159E+05	0.26399E-01
0.160E+05	0.26389E-01

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

VERSION 3.3, DECEMBER 1988

Developed by Phillip Mineart and Atul Salhotra of
Woodward-Clyde Consultants, Oakland, California
In cooperation with:
Hydrogeologic, Inc., Herndon, Virginia,
Geotrans, Inc., Herndon, Virginia,
and
Aqua Terra Consultants, Mountain View, California

1
Run options
--- -------

RUN2B C&R BATTERY AVE. CASE-10,000 ACTION LEVEL

TIME TO REACH MCL AT 10M RECEPTOR
Chemical simulated is Pb

Option Chosen — Saturated and unsaturated zone models
Run was — DETERMIN
Run was transient
Reject runs if Y coordinate outside plume
Reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

CHEMICAL SPECIFIC VARIABLES

		PARAMETERS	

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.352E+05
Dissolved phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.221E+09
Overall chemical decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.358E+05
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	370.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	280.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	0.250E+08
Reference temperature	C	CONSTANT	16.6	0.000E+00	0.000E+00	40.0
Normalized distribution coefficient	ml/g 7	CONSTANT	752.	0.000E+00	0.000E+00	0.331
Distribution coefficient	--	DERIVED	0.200	0.000E+00	0.000E+00	0.166E+05
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	100.
Air diffusion coefficient	cm2/s	CONSTANT	0.645E-01	0.645E-02	0.000E+00	1.00
Reference temperature for air diffusion	C	CONSTANT	25.0	0.000E+00	15.0	30.0
Molecular weight	g/M	CONSTANT	207.	0.000E+00	0.000E+00	0.100E+05
Mole fraction of solute	--	CONSTANT	0.100	0.100E-01	0.100E-02	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000E+00	0.230E-01	0.000E+00	10.0
Henry's law constant	atm-m^3/M	CONSTANT	0.100E-06	0.000E+00	0.000E+00	1.00
RFD value for drinking water	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
ADIF value for fish consumption	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
CCC for aquatic organisms	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.610E-02	0.700E-02	0.254E-04	0.688
Area of waste disposal unit	m^2	DERIVED	0.277E+05	2.16	-0.884	12.3
Duration of pulse	yr	CONSTANT	0.450E+04	3.00	0.100	0.100E+31
Spread of contaminant source	m	DERIVED	21.7	0.000E+00	0.100E-02	0.600E+05
Recharge rate	m/yr	CONSTANT	0.610E-02	0.760E-02	0.254E-04	0.668
Source decay constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	10.0
Initial concentration at landfill	mg/l	CONSTANT	1.00	0.100E-01	0.000E+00	10.0
Length scale of facility	m	CONSTANT	213.	1.00	1.00	0.100E+06
Width scale of facility	m	CONSTANT	130.	1.00	1.00	0.100E+06

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	7
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

COORDINATE DATA, Computer generated
1

GRID SPACING PARAMETERS

XSTART:	0.0
XO:	8.2
DX:	0.5
XFAC:	1.5
DXMAX:	2.0

MATERIAL NUMBER FOR EACH LAYER
1 1 1 1 1 1 1

1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	0.320E-01	2.92	0.000E+00	3.50
Unsaturated zone porosity	--	CONSTANT	0.380	0.200E-01	0.200	0.700
Air entry pressure head	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	1.00
Depth of the unsaturated zone	m	CONSTANT	8.20	1.00	0.610	366.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.880E-01	0.900E-02	0.000E+00	0.115
Brook and Corey exponent, EN	--	CONSTANT	0.500	0.100	0.000E+00	1.00
ALFA coefficient	1/cm	CONSTANT	0.900E-02	0.970E-01	0.000E+00	0.150
Van Genuchten exponent, ENN	--	CONSTANT	1.23	0.610E-01	1.00	1.50

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

NLAY	- Number of different layers used		1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	10.0
WTFUN	- Weighting factor	--	1.2

OPTIONS CHOSEN

Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Thickness of layer	m	CONSTANT	8.20	1.00	0.000E+00	500.
Longitudinal dispersivity of layer	m	CONSTANT	0.400	0.400E-01	0.000E+00	10.0
Percent organic matter	--	CONSTANT	0.747	7.77	0.000E+00	11.0
Bulk density of soil for layer	g/cc	CONSTANT	1.70	0.200E-01	0.795	2.12
Biological decay coefficient	1/yr	CONSTANT	0.000E+00	0.200E-01	0.000E+00	5.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.630E-03	0.630E-04	0.400E-03	0.100
Aquifer porosity	--	CONSTANT	0.380	0.000E+00	0.300	0.560
Bulk density	g/cc	CONSTANT	1.70	0.000E+00	1.16	1.80
Aquifer thickness	m	CONSTANT	30.2	78.6	3.00	560.
Source thickness (mixing zone depth)	m	DERIVED	0.000E+00	0.600	2.00	10.0
Conductivity (hydraulic)	m/yr	CONSTANT	0.389E+04	0.758E+04	31.6	0.151E+06
Gradient (hydraulic)		CONSTANT	0.460E-03	0.310E-01	0.100E-04	0.100
Groundwater seepage velocity	m/yr	DERIVED	0.000E+00	0.000E+00	0.100E-01	0.925E+04
Retardation coefficient	--	DERIVED	1.00	0.100	1.00	0.352E+06
Longitudinal dispersivity	m	CONSTANT	1.00	0.700	0.100	324.
Transverse dispersivity	m	CONSTANT	0.125	0.000E+00	0.100	41.0
Vertical dispersivity	m	DERIVED	0.950	0.950E-01	0.380	250.
Temperature of aquifer	C	CONSTANT	16.6	5.29	5.00	30.0
pH	--	CONSTANT	4.82	1.28	0.300	14.0
Organic carbon content (fraction)		CONSTANT	1.00	0.300E-03	0.100E-02	0.100E-01
Well distance from site	m	CONSTANT	10.0	0.000E+00	15.2	0.160E+04
Angle off center	degree	CONSTANT	0.000E+00	0.000E+00	0.000E+00	45.0
Well vertical distance	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	560.

1

TIME	CONCENTRATION
0.630E+04	0.23036E-04
0.631E+04	0.23868E-04
0.632E+04	0.24722E-04
0.633E+04	0.25598E-04
0.634E+04	0.26496E-04
0.635E+04	0.27417E-04
0.636E+04	0.28362E-04
0.637E+04	0.29329E-04
0.638E+04	0.30321E-04
0.639E+04	0.31336E-04
0.640E+04	0.32376E-04
0.725E+04	0.23566E-03
0.726E+04	0.23964E-03
0.727E+04	0.24367E-03
0.728E+04	0.24775E-03
0.729E+04	0.25187E-03
0.730E+04	0.25603E-03
0.731E+04	0.26023E-03
0.732E+04	0.26448E-03
0.160E+05	0.26389E-01

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

VERSION 3.3, DECEMBER 1988

Developed by Phillip Mineart and Atul Salhotra of
Woodward-Clyde Consultants, Oakland, California
In cooperation with:
Hydrogeologic, Inc., Herndon, Virginia,
Geotrans, Inc., Herndon, Virginia,
and
Aqua Terra Consultants, Mountain View, California

1
Run options
--- -------

RUN2C C&R BATTERY AVE. CASE-10,000 ACTION LEVEL

MAXIMUM CONC. AT 100M RECEPTOR
Chemical simulated is Pb

Option Chosen	Saturated and unsaturated zone models
Run was	DETERMIN

Run was transient
Reject runs if Y coordinate outside plume
Reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model
1
1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.352E+05
Dissolved phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.221E+09
Overall chemical decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.358E+05
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	370.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	280.
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	0.250E+08
Reference temperature	C	CONSTANT	16.6	0.000E+00	0.000E+00	40.0
Normalized distribution coefficient	ml/g 7	CONSTANT	752.	0.000E+00	0.000E+00	0.331
Distribution coefficient	--	DERIVED	0.200	0.000E+00	0.000E+00	0.166E+05
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	100.
Air diffusion coefficient	cm2/s	CONSTANT	0.645E-01	0.645E-02	0.000E+00	1.00
Reference temperature for air diffusion	C	CONSTANT	25.0	0.000E+00	15.0	30.0
Molecular weight	g/M	CONSTANT	207.	0.000E+00	0.000E+00	0.100E+05
Mole fraction of solute	--	CONSTANT	0.100	0.100E-01	0.100E-02	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000E+00	0.230E-01	0.000E+00	10.0
Henry's law constant	atm-m^3/M	CONSTANT	0.100E-06	0.000E+00	0.000E+00	1.00
RFD value for drinking water	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
ADIF value for fish consumption	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
CCC for aquatic organisms	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.610E-02	0.700E-02	0.254E-04	0.688
Area of waste disposal unit	m^2	DERIVED	0.277E+05	2.16	-0.884	12.3
Duration of pulse	yr	CONSTANT	0.450E+04	3.00	0.100	0.100E+31
Spread of contaminant source	m	DERIVED	21.7	0.000E+00	0.100E-02	0.600E+05
Recharge rate	m/yr	CONSTANT	0.610E-02	0.760E-02	0.254E-04	0.668
Source decay constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	10.0
Initial concentration at landfill	mg/l	CONSTANT	1.00	0.100E-01	0.000E+00	10.0
Length scale of facility	m	CONSTANT	213.	1.00	1.00	0.100E+06
Width scale of facility	m	CONSTANT	130.	1.00	1.00	0.100E+06

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	7
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1

OPTIONS CHOSEN
--- ---
Van Genuchten functional coefficients
User defined coordinate system

COORDINATE DATA, Computer generated

GRID SPACING PARAMETERS

XSTART:	0.0
XO:	8.2
DX:	0.5
XFAC:	1.5
DXMAX:	2.0

AR302978

MATERIAL [illegible]BER FOR EACH LAYER
1 1 1 1 1 1 1

1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	0.320E-01	2.92	0.000E+00	3.50
Unsaturated zone porosity	--	CONSTANT	0.380	0.200E-01	0.200	0.700
Air entry pressure head	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	1.00
Depth of the unsaturated zone	m	CONSTANT	8.20	1.00	0.610	366.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.880E-01	0.900E-02	0.000E+00	0.115
Brook and Corey exponent, EN	--	CONSTANT	0.500	0.100	0.000E+00	1.00
ALFA coefficient	1/cm	CONSTANT	0.900E-02	0.970E-01	0.000E+00	0.150
Van Genuchten exponent, ENN	--	CONSTANT	1.23	0.610E-01	1.00	1.50

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

NLAY	- Number of different layers used		1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	10.0
WTFUN	- Weighting factor	--	1.2

OPTIONS CHOSEN

Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Thickness of layer	m	CONSTANT	8.20	1.00	0.000E+00	500.
Longitudinal dispersivity of layer	m	CONSTANT	0.400	0.400E-01	0.000E+00	10.0
Percent organic matter	--	CONSTANT	0.747	7.77	0.000E+00	11.0
Bulk density of soil for layer	g/cc	CONSTANT	1.70	0.200E-01	0.795	2.12
Biological decay coefficient	1/yr	CONSTANT	0.000E+00	0.200E-01	0.000E+00	5.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Particle diameter	cm	CONSTANT	0.630E-03	0.630E-04	0.400E-03	0.100
Aquifer porosity	--	CONSTANT	0.380	0.000E+00	0.300	0.560
Bulk density	g/cc	CONSTANT	1.70	0.000E+00	1.16	1.80
Aquifer thickness	m	CONSTANT	30.2	78.6	3.00	560.
Source thickness (mixing zone depth)	m	DERIVED	0.000E+00	0.600	2.00	10.0
Conductivity (hydraulic)	m/yr	CONSTANT	0.389E+04	0.758E+04	31.6	0.151E+06
Gradient (hydraulic)		CONSTANT	0.460E-03	0.310E-01	0.100E-04	0.100
Groundwater seepage velocity	m/yr	DERIVED	0.000E+00	0.000E+00	0.100E-01	0.925E+04
Retardation coefficient	--	DERIVED	1.00	0.100	1.00	0.352E+06
Longitudinal dispersivity	m	CONSTANT	10.0	0.700	0.100	324.
Transverse dispersivity	m	CONSTANT	1.25	0.000E+00	0.100	41.0
Vertical dispersivity	m	DERIVED	0.950	0.950E-01	0.380	250.
Temperature of aquifer	C	CONSTANT	16.6	5.29	5.00	30.0
pH	--	CONSTANT	4.82	1.28	0.300	14.0
Organic carbon content (fraction)		CONSTANT	1.00	0.300E-03	0.100E-02	0.100E-01
Well distance from site	m	CONSTANT	100.	0.000E+00	15.2	0.160E+04
Angle off center	degree	CONSTANT	0.000E+00	0.000E+00	0.000E+00	45.0
Well vertical distance	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	560.

1

TIME	CONCENTRATION
0.600E+05	0.38155E-02
0.605E+05	0.38232E-02
0.610E+05	0.38288E-02
0.615E+05	0.38325E-02
0.620E+05	0.38341E-02
0.625E+05	0.38340E-02
0.630E+05	0.38323E-02
0.635E+05	0.38280E-02
0.640E+05	0.38229E-02
0.645E+05	0.38162E-02
0.650E+05	0.38060E-02
0.655E+05	0.37964E-02
0.660E+05	0.37851E-02
0.665E+05	0.37691E-02
0.670E+05	0.37558E-02
0.675E+05	0.37414E-02
0.680E+05	0.37226E-02
0.685E+05	0.37063E-02
0.690E+05	0.36874E-02
0.695E+05	0.36683E-02

1

U. S. ENVIRONMENTAL PROTECTION AGENCY

EXPOSURE ASSESSMENT

MULTIMEDIA MODEL

VERSION 3.3, DECEMBER 1988

Developed by Phillip Mineart and Atul Salhotra of
Woodward-Clyde Consultants, Oakland, California
In cooperation with:
Hydrogeologic, Inc., Herndon, Virginia,
Geotrans, Inc., Herndon, Virginia,
and
Aqua Terra Consultants, Mountain View, California

1
Run options
--- -------

RUN2D C&R BATTERY AVE. CASE-10,000 ACTION LEVEL

TIME TO REACH MCL AT 100M RECEPTOR
Chemical simulated is Pb

Option Chosen	Saturated and unsaturated zone models
Run was	DETERMIN
Run was transient	
Reject runs if Y coordinate outside plume	
Reject runs if Z coordinate outside plume	
Gaussian source used in saturated zone model	

1
CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.352E+05
Dissolved phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.221E+09
Overall chemical decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.358E+05
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	370.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	280.
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	0.250E+08
Reference temperature	C	CONSTANT	16.6	0.000E+00	0.000E+00	40.0
Normalized distribution coefficient	ml/g 7	CONSTANT	752.	0.000E+00	0.000E+00	0.331
Distribution coefficient	--	DERIVED	0.200	0.000E+00	0.000E+00	0.166E+05
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	100.
Air diffusion coefficient	cm2/s	CONSTANT	0.645E-01	0.645E-02	0.000E+00	1.00
Reference temperature for air diffusion	C	CONSTANT	25.0	0.000E+00	15.0	30.0
Molecular weight	g/M	CONSTANT	207.	0.000E+00	0.000E+00	0.100E+05
Mole fraction of solute	--	CONSTANT	0.100	0.100E-01	0.100E-02	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000E+00	0.230E-01	0.000E+00	10.0
Henry's law constant	atm-m^3/M	CONSTANT	0.100E-06	0.000E+00	0.000E+00	1.00
RFD value for drinking water	*mg-kg/day*	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
ADIF value for fish consumption	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
CCC for aquatic organisms	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.610E-02	0.700E-02	0.254E-04	0.688
Area of waste disposal unit	m^2	DERIVED	0.277E+05	2.16	-0.884	12.3
Duration of pulse	yr	CONSTANT	0.450E+04	3.00	0.100	0.100E+31
Spread of contaminant source	m	DERIVED	21.7	0.000E+00	0.100E-02	0.600E+05
Recharge rate	m/yr	CONSTANT	0.610E-02	0.760E-02	0.254E-04	0.668
Source decay constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	10.0
Initial concentration at landfill	mg/l	CONSTANT	1.00	0.100E-01	0.000E+00	10.0
Length scale of facility	m	CONSTANT	213.	1.00	1.00	0.100E+06
Width scale of facility	m	CONSTANT	130.	1.00	1.00	0.100E+06

