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GRAF

Post-Processing Software

for output from the

Eclipse *

Reservoir Simulation Software **

vended by

Schlumberger (GeoQuest)

* This tutorial is based on Grid version 1999a_1.
** Eclipse is Schlumberger (GeoQuest) software.

Thank you for visiting www.EricLaine.com.

The primary purpose of this document is to serve as a memory aid for the author. Thus, the author is also the target audience. (In other words, the quality of the composition is 100% sufficient for me to understand what I wrote.)

The secondary purpose is to share this tutorial with the public. I appreciate the possibility that the general public may have some difficulty understanding the my personal abbreviations and my intuitive logic.

Please send your questions and your suggestions to EricLaine@compuserve.com.

This tutorial uses Grid to create contour maps for each desired property.

The maps are then used to populate the simulation grid with properties such as depth, thickness, porosity, and permeability.

The purpose of this tutorial is to improve the author's personal productivity. The author believes other interested parties will also find this useful.

Major topics

- Starting Grid
- Mesh maps
  - Defining the map mesh
  - Creating contours on the maps mesh
    - Discusses the need for sufficient contour-point density
  - Add wells
  - Exporting contour maps
  - Saving contour maps
  - Importing contour maps

Major topics, continued
- Simulation grids
  - Creating grids
    - Vector
    - N x M
    - Irregular grids
  - Populating the grid
    - Overview
    - Verification
    - Review
    - Required number of grids
  - Exporting grid properties
- Eclipse input (*.GRDECL files)
  - Example and validation
- Quality
  - Sufficient input
  - Control-contour and control-point synergy
- Automated contouring criteria
  - Search radius
  - Empty octants
- Supplemental index for GeoQuest's Grid manual
- Sample hydraulic-fracture grid
- Summary and conclusions

Agreement (1 of 2)

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GOAL

The goal of this tutorial is to provide a convenient study guide for learning to use GeoQuest's (Schlumberger's) Graphical Post-Processing software (GRAF.)

Most of the information this tutorial comes from Schlumberger's (GeoQuest's) GRAF Reference Manual (version 98a) and from GRAF itself. This document includes quotations from GeoQuest's reference materials. All quotes are protected by GeoQuest's copyright. It is assumed that the user honors GeoQuest's copyright by having an up-to-date license for GRAF.

The author's added value is in the unique approach for learning how to use GRAF. E-Mail EricLaine@compuserve.com (or call 01-1(800)900-6527] for permission to copy this tutorial.

OVERVIEW

GRAF is a powerful post processor. It uses a command-line interface style. The interface guides the user through the post-processing sequence. The sequence uses a series of menus and sub-menus guide the user. This is a fine, and the user can only see one menu at a time. It helps when the user's experience provides advance knowledge about contents of the as yet unseen sub-menus.

This tutorial helps the infrequent user and the novice by presenting the author's experience in a logical fashion. This tutorial is a step-by-step example that uses most of GRAF's features. The novice can use the steps as a procedure. The infrequent user can review the steps as a way to remember how to use GRAF. Either way, the user's productivity goes up.

THE EXAMPLE

The example presented in this tutorial is CASE01.DATA. CASE01.DATA is GeoQuest's e300 version of the Society of Petroleum Third Engineers Comparative Study Project. The 3rd SPE Comparative Study is a gas-cycling study. Gas cycling requires tuning an equation-of-state to match laboratory-measured Pressure-Volume-Temperature data. A tuned EOS is the PVT input for compositional simulation.

There are companion tutorials.

A tutorial named PVTi.ppt details QeoQuest's PVTi software. PVTi uses the input file named VOLOIL.PVI, which is covered by the VOLOIL.ppt tutorial. Output from VOLOIL is part of the input for the e300 software. CASE01.ppt is the tutorial for CASE01.DATA.

THE TABLE of CONTENTS

0 - How to start GRAF

Starting from Windows

Starting from UNIX

This tutorial assumes you are running Eclipse, etc. on a UNIX operating system. However, you may be using a Windows computer to access the UNIX computer.

The next section covers running GRAF from a Windows computer. The next section also covers running GRAF from a UNIX computer.

0 - How to start GRAF - Windows

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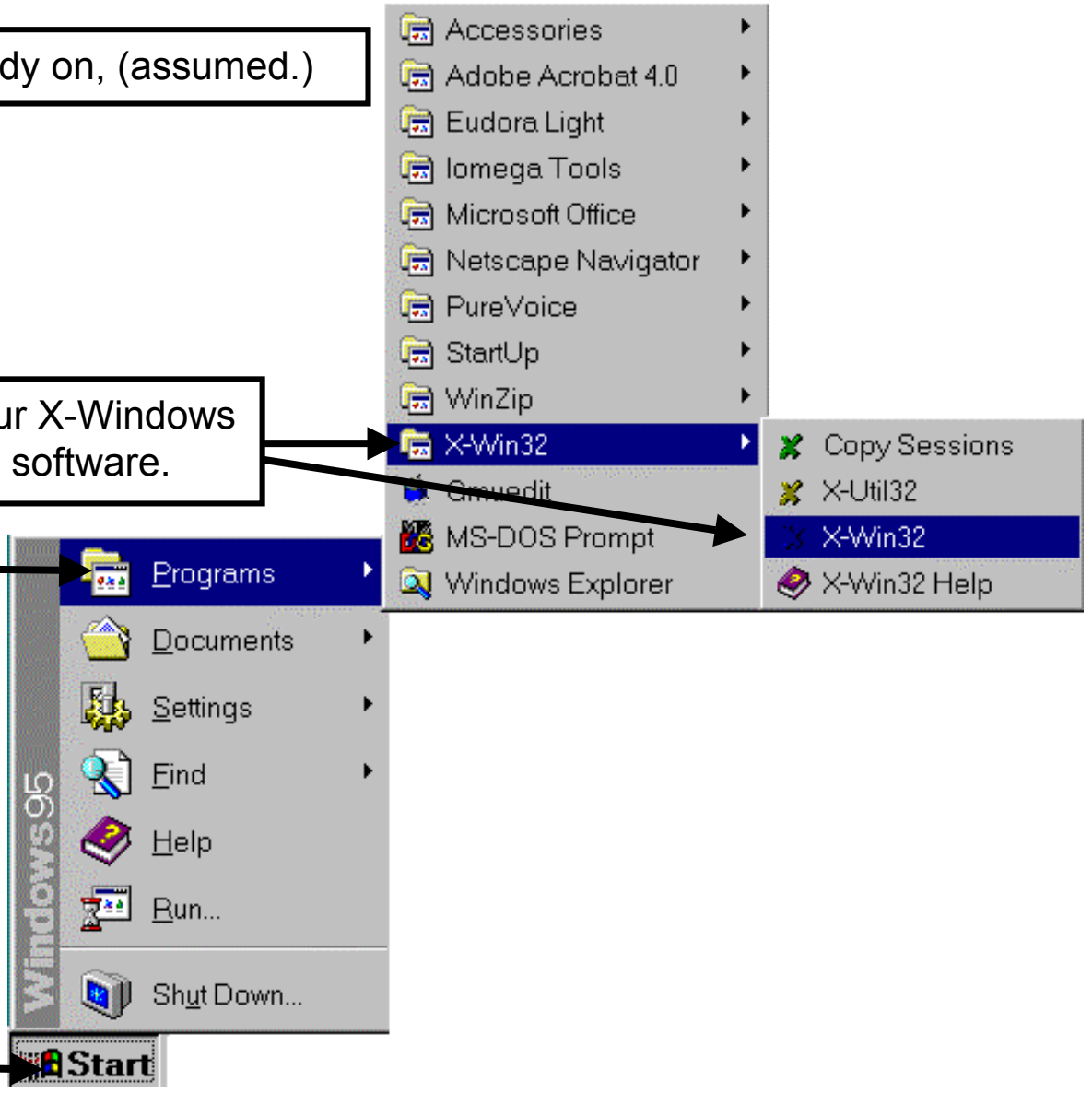
1. Your Windows computer is already on, (assumed.)

