SOFTWARE RELEASE NOTICE

01. SRN Number: GHGC-SRN-168

02. Project Title: Radionuclide Transport KTI | Project No.: 20-1402-871

03. SRN Title: NETPATH VERSION 2.0

04. Originator/Requestor: David Turner | Date: 4/01/98

05. Summary of Actions

- ■ Release of new software
- ☐ Release of modified software:
  - ☐ Enhancements made
  - ☐ Corrections made
- ☐ Change of access software
- ☒ Software Retirement

E. C. P 12/5/2001

06. Persons Authorized Access

Name	RO/RW	A/C/D
D. Turner	RO	A
E. Pearcy	RO	A
R. Pabalan	RO	A

07. Element Manager Approval: E. C. P Date: 4/6/98

08. Remarks:
U.S. Geological Survey

SOFTWARE SUMMARY FORM

01. Summary Date: 04/01/98	02. Summary prepared by (Name and phone) David Turner, (210) 522-2139	03. Summary Action: New
04. Software Date: 04/01/98	05. Short Title: NETPATH Version 2.0	
06. Software Title: NETPATH Version 2.0		07. Internal Software ID: NONE

08. Software Type: ☐ Automated Data System ■ Computer Program ☐ Subroutine/Module	09. Processing Mode: ■ Interactive ☐ Batch ■ Combination	10. APPLICATION AREA a. General: ■ Scientific/Engineering ☐ Auxiliary Analyses ☐ Total System PA ☐ Subsystem PA ☐ Other b. Specific:
11. Submitting Organization and Address: CNWRA 6220 Culebra Road San Antonio, TX 78228		12. Technical Contact(s) and Phone: David Turner, (210) 522-2139 John Bradbury (NRC), (301) 415-6597

13. Narrative:
NETPATH is an interactive FORTRAN 77 computer program used to interpret net geochemical mass-balance reactions between an initial and final water along a hydrologic flowpath. NETPATH can also compute mixing proportions of 2 to 5 initial waters and net geochemical reactions that can account for the observed composition of a final water.

14. Computer Platform: PC	15. Computer Operating System: DOS	16. Programming Language(s): Fortran 77	17. Number of Source Program Statements: N/A
18. Computer Memory Requirements: 4 MB RAM	19. Tape Drives: N/A	20. Disk/Drum Units: 5 MB	21. Graphics: N/A

22. Other Operational Requirements: None

23. Software Availability: ■Available ☐ Limited ☐ In-House ONLY	24. Documentation Availability: ■ Available ☐ Inadequate ☐ In-House ONLY

Software Custodian: [signature] Date: 4/6/98

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

SOFTWARE CONTROL CHECKLIST

Name of Software: NETPATH **Version:** 2.0
Primary User: David Turner

☐	SOFTWARE REQUIREMENTS DESCRIPTION	
	Documentation	☐
☐	DESIGN AND DEVELOPMENT	
	Documentation (Scientific Notebook)	☐
☐	DESIGN VERIFICATION	
	Computer runs uniquely identified	☐
	Software analysis tools have been applied and discrepancies resolved	☐
	Design Verification Report	☐
☒	INSTALLATION TESTING	
	Installation test documentation	X
	Discrepancy resolution	☐
☒	CONFIGURATION CONTROL	
	Software Summary Form	X
	User's Manual - U.S. Geological Survey Water Resources Investigation Report 94-4169	X
	Technical Description ON DISKETTE	X
	Source Code	X
	Version Control	N/A
	Software Release Notice	X
☐	SOFTWARE PROBLEM REPORTING AND RESOLUTION	
	Software Problem and Change Request	☐
☐	SOFTWARE VALIDATION	
	Software Validation Test Plan	☐
	Software Validation Test Report	☐
	Software Validation Review	☐
☐	SOFTWARE RETIREMENT	
	Software Release Notice	☐

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TO: Bruce Mabrito
FROM: David Turner
SUBJECT: Installation and Testing of NETPATH, Version 2.0 Acquired Software
DATE: April 1, 1998

The geochemical mass-balance code NETPATH, Version 2.0 was obtained as a compressed file (**netp2-13.exe**) from the U.S. Geological Survey anonymous FTP site. The FTP address is:

brrcrftp.cr.usgs.gov

On this site, the DOS/PC version of NETPATH is located in the **geochem/pc/netpath** subdirectory. The compressed file **netp2-13.exe** contains the executable file, the fortran 77 source code, test problem input and output files, and a postscript copy of the user's manual. This file is attached (3.5" floppy disk). The code can also be ordered from:

U.S. Geological Survey
NWIS Program Office
437 National Center
Reston, VA 22092

The compressed file was expanded and NETPATH, Version 2.0 was installed on the shared drive (**G:\turner\usgscode\netpath2**), and has been tested in the DOS shell for Windows NT 4.0. No problems were encountered during installation.

The test problems provided with the NETPATH distribution file were run to test proper installation. Hardcopies and electronic files of the following are attached:

Input Files (from USGS)
Output Files (from USGS)
Output Files (CNWRA-generated)

The input and output files received from the USGS are also included as electronic files on the attached disk (**netp2-13.exe**), and also on

[redacted] Installation
Test Results
NETPATH, Version 2.0

5/3Y

np-1a.out

```
--------------------------|----------------------------|----------------------
Carbon        Sulfur      |+NaCl     +GYPSUM   KAOLINIT |Mixing: No
Calcium       Magnesium   | Ca-MONT  CO2 GAS   CALCITE  |Evaporation: No
Sodium        Chloride    | SiO2     BIOTITE +PLAGAN38 |Rayleigh Calcs: No
Silica        Aluminum    |                            |
Potassium                 |                            |
================================================================================
Warning: There is no data for Aluminum in 2 of the wells: zero will be used
================================================================================
Initial Well : Sierra Nevada (Ephemeral Spr.)
Final Well   : Sierra Nevada (Perennial Spr.)

          Final      Initial
 C       1.1993      0.7825
 S       0.0250      0.0100
 CA      0.2600      0.0780
 MG      0.0710      0.0290
 NA      0.2590      0.1340
 CL      0.0300      0.0140
 SI      0.4100      0.2730
 AL      0.0000      0.0000
 K       0.0400      0.0280

 NaCl      NA   1.0000 CL   1.0000
 GYPSUM    CA   1.0000 S    1.0000 RS   6.0000 I3  22.0000
 KAOLINIT  AL   2.0000 SI   2.0000
 Ca-MONT   CA   0.1670 AL   2.3300 SI   3.6700
 CO2 GAS   C    1.0000 RS   4.0000 I1 -25.0000 I2 100.0000
 CALCITE   CA   1.0000 C    1.0000 RS   4.0000 I1   0.0000 I2   0.0000
 SiO2      SI   1.0000
 BIOTITE   AL   1.0000 MG   3.0000 K    1.0000 SI   3.0000
 PLAGAN38  CA   0.3800 NA   0.6200 AL   1.3800 SI   2.6200
 No models found.
```

np-1b.out

Initial Well : Sierra Nevada (Ephemeral Spr.)
Final Well : Sierra Nevada (Perennial Spr.)

Constraints: 8	Phases: 9	Parameters
Carbon	+NaCl	+GYPSUM	KAOLINIT	Mixing: No
Calcium	Magnesium	Ca-MONT	CO2 GAS	CALCITE	Evaporation: No
Sodium	Chloride	SiO2	BIOTITE	+PLAGAN38	Rayleigh Calcs: No
Silica	Aluminum			

Warning: There is no data for Aluminum in 2 of the wells: zero will be used

	Final	Initial
C	1.1993	0.7825
S	0.0250	0.0100
CA	0.2600	0.0780
MG	0.0710	0.0290
NA	0.2590	0.1340
CL	0.0300	0.0140
SI	0.4100	0.2730
AL	0.0000	0.0000

NaCl	NA	1.0000	CL	1.0000						
GYPSUM	CA	1.0000	S	1.0000	RS	6.0000	I3	22.0000		
KAOLINIT	AL	2.0000	SI	2.0000						
Ca-MONT	CA	0.1670	AL	2.3300	SI	3.6700				
CO2 GAS	C	1.0000	RS	4.0000	I1	-25.0000	I2	100.0000		
CALCITE	CA	1.0000	C	1.0000	RS	4.0000	I1	0.0000	I2	0.0000
SiO2	SI	1.0000								
BIOTITE	AL	1.0000	MG	3.0000	K	1.0000	SI	3.0000		
PLAGAN38	CA	0.3800	NA	0.6200	AL	1.3800	SI	2.6200		

9 models checked
5 models found

	MODEL 1
NaCl	+ 0.01600
GYPSUM	+ 0.01500
KAOLINIT	-0.03355
Ca-MONT	-0.08136
CO2 GAS	0.30296
CALCITE	0.11380
BIOTITE	0.01400
PLAGAN38	+ 0.17584

	MODEL 2
NaCl	+ 0.01600
GYPSUM	+ 0.01500
KAOLINIT	-0.82741
Ca-MONT	0.60007
CO2 GAS	0.41676
SiO2	-0.91311
BIOTITE	0.01400

PLAGAN38	+	0.17584

	MODEL	3
NaCl	+	0.01600
GYPSUM	+	0.01500
KAOLINIT		2.07993
Ca-MONT		-1.89550
CALCITE		0.41676
SiO2		2.43096
BIOTITE		0.01400
PLAGAN38	+	0.17584

	MODEL	4
NaCl	+	0.01600
GYPSUM	+	0.01500
KAOLINIT		-0.12833
CO2 GAS		0.31655
CALCITE		0.10021
SiO2		-0.10902
BIOTITE		0.01400
PLAGAN38	+	0.17584

	MODEL	5
NaCl	+	0.01600
GYPSUM	+	0.01500
Ca-MONT		-0.11015
CO2 GAS		0.29815
CALCITE		0.11861
SiO2		0.03859
BIOTITE		0.01400
PLAGAN38	+	0.17584

np-1c.out

Initial Well : Sierra Nevada (Ephemeral Spr.)
Final Well : Sierra Nevada (Perennial Spr.)