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	7
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

COORDINATE DATA, Computer generated

21

GRID SPACING PARAMETERS

XSTART: 0.0
XO: 8.2
DX: 0.5
XFAC: 1.5
DXMAX: 2.0

MATERIAL NUMBER FOR EACH LAYER
1 1 1 1 1 1 1

1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	0.320E-01	2.92	0.000E+00	3.50
Unsaturated zone porosity	--	CONSTANT	0.380	0.200E-01	0.200	0.700
Air entry pressure head	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	1.00
Depth of the unsaturated zone	m	CONSTANT	8.20	1.00	0.610	366.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.880E-01	0.900E-02	0.000E+00	0.115
Brook and Corey exponent,EN	--	CONSTANT	0.500	0.100	0.000E+00	1.00
ALFA coefficient	1/cm	CONSTANT	0.900E-02	0.970E-01	0.000E+00	0.150
Van Genuchten exponent, ENN	--	CONSTANT	1.23	0.610E-01	1.00	1.50

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

NLAY	- Number of different layers used		1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	10.0
WTFUN	- Weighting factor	--	1.2

AR302983

OPTIONS CHOSEN

Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

PARAMETERS

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Thickness of layer	m	CONSTANT	8.20	1.00	0.000E+00	500.
Longitudinal dispersivity of layer	m	CONSTANT	0.400	0.400E-01	0.000E+00	10.0
Percent organic matter	--	CONSTANT	0.747	7.77	0.000E+00	11.0
Bulk density of soil for layer	g/cc	CONSTANT	1.70	0.200E-01	0.795	2.12
Biological decay coefficient	1/yr	CONSTANT	0.000E+00	0.200E-01	0.000E+00	5.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Particle diameter	cm	CONSTANT	0.630E-03	0.630E-04	0.400E-03	0.100
Aquifer porosity	--	CONSTANT	0.380	0.000E+00	0.300	0.560
Bulk density	g/cc	CONSTANT	1.70	0.000E+00	1.16	1.80
Aquifer thickness	m	CONSTANT	30.2	78.6	3.00	560.
Source thickness (mixing zone depth)	m	DERIVED	0.000E+00	0.600	2.00	10.0
Conductivity (hydraulic)	m/yr	CONSTANT	0.389E+04	0.758E+04	31.6	0.151E+06
Gradient (hydraulic)		CONSTANT	0.460E-03	0.310E-01	0.100E-04	0.100
Groundwater seepage velocity	m/yr	DERIVED	0.000E+00	0.000E+00	0.100E-01	0.925E+04
Retardation coefficient	--	DERIVED	1.00	0.100	1.00	0.352E+06
Longitudinal dispersivity	m	CONSTANT	10.0	0.700	0.100	324.
Transverse dispersivity	m	CONSTANT	1.25	0.000E+00	0.100	41.0
Vertical dispersivity	m	DERIVED	0.950	0.950E-01	0.380	250.
Temperature of aquifer	C	CONSTANT	16.6	5.29	5.00	30.0
pH	--	CONSTANT	4.82	1.28	0.300	14.0
Organic carbon content (fraction)		CONSTANT	1.00	0.300E-03	0.100E-02	0.100E-01
Well distance from site	m	CONSTANT	100.	0.000E+00	15.2	0.160E+04
Angle off center	degree	CONSTANT	0.000E+00	0.000E+00	0.000E+00	45.0
Well vertical distance	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	560.

1

TIME	CONCENTRATION
0.230E+05	0.15715E-04
0.231E+05	0.16643E-04
0.232E+05	0.17607E-04
0.233E+05	0.18624E-04
0.234E+05	0.20238E-04
0.235E+05	0.20800E-04
0.235E+05	0.21377E-04
0.236E+05	0.21964E-04
0.237E+05	0.23178E-04
0.238E+05	0.24445E-04
0.294E+05	0.23045E-03
0.294E+05	0.23389E-03
0.295E+05	0.23736E-03
0.295E+05	0.24087E-03
0.296E+05	0.24441E-03
0.296E+05	0.24798E-03
0.297E+05	0.25159E-03
0.297E+05	0.25523E-03
0.298E+05	0.25891E-03
0.630E+05	0.38320E-02

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

VERSION 3.3, DECEMBER 1988

Developed by Phillip Mineart and Atul Salhotra of
Woodward-Clyde Consultants, Oakland, California
In cooperation with:
Hydrogeologic, Inc., Herndon, Virginia,
Geotrans, Inc., Herndon, Virginia,
and
Aqua Terra Consultants, Mountain View, California

1
Run options
--- -------

RUN3A C&R BATTERY AVE. CASE-1000 ACTION LEVEL

MAXIMUM CONC. AT 10M RECEPTOR
Chemical simulated is Pb

Option Chosen	Saturated and unsaturated zone models
Run was	DETERMIN
Run was transient	
Reject runs if Y coordinate outside plume	
Reject runs if Z coordinate outside plume	
Gaussian source used in saturated zone model	

CHEMICAL SPECIFIC VARIABLES

[illegible]	UNITS	DISTRIBUTION	PARAMETERS	LIMITS

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.352E+05
Dissolved phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.221E+09
Overall chemical decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.358E+05
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	370.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	280.
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	0.250E+08
Reference temperature	C	CONSTANT	16.6	0.000E+00	0.000E+00	40.0
Normalized distribution coefficient	ml/g 7	CONSTANT	0.100E+04	0.000E+00	0.000E+00	0.331
Distribution coefficient	--	DERIVED	0.200	0.000E+00	0.000E+00	0.166E+05
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	100.
Air diffusion coefficient	cm2/s	CONSTANT	0.645E-01	0.645E-02	0.000E+00	1.00
Reference temperature for air diffusion	C	CONSTANT	25.0	0.000E+00	15.0	30.0
Molecular weight	g/M	CONSTANT	207.	0.000E+00	0.000E+00	0.100E+05
Mole fraction of solute	--	CONSTANT	0.100	0.100E-01	0.100E-02	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000E+00	0.230E-01	0.000E+00	10.0
Henry's law constant	atm-m^3/M	CONSTANT	0.100E-06	0.000E+00	0.000E+00	1.00
RFD value for drinking water	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
ADIF value for fish consumption	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
CCC for aquatic organisms	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.610E-02	0.700E-02	0.254E-04	0.688
Area of waste disposal unit	m^2	DERIVED	0.277E+05	2.16	-0.884	12.3
Duration of pulse	yr	CONSTANT	0.162E+04	3.00	0.100	0.100E+31
Spread of contaminant source	m	DERIVED	21.7	0.000E+00	0.100E-02	0.600E+05
Recharge rate	m/yr	CONSTANT	0.610E-02	0.760E-02	0.254E-04	0.668
Source decay constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	10.0
Initial concentration at landfill	mg/l	CONSTANT	1.00	0.100E-01	0.000E+00	10.0
Length scale of facility	m	CONSTANT	213.	1.00	1.00	0.100E+06
Width scale of facility	m	CONSTANT	130.	1.00	1.00	0.100E+06

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	7
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

COORDINATE DATA, Computer generated

GRID SPACING PARAMETERS

XSTART:	0.0
XO:	8.2
DX:	0.5
XFAC:	1.5
DXMAX:	2.0

MATERIAL NUMBER FOR EACH LAYER
1 1 1 1 1 1 1

1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	0.320E-01	2.92	0.000E+00	3.50
Unsaturated zone porosity	--	CONSTANT	0.380	0.200E-01	0.200	0.700
Air entry pressure head	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	1.00
Depth of the unsaturated zone	m	CONSTANT	8.20	1.00	0.610	366.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.880E-01	0.900E-02	0.000E+00	0.115
Brook and Corey exponent, EN	--	CONSTANT	0.500	0.100	0.000E+00	1.00
ALFA coefficient	1/cm	CONSTANT	0.900E-02	0.970E-01	0.000E+00	0.150
Van Genuchten exponent, ENN	--	CONSTANT	1.23	0.610E-01	1.00	1.50

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

NLAY	- Number of different layers used		1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	10.0
WTFUN	- Weighting factor	--	1.2

OPTIONS CHOSEN
Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations

1

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS	LIMITS

AR302987

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Thickness of layer	m	CONSTANT	8.20	1.00	0.000E+00	500.
Longitudinal dispersivity of layer	m	CONSTANT	0.400	0.400E-01	0.000E+00	10.0
Percent organic matter	--	CONSTANT	30.3	7.77	0.000E+00	11.0
Bulk density of soil for layer	g/cc	CONSTANT	1.70	0.200E-01	0.795	2.12
Biological decay coefficient	1/yr	CONSTANT	0.000E+00	0.200E-01	0.000E+00	5.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Particle diameter	cm	CONSTANT	0.630E-03	0.630E-04	0.400E-03	0.100
Aquifer porosity	--	CONSTANT	0.380	0.000E+00	0.300	0.560
Bulk density	g/cc	CONSTANT	1.70	0.000E+00	1.16	1.80
Aquifer thickness	m	CONSTANT	30.2	78.6	3.00	560.
Source thickness (mixing zone depth)	m	DERIVED	0.000E+00	0.600	2.00	10.0
Conductivity (hydraulic)	m/yr	CONSTANT	0.389E+04	0.758E+04	31.6	0.151E+06
Gradient (hydraulic)		CONSTANT	0.460E-03	0.310E-01	0.100E-04	0.100
Groundwater seepage velocity	m/yr	DERIVED	0.000E+00	0.000E+00	0.100E-01	0.925E+04
Retardation coefficient	--	DERIVED	1.00	0.100	1.00	0.352E+06
Longitudinal dispersivity	m	CONSTANT	1.00	0.700	0.100	324.
Transverse dispersivity	m	CONSTANT	0.125	0.000E+00	0.100	41.0
Vertical dispersivity	m	DERIVED	0.950	0.950E-01	0.380	250.
Temperature of aquifer	C	CONSTANT	16.6	5.29	5.00	30.0
pH	--	CONSTANT	4.82	1.28	0.300	14.0
Organic carbon content (fraction)		CONSTANT	1.00	0.300E-03	0.100E-02	0.100E-01
Well distance from site	m	CONSTANT	10.0	0.000E+00	15.2	0.160E+04
Angle off center	degree	CONSTANT	0.000E+00	0.000E+00	0.000E+00	45.0
Well vertical distance	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	560.

1

TIME	CONCENTRATION
0.300E+06	0.26055E-03
0.310E+06	0.27706E-03
0.320E+06	0.29280E-03
0.330E+06	0.30687E-03
0.340E+06	0.33434E-03
0.350E+06	0.31359E-03
0.360E+06	0.30425E-03
0.370E+06	0.29437E-03
0.380E+06	0.29045E-03
0.390E+06	0.28571E-03
0.400E+06	0.28103E-03
0.410E+06	0.27934E-03
0.420E+06	0.26867E-03
0.430E+06	0.24952E-03
0.440E+06	0.23302E-03
0.450E+06	0.21713E-03
0.460E+06	0.20344E-03
0.470E+06	0.19077E-03
0.480E+06	0.18897E-03
0.490E+06	0.17329E-03

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S M E N T

M U L T I M E D I A M O D E L

VERSION 3.3, DECEMBER 1988

Developed by Phillip Mineart and Atul Salhotra of
Woodward-Clyde Consultants, Oakland, California
In cooperation with:
Hydrogeologic, Inc., Herndon, Virginia,
Geotrans, Inc., Herndon, Virginia,
and
Aqua Terra Consultants, Mountain View, California

1
Run options
--- -------

RUN3B C&R BATTERY AVE. CASE-1000 ACTION LEVEL

TIME TO REACH MCL AT 10M RECEPTOR
Chemical simulated is Pb

Option Chosen	Saturated and unsaturated zone models
Run was	DETERMIN
Run was transient	
Reject runs if Y coordinate outside plume	
Reject runs if Z coordinate outside plume	
Gaussian source used in saturated zone model	

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.352E+05
Dissolved phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.221E+09
Overall chemical decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.358E+05
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	370.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	280.
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	0.250E+08
Reference temperature	C	CONSTANT	16.6	0.000E+00	0.000E+00	40.0
Normalized distribution coefficient	ml/g 7	CONSTANT	0.100E+04	0.000E+00	0.000E+00	0.331
Distribution coefficient	--	DERIVED	0.200	0.000E+00	0.000E+00	0.166E+05
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	100.
Air diffusion coefficient	cm2/s	CONSTANT	0.645E-01	0.645E-02	0.000E+00	1.00
Reference temperature for air diffusion	C	CONSTANT	25.0	0.000E+00	15.0	30.0
Molecular weight	g/M	CONSTANT	207.	0.000E+00	0.000E+00	0.100E+05
Mole fraction of solute	--	CONSTANT	0.100	0.100E-01	0.100E-02	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000E+00	0.230E-01	0.000E+00	10.0
Henry's law constant	atm-m^3/M	CONSTANT	0.100E-06	0.000E+00	0.000E+00	1.00
RFD value for drinking water	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
ADIF value for fish consumption	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
CCC for aquatic organisms	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.610E-02	0.700E-02	0.254E-04	0.688
Area of waste disposal unit	m^2	DERIVED	0.277E+05	2.16	-0.884	12.3
Duration of pulse	yr	CONSTANT	0.162E+04	3.00	0.100	0.100E+31
Spread of contaminant source	m	DERIVED	21.7	0.000E+00	0.100E-02	0.600E+05
Recharge rate	m/yr	CONSTANT	0.610E-02	0.760E-02	0.254E-04	0.668
Source decay constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	10.0
Initial concentration at landfill	mg/l	CONSTANT	1.00	0.100E-01	0.000E+00	10.0
Length scale of facility	m	CONSTANT	213.	1.00	1.00	0.100E+06
Width scale of facility	m	CONSTANT	130.	1.00	1.00	0.100E+06

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	7
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

COORDINATE DATA, Computer generated

GRID SPACING PARAMETERS

XSTART: 0.0
XO: 8.2
DX: 0.5
XFAC: 1.5

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

VERSION 3.3, DECEMBER 1988

Developed by Phillip Mineart and Atul Salhotra of
Woodward-Clyde Consultants, Oakland, California
In cooperation with:
Hydrogeologic, Inc., Herndon, Virginia,
Geotrans, Inc., Herndon, Virginia,
and
Aqua Terra Consultants, Mountain View, California

1
Run options
--- -------

RUN3C C&R BATTERY AVE. CASE-1000 ACTION LEVEL

MAXIMUM CONC. AT 100M RECEPTOR
Chemical simulated is Pb

Option Chosen — Saturated and unsaturated zone models
Run was — DETERMIN
Run was transient
Reject runs if Y coordinate outside plume
Reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model
1
1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.352E+05
Dissolved phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.221E+09
Overall chemical decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.358E+05
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	370.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	280.
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	0.250E+08
Reference temperature	C	CONSTANT	16.6	0.000E+00	0.000E+00	40.0
Normalized distribution coefficient	ml/g 7	CONSTANT	0.100E+04	0.000E+00	0.000E+00	0.331
Distribution coefficient	--	DERIVED	0.200	0.000E+00	0.000E+00	0.166E+05
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	100.
Air diffusion coefficient	cm2/s	CONSTANT	0.645E-01	0.645E-02	0.000E+00	1.00
Reference temperature for air diffusion	C	CONSTANT	25.0	0.000E+00	15.0	30.0
Molecular weight	g/M	CONSTANT	207.	0.000E+00	0.000E+00	0.100E+05
Mole fraction of solute	--	CONSTANT	0.100	0.100E-01	0.100E-02	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000E+00	0.230E-01	0.000E+00	10.0
Henry's law constant	atm-m^3/M	CONSTANT	0.100E-06	0.000E+00	0.000E+00	1.00
RFD value for drinking water	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
ADIF value for fish consumption	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
CCC for aquatic organisms	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.610E-02	0.700E-02	0.254E-04	0.688
Area of waste disposal unit	m^2	DERIVED	0.277E+05	2.16	-0.884	12.3
Duration of pulse	yr	CONSTANT	0.162E+04	3.00	0.100	0.100E+31
Spread of contaminant source	m	DERIVED	21.7	0.000E+00	0.100E-02	0.600E+05
Recharge rate	m/yr	CONSTANT	0.610E-02	0.760E-02	0.254E-04	0.668
Source decay constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	10.0
Initial concentration at landfill	mg/l	CONSTANT	1.00	0.100E-01	0.000E+00	10.0
Length scale of facility	m	CONSTANT	213.	1.00	1.00	0.100E+06
Width scale of facility	m	CONSTANT	130.	1.00	1.00	0.100E+06