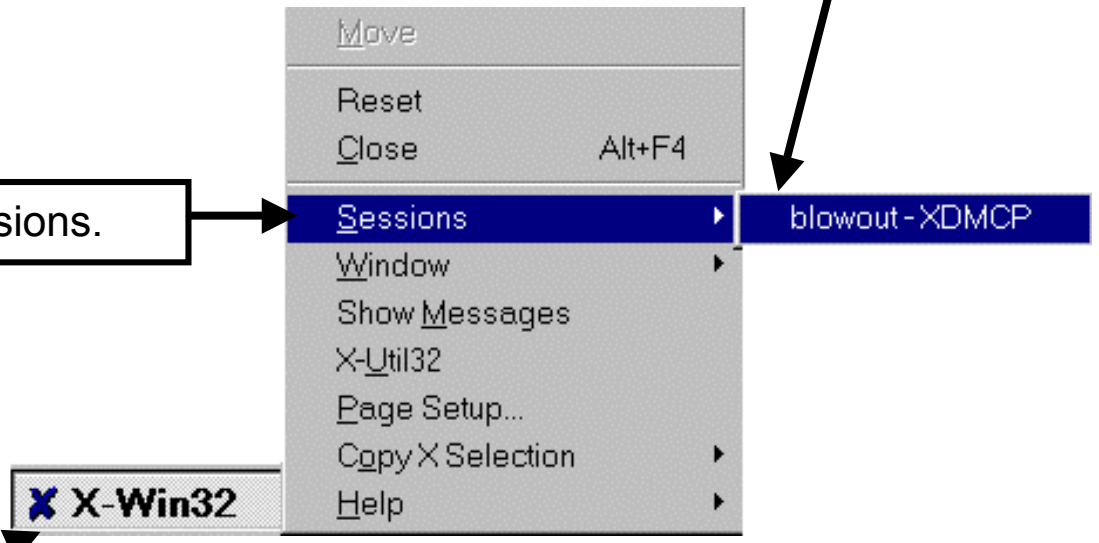
2. Left-click the Start button, (or hold the Ctrl key down then type the Esc key.)

3. Select “Programs.”

4. Select your X-Windows emulation software.



0 - How to start GRAF - Windows



3. Left-click the desired session.

2. Select Sessions.

1. Left-click the X-Windows-emulation-software button (on the taskbar.)

0 - How to start GRAF - Windows

REVIEW

Your Windows computer is now acting like a UNIX computer.

This is the end of the how-to-start-GRAF-in-Windows instructions.

COMING UP

This is the beginning of the How-to-start-GRAF-in-UNIX instructions.

0 - How to start GRAF - UNIX

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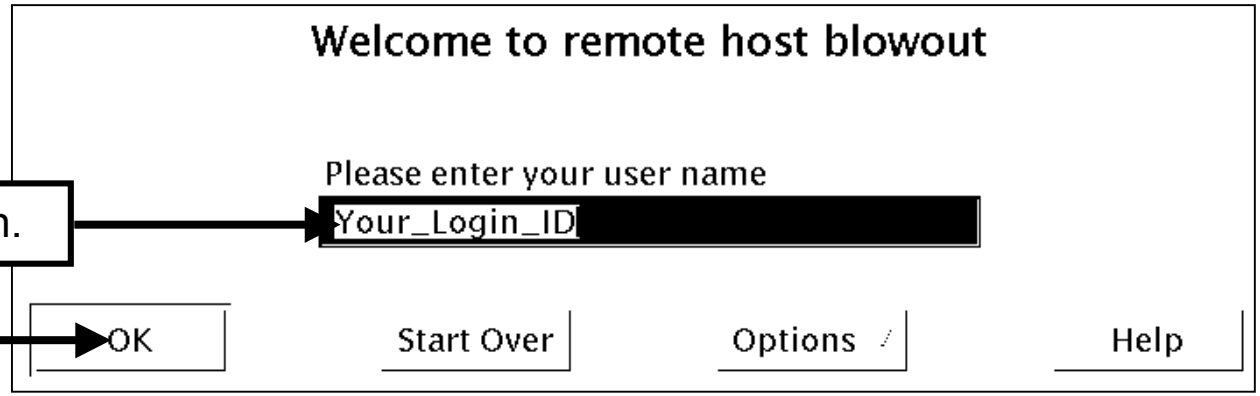
1. Enter your login identification.