Carbon	Sulfur	-KAOLINIT	Mixing: No
Calcium	Magnesium	Unforced	Evaporation: No
Sodium	Chloride	+NaCl +GYPSUM -Ca-MONT	Rayleigh Calcs: No
Silica	Aluminum	CO2 GAS CALCITE SiO2	
		BIOTITE +PLAGAN38	

Warning: There is no data for Aluminum in 2 of the wells: zero will be used

	Final	Initial
C	1.1993	0.7825
S	0.0250	0.0100
CA	0.2600	0.0780
MG	0.0710	0.0290
NA	0.2590	0.1340
CL	0.0300	0.0140
SI	0.4100	0.2730
AL	0.0000	0.0000

KAOLINIT	AL	2.0000	SI	2.0000						
NaCl	NA	1.0000	CL	1.0000						
GYPSUM	CA	1.0000	S	1.0000	RS	6.0000	I3	22.0000		
Ca-MONT	CA	0.1670	AL	2.3300	SI	3.6700				
CO2 GAS	C	1.0000	RS	4.0000	I1	-25.0000	I2	100.0000		
CALCITE	CA	1.0000	C	1.0000	RS	4.0000	I1	0.0000	I2	0.0000
SiO2	SI	1.0000								
BIOTITE	AL	1.0000	MG	3.0000	K	1.0000	SI	3.0000		
PLAGAN38	CA	0.3800	NA	0.6200	AL	1.3800	SI	2.6200		

8 models checked
2 models found

MODEL 1

KAOLINIT	- F	-0.03355
NaCl	+	0.01600
GYPSUM	+	0.01500
Ca-MONT	-	-0.08136
CO2 GAS		0.30296
CALCITE		0.11380
BIOTITE		0.01400
PLAGAN38	+	0.17584

MODEL 2

KAOLINIT	- F	-0.12833
NaCl	+	0.01600
GYPSUM	+	0.01500
CO2 GAS		0.31655
CALCITE		0.10021
SiO2		-0.10902
BIOTITE		0.01400
PLAGAN38	+	0.17584

np-2.out

Initial Well: GSL, Bear R. weighted 1961 NETPATH 2.13
Final Well : GSL, S. arm at RR Oct. 1960. December 30, 1996

Constraints: 5	Phases: 5	Parameters
Carbon	CO2 GAS	Mixing: No
Sulfur	NaCl	
Calcium	ARAGONIT	Evaporation: Yes
Sodium	MIRABILI	
Chloride	GYPSUM	Rayleigh Calcs: No

	Final	Initial
C	6.3060	6.0210
S	291.4270	0.6980
CA	11.2170	1.6980
NA	5428.6160	9.4490
CL	5834.6400	9.2340

CO2 GAS	C	1.0000	RS	4.0000	I1	-25.0000	I2	100.0000
NaCl	NA	1.0000	CL	1.0000				
ARAGONIT	CA	1.0000	C	1.0000	RS	4.0000		
MIRABILI	NA	2.0000	S	1.0000	RS	6.0000		
GYPSUM	CA	1.0000	S	1.0000	RS	6.0000	I3	22.0000

5 models checked
3 models found

MODEL 1

CO2 GAS	-4.32887	
NaCl	-2.26579	
ARAGONIT	-1.68460	
MIRABILI	-0.34995	
Evaporation factor:	837.323	1.194g H2O remain

MODEL 2

CO2 GAS	-4.13876	
ARAGONIT	-1.87226	
MIRABILI	-0.42879	
GYPSUM	0.19201	
Evaporation factor:	631.865	1.583g H2O remain

MODEL 3

NaCl	49.32956	
ARAGONIT	-5.95771	
MIRABILI	-2.14518	
GYPSUM	4.37229	
Evaporation factor:	99.629	10.037g H2O remain

np-3-1.out

Initial Well : Chapelle-Knobel (1985) Fd-12
Final Well : Chapelle-Knobel (1985) Ff-35

Constraints: 3	Phases: 3	Parameters
Carbon	CALCITE EXCHANGE CO2 GAS	Mixing: No
Calcium		Evaporation: No
Sodium		Rayleigh Calcs: No
		Exchange: Ca/Na

	Final	Initial
C	5.9742	3.0741
CA	0.0749	1.0232
NA	6.0930	0.1653

CALCITE	CA	1.0000	C	1.0000	RS	4.0000	I1	0.0000	I2	0.0000
EXCHANGE	CA	-1.0000	NA	2.0000	MG	0.0000				
CO2 GAS	C	1.0000	RS	4.0000	I1	-25.0000	I2	100.0000		

1 model checked
1 model found

MODEL 1	
CALCITE	2.01547
EXCHANGE	2.96382
CO2 GAS	0.88468

np-3-2.out

Initial Well : Chapelle-Knobel (1985) Fd-12
Final Well : Chapelle-Knobel (1985) Ff-35

Constraints: 4	Phases: 4	Parameters
Carbon Sodium Calcium Redox	CALCITE EXCHANGE+O2 GAS +"CH2O"	Mixing: No Evaporation: No Rayleigh Calcs: No Exchange: Ca/Na

	Final	Initial
C	5.9742	3.0741
CA	0.0749	1.0232
NA	6.0930	0.1653
RS	23.8968	12.2962

CALCITE	CA	1.0000	C	1.0000	RS	4.0000	I1	0.0000	I2	0.0000
EXCHANGE	CA	-1.0000	NA	2.0000	MG	0.0000				
O2 GAS	RS	4.0000								
"CH2O"	C	1.0000	I1	-25.0000	I2	0.0000				

1 model checked
1 model found

MODEL 1

CALCITE		2.01547
EXCHANGE		2.96382
O2 GAS	+	0.88468
"CH2O"	+	0.88468

np-3-3a.out

Initial Well : Chapelle-Knobel (1985) Fd-12
Final Well : Chapelle-Knobel (1985) Ff-35

Constraints: 5	Phases: 5	Parameters
Carbon	CALCITE	"CH2O"	GOETHITE	Mixing: No
Sodium	Calcium	Redox	FeII-Na	CO2 GAS		Evaporation: No
Iron						Rayleigh Calcs: No

Warning: There is no data for Iron in 1 of the wells: zero will be used

	Final	Initial
C	5.9742	3.0741
CA	0.0749	1.0232
NA	6.0930	0.1653
RS	23.8968	12.2962
FE	0.0000	0.0000

CALCITE	CA	1.0000	C	1.0000	RS	4.0000	I1	0.0000	I2	0.0000
"CH2O"	C	1.0000	I1	-25.0000	I2	0.0000				
GOETHITE	FE	1.0000	RS	3.0000						
FeII-Na	FE	-1.0000	NA	2.0000	RS	-2.0000				
CO2 GAS	C	1.0000	RS	4.0000	I1	-25.0000	I2	100.0000		

1 model checked
1 model found

MODEL 1

CALCITE		-0.94835
"CH2O"	+	0.74096
GOETHITE		2.96382
FeII-Na		2.96382
CO2 GAS		3.10755

np-3-3b.out

Initial Well : Chapelle-Knobel (1985) Fd-12
Final Well : Chapelle-Knobel (1985) Ff-35

Constraints: 5	Phases: 5	Parameters
Carbon	CALCITE EXCHANGE+"CH2O"	Mixing: No
Sodium	GOETHITE MAGNETIT	Evaporation: No
Iron		Rayleigh Calcs: No
Calcium		Exchange: Ca/Na
Redox		

Warning: There is no data for Iron in 1 of the wells: zero will be used

	Final	Initial
C	5.9742	3.0741
CA	0.0749	1.0232
NA	6.0930	0.1653
RS	23.8968	12.2962
FE	0.0000	0.0000