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	7
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1

AR302993

OPTIONS CHOSEN
Van Genuchten functional coefficients
User defined coordinate system

COORDINATE DATA, Computer generated

1

GRID SPACING PARAMETERS

XSTART: 0.0
XO: 8.2
DX: 0.5
XFAC: 1.5
DXMAX: 2.0

MATERIAL NUMBER FOR EACH LAYER
1 1 1 1 1 1 1

1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	0.320E-01	2.92	0.000E+00	3.50
Unsaturated zone porosity	--	CONSTANT	0.380	0.200E-01	0.200	0.700
Air entry pressure head	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	1.00
Depth of the unsaturated zone	m	CONSTANT	8.20	1.00	0.610	366.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.880E-01	0.900E-02	0.000E+00	0.115
Brook and Corey exponent, EN	--	CONSTANT	0.500	0.100	0.000E+00	1.00
ALFA coefficient	1/cm	CONSTANT	0.900E-02	0.970E-01	0.000E+00	0.150
Van Genuchten exponent, ENN	--	CONSTANT	1.23	0.610E-01	1.00	1.50

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

NLAY	- Number of different layers used		1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	10.0
WTFUN	- Weighting factor	--	1.2

OPTIONS CHOSEN

Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations

1

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Thickness of layer	m	CONSTANT	8.20	1.00	0.000E+00	500.
Longitudinal dispersivity of layer	m	CONSTANT	0.400	0.400E-01	0.000E+00	10.0
Percent organic matter	--	CONSTANT	30.3	7.77	0.000E+00	11.0
Bulk density of soil for layer	g/cc	CONSTANT	1.70	0.200E-01	0.795	2.12
Biological decay coefficient	1/yr	CONSTANT	0.000E+00	0.200E-01	0.000E+00	5.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Particle diameter	cm	CONSTANT	0.630E-03	0.630E-04	0.400E-03	0.100
Aquifer porosity	--	CONSTANT	0.380	0.000E+00	0.300	0.560
Bulk density	g/cc	CONSTANT	1.70	0.000E+00	1.16	1.80
Aquifer thickness	m	CONSTANT	30.2	78.6	3.00	560.
Source thickness (mixing zone depth)	m	DERIVED	0.000E+00	0.600	2.00	10.0
Conductivity (hydraulic)	m/yr	CONSTANT	0.389E+04	0.758E+04	31.6	0.151E+06
Gradient (hydraulic)		CONSTANT	0.460E-03	0.310E-01	0.100E-04	0.100
Groundwater seepage velocity	m/yr	DERIVED	0.000E+00	0.000E+00	0.100E-01	0.925E+04
Retardation coefficient	--	DERIVED	1.00	0.100	1.00	0.352E+06
Longitudinal dispersivity	m	CONSTANT	10.0	0.700	0.100	324.
Transverse dispersivity	m	CONSTANT	1.25	0.000E+00	0.100	41.0
Vertical dispersivity	m	DERIVED	0.950	0.950E-01	0.380	250.
Temperature of aquifer	C	CONSTANT	16.6	5.29	5.00	30.0
pH	--	CONSTANT	4.82	1.28	0.300	14.0
Organic carbon content (fraction)		CONSTANT	1.00	0.300E-03	0.100E-02	0.100E-01
Well distance from site	m	CONSTANT	100.	0.000E+00	15.2	0.160E+04
Angle off center	degree	CONSTANT	0.000E+00	0.000E+00	0.000E+00	45.0
Well vertical distance	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	560.

1

TIME	CONCENTRATION
0.400E+06	0.24243E-03
0.420E+06	0.25413E-03
0.440E+06	0.25654E-03
0.460E+06	0.25481E-03
0.480E+06	0.24864E-03
0.500E+06	0.23182E-03
0.520E+06	0.21279E-03
0.540E+06	0.19661E-03
0.560E+06	0.17773E-03
0.580E+06	0.15397E-03
0.600E+06	0.13200E-03
0.620E+06	0.11570E-03
0.640E+06	0.10296E-03
0.660E+06	0.84786E-04
0.680E+06	0.68435E-04
0.700E+06	0.55281E-04
0.720E+06	0.46651E-04
0.740E+06	0.39626E-04
0.760E+06	0.33048E-04
0.780E+06	0.23788E-04

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

VERSION 3.3, DECEMBER 1988

Developed by Phillip Mineart and Atul Salhotra of
Woodward-Clyde Consultants, Oakland, California
In cooperation with:
Hydrogeologic, Inc., Herndon, Virginia,
Geotrans, Inc., Herndon, Virginia,
and
Aqua Terra Consultants, Mountain View, California

1
Run options
--- -------

RUN3D C&R BATTERY AVE. CASE-1000 ACTION LEVEL

TIME TO REACH MCL AT 100M
Chemical simulated is Pb

Option Chosen — Saturated and unsaturated zone models
Run was — DETERMIN
Run was transient
Reject runs if Y coordinate outside plume
Reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.352E+05
Dissolved phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.221E+09
Overall chemical decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.358E+05
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	370.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	280.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	0.250E+08
Reference temperature	C	CONSTANT	16.6	0.000E+00	0.000E+00	40.0
Normalized distribution coefficient	ml/g 7	CONSTANT	0.100E+04	0.000E+00	0.000E+00	0.331
Distribution coefficient	--	DERIVED	0.200	0.000E+00	0.000E+00	0.166E+05
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	100.
Air diffusion coefficient	cm2/s	CONSTANT	0.645E-01	0.645E-02	0.000E+00	1.00
Reference temperature for air diffusion	C	CONSTANT	25.0	0.000E+00	15.0	30.0
Molecular weight	g/M	CONSTANT	207.	0.000E+00	0.000E+00	0.100E+05
Mole fraction of solute	--	CONSTANT	0.100	0.100E-01	0.100E-02	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000E+00	0.230E-01	0.000E+00	10.0
Henry's law constant	atm-m^3/M	CONSTANT	0.100E-06	0.000E+00	0.000E+00	1.00
RFD value for drinking water	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
ADIF value for fish consumption	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
CCC for aquatic organisms	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.610E-02	0.700E-02	0.254E-04	0.688
Area of waste disposal unit	m^2	DERIVED	0.277E+05	2.16	-0.884	12.3
Duration of pulse	yr	CONSTANT	0.162E+04	3.00	0.100	0.100E+31
Spread of contaminant source	m	DERIVED	21.7	0.000E+00	0.100E-02	0.600E+05
Recharge rate	m/yr	CONSTANT	0.610E-02	0.760E-02	0.254E-04	0.668
Source decay constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	10.0
Initial concentration at landfill	mg/l	CONSTANT	1.00	0.100E-01	0.000E+00	10.0
Length scale of facility	m	CONSTANT	213.	1.00	1.00	0.100E+06
Width scale of facility	m	CONSTANT	130.	1.00	1.00	0.100E+06

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	7
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

COORDINATE DATA, Computer generated

1

GRID SPACING PARAMETERS

XSTART:	0.0
XO:	8.2
DX:	0.5
XFAC:	1.5
DXMAX:	2.0

AR302997

MATERIAL [redacted]BER FOR EACH LAYER
1 1 1 1 1 1 1

1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	0.320E-01	2.92	0.000E+00	3.50
Unsaturated zone porosity	--	CONSTANT	0.380	0.200E-01	0.200	0.700
Air entry pressure head	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	1.00
Depth of the unsaturated zone	m	CONSTANT	8.20	1.00	0.610	366.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.880E-01	0.900E-02	0.000E+00	0.115
Brook and Corey exponent,EN	--	CONSTANT	0.500	0.100	0.000E+00	1.00
ALFA coefficient	1/cm	CONSTANT	0.900E-02	0.970E-01	0.000E+00	0.150
Van Genuchten exponent, ENN	--	CONSTANT	1.23	0.610E-01	1.00	1.50

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

NLAY	- Number of different layers used		1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	10.0
WTFUN	- Weighting factor	--	1.2

OPTIONS CHOSEN

Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations

AR302998

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Thickness of layer	m	CONSTANT	8.20	1.00	0.000E+00	500.
Longitudinal dispersivity of layer	m	CONSTANT	0.400	0.400E-01	0.000E+00	10.0
Percent organic matter	--	CONSTANT	30.3	7.77	0.000E+00	11.0
Bulk density of soil for layer	g/cc	CONSTANT	1.70	0.200E-01	0.795	2.12
Biological decay coefficient	1/yr	CONSTANT	0.000E+00	0.200E-01	0.000E+00	5.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.630E-03	0.630E-04	0.400E-03	0.100
Aquifer porosity	--	CONSTANT	0.380	0.000E+00	0.300	0.560
Bulk density	g/cc	CONSTANT	1.70	0.000E+00	1.16	1.80
Aquifer thickness	m	CONSTANT	30.2	78.6	3.00	560.
Source thickness (mixing zone depth)	m	DERIVED	0.000E+00	0.600	2.00	10.0
Conductivity (hydraulic)	m/yr	CONSTANT	0.389E+04	0.758E+04	31.6	0.151E+06
Gradient (hydraulic)		CONSTANT	0.460E-03	0.310E-01	0.100E-04	0.100
Groundwater seepage velocity	m/yr	DERIVED	0.000E+00	0.000E+00	0.100E-01	0.925E+04
Retardation coefficient	--	DERIVED	1.00	0.100	1.00	0.352E+06
Longitudinal dispersivity	m	CONSTANT	10.0	0.700	0.100	324.
Transverse dispersivity	m	CONSTANT	1.25	0.000E+00	0.100	41.0
Vertical dispersivity	m	DERIVED	0.950	0.950E-01	0.380	250.
Temperature of aquifer	C	CONSTANT	16.6	5.29	5.00	30.0
pH	--	CONSTANT	4.82	1.28	0.300	14.0
Organic carbon content (fraction)		CONSTANT	1.00	0.300E-03	0.100E-02	0.100E-01
Well distance from site	m	CONSTANT	100.	0.000E+00	15.2	0.160E+04
Angle off center	degree	CONSTANT	0.000E+00	0.000E+00	0.000E+00	45.0
Well vertical distance	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	560.

1

TIME	CONCENTRATION
0.240E+06	0.51393E-05
0.245E+06	0.76164E-05
0.250E+06	0.10784E-04
0.255E+06	0.14703E-04
0.260E+06	0.21608E-04
0.265E+06	0.30688E-04
0.270E+06	0.40705E-04
0.275E+06	0.51232E-04
0.280E+06	0.61895E-04
0.285E+06	0.72385E-04
0.290E+06	0.82427E-04
0.295E+06	0.92001E-04
0.300E+06	0.10087E-03
0.305E+06	0.10906E-03
0.400E+06	0.24243E-03
0.500E+06	0.23182E-03
0.550E+06	0.18927E-03
0.580E+06	0.15397E-03
0.600E+06	0.13200E-03
0.610E+06	0.12318E-03

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

VERSION 3.3, DECEMBER 1988

Developed by Phillip Mineart and Atul Salhotra of
Woodward-Clyde Consultants, Oakland, California
In cooperation with:
Hydrogeologic, Inc., Herndon, Virginia,
Geotrans, Inc., Herndon, Virginia,
and
Aqua Terra Consultants, Mountain View, California

1
Run options
--- -------

RUN4A C&R BATTERY WORST CASE NO ACTION

MAXIMUM CONC. AT 10M RECEPTOR
Chemical simulated is Pb

Option Chosen — Saturated and unsaturated zone models
Run was — DETERMIN
Run was transient
Reject runs if Y coordinate outside plume
Reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model
1
1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Solid phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.352E+05
Dissolved phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.221E+09
Overall chemical decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.358E+05
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	370.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	280.
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	0.250E+08
Reference temperature	C	CONSTANT	16.6	0.000E+00	0.000E+00	40.0
Normalized distribution coefficient	ml/g	CONSTANT	0.340E-01	0.000E+00	0.000E+00	0.331E+06
Distribution coefficient	--	DERIVED	0.200	0.000E+00	0.000E+00	0.166E+05
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	100.
Air diffusion coefficient	cm2/s	CONSTANT	0.645E-01	0.645E-02	0.000E+00	1.00
Reference temperature for air diffusion	C	CONSTANT	25.0	0.000E+00	15.0	30.0
Molecular weight	g/M	CONSTANT	207.	0.000E+00	0.000E+00	0.100E+05
Mole fraction of solute	--	CONSTANT	0.100	0.100E-01	0.100E-02	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000E+00	0.230E-01	0.000E+00	10.0
Henry's law constant	atm-m^3/M	CONSTANT	0.100E-06	0.000E+00	0.000E+00	1.00
RFD value for drinking water	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
ADIF value for fish consumption	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
CCC for aquatic organisms	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.610E-02	0.700E-02	0.254E-04	0.688
Area of waste disposal unit	m^2	DERIVED	0.277E+05	2.16	-0.884	12.3
Duration of pulse	yr	CONSTANT	611.	3.00	0.100	0.100E+31
Spread of contaminant source	m	DERIVED	21.7	0.000E+00	0.100E-02	0.600E+05
Recharge rate	m/yr	CONSTANT	0.610E-02	0.760E-02	0.254E-04	0.668
Source decay constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	10.0
Initial concentration at landfill	mg/l	CONSTANT	1.00	0.100E-01	0.000E+00	10.0
Length scale of facility	m	CONSTANT	213.	1.00	1.00	0.100E+06
Width scale of facility	m	CONSTANT	130.	1.00	1.00	0.100E+06

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	7
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

COORDINATE DATA, Computer generated

GRID SPACING PARAMETERS

XSTART:	0.0
XO:	8.2
DX:	0.5
XFAC:	1.5
DXMAX:	2.0

AR303001

MATERIAL NUMBER FOR EACH LAYER
1 1 1 1 1 1 1

1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	0.320E-01	2.92	0.000E+00	3.50
Unsaturated zone porosity	--	CONSTANT	0.380	0.200E-01	0.200	0.700
Air entry pressure head	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	1.00
Depth of the unsaturated zone	m	CONSTANT	8.20	1.00	0.610	366.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.880E-01	0.900E-02	0.000E+00	0.115
Brook and Corey exponent,EN	--	CONSTANT	0.500	0.100	0.000E+00	1.00
ALFA coefficient	1/cm	CONSTANT	0.900E-02	0.970E-01	0.000E+00	0.150
Van Genuchten exponent, ENN	--	CONSTANT	1.23	0.610E-01	1.00	1.50

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

NLAY	- Number of different layers used		1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	10.0
WTFUN	- Weighting factor	--	1.2

AR303002

OPTIONS CHOSEN

Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations

1

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Thickness of layer	m	CONSTANT	8.20	1.00	0.000E+00	500.
Longitudinal dispersivity of layer	m	CONSTANT	0.400	0.400E-01	0.000E+00	10.0
Percent organic matter	--	CONSTANT	172.	7.77	0.000E+00	11.0
Bulk density of soil for layer	g/cc	CONSTANT	1.70	0.200E-01	0.795	2.12
Biological decay coefficient	1/yr	CONSTANT	0.000E+00	0.200E-01	0.000E+00	5.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.630E-03	0.630E-04	0.400E-03	0.100
Aquifer porosity	--	CONSTANT	0.380	0.000E+00	0.300	0.560
Bulk density	g/cc	CONSTANT	1.70	0.000E+00	1.16	1.80
Aquifer thickness	m	CONSTANT	30.2	78.6	3.00	560.
Source thickness (mixing zone depth)	m	DERIVED	0.000E+00	0.600	2.00	10.0
Conductivity (hydraulic)	m/yr	CONSTANT	0.389E+04	0.758E+04	31.6	0.151E+06
Gradient (hydraulic)		CONSTANT	0.460E-03	0.310E-01	0.100E-04	0.100
Groundwater seepage velocity	m/yr	DERIVED	4.71	0.000E+00	0.100E-01	0.925E+04
Retardation coefficient	--	DERIVED	1.00	0.100	1.00	0.352E+06
Longitudinal dispersivity	m	CONSTANT	1.00	0.700	0.100	324.
Transverse dispersivity	m	CONSTANT	0.125	0.000E+00	0.100	41.0
Vertical dispersivity	m	DERIVED	0.950	0.950E-01	0.380	250.
Temperature of aquifer	C	CONSTANT	16.6	5.29	5.00	30.0
pH	--	CONSTANT	4.82	1.28	0.300	14.0
Organic carbon content (fraction)		CONSTANT	1.00	0.300E-03	0.100E-02	0.100E-01
Well distance from site	m	CONSTANT	10.0	0.000E+00	15.2	0.160E+04
Angle off center	degree	CONSTANT	0.000E+00	0.000E+00	0.000E+00	45.0
Well vertical distance	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	560.