2. Left-click OK.



2. Select Sessions.

3. Enter your password.

4. Left-click OK.

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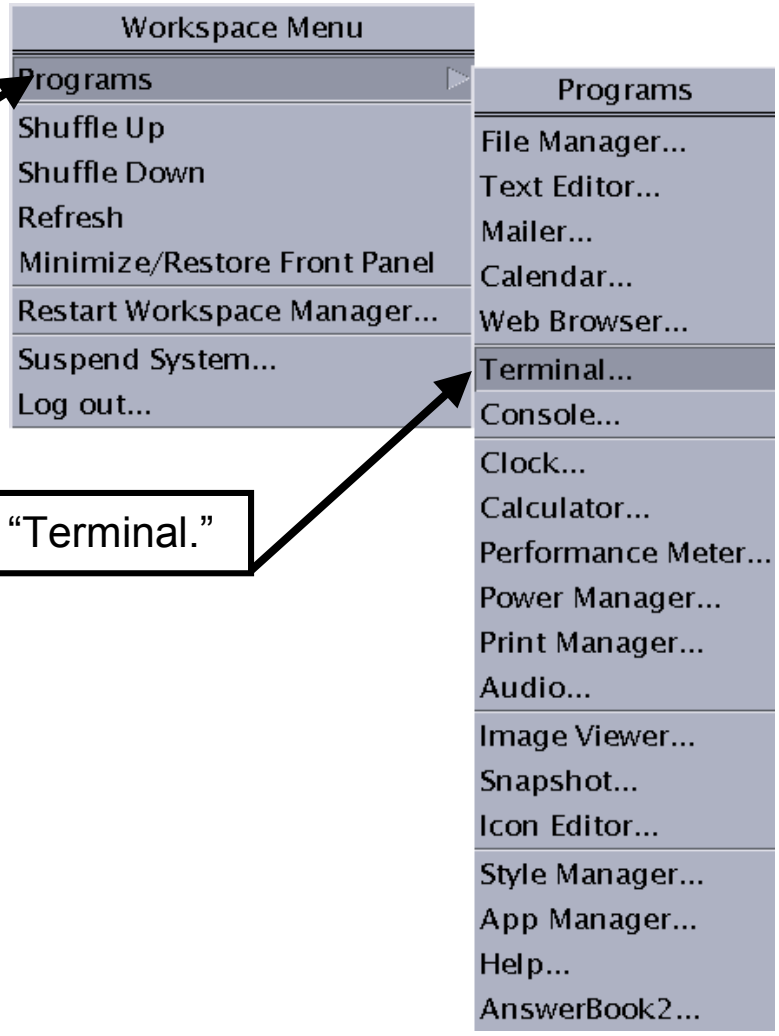
0 - How to start GRAF - UNIX

1. Your UNIX computer terminal is already on , (assumed.)

2. Right-click on the window to open a menu.

3. Select “Programs.”

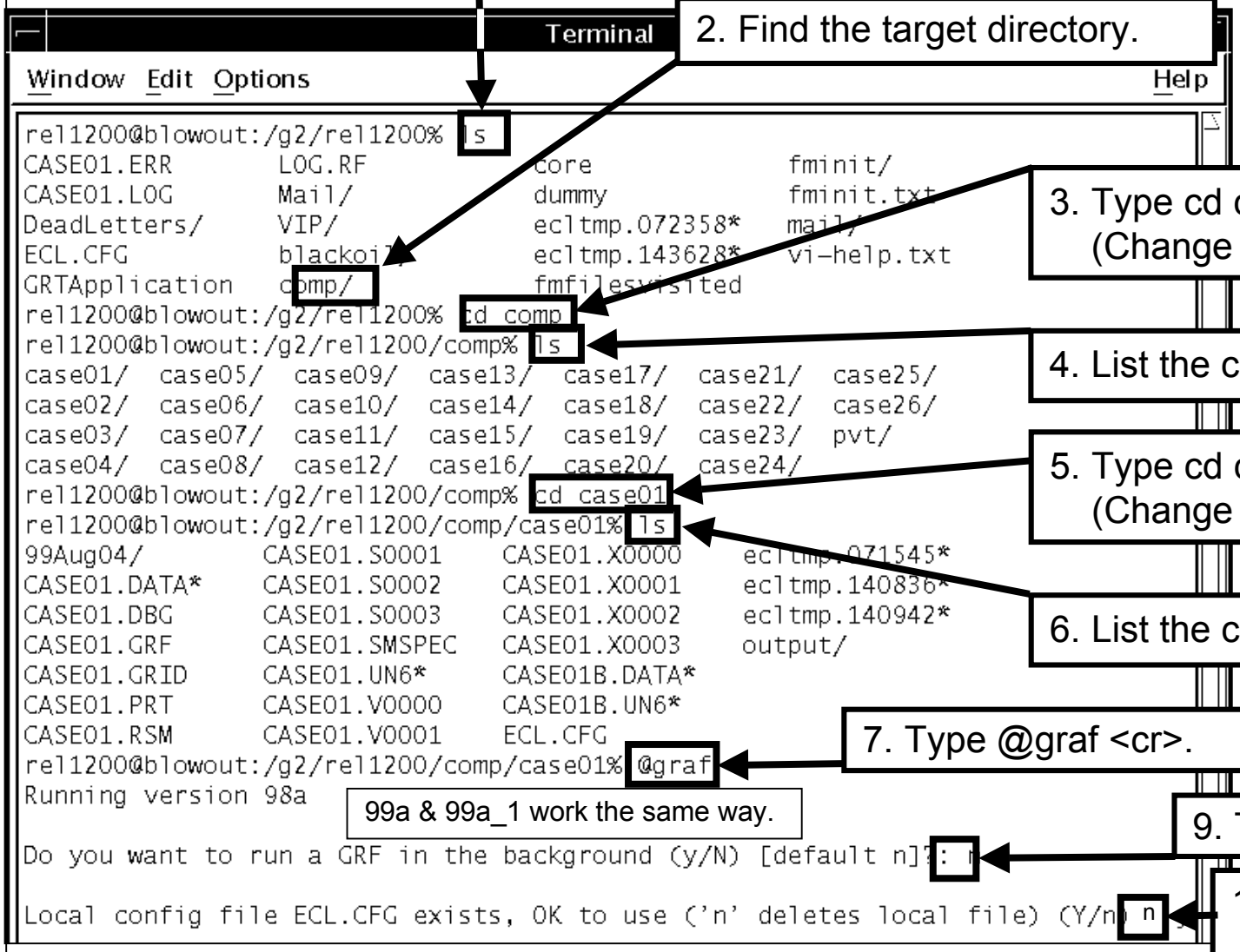


4. Select “Terminal.”

0 - How to start GRAF - UNIX

NOTE: **<cr>** means
"Press the 'Enter' key."

1. Locate and activate the case01 directory.
List the current directory by typing ls <cr>.



2. Find the target directory.

3. Type cd comp <cr>.
(Change the directory to comp.)

4. List the current directory.

5. Type cd case01 <cr>.
(Change the directory.)

6. List the current directory.

7. Type @graf <cr>.

99a & 99a_1 work the same way.