CALCITE	CA	1.0000	C	1.0000	RS	4.0000	I1	0.0000	I2	0.0000
EXCHANGE	CA	-1.0000	NA	2.0000	MG	0.0000				
"CH2O"	C	1.0000	I1	-25.0000	I2	0.0000				
GOETHITE	FE	1.0000	RS	3.0000						
MAGNETIT	FE	3.0000	RS	8.0000						

1 model checked
1 model found

	MODEL 1
CALCITE	2.01547
EXCHANGE	2.96382
"CH2O"	+ 0.88468
GOETHITE	10.61616
MAGNETIT	-3.53872

np-3-4.out

Initial Well : Chapelle-Knobel (1985) Fd-12
Final Well : Chapelle-Knobel (1985) Ff-35

Constraints: 6	Phases: 6	Parameters
Carbon	CALCITE EXCHANGE+"CH2O"	Mixing: No
Sodium	GOETHITE+GYPSUM -PYRITE	Evaporation: No
Iron		Rayleigh Calcs: No
		Exchange: Ca/Na

Warning: There is no data for Iron in 1 of the wells: zero will be used

	Final	Initial
C	5.9742	3.0741
CA	0.0749	1.0232
NA	6.0930	0.1653
RS	24.7092	13.4833
FE	0.0000	0.0000
S	0.1354	0.1978

CALCITE	CA	1.0000	C	1.0000	RS	4.0000	I1	0.0000	I2 0.0000
EXCHANGE	CA	-1.0000	NA	2.0000	MG	0.0000			
"CH2O"	C	1.0000	I1	-25.0000	I2	0.0000			
GOETHITE	FE	1.0000	RS	3.0000					
GYPSUM	CA	1.0000	S	1.0000	RS	6.0000	I3	22.0000	
PYRITE	FE	1.0000	S	2.0000	RS	0.0000	I3	-60.0000	

1 model checked
1 model found

MODEL 1		
CALCITE		1.13821
EXCHANGE		2.96382
"CH2O"	+	1.76194
GOETHITE		0.46985
GYPSUM	+	0.87726
PYRITE	-	-0.46985

np-3-5.out

Initial Well : Chapelle-Knobel (1985) Fd-12
Final Well : Chapelle-Knobel (1985) Ff-35

Constraints: 4	Phases: 4	Parameters
Carbon Sodium Calcium Redox	CALCITE EXCHANGE CH4 GAS +"CH2O"	Mixing: No Evaporation: No Rayleigh Calcs: No Exchange: Ca/Na

	Final	Initial
C	5.9742	3.0741
CA	0.0749	1.0232
NA	6.0930	0.1653
RS	23.8968	12.2962

CALCITE	CA	1.0000	C	1.0000	RS	4.0000	I1	0.0000	I2	0.0000
EXCHANGE	CA	-1.0000	NA	2.0000	MG	0.0000				
CH4 GAS	C	1.0000	RS	-4.0000	I1	-40.0000	I2	0.0000		
"CH2O"	C	1.0000	I1	-25.0000	I2	0.0000				

1 model checked
1 model found

	MODEL 1	
CALCITE		2.01547
EXCHANGE		2.96382
CH4 GAS		-0.88468
"CH2O"	+	1.76936

np-3-6.out

Initial Well : Chapelle-Knobel (1985) Fd-12
Final Well : Chapelle-Knobel (1985) Ff-35

Constraints: 6	Phases: 6	Parameters
Carbon	CALCITE	Mixing: No
Calcium	EXCHANGE	Evaporation: No
Sodium	GOETHITE	Rayleigh Calcs: No
Redox	+GYPSUM	Exchange: Ca/Na
Iron	-PYRITE	
Sulfur	+LIGNITE	

Warning: There is no data for Iron in 1 of the wells: zero will be used

	Final	Initial
C	5.9742	3.0741
CA	0.0749	1.0232
NA	6.0930	0.1653
RS	24.7092	13.4833
FE	0.0000	0.0000
S	0.1354	0.1978

CALCITE	CA	1.0000	C	1.0000	RS	4.0000	I1	0.0000	I2 0.0000
EXCHANGE	CA	-1.0000	NA	2.0000	MG	0.0000			
GOETHITE	FE	1.0000	RS	3.0000					
GYPSUM	CA	1.0000	S	1.0000	RS	6.0000	I3	22.0000	
PYRITE	FE	1.0000	S	2.0000	RS	0.0000	I3	-60.0000	
LIGNITE	C	1.0000	RS	-0.4000	I1	-25.0000	I2	0.0000	

1 model checked
1 model found

	MODEL 1	
CALCITE		0.91086
EXCHANGE		2.96382
GOETHITE		0.58353
GYPSUM	+	1.10461
PYRITE	-	-0.58353
LIGNITE	+	1.98929

np-3-7.out

Initial Well : Chapelle-Knobel (1985) Fd-12
Final Well : Chapelle-Knobel (1985) Ff-35

Constraints: 3	Phases: 3	Parameters
Carbon Calcium Sodium	CALCITE CO2 GAS H-Exch	Mixing: No Evaporation: No Rayleigh Calcs: No

	Final	Initial
C	5.9742	3.0741
CA	0.0749	1.0232
NA	6.0930	0.1653

CALCITE	CA	1.0000	C	1.0000	RS	4.0000	I1	0.0000	I2	0.0000
CO2 GAS	C	1.0000	RS	4.0000	I1	-25.0000	I2	100.0000		
H-Exch	NA	1.6000	CA	-1.0000						

1 model checked
1 model found

MODEL 1

CALCITE	2.75643
CO2 GAS	0.14373
H-Exch	3.70478

np-4.out

Initial Well 1 : Pinal Cr. background, #404
Initial Well 2 : Pinal Cr pH<4 plume, #51
Final well : Pinal Cr pH 4-5, #402

Constraints: 11		Phases: 11			Parameters
Carbon	Sulfur	CALCITE	CO2 GAS	GYPSUM	Mixing: Yes
Calcium	Aluminum	+ALBITE	+O2 GAS	GIBBSITE	Evaporation: No
Magnesium	Sodium	GOETHITE	+DOLOMITE	MnOOH	Rayleigh Calcs: No
Chloride	Silica	KAOLINIT	SiO2		
Iron	Manganese				
Redox					

The mixing ratio will be determined by Chloride
Warning: There is no data for Aluminum in 1 of the wells: zero will be used

	Final	Initial 1	Initial 2
C	4.6957	3.9020	4.2204
S	34.5357	0.1875	92.8765
CA	13.5447	0.9984	11.1301
AL	0.3726	0.0000	9.3939
MG	7.8567	0.5349	16.2636
NA	4.8102	1.1749	9.2610
CL	3.9699	0.2257	9.7230
SI	1.6062	0.5328	1.6874
FE	9.7207	0.0000	50.8313
MN	1.2078	0.0018	1.3841
RS	247.9333	17.4742	678.6412

CALCITE	CA	1.0000	C	1.0000	RS	4.0000	I1	0.0000	I2 0.0000
CO2 GAS	C	1.0000	RS	4.0000	I1	-25.0000	I2	100.0000	
GYPSUM	CA	1.0000	S	1.0000	RS	6.0000	I3	22.0000	
ALBITE	NA	1.0000	AL	1.0000	SI	3.0000			
O2 GAS	RS	4.0000							
GIBBSITE	AL	1.0000							
GOETHITE	FE	1.0000	RS	3.0000					
DOLOMITE	CA	1.0000	MG	1.0000	C	2.0000	RS	8.0000	I1 0.0000
	I2	0.0000							
MnOOH	MN	1.0000	RS	3.0000					
KAOLINIT	AL	2.0000	SI	2.0000					
SiO2	SI	1.0000							

11 models checked
3 models found

	MODEL 1	
Init 1	+ F	0.60576
Init 2	+ F	0.39424
CALCITE		9.62443
CO2 GAS		-11.19810
GYPSUM		-2.19327
ALBITE	+	0.44746
O2 GAS	+	2.31576
GIBBSITE		-3.05421
GOETHITE		-10.31891

DOLOMITE	+	1.12089
MnOOH		0.66099
KAOLINIT		-0.36204

MODEL 2

Init 1	+ F	0.60576
Init 2	+ F	0.39424
CALCITE		9.62443
CO2 GAS		-11.19810
GYPSUM		-2.19327
ALBITE	+	0.44746
O2 GAS	+	2.31576
GIBBSITE		-3.77829
GOETHITE		-10.31891
DOLOMITE	+	1.12089
MnOOH		0.66099
SiO2		-0.72409

MODEL 3

Init 1	+ F	0.60576
Init 2	+ F	0.39424
CALCITE		9.62443
CO2 GAS		-11.19810
GYPSUM		-2.19327
ALBITE	+	0.44746
O2 GAS	+	2.31576
GOETHITE		-10.31891
DOLOMITE	+	1.12089
MnOOH		0.66099
KAOLINIT		-1.88915
SiO2		3.05421

np-5-1.out

Initial Well : Chapelle-Knobel (1985) Fd-12
Final Well : Chapelle-Knobel (1985) Ff-35