1

TIME	CONCENTRATION
0.810E+03	0.51571E-01
0.811E+03	0.51567E-01
0.812E+03	0.51563E-01
0.813E+03	0.51558E-01
0.814E+03	0.51552E-01
0.815E+03	0.51546E-01
0.816E+03	0.51539E-01
0.817E+03	0.51532E-01
0.818E+03	0.51809E-01
0.819E+03	0.51848E-01
0.820E+03	0.51887E-01
0.821E+03	0.51925E-01
0.822E+03	0.51499E-01
0.823E+03	0.51499E-01
0.824E+03	0.51500E-01
0.825E+03	0.51502E-01
0.826E+03	0.51504E-01
0.827E+03	0.51505E-01
0.828E+03	0.51507E-01
0.100E+05	0.00000E+00

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

VERSION 3.3, DECEMBER 1988

Developed by Phillip Mineart and Atul Salhotra of
Woodward-Clyde Consultants, Oakland, California
In cooperation with:
Hydrogeologic, Inc., Herndon, Virginia,
Geotrans, Inc., Herndon, Virginia,
and
Aqua Terra Consultants, Mountain View, California

1
Run options
--- -------

RUN4B C&R BATTER WORST CASE NO ACTION

TIME TO REACH MCL AT 10M RECEPTOR
Chemical simulated is Pb

Option Chosen — Saturated and unsaturated zone models
Run was — DETERMIN
Run was transient
Reject runs if Y coordinate outside plume
Reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model
1
1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.352E+05
Dissolved phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.221E+09
Overall chemical decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.358E+05
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	370.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	280.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	0.250E+08
Reference temperature	C	CONSTANT	16.6	0.000E+00	0.000E+00	40.0
Normalized distribution coefficient	ml/g	CONSTANT	0.340E-01	0.000E+00	0.000E+00	0.331E+06
Distribution coefficient	--	DERIVED	0.200	0.000E+00	0.000E+00	0.166E+05
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	100.
Air diffusion coefficient	cm2/s	CONSTANT	0.645E-01	0.645E-02	0.000E+00	1.00
Reference temperature for air diffusion	C	CONSTANT	25.0	0.000E+00	15.0	30.0
Molecular weight	g/M	CONSTANT	207.	0.000E+00	0.000E+00	0.100E+05
Mole fraction of solute	--	CONSTANT	0.100	0.100E-01	0.100E-02	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000E+00	0.230E-01	0.000E+00	10.0
Henry's law constant	atm-m^3/M	CONSTANT	0.100E-06	0.000E+00	0.000E+00	1.00
RFD value for drinking water	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
ADIF value for fish consumption	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
CCC for aquatic organisms	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.610E-02	0.700E-02	0.254E-04	0.688
Area of waste disposal unit	m^2	DERIVED	0.277E+05	2.16	-0.884	12.3
Duration of pulse	yr	CONSTANT	611.	3.00	0.100	0.100E+31
Spread of contaminant source	m	DERIVED	21.7	0.000E+00	0.100E-02	0.600E+05
Recharge rate	m/yr	CONSTANT	0.610E-02	0.760E-02	0.254E-04	0.668
Source decay constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	10.0
Initial concentration at landfill	mg/l	CONSTANT	1.00	0.100E-01	0.000E+00	10.0
Length scale of facility	m	CONSTANT	213.	1.00	1.00	0.100E+06
Width scale of facility	m	CONSTANT	130.	1.00	1.00	0.100E+06

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	7
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1

AR303005

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

COORDINATE DATA, Computer generated

1

GRID SPACING PARAMETERS

XSTART: 0.0
XO: 8.2
DX: 0.5
XFAC: 1.5
DXMAX: 2.0

MATERIAL NUMBER FOR EACH LAYER
1 1 1 1 1 1 1

1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	0.320E-01	2.92	0.000E+00	3.50
Unsaturated zone porosity	--	CONSTANT	0.380	0.200E-01	0.200	0.700
Air entry pressure head	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	1.00
Depth of the unsaturated zone	m	CONSTANT	8.20	1.00	0.610	365.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.880E-01	0.900E-02	0.000E+00	0.115
Brook and Corey exponent,EN	--	CONSTANT	0.500	0.100	0.000E+00	1.00
ALFA coefficient	1/cm	CONSTANT	0.900E-02	0.970E-01	0.000E+00	0.150
Van Genuchten exponent, ENN	--	CONSTANT	1.23	0.610E-01	1.00	1.50

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

NLAY	- Number of different layers used		1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	10.0
WTFUN	- Weighting factor	--	1.2

OPTIONS CHOSEN

Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations

1

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Thickness of layer	m	CONSTANT	8.20	1.00	0.000E+00	500.
Longitudinal dispersivity of layer	m	CONSTANT	0.400	0.400E-01	0.000E+00	10.0
Percent organic matter	--	CONSTANT	172.	7.77	0.000E+00	11.0
Bulk density of soil for layer	g/cc	CONSTANT	1.70	0.200E-01	0.795	2.12
Biological decay coefficient	1/yr	CONSTANT	0.000E+00	0.200E-01	0.000E+00	5.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Particle diameter	cm	CONSTANT	0.630E-03	0.630E-04	0.400E-03	0.100
Aquifer porosity	--	CONSTANT	0.380	0.000E+00	0.300	0.560
Bulk density	g/cc	CONSTANT	1.70	0.000E+00	1.16	1.80
Aquifer thickness	m	CONSTANT	30.2	78.6	3.00	560.
Source thickness (mixing zone depth)	m	DERIVED	0.000E+00	0.600	2.00	10.0
Conductivity (hydraulic)	m/yr	CONSTANT	0.389E+04	0.758E+04	31.6	0.151E+06
Gradient (hydraulic)		CONSTANT	0.460E-03	0.310E-01	0.100E-04	0.100
Groundwater seepage velocity	m/yr	DERIVED	4.71	0.000E+00	0.100E-01	0.925E+04
Retardation coefficient	--	DERIVED	1.00	0.100	1.00	0.352E+06
Longitudinal dispersivity	m	CONSTANT	1.00	0.700	0.100	324.
Transverse dispersivity	m	CONSTANT	0.125	0.000E+00	0.100	41.0
Vertical dispersivity	m	DERIVED	0.950	0.950E-01	0.380	250.
Temperature of aquifer	C	CONSTANT	16.6	5.29	5.00	30.0
pH	--	CONSTANT	4.82	1.28	0.300	14.0
Organic carbon content (fraction)		CONSTANT	1.00	0.300E-03	0.100E-02	0.100E-01
Well distance from site	m	CONSTANT	10.0	0.000E+00	15.2	0.160E+04
Angle off center	degree	CONSTANT	0.000E+00	0.000E+00	0.000E+00	45.0
Well vertical distance	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	560.

1

TIME	CONCENTRATION
0.201E+03	0.28444E-08
0.201E+03	0.26904E-07
0.201E+03	0.13499E-06
0.202E+03	0.45453E-06
0.202E+03	0.11708E-05
0.202E+03	0.24973E-05
0.202E+03	0.46406E-05
0.202E+03	0.77653E-05
0.203E+03	0.11992E-04
0.203E+03	0.17377E-04
0.203E+03	0.23927E-04
0.203E+03	0.31603E-04
0.203E+03	0.40330E-04
0.204E+03	0.50013E-04
0.204E+03	0.60539E-04
0.204E+03	0.71792E-04
0.205E+03	0.13500E-03
0.206E+03	0.20183E-03
0.100E+05	0.99984E-04
0.150E+05	0.00000E+00

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

VERSION 3.3, DECEMBER 1988

Developed by Phillip Mineart and Atul Salhotra of
Woodward-Clyde Consultants, Oakland, California
In cooperation with:
Hydrogeologic, Inc., Herndon, Virginia,
Geotrans, Inc., Herndon, Virginia,
and
Aqua Terra Consultants, Mountain View, California

1
Run options
--- -------

RUN4C C&R BATTERY WORST CASE NO ACTION

MAXIMUM CONC. AT 10M RECEPTOR
Chemical simulated is Pb

Option Chosen — Saturated and unsaturated zone models
Run was — DETERMIN
Run was transient
Reject runs if Y coordinate outside plume
Reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model
1
1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.352E+05
Dissolved phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.221E+09
Overall chemical decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.358E+05
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	370.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	280.
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	0.250E+08
Reference temperature	C	CONSTANT	16.6	0.000E+00	0.000E+00	40.0
Normalized distribution coefficient	ml/g	CONSTANT	0.340E-01	0.000E+00	0.000E+00	0.331E+06
Distribution coefficient	--	DERIVED	0.200	0.000E+00	0.000E+00	0.166E+05
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	100.
Air diffusion coefficient	cm2/s	CONSTANT	0.645E-01	0.645E-02	0.000E+00	1.00
Reference temperature for air diffusion	C	CONSTANT	25.0	0.000E+00	15.0	30.0
Molecular weight	g/M	CONSTANT	207.	0.000E+00	0.000E+00	0.100E+05
Mole fraction of solute	--	CONSTANT	0.100	0.100E-01	0.100E-02	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000E+00	0.230E-01	0.000E+00	10.0
Henry's law constant	atm-m^3/M	CONSTANT	0.100E-06	0.000E+00	0.000E+00	1.00
RFD value for drinking water	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
ADIF value for fish consumption	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
CCC for aquatic organisms	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.610E-02	0.700E-02	0.254E-04	0.688
Area of waste disposal unit	m^2	DERIVED	0.277E+05	2.16	-0.884	12.3
Duration of pulse	yr	CONSTANT	611.	3.00	0.100	0.100E+31
Spread of contaminant source	m	DERIVED	21.7	0.000E+00	0.100E-02	0.600E+05
Recharge rate	m/yr	CONSTANT	0.610E-02	0.760E-02	0.254E-04	0.668
Source decay constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	10.0
Initial concentration at landfill	mg/l	CONSTANT	1.00	0.100E-01	0.000E+00	10.0
Length scale of facility	m	CONSTANT	213.	1.00	1.00	0.100E+06
Width scale of facility	m	CONSTANT	130.	1.00	1.00	0.100E+06

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	7
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1

OPTIONS CHOSEN
Van Genuchten functional coefficients
User defined coordinate system

COORDINATE DATA, Computer generated

GRID SPACING PARAMETERS

XSTART:	0.0
XO:	8.2
DX:	0.5
XFAC:	1.5
DXMAX:	2.0

MATERIAL NUMBER FOR EACH LAYER
1 1 1 1 1 1 1

1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	0.320E-01	2.92	0.000E+00	3.50
Unsaturated zone porosity	--	CONSTANT	0.380	0.200E-01	0.200	0.700
Air entry pressure head	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	1.00
Depth of the unsaturated zone	m	CONSTANT	8.20	1.00	0.610	366.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.880E-01	0.900E-02	0.000E+00	0.115
Brook and Corey exponent, EN	--	CONSTANT	0.500	0.100	0.000E+00	1.00
ALFA coefficient	1/cm	CONSTANT	0.900E-02	0.970E-01	0.000E+00	0.150
Van Genuchten exponent, ENN	--	CONSTANT	1.23	0.610E-01	1.00	1.50

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

NLAY	- Number of different layers used		1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	10.0
WTFUN	- Weighting factor	--	1.2

OPTIONS CHOSEN

Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations

PR 3301 0

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Thickness of layer	m	CONSTANT	8.20	1.00	0.000E+00	500.
Longitudinal dispersivity of layer	m	CONSTANT	0.400	0.400E-01	0.000E+00	10.0
Percent organic matter	--	CONSTANT	172.	7.77	0.000E+00	11.0
Bulk density of soil for layer	g/cc	CONSTANT	1.70	0.200E-01	0.795	2.12
Biological decay coefficient	1/yr	CONSTANT	0.000E+00	0.200E-01	0.000E+00	5.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Particle diameter	cm	CONSTANT	0.630E-03	0.630E-04	0.400E-03	0.100
Aquifer porosity	--	CONSTANT	0.380	0.000E+00	0.300	0.560
Bulk density	g/cc	CONSTANT	1.70	0.000E+00	1.16	1.80
Aquifer thickness	m	CONSTANT	30.2	78.6	3.00	560.
Source thickness (mixing zone depth)	m	DERIVED	0.000E+00	0.600	2.00	10.0
Conductivity (hydraulic)	m/yr	CONSTANT	0.389E+04	0.758E+04	31.6	0.151E+06
Gradient (hydraulic)		CONSTANT	0.460E-03	0.310E-01	0.100E-04	0.100
Groundwater seepage velocity	m/yr	DERIVED	4.71	0.000E+00	0.100E-01	0.925E+04
Retardation coefficient	--	DERIVED	1.00	0.100	1.00	0.352E+06
Longitudinal dispersivity	m	CONSTANT	10.0	0.700	0.100	324.
Transverse dispersivity	m	CONSTANT	1.25	0.000E+00	0.100	41.0
Vertical dispersivity	m	DERIVED	0.950	0.950E-01	0.380	250.
Temperature of aquifer	C	CONSTANT	16.6	5.29	5.00	30.0
pH	--	CONSTANT	4.82	1.28	0.300	14.0
Organic carbon content (fraction)		CONSTANT	1.00	0.300E-03	0.100E-02	0.100E-01
Well distance from site	m	CONSTANT	100.	0.000E+00	15.2	0.160E+04
Angle off center	degree	CONSTANT	0.000E+00	0.000E+00	0.000E+00	45.0
Well vertical distance	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	560.