9. Type n <cr>.

10. Type n <cr>, unless you modified ECL.CFG
(ignore if there is no ECL.CFG.)

10. Note: all the Eclipse filenames use UPPER-CASE letters.

0 - How to start GRAF (with UNIX)

```
ing local config file ECL.CFG

-------------------------------------------------------------------
| Unsupported X emulation package vendor :- StarNet Communications Corp

| All program functions may not work correctly
| Please contact GeoQuest for advice on supported X Emulators
-------------------------------------------------------------------
 GRAF   Version 98A.   Week 9809. Build Number  187.
graf for use by graf  Locked  - Expiry Date 24-aug-99
   Run-Time Monitoring Available
   Please choose type of run :
   0 : Exit
   1 : Interactive, no graphics
   2 : Interactive, with graphics
   3 : Run summaries only
   4 : Execute GRF only
   5 : Show version size and dates
 2

 Drivers available from configuration file are:-
   Device  40 : 'NULL DRIVER    ' with hardcopy
   Device  41 : 'TEKTRONIX 41XX' colour TEKTRONIX
   Device  42 : 'TEKTRONIX 41XX' colour TEKTRONIX (H.COPY)
   Device  51 : 'X-Windows      ' for Dec Alpha
   Device  52 : 'X-Windows      ' for Sun (SunOS 4.1.3)
   Device  53 : 'X-Windows      ' for Sun (Solaris 2)
   Device  54 : 'X-Windows      ' for Silicon Graphics
   Device  55 : 'X-Windows      ' for RS/6000
   Device  56 : 'X-Windows      ' for hp700
   Device  57 : 'X-Windows      ' for MacIntosh MacX
   Device  58 : 'X-Windows      ' for PC/XVIEW
   Device  98 : 'X-Windows      ' for Weltest200
   Device  99 : 'X-Windows      ' for RTView

  Please input the required device number:
  or -1 to repeat the list
 58
```

99a & 99a_1 work the same way.

3. Type 2 <cr>
   Interactive, with graphics.

4. Type 58<cr>
   for PC/XVIEW.

0 - How to start GRAF - UNIX

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REVIEW

GRAF is now running.

COMING UP

Preview GRAF's Menu Structure and Workflow

0 - GRAF's Menu Structure and Workflow

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99a & 99a_1 work the same way.

```
GRAF Version 98A

 0  PRIMARY MENU


 1 Read ECLIPSE or user data
 2 Print or index loaded information
 3 Create a picture
 4 Modify a picture
 5 Display a picture
 6 Load or save workspace
 7 Copy one picture to another
 8 Write or execute graphics run file
 9 Modify Granite settings
10 End session
11 Additional facilities
```

GRAF's menu structure is a logical sequence of options presented as a hierarchy. It helps when the user has a good mental image of the menu levels. Awareness of the menu levels makes GRAF's hierarchy more intuitive. (This is important because GRAF only shows one menu level at a time.)

GRAF's Workflow

Generally, workflow is from the top down. This usually means:

A. Start at the top menu choice.
B. Go down one level in the hierarchy.
C. Start at the top menu choice.
D. Work down the menu choices.
E. Go back up one level.
F. Work down the menu.
G. Go down one level in the hierarchy.

1 - Loading Data

Menu 0 -> 0.1.

COMING UP

CASE01.DATA produces several files that can be loaded into GRAF.

These include summary, grid, and restart data.

Menus 1.1, 1.3, and 1.4 to load Eclipse output into GRAF.

Menu 1.1 reads VECTOR (xy-plot) results.

1 - Loading Data - Summary File

Menu 0 -> 0.1.

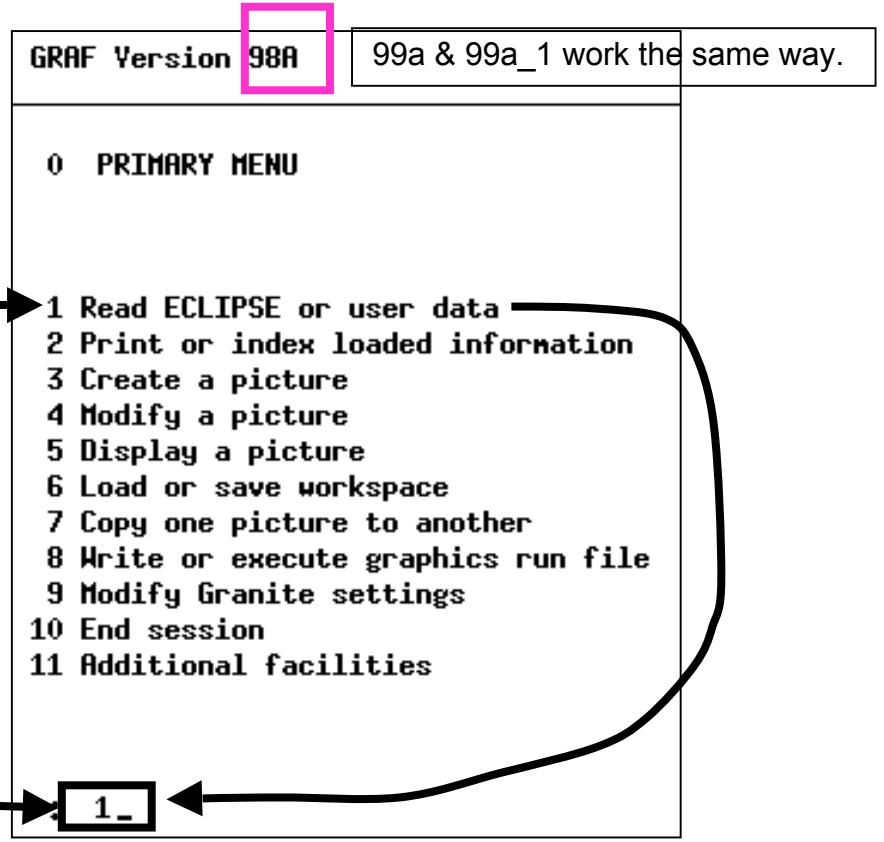
1. GRAF conveniently puts the cursor where it needs to be. The user need only type the number (or text) for the next menu.

GRAF's Workflow

Workflow is generally from the top down.