Constraints: 6	Phases: 6	Parameters
Carbon	CALCITE	Mixing: No
Calcium	EXCHANGE	Evaporation: No
Sodium	GOETHITE	Rayleigh Calcs: Yes
Redox	+GYPSUM	Exchange: Ca/Na
Iron	-PYRITE	Init C-14 50.00 (TDC)
Sulfur	+LIGNITE	(User-defined)

Warning: There is no data for Iron in 1 of the wells: zero will be used

	Final	Initial
C	5.9742	3.0741
CA	0.0749	1.0232
NA	6.0930	0.1653
RS	24.7092	13.4833
FE	0.0000	0.0000
S	0.1354	0.1978

CALCITE	CA	1.0000	C	1.0000	RS	4.0000	I1	1.1000	I2	0.0000
EXCHANGE	CA	-1.0000	NA	2.0000	MG	0.0000				
GOETHITE	FE	1.0000	RS	3.0000						
GYPSUM	CA	1.0000	S	1.0000	RS	6.0000	I3	22.0000		
PYRITE	FE	1.0000	S	2.0000	RS	0.0000	I3	-60.0000		
LIGNITE	C	1.0000	RS	-0.4000	I1	-22.0000	I2	0.0000		

1 model checked
1 model found

MODEL 1

CALCITE		0.91086
EXCHANGE		2.96382
GOETHITE		0.58353
GYPSUM	+	1.10461
PYRITE	-	-0.58353
LIGNITE	+	1.98929

	Computed	Observed
Carbon-13	-13.6412	-6.2000
C-14 (% mod)	25.7278*	3.1000
Sulfur-34	66.9879	Undefined
Strontium-87	Insufficient data	
Nitrogen-15	Insufficient data	

Adjusted C-14 age in years: 17494.* * = based on User-defined

Model (for initial A0)	A0 (initial)	Computed (no decay)	Observed	age (final)
Original Data	33.90	17.44	3.10	14281.
Mass Balance	55.75	28.69	3.10	18394.
Vogel	85.00	43.74	3.10	21880.
Tamers	52.75	27.15	3.10	17937.
Ingerson and Pearson	50.40	25.93	3.10	17559.
Mook	34.25	17.62	3.10	14366.
Fontes and Garnier	50.35	25.91	3.10	17551.

Eichinger	47.91	24.65	3.10	17141.
User-defined	50.00	25.73	3.10	17494.

Data used for Carbon-13

Initial Value: -12.6000 Modeled Final Value: -13.6412

2 dissolving phases:

Phase	Delta C	Isotopic composition (o/oo)
CALCITE	0.91086	1.1000
LIGNITE	1.98929	-22.0000

Data used for C-14 (% mod)

Initial Value: 50.0000 Modeled Final Value: 25.7278

2 dissolving phases:

Phase	Delta C	Isotopic composition (% modern)
CALCITE	0.91086	0.0000
LIGNITE	1.98929	0.0000

Data used for Sulfur-34

Initial Value: 0.0000 Modeled Final Value: 66.9879

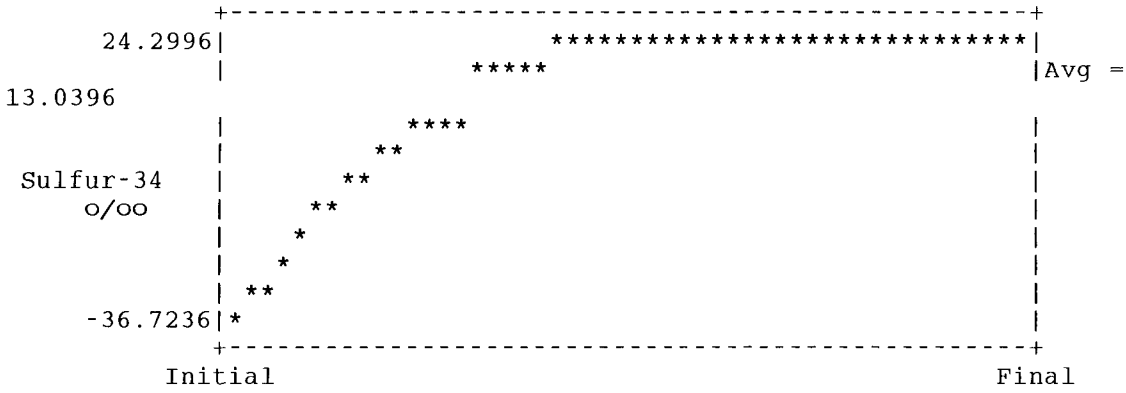
1 dissolving phases:

Phase	Delta S	Isotopic composition (o/oo)
GYPSUM	1.10461	22.0000

1 precipitating phases:

Phase	Delta S	Fractionation factor	Average Isotopic composition (o/oo)
PYRITE	-1.16705	-40.0000	13.0396

Isotopic composition of precipitating PYRITE



Data used for Strontium-87
Insufficient data

Data used for Nitrogen-15
Insufficient data

np-5-2.out

Initial Well : Chapelle-Knobel (1985) Fd-12
Final Well : Chapelle-Knobel (1985) Ff-35

Constraints: 6	Phases: 6	Parameters
Carbon Calcium	*CALCITE EXCHANGE GOETHITE	Mixing: No
Sodium Redox	+GYPSUM -PYRITE +LIGNITE	Evaporation: No
Iron Sulfur		Rayleigh Calcs: Yes
		Exchange: Ca/Na
		Init C-14 50.00 (TDC)
		(User-defined)

Warning: There is no data for Iron in 1 of the wells: zero will be used

	Final	Initial
C	5.9742	3.0741
CA	0.0749	1.0232
NA	6.0930	0.1653
RS	24.7092	13.4833
FE	0.0000	0.0000
S	0.1354	0.1978

CALCITE	CA	1.0000	C	1.0000	RS	4.0000	I1	1.1000	I2 0.0000
EXCHANGE	CA	-1.0000	NA	2.0000	MG	0.0000			
GOETHITE	FE	1.0000	RS	3.0000					
GYPSUM	CA	1.0000	S	1.0000	RS	6.0000	I3	22.0000	
PYRITE	FE	1.0000	S	2.0000	RS	0.0000	I3	-60.0000	
LIGNITE	C	1.0000	RS	-0.4000	I1	-22.0000	I2	0.0000	

1 model checked
1 model found

MODEL 1

CALCITE	0.91086	5.200 exchanged
EXCHANGE	2.96382	
GOETHITE	0.58353	
GYPSUM +	1.10461	
PYRITE -	-0.58353	
LIGNITE +	1.98929	

	Computed	Observed
Carbon-13	-6.2068	-6.2000
C-14 (% mod)	7.8031*	3.1000
Sulfur-34	66.9879	Undefined
Strontium-87	Insufficient data	
Nitrogen-15	Insufficient data	

Adjusted C-14 age in years: 7631.* * = based on User-defined

Model (for initial A0)	A0 (initial)	Computed (no decay)	Observed	age (final)
Original Data	33.90	5.29	3.10	4419.
Mass Balance	55.75	8.70	3.10	8531.
Vogel	85.00	13.27	3.10	12018.
Tamers	52.75	8.23	3.10	8074.
Ingerson and Pearson	50.40	7.87	3.10	7697.
Mook	34.25	5.34	3.10	4503.

Fontes and Garnier	50.35	7.86	3.10	7688.
Eichinger	47.91	7.48	3.10	7278.
User-defined	50.00	7.80	3.10	7631.

Data used for Carbon-13

Initial Value: -12.6000 Modeled Final Value: -6.2068

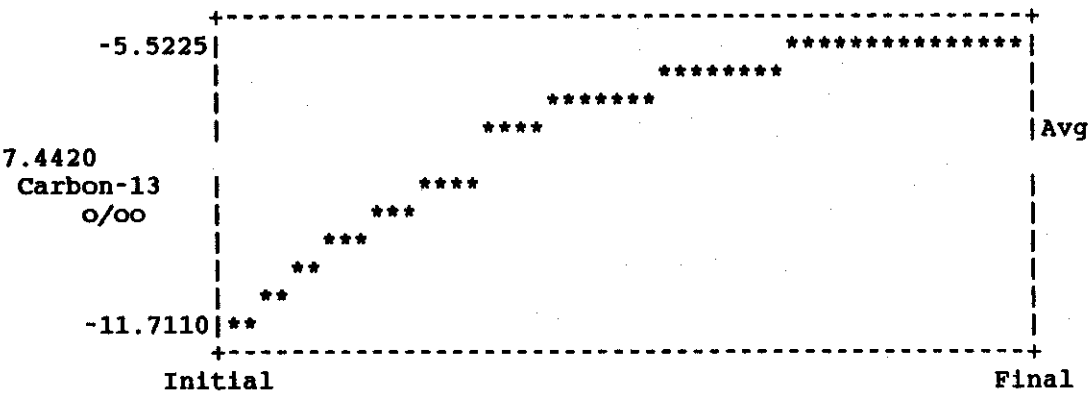
2 dissolving phases:

Phase	Delta C	Isotopic composition (o/oo)
CALCITE	6.11086	1.1000
LIGNITE	1.98929	-22.0000

1 precipitating phases:

Phase	Delta C	Fractionation factor	Average Isotopic composition (o/oo)
CALCITE	-5.20000	0.7050	-7.4420

Isotopic composition of precipitating CALCITE



Data used for C-14 (% mod)

Initial Value: 50.0000 Modeled Final Value: 7.8031

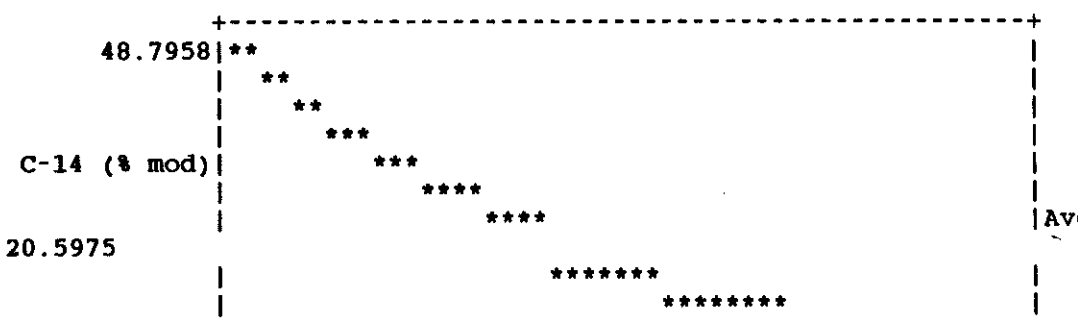
2 dissolving phases:

Phase	Delta C	Isotopic composition (% modern)
CALCITE	6.11086	0.0000
LIGNITE	1.98929	0.0000

1 precipitating phases:

Phase	Delta C	Fractionation factor	Average Isotopic composition (% modern)
CALCITE	-5.20000	1.4099	20.5975

Isotopic composition of precipitating CALCITE




```
      7.9221|                                        ***************|
            +-----------------------------------------------------+
              Initial                                         Final
```

Data used for Sulfur-34

Initial Value: 0.0000 Modeled Final Value: 66.9879

1 dissolving phases:

Phase	Delta S	Isotopic composition (o/oo)
GYPSUM	1.10461	22.0000

1 precipitating phases:

Phase	Delta S	Fractionation factor	Average Isotopic composition (o/oo)
PYRITE	-1.16705	-40.0000	13.0396

Isotopic composition of precipitating PYRITE

```
            +-----------------------------------------------------+
     24.2996|                       *********************************|
            |                 *****                                 |Avg =
13.0396
            |              ****                                     |
            |            **                                         |
 Sulfur-34  |          **                                           |
    o/oo    |        **                                             |
            |      *                                                |
            |     *                                                 |
            |   **                                                  |
    -36.7236|**                                                     |
            +-----------------------------------------------------+
              Initial                                         Final
```

Data used for Strontium-87

Insufficient data

Data used for Nitrogen-15

Insufficient data

np-5-3.out

Initial Well : Chapelle-Knobel (1985) Fd-12
Final Well : Chapelle-Knobel (1985) Ff-35

Constraints: 6	Phases: 6	Parameters
Carbon	CALCITE	Mixing: No
Calcium	EXCHANGE	Evaporation: No
Sodium	GOETHITE	Rayleigh Calcs: Yes
Redox	+GYPSUM	Exchange: Ca/Na
Iron	-PYRITE	Init C-14 50.00 (TDC)
Sulfur	+LIGNITE	(User-defined)

Warning: There is no data for Iron in 1 of the wells: zero will be used

	Final	Initial
C	5.9742	3.0741
CA	0.0749	1.0232
NA	6.0930	0.1653
RS	24.7092	13.4833
FE	0.0000	0.0000
S	0.1354	0.1978

CALCITE	CA	1.0000	C	1.0000	RS	4.0000	I1	1.1000	I2 0.0000
EXCHANGE	CA	-1.0000	NA	2.0000	MG	0.0000			
GOETHITE	FE	1.0000	RS	3.0000					
GYPSUM	CA	1.0000	S	1.0000	RS	6.0000	I3	22.0000	
PYRITE	FE	1.0000	S	2.0000	RS	0.0000	I3	-60.0000	
LIGNITE	C	1.0000	RS	-0.4000	I1	-22.0000	I2	0.0000	

1 model checked
1 model found

MODEL 1

CALCITE		0.91086 999.999 exchanged
EXCHANGE		2.96382
GOETHITE		0.58353
GYPSUM	+	1.10461
PYRITE	-	-0.58353
LIGNITE	+	1.98929

	Computed	Observed
Carbon-13	0.3510	-6.2000
C-14 (% mod)	0.0000	3.1000
Sulfur-34	66.9879	Undefined
Strontium-87	Insufficient data	
Nitrogen-15	Insufficient data	

Model (for initial A0)	A0 (initial)	Computed (no decay)	Observed	age (final)

Data used for Carbon-13

Initial Value: -12.6000 Modeled Final Value: 0.3510

2 dissolving phases:

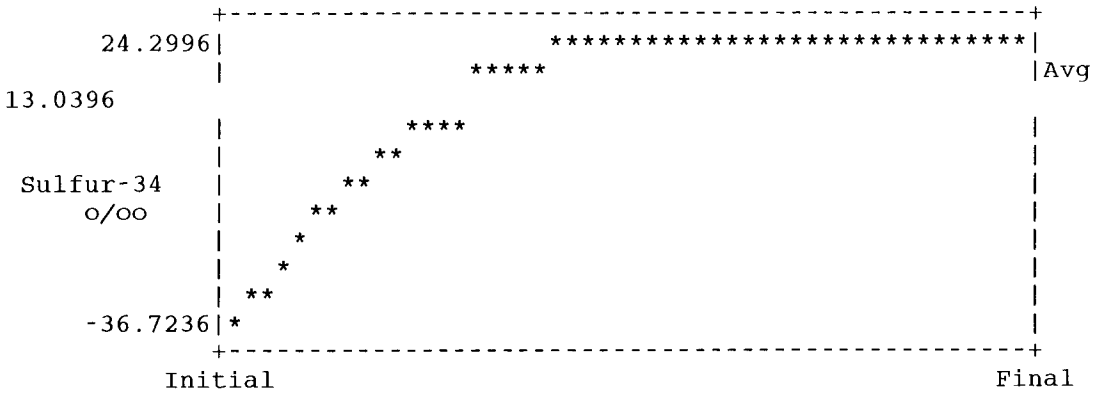
Phase	Delta C	Isotopic composition (o/oo)

```
CALCITE  1000.90986            1.1000
LIGNITE     1.98929          -22.0000

 1 precipitating phases:                                  Average
Phase       Delta C     Fractionation factor Isotopic composition (o/oo)
CALCITE  -999.99900              0.7050                  0.9262

          Isotopic composition of precipitating CALCITE

              +-------------------------------------------------+
      1.0562| ************************************************|Avg =
0.9262
              |                                                 |
              |                                                 |
              |                                                 |
Carbon-13     |                                                 |
    o/oo      |                                                 |
              |                                                 |
              |                                                 |
              |                                                 |
     -5.4339|*                                                 |
              +-------------------------------------------------+
           Initial                                          Final

 Data used for C-14 (% mod)

 Initial Value:      50.0000        Modeled Final Value:       0.0000

  2 dissolving phases:
Phase       Delta C     Isotopic composition (% modern)
CALCITE  1000.90986              0.0000
LIGNITE     1.98929              0.0000

 1 precipitating phases:                                  Average
Phase       Delta C     Fractionation factor Isotopic composition (% modern)
CALCITE  -999.99900              1.4099                  0.5023

          Isotopic composition of precipitating CALCITE

              +-------------------------------------------------+
     25.0739|*                                                 |
              |                                                 |
              |                                                 |
              |                                                 |
C-14 (% mod)|                                                 |
              |                                                 |
              |                                                 |
              |                                                 |
              |                                                 |
      0.0000| ************************************************|Avg =
0.5023
              +-------------------------------------------------+
           Initial                                          Final

 Data used for Sulfur-34

 Initial Value:       0.0000        Modeled Final Value:      66.9879

  1 dissolving phases:
Phase       Delta S     Isotopic composition (o/oo)
GYPSUM      1.10461             22.0000
```

1 precipitating phases:

Phase	Delta S	Fractionation factor	Average Isotopic composition (o/oo)
PYRITE	-1.16705	-40.0000	13.0396

Isotopic composition of precipitating PYRITE



Data used for Strontium-87
Insufficient data

Data used for Nitrogen-15
Insufficient data

np-5-4.out

Initial Well : Chapelle-Knobel (1985) Fd-12
Final Well : Chapelle-Knobel (1985) Ff-35