1

TIME	CONCENTRATION
0.700E+03	0.45874E-01
0.720E+03	0.45807E-01
0.740E+03	0.47048E-01
0.760E+03	0.47545E-01
0.780E+03	0.47738E-01
0.800E+03	0.50349E-01
0.820E+03	0.51130E-01
0.840E+03	0.51062E-01
0.860E+03	0.51038E-01
0.880E+03	0.50910E-01
0.900E+03	0.52334E-01
0.920E+03	0.51052E-01
0.940E+03	0.49985E-01
0.960E+03	0.49824E-01
0.980E+03	0.47062E-01
0.985E+03	0.46251E-01
0.990E+03	0.45544E-01
0.995E+03	0.45263E-01
0.100E+04	0.44769E-01
0.100E+05	0.00000E+00

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

VERSION 3.3, DECEMBER 1988

Developed by Phillip Mineart and Atul Salhotra of
Woodward-Clyde Consultants, Oakland, California
In cooperation with:
Hydrogeologic, Inc., Herndon, Virginia,
Geotrans, Inc., Herndon, Virginia,
and
Aqua Terra Consultants, Mountain View, California

1
Run options
--- -------

RUN4D C&R BATTERY WORST CASE NO ACTION

TIME TO REACH MCL AT 100M RECEPTOR
Chemical simulated is Pb

Option Chosen — Saturated and unsaturated zone models
Run was — DETERMIN
Run was transient
Reject runs if Y coordinate outside plume
Reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model
1
1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.352E+05
Dissolved phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.221E+09
Overall chemical decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.358E+05
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	370.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	280.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	0.250E+08
Reference temperature	C	CONSTANT	16.6	0.000E+00	0.000E+00	40.0
Normalized distribution coefficient	ml/g	CONSTANT	0.340E-01	0.000E+00	0.000E+00	0.331E+06
Distribution coefficient	--	DERIVED	0.200	0.000E+00	0.000E+00	0.166E+05
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	100.
Air diffusion coefficient	cm2/s	CONSTANT	0.645E-01	0.645E-02	0.000E+00	1.00
Reference temperature for air diffusion	C	CONSTANT	25.0	0.000E+00	15.0	30.0
Molecular weight	g/M	CONSTANT	207.	0.000E+00	0.000E+00	0.100E+05
Mole fraction of solute	--	CONSTANT	0.100	0.100E-01	0.100E-02	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000E+00	0.230E-01	0.000E+00	10.0
Henry's law constant	atm-m^3/M	CONSTANT	0.100E-06	0.000E+00	0.000E+00	1.00
RFD value for drinking water	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
ADIF value for fish consumption	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
CCC for aquatic organisms	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.610E-02	0.700E-02	0.254E-04	0.688
Area of waste disposal unit	m^2	DERIVED	0.277E+05	2.16	-0.884	12.3
Duration of pulse	yr	CONSTANT	611.	3.00	0.100	0.100E+31
Spread of contaminant source	m	DERIVED	21.7	0.000E+00	0.100E-02	0.500E+05
Recharge rate	m/yr	CONSTANT	0.610E-02	0.760E-02	0.254E-04	0.668
Source decay constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	10.0
Initial concentration at landfill	mg/l	CONSTANT	1.00	0.100E-01	0.000E+00	10.0
Length scale of facility	m	CONSTANT	213.	1.00	1.00	0.100E+06
Width scale of facility	m	CONSTANT	130.	1.00	1.00	0.100E+06

AR303013

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	7
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

COORDINATE DATA, Computer generated

1

GRID SPACING PARAMETERS

XSTART:	0.0
XO:	8.2
DX:	0.5
XFAC:	1.5
DXMAX:	2.0

MATERIAL NUMBER FOR EACH LAYER
1 1 1 1 1 1 1

1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	0.320E-01	2.92	0.000E+00	3.50
Unsaturated zone porosity	--	CONSTANT	0.380	0.200E-01	0.200	0.700
Air entry pressure head	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	1.00
Depth of the unsaturated zone	m	CONSTANT	8.20	1.00	0.610	366.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.880E-01	0.900E-02	0.000E+00	0.115
Brook and Corey exponent, EN	--	CONSTANT	0.500	0.100	0.000E+00	1.00
ALFA coefficient	1/cm	CONSTANT	0.900E-02	0.970E-01	0.000E+00	0.150
Van Genuchten exponent, ENN	--	CONSTANT	1.23	0.610E-01	1.00	1.50

AR303014

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

NLAY	- Number of different layers used		1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	10.0
WTFUN	- Weighting factor	--	1.2

OPTIONS CHOSEN

Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations

1

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Thickness of layer	m	CONSTANT	8.20	1.00	0.000E+00	500.
Longitudinal dispersivity of layer	m	CONSTANT	0.400	0.400E-01	0.000E+00	10.0
Percent organic matter	--	CONSTANT	172.	7.77	0.000E+00	11.0
Bulk density of soil for layer	g/cc	CONSTANT	1.70	0.200E-01	0.795	2.12
Biological decay coefficient	1/yr	CONSTANT	0.000E+00	0.200E-01	0.000E+00	5.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Particle diameter	cm	CONSTANT	0.630E-03	0.630E-04	0.400E-03	0.100
Aquifer porosity	--	CONSTANT	0.380	0.000E+00	0.300	0.560
Bulk density	g/cc	CONSTANT	1.70	0.000E+00	1.16	1.80
Aquifer thickness	m	CONSTANT	30.2	78.6	3.00	560.
Source thickness (mixing zone depth)	m	DERIVED	0.000E+00	0.600	2.00	10.0
Conductivity (hydraulic)	m/yr	CONSTANT	0.389E+04	0.758E+04	31.6	0.151E+06
Gradient (hydraulic)		CONSTANT	0.460E-03	0.310E-01	0.100E-04	0.100
Groundwater seepage velocity	m/yr	DERIVED	4.71	0.000E+00	0.100E-01	0.925E+04
Retardation coefficient	--	DERIVED	1.00	0.100	1.00	0.352E+06
Longitudinal dispersivity	m	CONSTANT	10.0	0.700	0.100	324.
Transverse dispersivity	m	CONSTANT	1.25	0.000E+00	0.100	41.0
Vertical dispersivity	m	DERIVED	0.950	0.950E-01	0.380	250.
Temperature of aquifer	C	CONSTANT	16.6	5.29	5.00	30.0
pH	--	CONSTANT	4.82	1.28	0.300	14.0
Organic carbon content (fraction)		CONSTANT	1.00	0.300E-03	0.100E-02	0.100E-01
Well distance from site	m	CONSTANT	100.	0.000E+00	15.2	0.160E+04
Angle off center	degree	CONSTANT	0.000E+00	0.000E+00	0.000E+00	45.0
Well vertical distance	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	560.

1

TIME	CONCENTRATION
0.209E+03	0.77164E-08
0.209E+03	0.16687E-07
0.210E+03	0.33454E-07
0.210E+03	0.62846E-07
0.211E+03	0.11161E-06
0.211E+03	0.18867E-06
0.212E+03	0.30515E-06
0.212E+03	0.47637E-06
0.213E+03	0.71812E-06
0.213E+03	0.10506E-05
0.214E+03	0.14962E-05
0.214E+03	0.20801E-05
0.215E+03	0.28296E-05
0.215E+03	0.37742E-05
0.216E+03	0.49449E-05
0.216E+03	0.63741E-05
0.217E+03	0.80949E-05
0.217E+03	0.10141E-04
0.218E+03	0.12546E-04
0.100E+05	0.00000E+00

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

VERSION 3.3, DECEMBER 1988

Developed by Phillip Mineart and Atul Salhotra of
Woodward-Clyde Consultants, Oakland, California
In cooperation with:
Hydrogeologic, Inc., Herndon, Virginia,
Geotrans, Inc., Herndon, Virginia,
and
Aqua Terra Consultants, Mountain View, California

1
Run options
--- -------

RUN5A C&R BATTERY WORST CASE-10,000 ACTION LEVEL

MAXIMUM CONC. AT 10M RECEPTOR
Chemical simulated is Pb

Option Chosen — Saturated and unsaturated zone models
Run was — DETERMIN
Run was transient
Reject runs if Y coordinate outside plume
Reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model
1
1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.352E+05
Dissolved phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.221E+09
Overall chemical decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.358E+05
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	370.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	280.
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	0.250E+08
Reference temperature	C	CONSTANT	16.6	0.000E+00	0.000E+00	40.0
Normalized distribution coefficient	ml/g	CONSTANT	0.970E-01	0.000E+00	0.000E+00	0.331E+06
Distribution coefficient	--	DERIVED	0.200	0.000E+00	0.000E+00	0.166E+05
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	100.
Air diffusion coefficient	cm2/s	CONSTANT	0.645E-01	0.645E-02	0.000E+00	1.00
Reference temperature for air diffusion	C	CONSTANT	25.0	0.000E+00	15.0	30.0
Molecular weight	g/M	CONSTANT	207.	0.000E+00	0.000E+00	0.100E+05
Mole fraction of solute	--	CONSTANT	0.100	0.100E-01	0.100E-02	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000E+00	0.230E-01	0.000E+00	10.0
Henry's law constant	atm-m^3/M	CONSTANT	0.100E-06	0.000E+00	0.000E+00	1.00
RFD value for drinking water	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
ADIF value for fish consumption	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
CCC for aquatic organisms	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.610E-02	0.700E-02	0.254E-04	0.688
Area of waste disposal unit	m^2	DERIVED	0.277E+05	2.16	-0.884	12.3
Duration of pulse	yr	CONSTANT	0.112E+04	3.00	0.100	0.100E+31
Spread of contaminant source	m	DERIVED	21.7	0.000E+00	0.100E-02	0.600E+05
Recharge rate	m/yr	CONSTANT	0.610E-02	0.760E-02	0.254E-04	0.668
Source decay constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	10.0
Initial concentration at landfill	mg/l	CONSTANT	1.00	0.100E-01	0.000E+00	10.0
Length scale of facility	m	CONSTANT	213.	1.00	1.00	0.100E+06
Width scale of facility	m	CONSTANT	130.	1.00	1.00	0.100E+06

AR303

UNSATURATED ZONE FLOW MODEL PARAMETERS
(Input parameter description and value)

NP	- Total number of nodal points	7
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1

OPTIONS CHOSEN

Van Genuchten functional coefficients
User defined coordinate system

COORDINATE DATA, Computer generated

1

GRID SPACING PARAMETERS

XSTART:	0.0
XO:	8.2
DX:	0.5
XFAC:	1.5
DXMAX:	2.0

MATERIAL NUMBER FOR EACH LAYER
1 1 1 1 1 1 1

1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	0.320E-01	2.92	0.000E+00	3.50
Unsaturated zone porosity	--	CONSTANT	0.380	0.200E-01	0.200	0.700
Air entry pressure head	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	1.00
Depth of the unsaturated zone	m	CONSTANT	8.20	1.00	0.610	366.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.880E-01	0.900E-02	0.000E+00	0.115
Brook and Corey exponent, EN	--	CONSTANT	0.500	0.100	0.000E+00	1.00
ALFA coefficient	1/cm	CONSTANT	0.900E-02	0.970E-01	0.000E+00	0.150
Van Genuchten exponent, ENN	--	CONSTANT	1.23	0.610E-01	1.00	1.50

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

NLAY	- Number of different layers used		1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	10.0
WTFUN	- Weighting factor	--	1.2

OPTIONS CHOSEN
Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Thickness of layer	m	CONSTANT	8.20	1.00	0.000E+00	500.
Longitudinal dispersivity of layer	m	CONSTANT	0.400	0.400E-01	0.000E+00	10.0
Percent organic matter	--	CONSTANT	172.	7.77	0.000E+00	11.0
Bulk density of soil for layer	g/cc	CONSTANT	1.70	0.200E-01	0.795	2.12
Biological decay coefficient	1/yr	CONSTANT	0.000E+00	0.200E-01	0.000E+00	5.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Particle diameter	cm	CONSTANT	0.630E-03	0.630E-04	0.400E-03	0.100
Aquifer porosity	--	CONSTANT	0.380	0.000E+00	0.300	0.560
Bulk density	g/cc	CONSTANT	1.70	0.000E+00	1.16	1.80
Aquifer thickness	m	CONSTANT	30.2	78.6	3.00	560.
Source thickness (mixing zone depth)	m	DERIVED	0.000E+00	0.600	2.00	10.0
Conductivity (hydraulic)	m/yr	CONSTANT	0.389E+04	0.758E+04	31.6	0.151E+06
Gradient (hydraulic)		CONSTANT	0.460E-03	0.310E-01	0.100E-04	0.100
Groundwater seepage velocity	m/yr	DERIVED	4.71	0.000E+00	0.100E-01	0.925E+04
Retardation coefficient	--	DERIVED	1.00	0.100	1.00	0.352E+06
Longitudinal dispersivity	m	CONSTANT	1.00	0.700	0.100	324.
Transverse dispersivity	m	CONSTANT	0.125	0.000E+00	0.100	41.0
Vertical dispersivity	m	DERIVED	0.950	0.950E-01	0.380	250.
Temperature of aquifer	C	CONSTANT	16.6	5.29	5.00	30.0
pH	--	CONSTANT	4.82	1.28	0.300	14.0
Organic carbon content (fraction)		CONSTANT	1.00	0.300E-03	0.100E-02	0.100E-01
Well distance from site	m	CONSTANT	10.0	0.000E+00	15.2	0.160E+04
Angle off center	degree	CONSTANT	0.000E+00	0.000E+00	0.000E+00	45.0
Well vertical distance	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	560.

1

TIME	CONCENTRATION
0.131E+04	0.53584E-01
0.131E+04	0.53585E-01
0.131E+04	0.53586E-01
0.131E+04	0.53588E-01
0.131E+04	0.53646E-01
0.131E+04	0.53650E-01
0.131E+04	0.53653E-01
0.131E+04	0.53657E-01
0.131E+04	0.53661E-01
0.131E+04	0.53664E-01
0.131E+04	0.53668E-01
0.131E+04	0.53672E-01
0.131E+04	0.53675E-01
0.132E+04	0.53678E-01
0.132E+04	0.53682E-01
0.132E+04	0.53685E-01
0.132E+04	0.53688E-01
0.132E+04	0.53691E-01
0.132E+04	0.53591E-01
0.100E+05	0.00000E+00

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

VERSION 3.3, DECEMBER 1988

Developed by Phillip Mineart and Atul Salhotra of
Woodward-Clyde Consultants, Oakland, California
In cooperation with:
Hydrogeologic, Inc., Herndon, Virginia,
Geotrans, Inc., Herndon, Virginia,
and
Aqua Terra Consultants, Mountain View, California

Run options
--- -------

RUN5B C&R BATTERY WORST CASE-10,000 ACTION LEVEL

TIME TO REACH MCL AT 10M RECEPTOR
Chemical simulated is Pb

Option Chosen — Saturated and unsaturated zone models
Run was — DETERMIN
Run was transient
Reject runs if Y coordinate outside plume
Reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model
1
1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.352E+05
Dissolved phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.221E+09
Overall chemical decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.358E+05
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	370.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	280.
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	0.250E+08
Reference temperature	C	CONSTANT	16.6	0.000E+00	0.000E+00	40.0
Normalized distribution coefficient	ml/g	CONSTANT	0.970E-01	0.000E+00	0.000E+00	0.331E+06
Distribution coefficient	--	DERIVED	0.200	0.000E+00	0.000E+00	0.166E+05
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	100.
Air diffusion coefficient	cm2/s	CONSTANT	0.645E-01	0.645E-02	0.000E+00	1.00
Reference temperature for air diffusion	C	CONSTANT	25.0	0.000E+00	15.0	30.0
Molecular weight	g/M	CONSTANT	207.	0.000E+00	0.000E+00	0.100E+05
Mole fraction of solute	--	CONSTANT	0.100	0.100E-01	0.100E-02	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000E+00	0.230E-01	0.000E+00	10.0
Henry's law constant	atm-m^3/M	CONSTANT	0.100E-06	0.000E+00	0.000E+00	1.00
RFD value for drinking water	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
ADIF value for fish consumption	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
CCC for aquatic organisms	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.610E-02	0.700E-02	0.254E-04	0.688
Area of waste disposal unit	m^2	DERIVED	0.277E+05	2.16	-0.884	12.3
Duration of pulse	yr	CONSTANT	0.112E+04	3.00	0.100	0.100E+31
Spread of contaminant source	m	DERIVED	21.7	0.000E+00	0.100E-02	0.600E+05
Recharge rate	m/yr	CONSTANT	0.610E-02	0.760E-02	0.254E-04	0.668
Source decay constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	10.0
Initial concentration at landfill	mg/l	CONSTANT	1.00	0.100E-01	0.000E+00	10.0
Length scale of facility	m	CONSTANT	213.	1.00	1.00	0.100E+06
Width scale of facility	m	CONSTANT	130.	1.00	1.00	0.100E+06