A. Start at the top menu choice.
"1 Read ECLIPSE or user data."

B. Go down one level in the hierarchy.
Open the "Load Information ..." menu.



3. Type 1<cr>
Go to menu 1.

1 - Loading Data - Summary File

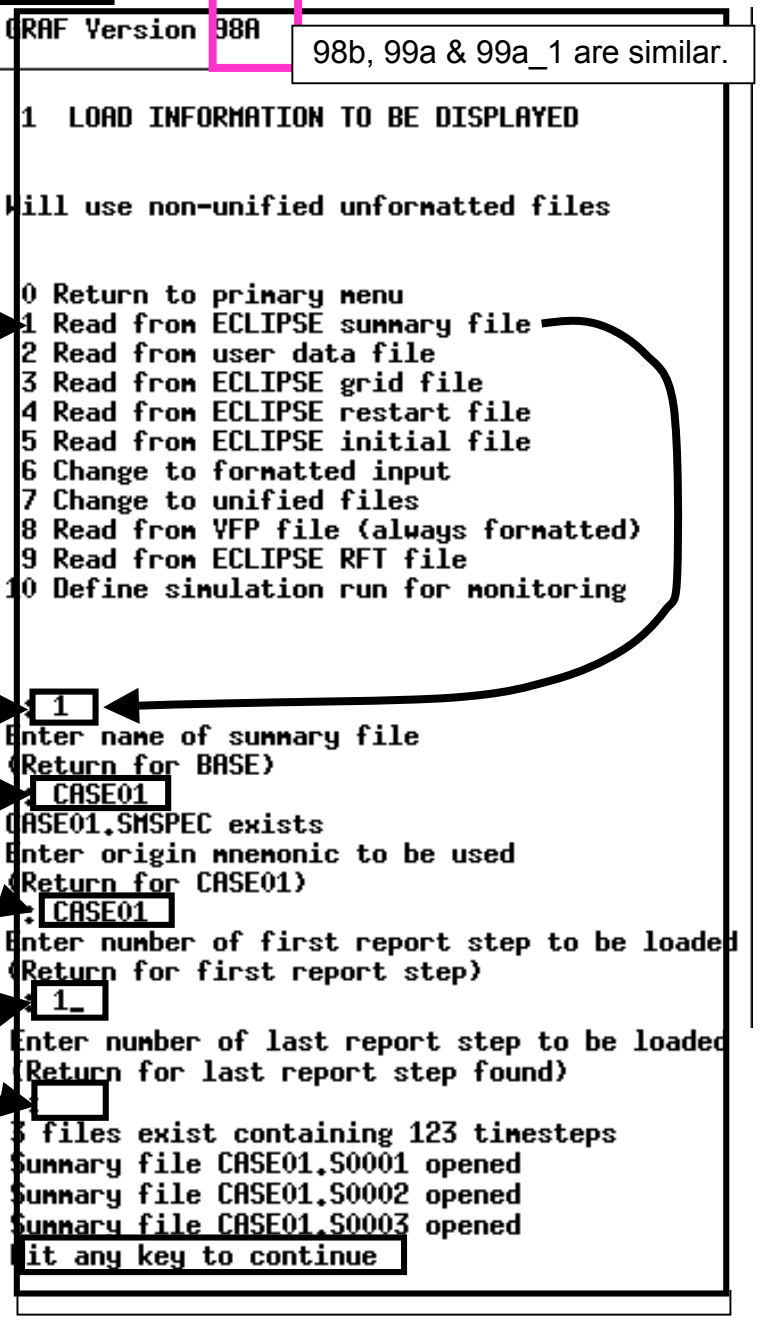
Menu 0.1 -> 0.1.1.

1. CASE01.DATA produces several files that can be loaded.
   These include summary, grid, and restart data.
   Menu 1.1 loads summary (VECTOR) data.

GRAF's Workflow

Workflow is generally from the top down.
C. Start at the top menu choice.
"Read from ECLIPSE summary file."

98b, 99a & 99a_1 are similar.



3. Type 1<cr>.

4. & 5. Type CASE01<cr>.

WARNING: UNIX treats lower-case & UPPER-CASE letters as different characters.

6. & 7. Type <cr>.

8. Type <cr>
   Finish menu 1.1.

1 - Loading Data - Summary File

Menu 0.1 -> 0.1.1 -> 0.1.3.

REVIEW

Menu 1.1 loaded summary (VECTOR) data for xy plots.

CASE01.DATA requested summary data in the SUMMARY section. The “ALL” keyword requests a standard summary-data set. The “RUNSPEC” keyword requested tabulated output. CASE01.DATA then requested specific keywords. The author manually edited CASE01.DATA to request additional keywords. (There is more discussion about this in CASE01.ppt.)

The output filenames containing SUMMARY results are CASE01.S0001, CASE01.S0002, and CASE01.S0003.

COMING UP

GRAF automatically returned to menu 1 (after doing menu 1.1.)

Menu 1.3 reads GRID information.

1 - Loading Data - Grid File

Menu 0.1 -> 0.1.3.

98b, 99a & 99a_1 are similar.

1. Menu 1.3 loads grid data.

GRAF's Workflow

Workflow is generally from the top down.
D. Work down the menu choices.
"Read from ECLIPSE grid file."

```
GRAF Version 98A

 1  LOAD INFORMATION TO BE DISPLAYED


Will use non-unified unformatted files


 0 Return to primary menu
 1 Read from ECLIPSE summary file
 2 Read from user data file
 3 Read from ECLIPSE grid file
 4 Read from ECLIPSE restart file
 5 Read from ECLIPSE initial file
 6 Change to formatted input
 7 Change to unified files
 8 Read from VFP file (always formatted)
 9 Read from ECLIPSE RFT file
10 Define simulation run for monitoring
```

3. Type 3<cr>.

4. Type <cr>.

5. Type <cr>.

```
: 3
Enter name of grid file
(Return for CASE01)
:
CASE01.GRID exists
Enter origin mnemonic to be used
(Return for CASE01)
:
Reading grid data

Data for field CASE01
Total cells = 324    (all active)

Data for field CASE01 loaded successfully
Hit any key to continue
```

6. Type <cr>
Finish menu 1.3.

1 - Loading Data - Grid File

Menu 0.1 -> 0.1.3. -> 0.1.4.

REVIEW

Menu 1.3 loaded grid data the output file named CASE01.GRID.

Loading grid data is required before loading solution data.

Solution data applies to individual grid cells (also called grid blocks.)

Grid data was defined in the RUNSPEC and GRID sections of CASE01.DATA.

COMING UP

GRAF automatically returned to menu 1 (after doing menu 1.3.)

Menu 1.4 reads SOLUTION (contour-map) results.

1 - Loading Data - Restart File

Menu 0.1 -> 0.1.4.

98b, 99a & 99a_1 are similar.

1. Menu 1.4 loads restart (GRID SOLUTION) data.

GRAF's Workflow

Workflow is generally from the top down.

D. Work down the menu choices. "Read from ECLIPSE restart file."

```
GRAF Version 98A

 1  LOAD INFORMATION TO BE DISPLAYED


Will use non-unified unformatted files


 0 Return to primary menu
 1 Read from ECLIPSE summary file
 2 Read from user data file
 3 Read from ECLIPSE grid file
 4 Read from ECLIPSE restart file
 5 Read from ECLIPSE initial file
 6 Change to formatted input
 7 Change to unified files
 8 Read from VFP file (always formatted)
 9 Read from ECLIPSE RFT file
10 Define simulation run for monitoring
```

3. Type 4<cr>.

```
4
Enter name of restart file
(Return for CASE01)
```

3. Type <cr>.

```

Enter origin mnemonic to be used
(Return for CASE01)
```

4. Type <cr>.

```

Enter number of first file to be loaded
(Return for first found)
```

5. Type <cr>.

```

Enter number of last file to be loaded
(Return for last in sequence)
```

6. Type <cr>.

```

File CASE01.X0000 opened
Load pressure values? (Y,N,A or I)
(Y = Yes [default], N = No, A = load All the rest, I = Ignore the rest)
```

7. Type Y <cr> to load Pressures.

```
Y
Load oil saturations (SOIL)? (Y,N,A or I)
```

8. Type Y <cr> to load oil saturation.

```
Y
Load oil viscosities (VOIL)? (Y,N,A or I)
```

9. Type Y <cr> to load oil viscosity.

```
Y_
```

1 - Loading Data - Restart File

Menu 0.1 -> 0.1.4.