Constraints: 6	Phases: 6	Parameters
Carbon	CALCITE	Mixing: No
Calcium	GOETHITE+GYPSUM	Evaporation: No
Sodium	-PYRITE +LIGNITE	Rayleigh Calcs: Yes
Redox	H-Exch	Init C-14 50.00 (TDC)
Iron		(User-defined)
Sulfur		

Warning: There is no data for Iron in 1 of the wells: zero will be used

	Final	Initial
C	5.9742	3.0741
CA	0.0749	1.0232
NA	6.0930	0.1653
RS	24.7092	13.4833
FE	0.0000	0.0000
S	0.1354	0.1978

CALCITE	CA	1.0000	C	1.0000	RS	4.0000	I1	1.1000	I2 0.0000
GOETHITE	FE	1.0000	RS	3.0000					
GYPSUM	CA	1.0000	S	1.0000	RS	6.0000	I3	22.0000	
PYRITE	FE	1.0000	S	2.0000	RS	0.0000	I3	-60.0000	
LIGNITE	C	1.0000	RS	-0.4000	I1	-22.0000	I2	0.0000	
H-Exch	NA	1.6000	CA	-1.0000					

1 model checked
1 model found

MODEL 1

CALCITE		2.70349
GOETHITE		0.05769
GYPSUM	+	0.05293
PYRITE	-	-0.05769
LIGNITE	+	0.19666
H-Exch		3.70478

	Computed	Observed
Carbon-13	-6.7098	-6.2000
C-14 (% mod)	25.7278*	3.1000
Sulfur-34	30.4195	Undefined
Strontium-87	Insufficient data	
Nitrogen-15	Insufficient data	

Adjusted C-14 age in years: 17494.* * = based on User-defined

Model (for initial A0)	A0 (initial)	Computed (no decay)	Observed	age (final)
Original Data	33.90	17.44	3.10	14281.
Mass Balance	55.75	28.69	3.10	18394.
Vogel	85.00	43.74	3.10	21880.
Tamers	52.75	27.15	3.10	17937.
Ingerson and Pearson	50.40	25.93	3.10	17559.
Mook	34.25	17.62	3.10	14366.
Fontes and Garnier	50.35	25.91	3.10	17551.
Eichinger	47.91	24.65	3.10	17141.

User-defined 50.00 25.73 3.10 17494.

Data used for Carbon-13

Initial Value: -12.6000 Modeled Final Value: -6.7098

2 dissolving phases:

Phase	Delta C	Isotopic composition (o/oo)
CALCITE	2.70349	1.1000
LIGNITE	0.19666	-22.0000

Data used for C-14 (% mod)

Initial Value: 50.0000 Modeled Final Value: 25.7278

2 dissolving phases:

Phase	Delta C	Isotopic composition (% modern)
CALCITE	2.70349	0.0000
LIGNITE	0.19666	0.0000

Data used for Sulfur-34

Initial Value: 0.0000 Modeled Final Value: 30.4195

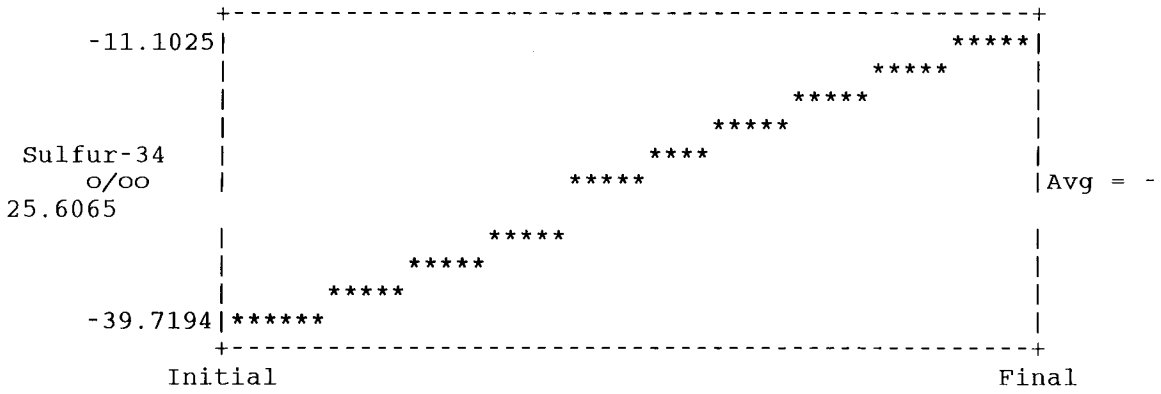
1 dissolving phases:

Phase	Delta S	Isotopic composition (o/oo)
GYPSUM	0.05293	22.0000

1 precipitating phases:

Phase	Delta S	Fractionation factor	Average Isotopic composition (o/oo)
PYRITE	-0.11537	-40.0000	-25.6065

Isotopic composition of precipitating PYRITE



Data used for Strontium-87
Insufficient data

Data used for Nitrogen-15
Insufficient data

np-5-5.out

Initial Well : Chapelle-Knobel (1985) Fd-12
Final Well : Chapelle-Knobel (1985) Ff-35

Constraints: 3	Phases: 3	Parameters
Carbon Calcium Sodium	CALCITE H-Exch CO2 GAS	Mixing: No Evaporation: No Rayleigh Calcs: Yes Init C-14 50.00 (TDC) (User-defined)

	Final	Initial
C	5.9742	3.0741
CA	0.0749	1.0232
NA	6.0930	0.1653

CALCITE	CA	1.0000	C	1.0000	RS	4.0000	I1	1.1000	I2	0.0000
H-Exch	NA	1.6000	CA	-1.0000						
CO2 GAS	C	1.0000	RS	4.0000	I1	-22.0000	I2	0.0000		

1 model checked
1 model found

MODEL 1

CALCITE	2.75643
H-Exch	3.70478
CO2 GAS	0.14373

	Computed	Observed
Carbon-13	-6.5051	-6.2000
C-14 (% mod)	25.7278*	3.1000
Sulfur-34	0.0000	Undefined
Strontium-87	Insufficient data	
Nitrogen-15	Insufficient data	

Adjusted C-14 age in years: 17494.* * = based on User-defined

Model (for initial A0)	A0 (initial)	Computed (no decay)	Observed	age (final)
Original Data	33.90	17.44	3.10	14281.
Mass Balance	55.75	28.69	3.10	18394.
Vogel	85.00	43.74	3.10	21880.
Tamers	52.75	27.15	3.10	17937.
Ingerson and Pearson	50.40	25.93	3.10	17559.
Mook	34.25	17.62	3.10	14366.
Fontes and Garnier	50.35	25.91	3.10	17551.
Eichinger	47.91	24.65	3.10	17141.
User-defined	50.00	25.73	3.10	17494.

Data used for Carbon-13

Initial Value: -12.6000 Modeled Final Value: -6.5051

2 dissolving phases:

Phase	Delta C	Isotopic composition (o/oo)
CALCITE	2.75643	1.1000
CO2 GAS	0.14373	-22.0000

Data used for C-14 (% mod)

Initial Value: 50.0000 Modeled Final Value: 25.7278

2 dissolving phases:

Phase	Delta C	Isotopic composition (% modern)
CALCITE	2.75643	0.0000
CO2 GAS	0.14373	0.0000

Data used for Sulfur-34

Initial Value: 0.0000 Modeled Final Value: 0.0000

No incoming or outgoing phases

Data used for Strontium-87
Insufficient data

Data used for Nitrogen-15
Insufficient data

np-6.out

Initial Well : Madison.Recharge #3
Final Well : Madison.Mysse

Constraints: 10	Phases: 10	Parameters
Carbon	+DOLOMITE CALCITE +ANHYDRIT	Mixing: No
Calcium	+"CH2O" GOETHITE-PYRITE	Evaporation: No
Sodium	EXCHANGE+NaCl SYLVITE	Rayleigh Calcs: Yes
Chloride	CO2 GAS	Exchange: Ca/Na
Redox		Init C-14 52.33 (TDC)
		(Mass Balance)

	Final	Initial
C	6.8700	4.3000
S	20.1190	0.1600
CA	11.2800	1.2000
MG	4.5400	1.0100
NA	31.8900	0.0200
K	2.5400	0.0200
CL	17.8500	0.0200
FE	0.0004	0.0010
RS	146.1228	18.1620
I3	317.9967	1.5568

DOLOMITE	CA	1.0000	MG	1.0000	C	2.0000	RS	8.0000	I1	8.0000
	I2	0.0000							
CALCITE	CA	1.0000	C	1.0000	RS	4.0000	I1	4.0000	I2	0.0000
ANHYDRIT	CA	1.0000	S	1.0000	RS	6.0000	I3	15.5000		
"CH2O"	C	1.0000	I1	-25.0000	I2	0.0000				
GOETHITE	FE	1.0000	RS	3.0000						
PYRITE	FE	1.0000	S	2.0000	RS	0.0000	I3	-44.1800		
EXCHANGE	CA	-1.0000	NA	2.0000	MG	0.0000				
NaCl	NA	1.0000	CL	1.0000						
SYLVITE	K	1.0000	CL	1.0000						
CO2 GAS	C	1.0000	RS	4.0000	I1	-16.2000	I2	100.0000		