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	7
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1

OPTIONS CHOSEN

Van Genuchten functional coefficients
User defined coordinate system

COORDINATE DATA, Computer generated

1

GRID SPACING PARAMETERS

XSTART: 0.0
XO: 8.2
DX: 0.5
XFAC: 1.5
DXMAX: 2.0

MATERIAL NUMBER FOR EACH LAYER
1 1 1 1 1 1 1

1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	0.320E-01	2.92	0.000E+00	3.50
Unsaturated zone porosity	--	CONSTANT	0.380	0.200E-01	0.200	0.700
Air entry pressure head	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	1.00
Depth of the unsaturated zone	m	CONSTANT	8.20	1.00	0.610	366.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.880E-01	0.900E-02	0.000E+00	0.115
Brook and Corey exponent,EN	--	CONSTANT	0.500	0.100	0.000E+00	1.00
ALFA coefficient	1/cm	CONSTANT	0.900E-02	0.970E-01	0.000E+00	0.150
Van Genuchten exponent, ENN	--	CONSTANT	1.23	0.610E-01	1.00	1.50

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

NLAY	- Number of different layers used		1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	10.0
WTFUN	- Weighting factor	--	1.2

OPTIONS CHOSEN

Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations

1

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

AR303022

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Thickness of layer	m	CONSTANT	8.20	1.00	0.000E+00	500.
Longitudinal dispersivity of layer	m	CONSTANT	0.400	0.400E-01	0.000E+00	10.0
Percent organic matter	--	CONSTANT	172.	7.77	0.000E+00	11.0
Bulk density of soil for layer	g/cc	CONSTANT	1.70	0.200E-01	0.795	2.12
Biological decay coefficient	1/yr	CONSTANT	0.000E+00	0.200E-01	0.000E+00	5.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Particle diameter	cm	CONSTANT	0.630E-03	0.630E-04	0.400E-03	0.100
Aquifer porosity	--	CONSTANT	0.380	0.000E+00	0.300	0.560
Bulk density	g/cc	CONSTANT	1.70	0.000E+00	1.16	1.80
Aquifer thickness	m	CONSTANT	30.2	78.6	3.00	560.
Source thickness (mixing zone depth)	m	DERIVED	0.000E+00	0.600	2.00	10.0
Conductivity (hydraulic)	m/yr	CONSTANT	0.389E+04	0.758E+04	31.6	0.151E+06
Gradient (hydraulic)		CONSTANT	0.460E-03	0.310E-01	0.100E-04	0.100
Groundwater seepage velocity	m/yr	DERIVED	4.71	0.000E+00	0.100E-01	0.925E+04
Retardation coefficient	--	DERIVED	1.00	0.100	1.00	0.352E+06
Longitudinal dispersivity	m	CONSTANT	1.00	0.700	0.100	324.
Transverse dispersivity	m	CONSTANT	0.125	0.000E+00	0.100	41.0
Vertical dispersivity	m	DERIVED	0.950	0.950E-01	0.380	250.
Temperature of aquifer	C	CONSTANT	16.6	5.29	5.00	30.0
pH	--	CONSTANT	4.82	1.28	0.300	14.0
Organic carbon content (fraction)		CONSTANT	1.00	0.300E-03	0.100E-02	0.100E-01
Well distance from site	m	CONSTANT	10.0	0.000E+00	15.2	0.160E+04
Angle off center	degree	CONSTANT	0.000E+00	0.000E+00	0.000E+00	45.0
Well vertical distance	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	560.

1

TIME	CONCENTRATION
0.260E+03	0.19425E-05
0.260E+03	0.33281E-05
0.260E+03	0.52799E-05
0.261E+03	0.78702E-05
0.261E+03	0.11154E-04
0.261E+03	0.15160E-04
0.261E+03	0.19896E-04
0.261E+03	0.25349E-04
0.262E+03	0.31493E-04
0.262E+03	0.38287E-04
0.262E+03	0.45682E-04
0.262E+03	0.53623E-04
0.262E+03	0.62052E-04
0.263E+03	0.70909E-04
0.263E+03	0.80135E-04
0.263E+03	0.89651E-04
0.263E+03	0.99468E-04
0.263E+03	0.10947E-03
0.264E+03	0.11963E-03
0.100E+05	0.00000E+00

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

VERSION 3.3, DECEMBER 1988

Developed by Phillip Mineart and Atul Salhotra of
Woodward-Clyde Consultants, Oakland, California
In cooperation with:
Hydrogeologic, Inc., Herndon, Virginia,
Geotrans, Inc., Herndon, Virginia,
and
Aqua Terra Consultants, Mountain View, California

1
Run options
--- -------

RUN5C C&R BATTERY WORST CASE-10,000 ACTION LEVEL

MAXIMUM CONC. AT 100M RECEPTOR
Chemical simulated is Pb

Option Chosen — Saturated and unsaturated zone models
Run was — DETERMIN
Run was transient
Reject runs if Y coordinate outside plume
Reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.352E+05
Dissolved phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.221E+09
Overall chemical decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.358E+05
Acid catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	370.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	280.
Base catalyzed hydrolysis rate	1/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	0.250E+08
Reference temperature	C	CONSTANT	16.6	0.000E+00	0.000E+00	40.0
Normalized distribution coefficient	ml/g	CONSTANT	0.970E-01	0.000E+00	0.000E+00	0.331E+06
Distribution coefficient	--	DERIVED	0.200	0.000E+00	0.000E+00	0.166E+05
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	100.
Air diffusion coefficient	cm2/s	CONSTANT	0.645E-01	0.645E-02	0.000E+00	1.00
Reference temperature for air diffusion	C	CONSTANT	25.0	0.000E+00	15.0	30.0
Molecular weight	g/M	CONSTANT	207.	0.000E+00	0.000E+00	0.100E+05
Mole fraction of solute	--	CONSTANT	0.100	0.100E-01	0.100E-02	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000E+00	0.230E-01	0.000E+00	10.0
Henry's law constant	atm-m^3/M	CONSTANT	0.100E-06	0.000E+00	0.000E+00	1.00
RFD value for drinking water	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
ADIF value for fish consumption	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
CCC for aquatic organisms	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.610E-02	0.700E-02	0.254E-04	0.688
Area of waste disposal unit	m^2	DERIVED	0.277E+05	2.16	-0.884	12.3
Duration of pulse	yr	CONSTANT	0.112E+04	3.00	0.100	0.100E+31
Spread of contaminant source	m	DERIVED	21.7	0.000E+00	0.100E-02	0.600E+05
Recharge rate	m/yr	CONSTANT	0.610E-02	0.760E-02	0.254E-04	0.668
Source decay constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	10.0
Initial concentration at landfill	mg/l	CONSTANT	1.00	0.100E-01	0.000E+00	10.0
Length scale of facility	m	CONSTANT	213.	1.00	1.00	0.100E+06
Width scale of facility	m	CONSTANT	130.	1.00	1.00	0.100E+06

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	7
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1

OPTIONS CHOSEN

Van Genuchten functional coefficients
User defined coordinate system

COORDINATE DATA, Computer generated

GRID SPACING PARAMETERS

XSTART:	0.0
XO:	8.2
DX:	0.5
XFAC:	1.5
DXMAX:	2.0

AR303025

MATERIAL NUMBER FOR EACH LAYER
1 1 1 1 1 1 1

1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	0.320E-01	2.92	0.000E+00	3.50
Unsaturated zone porosity	--	CONSTANT	0.380	0.200E-01	0.200	0.700
Air entry pressure head	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	1.00
Depth of the unsaturated zone	m	CONSTANT	8.20	1.00	0.610	366.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.880E-01	0.900E-02	0.000E+00	0.115
Brook and Corey exponent, EN	--	CONSTANT	0.500	0.100	0.000E+00	1.00
ALFA coefficient	1/cm	CONSTANT	0.900E-02	0.970E-01	0.000E+00	0.150
Van Genuchten exponent, ENN	--	CONSTANT	1.23	0.610E-01	1.00	1.50

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

NLAY	- Number of different layers used		1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	10.0
WTFUN	- Weighting factor	--	1.2

OPTIONS CHOSEN

Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Thickness of layer	m	CONSTANT	8.20	1.00	0.000E+00	500.
Longitudinal dispersivity of layer	m	CONSTANT	0.400	0.400E-01	0.000E+00	10.0
Percent organic matter	--	CONSTANT	172.	7.77	0.000E+00	11.0
Bulk density of soil for layer	g/cc	CONSTANT	1.70	0.200E-01	0.795	2.12
Biological decay coefficient	1/yr	CONSTANT	0.000E+00	0.200E-01	0.000E+00	5.00

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Particle diameter	cm	CONSTANT	0.630E-03	0.630E-04	0.400E-03	0.100
Aquifer porosity	--	CONSTANT	0.380	0.000E+00	0.300	0.560
Bulk density	g/cc	CONSTANT	1.70	0.000E+00	1.16	1.80
Aquifer thickness	m	CONSTANT	30.2	78.6	3.00	560.
Source thickness (mixing zone depth)	m	DERIVED	0.000E+00	0.600	2.00	10.0
Conductivity (hydraulic)	m/yr	CONSTANT	0.389E+04	0.758E+04	31.6	0.151E+06
Gradient (hydraulic)		CONSTANT	0.460E-03	0.310E-01	0.100E-04	0.100
Groundwater seepage velocity	m/yr	DERIVED	4.71	0.000E+00	0.100E-01	0.925E+04
Retardation coefficient	--	DERIVED	1.00	0.100	1.00	0.352E+06
Longitudinal dispersivity	m	CONSTANT	10.0	0.700	0.100	324.
Transverse dispersivity	m	CONSTANT	1.25	0.000E+00	0.100	41.0
Vertical dispersivity	m	DERIVED	0.950	0.950E-01	0.380	250.
Temperature of aquifer	C	CONSTANT	16.6	5.29	5.00	30.0
pH	--	CONSTANT	4.82	1.28	0.300	14.0
Organic carbon content (fraction)		CONSTANT	1.00	0.300E-03	0.100E-02	0.100E-01
Well distance from site	m	CONSTANT	100.	0.000E+00	15.2	0.160E+04
Angle off center	degree	CONSTANT	0.000E+00	0.000E+00	0.000E+00	45.0
Well vertical distance	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	560.

TIME	CONCENTRATION
0.135E+04	0.57066E-01
0.136E+04	0.57129E-01
0.137E+04	0.57147E-01
0.138E+04	0.57086E-01
0.139E+04	0.57034E-01
0.140E+04	0.56978E-01
0.141E+04	0.56921E-01
0.142E+04	0.56978E-01
0.143E+04	0.56820E-01
0.144E+04	0.56799E-01
0.145E+04	0.57236E-01
0.146E+04	0.57117E-01
0.147E+04	0.56767E-01
0.148E+04	0.56245E-01
0.149E+04	0.55594E-01
0.150E+04	0.54942E-01
0.151E+04	0.54308E-01
0.152E+04	0.53728E-01
0.153E+04	0.53175E-01
0.100E+05	0.00000E+00

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

VERSION 3.3, DECEMBER 1988

Developed by Phillip Mineart and Atul Salhotra of
Woodward-Clyde Consultants, Oakland, California
In cooperation with:
Hydrogeologic, Inc., Herndon, Virginia,
Geotrans, Inc., Herndon, Virginia,
and
Aqua Terra Consultants, Mountain View, California

1
Run options
--- -------

RUN5D C&R BATTERY WORST CASE-10,000 ACTION LEVEL

TIME TO REACH MCL AT 100M RECEPTOR
Chemical simulated is Pb

Option Chosen Saturated and unsaturated zone models
Run was DETERMIN
Run was transient
Reject runs if Y coordinate outside plume
Reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model
1
1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.352E+05
Dissolved phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.221E+09
Overall chemical decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.358E+05
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	370.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	280.
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	0.250E+08
Reference temperature	C	CONSTANT	16.6	0.000E+00	0.000E+00	40.0
Normalized distribution coefficient	ml/g	CONSTANT	0.970E-01	0.000E+00	0.000E+00	0.331E+06
Distribution coefficient	--	DERIVED	0.200	0.000E+00	0.000E+00	0.166E+05
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	100.
Air diffusion coefficient	cm2/s	CONSTANT	0.645E-01	0.645E-02	0.000E+00	1.00
Reference temperature for air diffusion	C	CONSTANT	25.0	0.000E+00	15.0	30.0
Molecular weight	g/M	CONSTANT	207.	0.000E+00	0.000E+00	0.100E+05
Mole fraction of solute	--	CONSTANT	0.100	0.100E-01	0.100E-02	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000E+00	0.230E-01	0.000E+00	10.0
Henry's law constant	atm-m^3/M	CONSTANT	0.100E-06	0.000E+00	0.000E+00	1.00
RFD value for drinking water	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
ADIF value for fish consumption	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
CCC for aquatic organisms	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.610E-02	0.700E-02	0.254E-04	0.688
Area of waste disposal unit	m^2	DERIVED	0.277E+05	2.16	-0.884	12.3
Duration of pulse	yr	CONSTANT	0.112E+04	3.00	0.100	0.100E+31
Spread of contaminant source	m	DERIVED	21.7	0.000E+00	0.100E-02	0.600E+05
Recharge rate	m/yr	CONSTANT	0.610E-02	0.760E-02	0.254E-04	0.668
Source decay constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	10.0
Initial concentration at landfill	mg/l	CONSTANT	1.00	0.100E-01	0.000E+00	10.0
Length scale of facility	m	CONSTANT	213.	1.00	1.00	0.100E+06
Width scale of facility	m	CONSTANT	130.	1.00	1.00	0.100E+06

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	7
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1

OPTIONS CHOSEN
Van Genuchten functional coefficients
User defined coordinate system

1

COORDINATE DATA, Computer generated

GRID SPACING PARAMETERS

XSTART:	0.0
XO:	8.2
DX:	0.5
XFAC:	1.5
DXMAX:	2.0

MATERIAL NUMBER FOR EACH LAYER
1 1 1 1 1 1 1

1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	0.320E-01	2.92	0.000E+00	3.50
Unsaturated zone porosity	--	CONSTANT	0.380	0.200E-01	0.200	0.700
Air entry pressure head	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	1.00
Depth of the unsaturated zone	m	CONSTANT	8.20	1.00	0.610	366.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.880E-01	0.900E-02	0.000E+00	0.115
Brook and Corey exponent,EN	--	CONSTANT	0.500	0.100	0.000E+00	1.00
ALFA coefficient	1/cm	CONSTANT	0.900E-02	0.970E-01	0.000E+00	0.150
Van Genuchten exponent, ENN	--	CONSTANT	1.23	0.610E-01	1.00	1.50

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

NLAY	- Number of different layers used		1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	10.0
WTFUN	- Weighting factor	--	1.2

OPTIONS CHOSEN

Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations

10 30 30

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Thickness of layer	m	CONSTANT	8.20	1.00	0.000E+00	500.
Longitudinal dispersivity of layer	m	CONSTANT	0.400	0.400E-01	0.000E+00	10.0
Percent organic matter	--	CONSTANT	172.	7.77	0.000E+00	11.0
Bulk density of soil for layer	g/cc	CONSTANT	1.70	0.200E-01	0.795	2.12
Biological decay coefficient	1/yr	CONSTANT	0.000E+00	0.200E-01	0.000E+00	5.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.630E-03	0.630E-04	0.400E-03	0.100
Aquifer porosity	--	CONSTANT	0.380	0.000E+00	0.300	0.560
Bulk density	g/cc	CONSTANT	1.70	0.000E+00	1.16	1.80
Aquifer thickness	m	CONSTANT	30.2	78.6	3.00	560.
Source thickness (mixing zone depth)	m	DERIVED	0.000E+00	0.600	2.00	10.0
Conductivity (hydraulic)	m/yr	CONSTANT	0.389E+04	0.758E+04	31.6	0.151E+06
Gradient (hydraulic)		CONSTANT	0.460E-03	0.310E-01	0.100E-04	0.100
Groundwater seepage velocity	m/yr	DERIVED	4.71	0.000E+00	0.100E-01	0.925E+04
Retardation coefficient	--	DERIVED	1.00	0.100	1.00	0.352E+06
Longitudinal dispersivity	m	CONSTANT	10.0	0.700	0.100	324.
Transverse dispersivity	m	CONSTANT	1.25	0.000E+00	0.100	41.0
Vertical dispersivity	m	DERIVED	0.950	0.950E-01	0.380	250.
Temperature of aquifer	C	CONSTANT	16.6	5.29	5.00	30.0
pH	--	CONSTANT	4.82	1.28	0.300	14.0
Organic carbon content (fraction)		CONSTANT	1.00	0.300E-03	0.100E-02	0.100E-01
Well distance from site	m	CONSTANT	100.	0.000E+00	15.2	0.160E+04
Angle off center	degree	CONSTANT	0.000E+00	0.000E+00	0.000E+00	45.0
Well vertical distance	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	560.