1. Type <cr>
   Finish menu 1.4.

```
12 solutions loaded successfully for origin CASE01
Well position data loaded
Hit any key to continue
```

1 - Loading Data - (complete)

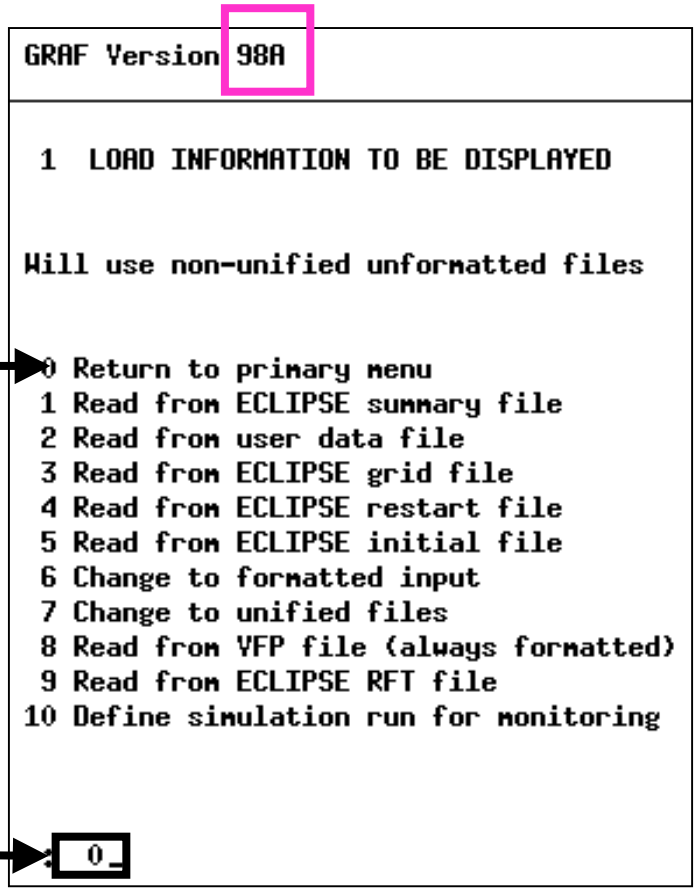
Menu 0.1 -> 0.

98b, 99a & 99a_1 are similar.

1. Back up one menu level.

GRAF's Workflow

Workflow is generally from the top down.
E. Go back up one level.
Return to the primary menu.



3. Type 0<cr>
Back to primary menu

1 - Loading Data - (complete)

0.1.1 -> 0.1.3 -> 0.1.4 -> 0.

OVERVIEW of WORKFLOW to this point

0 Primary Menu
0.1 Read ECLIPSE or user data
0.1.1 Read from ECLIPSE summary file.
0.1 Read ECLIPSE or user data
0.1.3 Read from ECLIPSE grid file.
0.1 Read ECLIPSE or user data
0.1.4 Read from ECLIPSE restart file
0.1 Read ECLIPSE or user data

1 - Loading Data - (complete)

0.1.1 -> 0.1.3 -> 0.1.4 -> 0.

2 - Index, Print, Save, & Restart

REVIEW

Menu 1.1 loaded (grid-cell) INDEX data.

Menu 1.3 loaded (grid-cell) VECTOR data for all timesteps.

Menu 1.4 loaded (grid-cell) SOLUTION data for all four reported timesteps.

CASE01.DATA used a OUTSOL card to request pressure, oil saturation, and oil viscosity in the SOLUTION section. (See CASE01.ppt for details.)

CASE01.DATA used TSTEP cards to SCHDEULE reports at 0, 3285, 3650, and 5475 days. CASE01.DATA also requested separate, binary files for each timestep. (See the SOLUTION section of CASE01.ppt.)

By default, CASE01.DATA also requested separate, binary files for each timestep. The output filenames are CASE01.X0000, CASE01.X0001, CASE01.X0002, and CASE01.X0003.

COMING UP

Index & print results (menus 2.1, 2.2, 2.3, 2.5, 2.6, & 2.7.)

2 - Index, Print, Save, & Restart

Menu 0 -> 0.2.

98b, 99a & 99a_1 are similar.

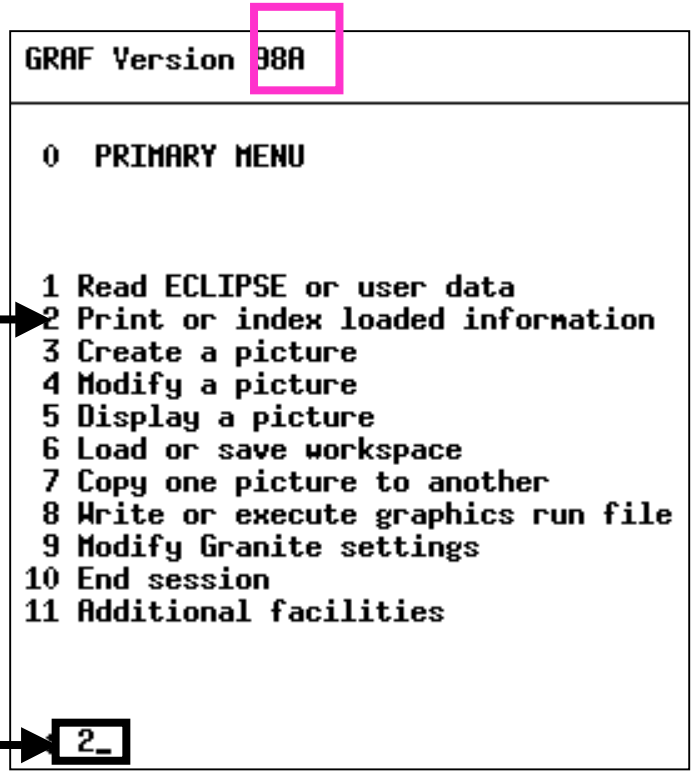
1. Go down one menu level.

GRAF's Workflow

Workflow is generally from the top down.