1 model checked
1 model found

	MODEL 1
DOLOMITE	+ 3.53000
CALCITE	-5.31723
ANHYDRIT	+ 20.14723
"CH2O"	+ 0.87077
GOETHITE	0.09351
PYRITE	- -0.09411
EXCHANGE	8.28000
NaCl	+ 15.31000
SYLVITE	2.52000
CO2 GAS	-0.04355

	Computed	Observed
Carbon-13	-2.2157	-2.3400
C-14 (% mod)	12.2688*	0.8000
Sulfur-34	15.8130	15.8058
Strontium-87	Insufficient data	

Nitrogen-15 Insufficient data

Adjusted C-14 age in years: 22570.* * = based on Mass Balance

Model (for initial A0)	A0 (initial)	Computed (no decay)	Observed	age (final)
Original Data	33.05	7.75	0.80	18771.
Mass Balance	52.33	12.27	0.80	22570.
Vogel	85.00	19.93	0.80	26580.
Tamers	53.46	12.54	0.80	22747.
Ingerson and Pearson	52.33	12.27	0.80	22570.
Mook	65.91	15.45	0.80	24478.
Fontes and Garnier	52.31	12.27	0.80	22568.
Eichinger	47.57	11.15	0.80	21783.
User-defined	100.00	23.45	0.80	27924.

Data used for Carbon-13

Initial Value: -6.9900 Modeled Final Value: -2.2157

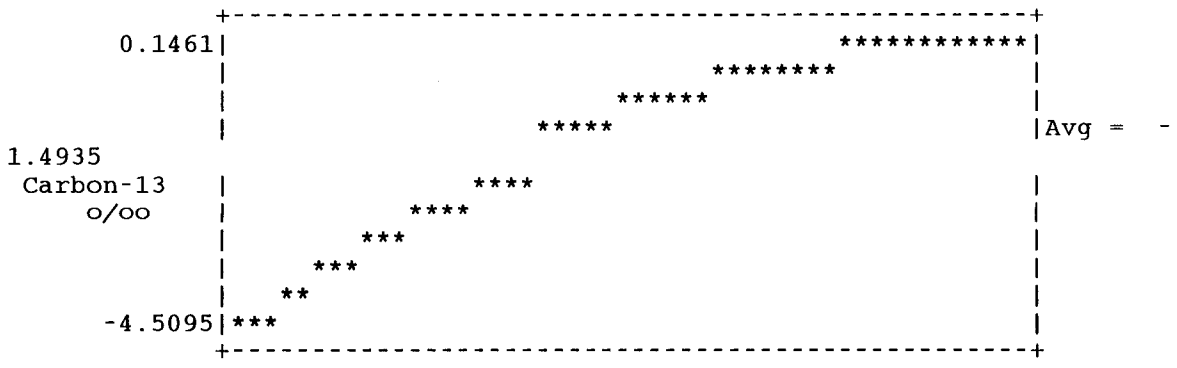
2 dissolving phases:

Phase	Delta C	Isotopic composition (o/oo)
DOLOMITE	7.06000	4.0000
"CH2O"	0.87077	-25.0000

2 precipitating phases:

Phase	Delta C	Fractionation factor	Average Isotopic composition (o/oo)
CALCITE	-5.31723	2.3844	-1.4935
CO2 GAS	-0.04355	-5.9202	-9.7659

Isotopic composition of precipitating CALCITE



Isotopic composition of precipitating CO2 GAS

Data used for C-14 (% mod)

Initial Value: 52.3256 Modeled Final Value: 12.2688

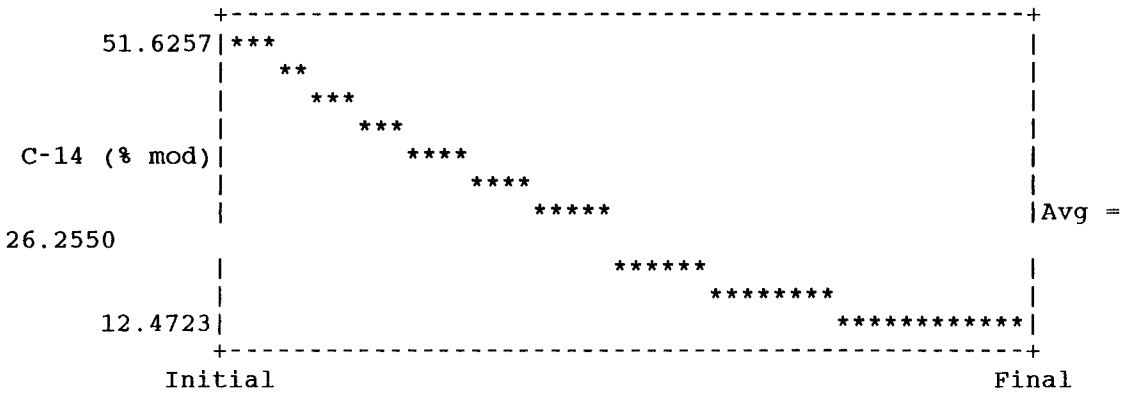
2 dissolving phases:

Phase	Delta C	Isotopic composition (% modern)
DOLOMITE	7.06000	0.0000
"CH2O"	0.87077	0.0000

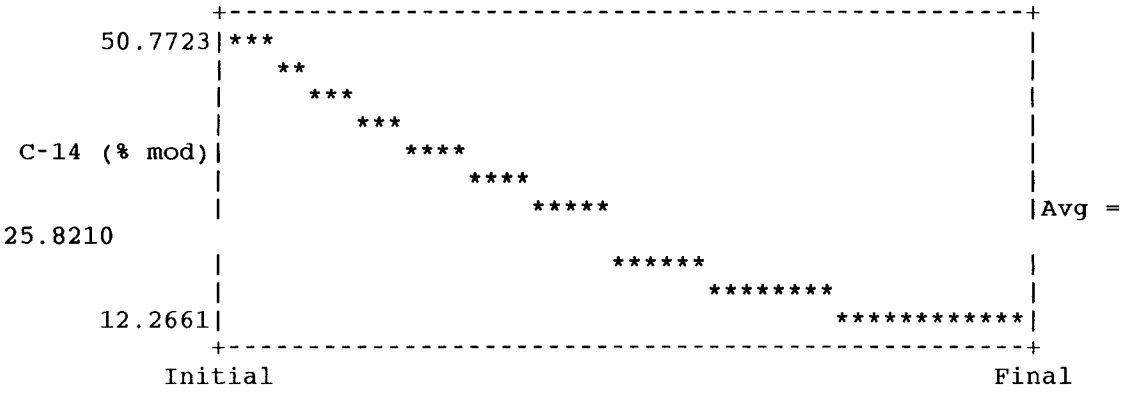
2 precipitating phases:

Phase	Delta C	Fractionation factor	Average Isotopic composition (% modern)
CALCITE	-5.31723	4.7687	26.2550
CO2 GAS	-0.04355	-11.8403	25.8210

Isotopic composition of precipitating CALCITE



Isotopic composition of precipitating CO2 GAS



Data used for Sulfur-34

Initial Value: 9.7300 Modeled Final Value: 15.8130

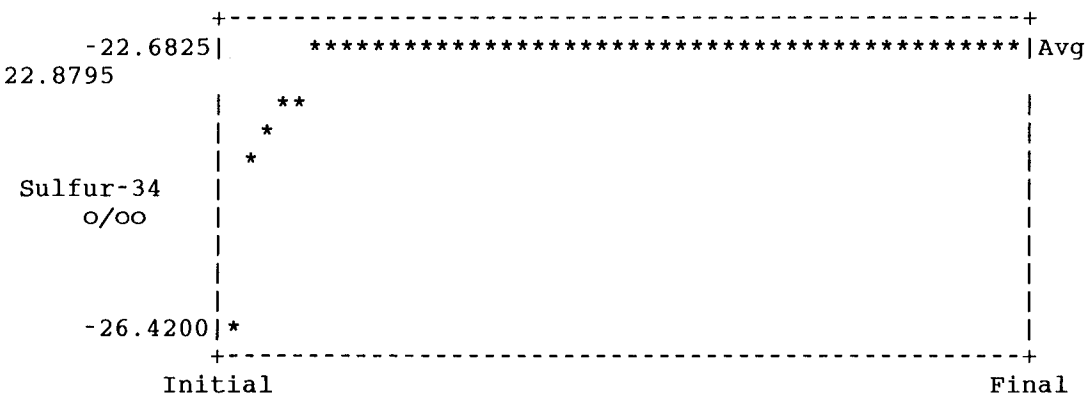
1 dissolving phases:

Phase	Delta S	Isotopic composition (o/oo)
ANHYDRIT	20.14723	15.5000

1 precipitating phases:

Phase	Delta S	Fractionation factor	Average Isotopic composition (o/oo)
PYRITE	-0.18823	-37.8958	-22.8795

Isotopic composition of precipitating PYRITE



Data used for Strontium-87
Insufficient data

Data used for Nitrogen-15
Insufficient data

np-7.out

Initial Well : Bemidjii Site AA
Final Well : Bemidjii Site BB

Constraints: 6	Phases: 6	Parameters
Carbon Iron Nitrogen Calcium Manganese Redox	MnO2 GOETHITE SIDERITE Sorb NH4 CO2-CH4 CALCITE	Mixing: No Evaporation: No Rayleigh Calcs: Yes X CO2 in CO2-CH4: 0.14 Init C-14 0.00 (TDC) (Original Data)

	Final	Initial
C	12.4730	22.6890
CA	3.0460	3.3220
FE	0.0790	1.0550
MN	0.1270	0.0160
N	0.1450	0.1680
RS	38.1867	56.9640

MnO2	MN	1.0000	RS	4.0000					
GOETHITE	FE	1.0000	RS	3.0000					
SIDERITE	FE	1.0000	C	1.0000	RS	6.0000	I1	0.0000	I2 0.0000
Sorb NH4	N	-1.0000	RS	3.0000					
CO2-CH4	C	1.0000	RS	-2.8800	I1	-49.5540	I2	0.0000	
CALCITE	CA	1.0000	C	1.0000	RS	4.0000	I1	0.0000	I2 0.0000

1 model checked
1 model found

MODEL 1

MnO2	0.11100
GOETHITE	6.48751
SIDERITE	-7.46351
Sorb NH4	0.02300
CO2-CH4	-2.47649
CALCITE	-0.27600

	Computed	Observed
Carbon-13	-9.7397	-9.7385
DIC C-13	-5.9515	-5.9500
C-14 (% mod)	Insufficient data	
Sulfur-34	0.0000	Undefined
Strontium-87	Insufficient data	
Nitrogen-15	Insufficient data	

Data used for Carbon-13

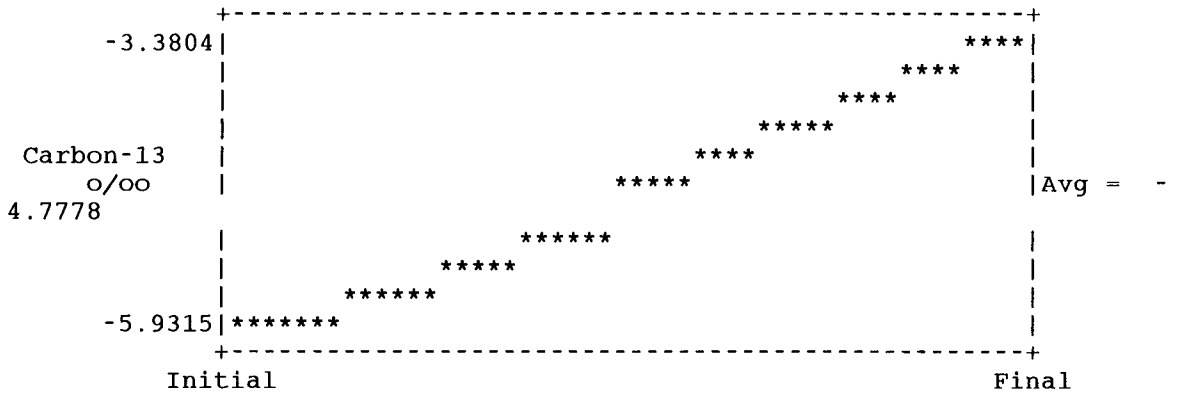
Initial Value: -12.3291 Modeled Final Value: -9.7397

4 precipitating phases:

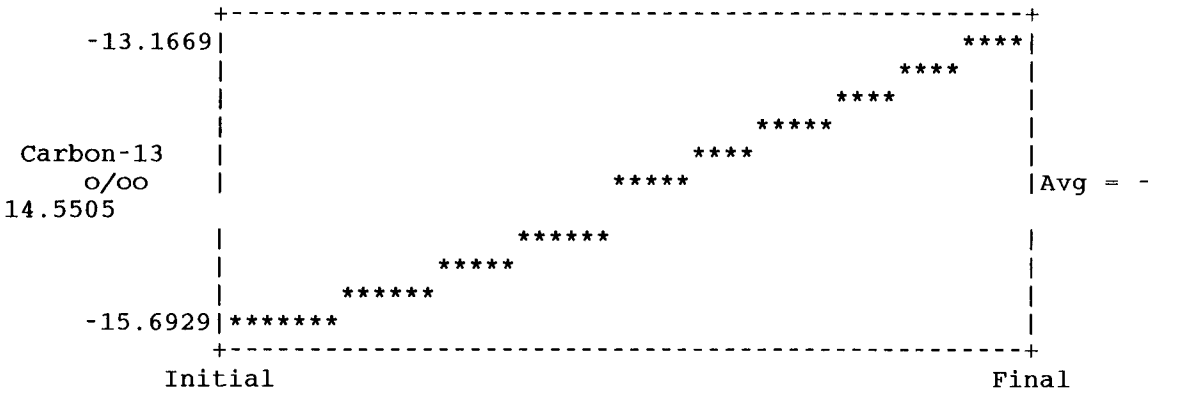
Phase	Delta C	Fractionation factor	Average Isotopic composition (o/oo)
SIDERITE	-7.46351	6.4576	-4.7778

CO2 GAS	-0.34671	-3.4255	-14.5505
CH4 GAS	-2.12978	-43.9000	-54.5732
CALCITE	-0.27600	6.4576	-4.7778

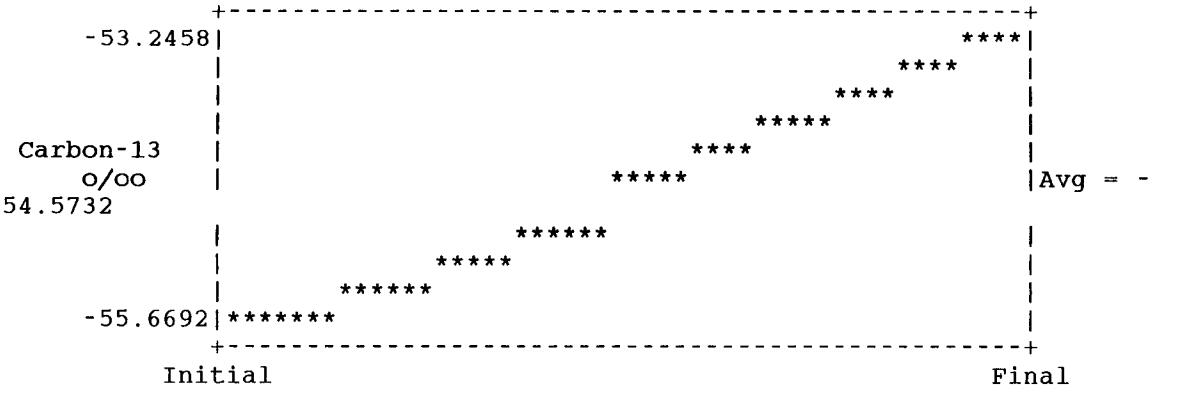
Isotopic composition of precipitating SIDERITE



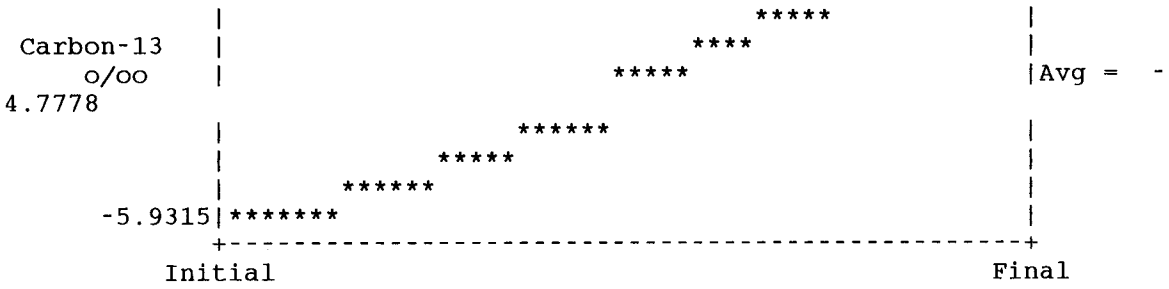
Isotopic composition of precipitating CO2 GAS



Isotopic composition of precipitating CH4 GAS



Isotopic composition of precipitating CALCITE



Data used for C-14 (% mod)
Insufficient data

Data used for Sulfur-34

Initial Value: 0.0000 Modeled Final Value: 0.0000

No incoming or outgoing phases

Data used for Strontium-87
Insufficient data

Data used for Nitrogen-15
Insufficient data