1

TIME	CONCENTRATION
0.265E+03	0.44792E-11
0.266E+03	0.59886E-10
0.268E+03	0.24627E-08
0.270E+03	0.31184E-07
0.272E+03	0.19743E-06
0.274E+03	0.80251E-06
0.276E+03	0.24142E-05
0.278E+03	0.58632E-05
0.280E+03	0.12161E-04
0.282E+03	0.22376E-04
0.284E+03	0.37528E-04
0.286E+03	0.58413E-04
0.288E+03	0.85689E-04
0.300E+03	0.38964E-03
0.302E+03	0.46104E-03
0.304E+03	0.53700E-03
0.306E+03	0.61690E-03
0.308E+03	0.70010E-03
0.310E+03	0.78579E-03
0.100E+05	0.00000E+00

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

VERSION 3.3, DECEMBER 1988

Developed by Phillip Mineart and Atul Salhotra of
Woodward-Clyde Consultants, Oakland, California
In cooperation with:
Hydrogeologic, Inc., Herndon, Virginia,
Geotrans, Inc., Herndon, Virginia,
and
Aqua Terra Consultants, Mountain View, California

Run options
--- -------

RUNGA C&R BATTERY WORST CASE-1000 ACTION LEVEL

MAXIMUM CONC. AT 10M RECEPTOR
Chemical simulated is Pb

Option Chosen	Saturated and unsaturated zone models
Run was	DETERMIN

Run was transient
Reject runs if Y coordinate outside plume
Reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model
1
1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Solid phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.352E+05
Dissolved phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.221E+09
Overall chemical decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.358E+05
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	370.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	280.
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	0.250E+08
Reference temperature	C	CONSTANT	16.6	0.000E+00	0.000E+00	40.0
Normalized distribution coefficient	ml/g	CONSTANT	0.214	0.000E+00	0.000E+00	0.331E+06
Distribution coefficient	--	DERIVED	0.200	0.000E+00	0.000E+00	0.166E+05
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	100.
Air diffusion coefficient	cm2/s	CONSTANT	0.645E-01	0.645E-02	0.000E+00	1.00
Reference temperature for air diffusion	C	CONSTANT	25.0	0.000E+00	15.0	30.0
Molecular weight	g/M	CONSTANT	207.	0.000E+00	0.000E+00	0.100E+05
Mole fraction of solute	--	CONSTANT	0.100	0.100E-01	0.100E-02	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000E+00	0.230E-01	0.000E+00	10.0
Henry's law constant	atm-m^3/M	CONSTANT	0.100E-06	0.000E+00	0.000E+00	1.00
RFD value for drinking water	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
ADIF value for fish consumption	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
CCC for aquatic organisms	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.610E-02	0.700E-02	0.254E-04	0.688
Area of waste disposal unit	m^2	DERIVED	0.277E+05	2.16	-0.884	12.3
Duration of pulse	yr	CONSTANT	439.	3.00	0.100	0.100E+31
Spread of contaminant source	m	DERIVED	21.7	0.000E+00	0.100E-02	0.600E+05
Recharge rate	m/yr	CONSTANT	0.610E-02	0.760E-02	0.254E-04	0.668
Source decay constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	10.0
Initial concentration at landfill	mg/l	CONSTANT	1.00	0.100E-01	0.000E+00	10.0
Length scale of facility	m	CONSTANT	213.	1.00	1.00	0.100E+06
Width scale of facility	m	CONSTANT	130.	1.00	1.00	0.100E+06

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	7
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1

OPTIONS CHOSEN
--- ---
Van Genuchten functional coefficients
User defined coordinate system

COORDINATE DATA, Computer generated

GRID SPACING PARAMETERS

XSTART:	0.0
XO:	8.2
DX:	0.5
XFAC:	1.5
DXMAX:	2.0

MATERIAL NUMBER FOR EACH LAYER
1 1 1 1 1 1 1

1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	0.320E-01	2.92	0.000E+00	3.50
Unsaturated zone porosity	--	CONSTANT	0.380	0.200E-01	0.200	0.700
Air entry pressure head	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	1.00
Depth of the unsaturated zone	m	CONSTANT	8.20	1.00	0.610	366.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.880E-01	0.900E-02	0.000E+00	0.115
Brook and Corey exponent,EN	--	CONSTANT	0.500	0.100	0.000E+00	1.00
ALFA coefficient	1/cm	CONSTANT	0.900E-02	0.970E-01	0.000E+00	0.150
Van Genuchten exponent, ENN	--	CONSTANT	1.23	0.610E-01	1.00	1.50

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

NLAY	- Number of different layers used		1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	10.0
WTFUN	- Weighting factor	--	1.2

OPTIONS CHOSEN

Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations

AR303034

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Thickness of layer	m	CONSTANT	8.20	1.00	0.000E+00	500.
Longitudinal dispersivity of layer	m	CONSTANT	0.400	0.400E-01	0.000E+00	10.0
Percent organic matter	--	CONSTANT	172.	7.77	0.000E+00	11.0
Bulk density of soil for layer	g/cc	CONSTANT	1.70	0.200E-01	0.795	2.12
Biological decay coefficient	1/yr	CONSTANT	0.000E+00	0.200E-01	0.000E+00	5.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Particle diameter	cm	CONSTANT	0.630E-03	0.630E-04	0.400E-03	0.100
Aquifer porosity	--	CONSTANT	0.380	0.000E+00	0.300	0.560
Bulk density	g/cc	CONSTANT	1.70	0.000E+00	1.16	1.80
Aquifer thickness	m	CONSTANT	30.2	78.6	3.00	560.
Source thickness (mixing zone depth)	m	DERIVED	0.000E+00	0.600	2.00	10.0
Conductivity (hydraulic)	m/yr	CONSTANT	0.389E+04	0.758E+04	31.6	0.151E+06
Gradient (hydraulic)		CONSTANT	0.460E-03	0.310E-01	0.100E-04	0.100
Groundwater seepage velocity	m/yr	DERIVED	4.71	0.000E+00	0.100E-01	0.925E+04
Retardation coefficient	--	DERIVED	1.00	0.100	1.00	0.352E+06
Longitudinal dispersivity	m	CONSTANT	1.00	0.700	0.100	324.
Transverse dispersivity	m	CONSTANT	0.125	0.000E+00	0.100	41.0
Vertical dispersivity	m	DERIVED	0.950	0.950E-01	0.380	250.
Temperature of aquifer	C	CONSTANT	16.6	5.29	5.00	30.0
pH	--	CONSTANT	4.82	1.28	0.300	14.0
Organic carbon content (fraction)		CONSTANT	1.00	0.300E-03	0.100E-02	0.100E-01
Well distance from site	m	CONSTANT	10.0	0.000E+00	15.2	0.160E+04
Angle off center	degree	CONSTANT	0.000E+00	0.000E+00	0.000E+00	45.0
Well vertical distance	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	560.

1

TIME	CONCENTRATION
0.900E+03	0.28716E-01
0.920E+03	0.29456E-01
0.940E+03	0.30537E-01
0.960E+03	0.31271E-01
0.980E+03	0.31962E-01
0.100E+04	0.32392E-01
0.102E+04	0.32478E-01
0.104E+04	0.32601E-01
0.106E+04	0.32317E-01
0.108E+04	0.32060E-01
0.110E+04	0.31565E-01
0.112E+04	0.30956E-01
0.114E+04	0.30251E-01
0.116E+04	0.29416E-01
0.118E+04	0.28744E-01
0.120E+04	0.27534E-01
0.122E+04	0.26712E-01
0.124E+04	0.25448E-01
0.126E+04	0.24326E-01
0.100E+05	0.00000E+00

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

VERSION 3.3, DECEMBER 1988

Developed by Phillip Mineart and Atul Salhotra of
Woodward-Clyde Consultants, Oakland, California
In cooperation with:
Hydrogeologic, Inc., Herndon, Virginia,
Geotrans, Inc., Herndon, Virginia,
and
Aqua Terra Consultants, Mountain View, California

1
Run options
--- -------

RUN6B C&R BATTERY WORST CASE-1000 ACTION LEVEL

TIME TO REACH MCL AT 10M RECEPTOR
Chemical simulated is Pb

Option Chosen	Saturated and unsaturated zone models
Run was	DETERMIN
Run was transient	
Reject runs if Y coordinate outside plume	
Reject runs if Z coordinate outside plume	
Gaussian source used in saturated zone model	

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Solid phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.352E+05
Dissolved phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.221E+09
Overall chemical decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.358E+05
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	370.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	280.
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	0.250E+08
Reference temperature	C	CONSTANT	16.6	0.000E+00	0.000E+00	40.0
Normalized distribution coefficient	ml/g	CONSTANT	0.214	0.000E+00	0.000E+00	0.331E+06
Distribution coefficient	--	DERIVED	0.200	0.000E+00	0.000E+00	0.166E+05
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	100.
Air diffusion coefficient	cm2/s	CONSTANT	0.645E-01	0.645E-02	0.000E+00	1.00
Reference temperature for air diffusion	C	CONSTANT	25.0	0.000E+00	15.0	30.0
Molecular weight	g/M	CONSTANT	207.	0.000E+00	0.000E+00	0.100E+05
Mole fraction of solute	--	CONSTANT	0.100	0.100E-01	0.100E-02	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000E+00	0.230E-01	0.000E+00	10.0
Henry's law constant	atm-m^3/M	CONSTANT	0.100E-06	0.000E+00	0.000E+00	1.00
RFD value for drinking water	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
ADIF value for fish consumption	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
CCC for aquatic organisms	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.610E-02	0.700E-02	0.254E-04	0.688
Area of waste disposal unit	m^2	DERIVED	0.277E+05	2.16	-0.884	12.3
Duration of pulse	yr	CONSTANT	439.	3.00	0.100	0.100E+31
Spread of contaminant source	m	DERIVED	21.7	0.000E+00	0.100E-02	0.600E+05
Recharge rate	m/yr	CONSTANT	0.610E-02	0.760E-02	0.254E-04	0.668
Source decay constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	10.0
Initial concentration at landfill	mg/l	CONSTANT	1.00	0.100E-01	0.000E+00	10.0
Length scale of facility	m	CONSTANT	213.	1.00	1.00	0.100E+06
Width scale of facility	m	CONSTANT	130.	1.00	1.00	0.100E+06

AR303047

UNSATURATED ZONE FLOW MODEL PARAMETERS
(Input parameter description and value)

NP	- Total number of nodal points	7
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1

OPTIONS CHOSEN

Van Genuchten functional coefficients
User defined coordinate system

COORDINATE DATA, Computer generated

1

GRID SPACING PARAMETERS

XSTART: 0.0
XO: 8.2
DX: 0.5
XFAC: 1.5
DXMAX: 2.0

MATERIAL NUMBER FOR EACH LAYER
1 1 1 1 1 1 1
1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	0.320E-01	2.92	0.000E+00	3.50
Unsaturated zone porosity	--	CONSTANT	0.380	0.200E-01	0.200	0.700
Air entry pressure head	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	1.00
Depth of the unsaturated zone	m	CONSTANT	8.20	1.00	0.610	366.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.880E-01	0.900E-02	0.000E+00	0.115
Brook and Corey exponent, EN	--	CONSTANT	0.500	0.100	0.000E+00	1.00
ALFA coefficient	1/cm	CONSTANT	0.900E-02	0.970E-01	0.000E+00	0.150
Van Genuchten exponent, ENN	--	CONSTANT	1.23	0.610E-01	1.00	1.50

AR303038
1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

NLAY	- Number of different layers used		1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	10.0
WTFUN	- Weighting factor	--	1.2

OPTIONS CHOSEN

Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations
1

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Thickness of layer	m	CONSTANT	8.20	1.00	0.000E+00	500.
Longitudinal dispersivity of layer	m	CONSTANT	0.400	0.400E-01	0.000E+00	10.0
Percent organic matter	--	CONSTANT	172.	7.77	0.000E+00	11.0
Bulk density of soil for layer	g/cc	CONSTANT	1.70	0.200E-01	0.795	2.12
Biological decay coefficient	1/yr	CONSTANT	0.000E+00	0.200E-01	0.000E+00	5.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Particle diameter	cm	CONSTANT	0.630E-03	0.630E-04	0.400E-03	0.100
Aquifer porosity	--	CONSTANT	0.380	0.000E+00	0.300	0.560
Bulk density	g/cc	CONSTANT	1.70	0.000E+00	1.16	1.80
Aquifer thickness	m	CONSTANT	30.2	78.6	3.00	560.
Source thickness (mixing zone depth)	m	DERIVED	0.000E+00	0.600	2.00	10.0
Conductivity (hydraulic)	m/yr	CONSTANT	0.389E+04	0.758E+04	31.6	0.151E+06
Gradient (hydraulic)		CONSTANT	0.460E-03	0.310E-01	0.100E-04	0.100
Groundwater seepage velocity	m/yr	DERIVED	4.71	0.000E+00	0.100E-01	0.925E+04
Retardation coefficient	--	DERIVED	1.00	0.100	1.00	0.352E+06
Longitudinal dispersivity	m	CONSTANT	1.00	0.700	0.100	324.
Transverse dispersivity	m	CONSTANT	0.125	0.000E+00	0.100	41.0
Vertical dispersivity	m	DERIVED	0.950	0.950E-01	0.380	250.
Temperature of aquifer	C	CONSTANT	16.6	5.29	5.00	30.0
pH	--	CONSTANT	4.82	1.28	0.300	14.0
Organic carbon content (fraction)		CONSTANT	1.00	0.300E-03	0.100E-02	0.100E-01
Well distance from site	m	CONSTANT	10.0	0.000E+00	15.2	0.160E+04
Angle off center	degree	CONSTANT	0.000E+00	0.000E+00	0.000E+00	45.0
Well vertical distance	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	560.