F. Work down the menu.
"Print or index loaded information."

G. Go down one level in the hierarchy.
Open the "Print or index …" menu.



3. Type 2<cr>.

2 - Index, Print, Save, & Restart - Vector Data

Menu 0.2 -> 0.2.1.

98b, 99a & 99a_1 are similar.

1. Go down one menu level.

GRAF's Workflow

Workflow is generally from the top down.

C. Start at the top menu choice.
"Index of data vectors."

```
GRAF Version 98A

 2  PRINT OR INDEX LOADED INFORMATION


 0 Return to primary menu
 1 Index of data vectors
 2 Index of field data
 3 Index of solution data
 4 Index of pictures
 5 Print index
 6 Print data
 7 Index of wells
 8 Index of VFP tables
 9 Index of calculations


: 1_
```

3. Type 1 <cr>
(Down the next hierarchy.)

4. GeoQuest abbreviates this combination as menu 2.1.
(See the top of the next slide.)

Menu 0.2 -> 0.2.1.

2 - Index, Print, Save, & Restart - Vector Data

GRAF Version 98A

98b, 99a & 99a_1 are similar.

2.1 INDEX OF DATA VECTORS IN WORKSPACE

1. Menu 2.1.

	MNEMONIC	ORIGIN	UNITS	WELL OR GROUP	CELL LGR OR REGION	NUMBER OF VALUES
1	TIME	CASE01	DAYS			123
2	YEARS	CASE01	YEARS			123
3	FOPR	CASE01	STB/DAY			123
4	WOPR	CASE01	STB/DAY	I		123
5	WOPR	CASE01	STB/DAY	P		123
6	FOPT	CASE01	STB			123
7	WOPT	CASE01	STB	I		123
8	WOPT	CASE01	STB	P		123
9	FWPR	CASE01	STB/DAY			123
10	WWPR	CASE01	STB/DAY	I		123
11	WWPR	CASE01	STB/DAY	P		123
12	FWPT	CASE01	STB			123
13	WWPT	CASE01	STB	I		123
14	WWPT	CASE01	STB	P		123
15	FWIR	CASE01	STB/DAY			123
16	WWIR	CASE01	STB/DAY	I		123
17	WWIR	CASE01	STB/DAY	P		123
18	FWIT	CASE01	STB			123
19	WWIT	CASE01	STB	I		123
20	WWIT	CASE01	STB	P		123
21	FGPR	CASE01	MSCF/DAY			123
22	WGPR	CASE01	MSCF/DAY	I		123
23	WGPR	CASE01	MSCF/DAY	P		123
24	FGPT	CASE01	MSCF			123
25	WGPT	CASE01	MSCF	I		123
26	WGPT	CASE01	MSCF	P		123
27	FGIR	CASE01	MSCF/DAY			123
28	WGIR	CASE01	MSCF/DAY	I		123
29	WGIR	CASE01	MSCF/DAY	P		123
30	FGIT	CASE01	MSCF			123
31	WGIT	CASE01	MSCF	I		123
32	WGIT	CASE01	MSCF	P		123

2. This list includes the keywords requested in the SUMMARY section of CASE01.DATA (using the ALL keyword.)
The ALL keyword requested the first 57 mnemonics.
There are no groups in CASE01, so GOPR, etc. are missing.
The others were requested individually in the SUMMARY section.

3. There are more.

Ent E to exit or Return for next page
: P_

Menu 0.2 -> 0.2.1.

2 - Index, Print, Save, & Restart - Vector Data

GRAF Version 98A

98b, 99a & 99a_1 are similar.

2.1 INDEX OF DATA VECTORS IN WORKSPACE

	MNEMONIC	ORIGIN	UNITS	WELL OR GROUP	AQUIFER CELL LGR OR REGION	NUMBER OF VALUES
33	FVPR	CASE01	RB/DAY			123
34	WVPR	CASE01	RB/DAY	I		123
35	WVPR	CASE01	RB/DAY	P		123
36	FVPT	CASE01	RB			123
37	WVPT	CASE01	RB	I		123
38	WVPT	CASE01	RB	P		123
39	FVIR	CASE01	RB/DAY			123
40	WVIR	CASE01	RB/DAY	I		123
41	WVIR	CASE01	RB/DAY	P		123
42	FVIT	CASE01	RB			123
43	WVIT	CASE01	RB	I		123
44	WVIT	CASE01	RB	P		123
45	FWCT	CASE01				123
46	WWCT	CASE01		I		123
47	WWCT	CASE01		P		123
48	FGOR	CASE01	MSCF/STB			123
49	WGOR	CASE01	MSCF/STB	I		123
50	WGOR	CASE01	MSCF/STB	P		123
51	FWGR	CASE01	STB/MSCF			123
52	WWGR	CASE01	STB/MSCF	I		123
53	WWGR	CASE01	STB/MSCF	P		123
54	WBHP	CASE01	PSIA	I		123
55	WBHP	CASE01	PSIA	P		123
56	WTHP	CASE01	PSIA	I		123
57	WTHP	CASE01	PSIA	P		123
58	FOPR	CASE01	STB/DAY			123
59	FOPT	CASE01	STB			123
60	FGOR	CASE01	MSCF/STB			123
61	FPR	CASE01	PSIA			123
62	WXMF_1	CASE01		P		123
63	WXMF_2	CASE01		P		123
64	WXMF_3	CASE01		P		123

1. Numbers 62 through 79 were manually added to the original version of CASE01.DATA. See the RUNSUM keyword in the SUMMARY section.

2. There are more.

Enter E to exit, P for previous page or Return for next page

: _

Menu 0.2 -> 0.2.1.

2 - Index, Print, Save, & Restart - Vector Data

GRAF Version 98A

2.1 INDEX OF DATA V

98b, 99a & 99a_1 are similar.

	MNEMONIC	ORIGIN	UNITS	WELL OR GROUP	AQUIFER CELL LGR OR REGION			NUMBER OF VALUES
65	WXMF_4	CASE01		P				123
66	WXMF_5	CASE01		P				123
67	WXMF_6	CASE01		P				123
68	WXMF_7	CASE01		P				123
69	WXMF_8	CASE01		P				123
70	WXMF_9	CASE01		P				123
71	WYMF_1	CASE01		P				123
72	WYMF_2	CASE01		P				123
73	WYMF_3	CASE01		P				123
74	WYMF_4	CASE01		P				123
75	WYMF_5	CASE01		P				123
76	WYMF_6	CASE01		P				123
77	WYMF_7	CASE01		P				123
78	WYMF_8	CASE01		P				123
79	WYMF_9	CASE01		P				123
80	BVOIL	CASE01	CP		7	7	4	123
81	BSOIL	CASE01			7	7	4	123
82	BSWAT	CASE01			7	7	4	123
83	BSGAS	CASE01			7	7	4	123
84	BPRES	CASE01	PSIA		1	1	1	123
85	BXMF_6	CASE01			1	1	1	123
86	BYMF_6	CASE01			1	1	1	123
87	NEWTON	CASE01	DAYS					123
88	IRPTSTEP	CASE01						123

1. Numbers 62 through 79 were manually added to the original version of CASE01.DATA.

2. That is the end.

END OF FILE. Enter E to exit or P for previous page

: E_

2 - Index, Print, Save, & Restart - Field Data

Menu 0.2 -> 0.2.2.