1

TIME	CONCENTRATION
0.360E+03	0.00000E+00
0.361E+03	0.00000E+00
0.362E+03	0.00000E+00
0.363E+03	0.00000E+00
0.364E+03	0.00000E+00
0.365E+03	0.11147E-19
0.366E+03	0.30908E-09
0.367E+03	0.17638E-06
0.368E+03	0.26525E-05
0.368E+03	0.61576E-05
0.369E+03	0.11807E-04
0.369E+03	0.19792E-04
0.370E+03	0.30081E-04
0.370E+03	0.42475E-04
0.371E+03	0.56673E-04
0.371E+03	0.72329E-04
0.372E+03	0.89089E-04
0.372E+03	0.10665E-03
0.373E+03	0.12472E-03
0.100E+05	0.00000E+00

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

VERSION 3.3, DECEMBER 1988

Developed by Phillip Mineart and Atul Salhotra of
Woodward-Clyde Consultants, Oakland, California
In cooperation with:
Hydrogeologic, Inc., Herndon, Virginia,
Geotrans, Inc., Herndon, Virginia,
and
Aqua Terra Consultants, Mountain View, California

Run options
--- -------

RUN6C C&R BATTERY WORST CASE-1000 ACTION LEVEL

MAXIMUM CONC. AT 100M RECEPTOR
Chemical simulated is Pb

Option Chosen	Saturated and unsaturated zone models
Run was	DETERMIN

Run was transient
Reject runs if Y coordinate outside plume
Reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model
1
1

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Solid phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.352E+05
Dissolved phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.221E+09
Overall chemical decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.358E+05
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	370.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	280.
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	0.250E+08
Reference temperature	C	CONSTANT	16.6	0.000E+00	0.000E+00	40.0
Normalized distribution coefficient	ml/g	CONSTANT	0.214	0.000E+00	0.000E+00	0.331E+06
Distribution coefficient	--	DERIVED	0.200	0.000E+00	0.000E+00	0.166E+05
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	100.
Air diffusion coefficient	cm2/s	CONSTANT	0.645E-01	0.645E-02	0.000E+00	1.00
Reference temperature for air diffusion	C	CONSTANT	25.0	0.000E+00	15.0	30.0
Molecular weight	g/M	CONSTANT	207.	0.000E+00	0.000E+00	0.100E+05
Mole fraction of solute	--	CONSTANT	0.100	0.100E-01	0.100E-02	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000E+00	0.230E-01	0.000E+00	10.0
Henry's law constant	atm-m^3/M	CONSTANT	0.100E-06	0.000E+00	0.000E+00	1.00
RFD value for drinking water	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
ADIF value for fish consumption	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
CCC for aquatic organisms	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Infiltration rate	m/yr	CONSTANT	0.610E-02	0.700E-02	0.254E-04	0.688
Area of waste disposal unit	m^2	DERIVED	0.277E+05	2.16	-0.884	12.3
Duration of pulse	yr	CONSTANT	439.	3.00	0.100	0.100E+31
Spread of contaminant source	m	DERIVED	21.7	0.000E+00	0.100E-02	0.600E+05
Recharge rate	m/yr	CONSTANT	0.610E-02	0.760E-02	0.254E-04	0.668
Source decay constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	10.0
Initial concentration at landfill	mg/l	CONSTANT	1.00	0.100E-01	0.000E+00	10.0
Length scale of facility	m	CONSTANT	213.	1.00	1.00	0.100E+06
Width scale of facility	m	CONSTANT	130.	1.00	1.00	0.100E+06

AR303041

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	7
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1

OPTIONS CHOSEN
------- ------
Van Genuchten functional coefficients
User defined coordinate system

COORDINATE DATA, Computer generated
1

GRID SPACING PARAMETERS

XSTART:	0.0
XO:	8.2
DX:	0.5
XFAC:	1.5
DXMAX:	2.0

MATERIAL NUMBER FOR EACH LAYER
1 1 1 1 1 1 1
1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	0.320E-01	2.92	0.000E+00	3.50
Unsaturated zone porosity	--	CONSTANT	0.380	0.200E-01	0.200	0.700
Air entry pressure head	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	1.00
Depth of the unsaturated zone	m	CONSTANT	8.20	1.00	0.610	366.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.880E-01	0.900E-02	0.000E+00	0.115
Brook and Corey exponent, EN	--	CONSTANT	0.500	0.100	0.000E+00	1.00
ALFA coefficient	1/cm	CONSTANT	0.900E-02	0.970E-01	0.000E+00	0.150
Van Genuchten exponent, ENN	--	CONSTANT	1.23	0.610E-01	1.00	1.50

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

NLAY	- Number of different layers used		1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	10.0
WTFUN	- Weighting factor	--	1.2

OPTIONS CHOSEN

Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations
1

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Thickness of layer	m	CONSTANT	8.20	1.00	0.000E+00	500.
Longitudinal dispersivity of layer	m	CONSTANT	0.400	0.400E-01	0.000E+00	10.0
Percent organic matter	--	CONSTANT	172.	7.77	0.000E+00	11.0
Bulk density of soil for layer	g/cc	CONSTANT	1.70	0.200E-01	0.795	2.12
Biological decay coefficient	1/yr	CONSTANT	0.000E+00	0.200E-01	0.000E+00	5.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS		LIMITS	
			MEAN	STD DEV	MIN	MAX
Particle diameter	cm	CONSTANT	0.630E-03	0.630E-04	0.400E-03	0.100
Aquifer porosity	--	CONSTANT	0.380	0.000E+00	0.300	0.560
Bulk density	g/cc	CONSTANT	1.70	0.000E+00	1.16	1.80
Aquifer thickness	m	CONSTANT	30.2	78.6	3.00	560.
Source thickness (mixing zone depth)	m	DERIVED	0.000E+00	0.600	2.00	10.0
Conductivity (hydraulic)	m/yr	CONSTANT	0.389E+04	0.758E+04	31.6	0.151E+06
Gradient (hydraulic)		CONSTANT	0.460E-03	0.310E-01	0.100E-04	0.100
Groundwater seepage velocity	m/yr	DERIVED	4.71	0.000E+00	0.100E-01	0.925E+04
Retardation coefficient	--	DERIVED	1.00	0.100	1.00	0.352E+06
Longitudinal dispersivity	m	CONSTANT	10.0	0.700	0.100	324.
Transverse dispersivity	m	CONSTANT	1.25	0.000E+00	0.100	41.0
Vertical dispersivity	m	DERIVED	0.950	0.950E-01	0.380	250.
Temperature of aquifer	C	CONSTANT	16.6	5.29	5.00	30.0
pH	--	CONSTANT	4.82	1.28	0.300	14.0
Organic carbon content (fraction)		CONSTANT	1.00	0.300E-03	0.100E-02	0.100E-01
Well distance from site	m	CONSTANT	100.	0.000E+00	15.2	0.160E+04
Angle off center	degree	CONSTANT	0.000E+00	0.000E+00	0.000E+00	45.0
Well vertical distance	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	560.

1

TIME	CONCENTRATION
0.100E+04	0.29258E-01
0.102E+04	0.29973E-01
0.104E+04	0.30294E-01
0.106E+04	0.30539E-01
0.107E+04	0.30602E-01
0.108E+04	0.30612E-01
0.109E+04	0.30507E-01
0.110E+04	0.30402E-01
0.111E+04	0.30277E-01
0.112E+04	0.30148E-01
0.113E+04	0.29934E-01
0.114E+04	0.29562E-01
0.115E+04	0.29248E-01
0.116E+04	0.28984E-01
0.117E+04	0.28697E-01
0.118E+04	0.28477E-01
0.119E+04	0.27998E-01
0.200E+04	0.49375E-02
0.201E+04	0.45212E-02
0.100E+05	0.00000E+00

1

U. S. E N V I R O N M E N T A L P R O T E C T I O N A G E N C Y

E X P O S U R E A S S E S S M E N T

M U L T I M E D I A M O D E L

VERSION 3.3, DECEMBER 1988

Developed by Phillip Mineart and Atul Salhotra of
Woodward-Clyde Consultants, Oakland, California
In cooperation with:
Hydrogeologic, Inc., Herndon, Virginia,
Geotrans, Inc., Herndon, Virginia,
and
Aqua Terra Consultants, Mountain View, California

1
Run options
--- -------

RUN6D C&R BATTERY WORST CASE-1000 ACTION LEVEL

TIME TO REACH MCL AT 100M RECEPTOR
Chemical simulated is Pb

Option Chosen — Saturated and unsaturated zone models
Run was — DETERMIN
Run was transient
Reject runs if Y coordinate outside plume
Reject runs if Z coordinate outside plume
Gaussian source used in saturated zone model

CHEMICAL SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Solid phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.352E+05
Dissolved phase decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.221E+09
Overall chemical decay coefficient	1/yr	DERIVED	0.000E+00	0.000E+00	0.000E+00	0.358E+05
Acid catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	370.
Neutral hydrolysis rate constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	280.
Base catalyzed hydrolysis rate	l/M-yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	0.250E+08
Reference temperature	C	CONSTANT	16.6	0.000E+00	0.000E+00	40.0
Normalized distribution coefficient	ml/g	CONSTANT	0.214	0.000E+00	0.000E+00	0.331E+06
Distribution coefficient	--	DERIVED	0.200	0.000E+00	0.000E+00	0.166E+05
Biodegradation coefficient (sat. zone)	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	100.
Air diffusion coefficient	cm2/s	CONSTANT	0.645E-01	0.645E-02	0.000E+00	1.00
Reference temperature for air diffusion	C	CONSTANT	25.0	0.000E+00	15.0	30.0
Molecular weight	g/M	CONSTANT	207.	0.000E+00	0.000E+00	0.100E+05
Mole fraction of solute	--	CONSTANT	0.100	0.100E-01	0.100E-02	1.00
Vapor pressure of solute	mm Hg	CONSTANT	0.000E+00	0.230E-01	0.000E+00	10.0
Henry's law constant	atm-m^3/M	CONSTANT	0.100E-06	0.000E+00	0.000E+00	1.00
RFD value for drinking water	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
ADIF value for fish consumption	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00
CCC for aquatic organisms	mg-kg/day	CONSTANT	1.00	0.000E+00	0.000E+00	1.00

1

SOURCE SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Infiltration rate	m/yr	CONSTANT	0.610E-02	0.700E-02	0.254E-04	0.688
Area of waste disposal unit	m^2	DERIVED	0.277E+05	2.16	-0.884	12.3
Duration of pulse	yr	CONSTANT	439.	3.00	0.100	0.100E+31
Spread of contaminant source	m	DERIVED	21.7	0.000E+00	0.100E-02	0.600E+05
Recharge rate	m/yr	CONSTANT	0.610E-02	0.760E-02	0.254E-04	0.668
Source decay constant	1/yr	CONSTANT	0.000E+00	0.000E+00	0.000E+00	10.0
Initial concentration at landfill	mg/l	CONSTANT	1.00	0.100E-01	0.000E+00	10.0
Length scale of facility	m	CONSTANT	213.	1.00	1.00	0.100E+06
Width scale of facility	m	CONSTANT	130.	1.00	1.00	0.100E+06

1

UNSATURATED ZONE FLOW MODEL PARAMETERS
(input parameter description and value)

NP	- Total number of nodal points	7
NMAT	- Number of different porous materials	1
KPROP	- Van Genuchten or Brooks and Corey	1
IMSHGN	- Spatial discretization option	1

OPTIONS CHOSEN

Van Genuchten functional coefficients
User defined coordinate system

COORDINATE DATA, Computer generated

GRID SPACING PARAMETERS

XSTART:	0.0
XO:	8.2
DX:	0.5
XFAC:	1.5
DXMAX:	2.0

AR303045

MATERIAL NUMBER FOR EACH LAYER
1 1 1 1 1 1 1

1

DATA FOR MATERIAL 1

VADOSE ZONE MATERIAL VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Saturated hydraulic conductivity	cm/hr	CONSTANT	0.320E-01	2.92	0.000E+00	3.50
Unsaturated zone porosity	--	CONSTANT	0.380	0.200E-01	0.200	0.700
Air entry pressure head	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	1.00
Depth of the unsaturated zone	m	CONSTANT	8.20	1.00	0.610	366.

DATA FOR MATERIAL 1

VADOSE ZONE FUNCTION VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Residual water content	--	CONSTANT	0.880E-01	0.900E-02	0.000E+00	0.115
Brook and Corey exponent, EN	--	CONSTANT	0.500	0.100	0.000E+00	1.00
ALFA coefficient	1/cm	CONSTANT	0.900E-02	0.970E-01	0.000E+00	0.150
Van Genuchten exponent, ENN	--	CONSTANT	1.23	0.610E-01	1.00	1.50

1

UNSATURATED ZONE TRANSPORT MODEL PARAMETERS

NLAY	- Number of different layers used		1
NTSTPS	- Number of time values concentration calc		20
DUMMY	- Not presently used		1
ISOL	- Type of scheme used in unsaturated zone		1
N	- Stehfest terms or number of increments		18
NTEL	- Points in Lagrangian interpolation		3
NGPTS	- Number of Gauss points		104
NIT	- Convolution integral segments		2
IBOUND	- Type of boundary condition		2
ITSGEN	- Time values generated or input		1
TMAX	- Max simulation time	--	10.0
WTFUN	- Weighting factor	--	1.2

OPTIONS CHOSEN

Stehfest numerical inversion algorithm
Nondecaying pulse source
Computer generated times for computing concentrations

94030846

DATA FOR LAYER 1

VADOSE TRANSPORT VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Thickness of layer	m	CONSTANT	8.20	1.00	0.000E+00	500.
Longitudinal dispersivity of layer	m	CONSTANT	0.400	0.400E-01	0.000E+00	10.0
Percent organic matter	--	CONSTANT	172.	7.77	0.000E+00	11.0
Bulk density of soil for layer	g/cc	CONSTANT	1.70	0.200E-01	0.795	2.12
Biological decay coefficient	1/yr	CONSTANT	0.000E+00	0.200E-01	0.000E+00	5.00

1

AQUIFER SPECIFIC VARIABLES

VARIABLE NAME	UNITS	DISTRIBUTION	PARAMETERS MEAN	PARAMETERS STD DEV	LIMITS MIN	LIMITS MAX
Particle diameter	cm	CONSTANT	0.630E-03	0.630E-04	0.400E-03	0.100
Aquifer porosity	--	CONSTANT	0.380	0.000E+00	0.300	0.560
Bulk density	g/cc	CONSTANT	1.70	0.000E+00	1.16	1.80
Aquifer thickness	m	CONSTANT	30.2	78.6	3.00	560.
Source thickness (mixing zone depth)	m	DERIVED	0.000E+00	0.600	2.00	10.0
Conductivity (hydraulic)	m/yr	CONSTANT	0.389E+04	0.758E+04	31.6	0.151E+06
Gradient (hydraulic)		CONSTANT	0.460E-03	0.310E-01	0.100E-04	0.100
Groundwater seepage velocity	m/yr	DERIVED	4.71	0.000E+00	0.100E-01	0.925E+04
Retardation coefficient	--	DERIVED	1.00	0.100	1.00	0.352E+06
Longitudinal dispersivity	m	CONSTANT	10.0	0.700	0.100	324.
Transverse dispersivity	m	CONSTANT	1.25	0.000E+00	0.100	41.0
Vertical dispersivity	m	DERIVED	0.950	0.950E-01	0.380	250.
Temperature of aquifer	C	CONSTANT	16.6	5.29	5.00	30.0
pH	--	CONSTANT	4.82	1.28	0.300	14.0
Organic carbon content (fraction)		CONSTANT	1.00	0.300E-03	0.100E-02	0.100E-01
Well distance from site	m	CONSTANT	100.	0.000E+00	15.2	0.160E+04
Angle off center	degree	CONSTANT	0.000E+00	0.000E+00	0.000E+00	45.0
Well vertical distance	m	CONSTANT	0.000E+00	0.000E+00	0.000E+00	560.

1

TIME	CONCENTRATION
0.394E+03	0.88168E-05
0.394E+03	0.10031E-04
0.395E+03	0.11364E-04
0.395E+03	0.12822E-04
0.396E+03	0.14412E-04
0.396E+03	0.16139E-04
0.397E+03	0.18011E-04
0.397E+03	0.20032E-04
0.398E+03	0.22209E-04
0.398E+03	0.24547E-04
0.399E+03	0.27052E-04
0.399E+03	0.29731E-04
0.411E+03	0.14709E-03
0.411E+03	0.15482E-03
0.412E+03	0.16277E-03
0.412E+03	0.17093E-03
0.413E+03	0.17932E-03
0.413E+03	0.18793E-03
0.414E+03	0.19674E-03
0.100E+05	0.00000E+00