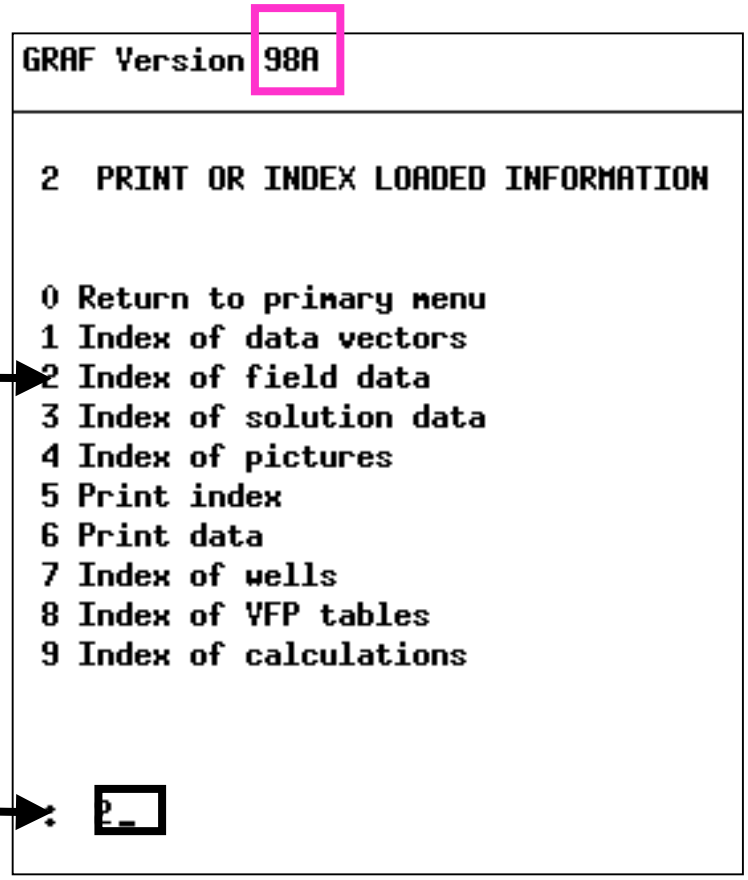
GRAF automatically returned to menu 2 -> menu 2.2.

98b, 99a & 99a_1 are similar.

GRAF's Workflow

Workflow is generally from the top down.

D. Work down the menu choices.
"Index of field data."



3. Type 2 <cr>
(Down the next hierarchy.)

4. GeoQuest abbreviates this combination as menu 2.2.
(See the top of the next slide.)

2 - Index, Print, Save, & Restart - Field Data

Menu 0.2 -> 0.2.2.

1. Review the field data.

98b, 99a & 99a_1 are similar.

Menu 2.2.

3. See the DIMENS keyword in the RUNSPEC section of CASE01.DATA.

4. Type E <cr>
Return to menu 2.

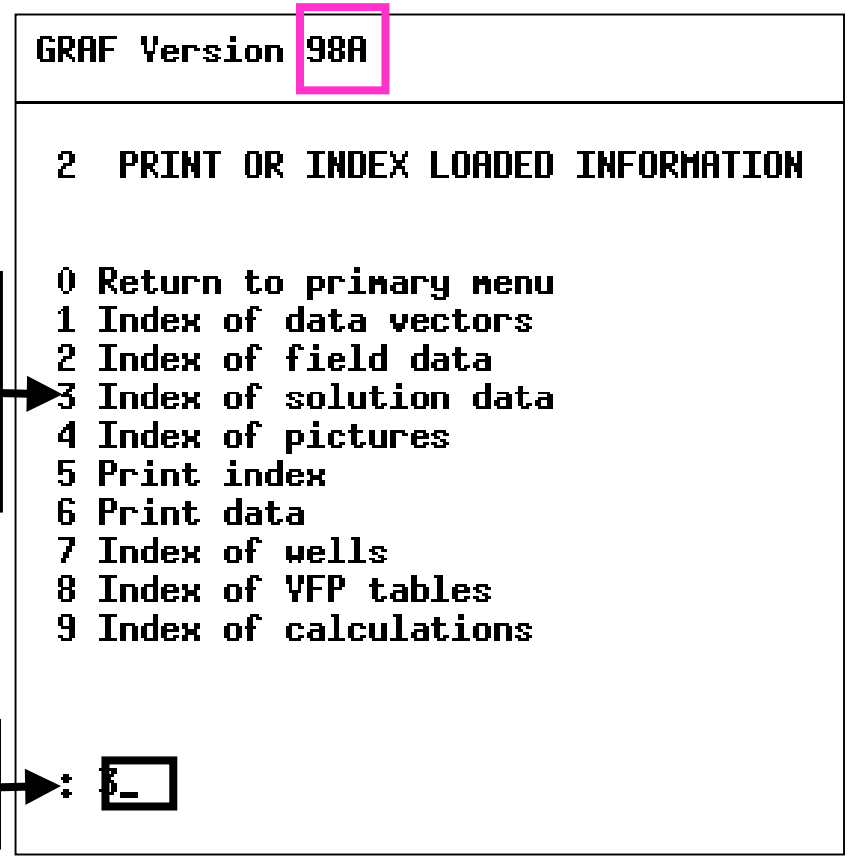
```
GRAF Version 98A

2.2  INDEX OF FIELD DATA IN WORKSPACE

   FIELD     LOCAL          DIMENSIONS          ACTIVE LGC     GRID
             GRID       X        Y        Z     CELLS  GROUPS TYPE

 1 CASE01                 9        9        4       324 None   Non Radial

END OF FILE. Enter E to exit
> E
```

2 - Index, Print, Save, & Restart - Solution Data

Menu 0.2 -> 0.2.3.

GRAF automatically returned to menu 2 -> menu 2.3.

98b, 99a & 99a_1 are similar.



GRAF's Workflow

Workflow is generally from the top down.

D. Work down the menu choices.
"Index of field data."

3. Type 3 <cr>
(Down the next hierarchy.)

4. GeoQuest abbreviates this combination as menu 2.3.
(See the top of the next slide.)

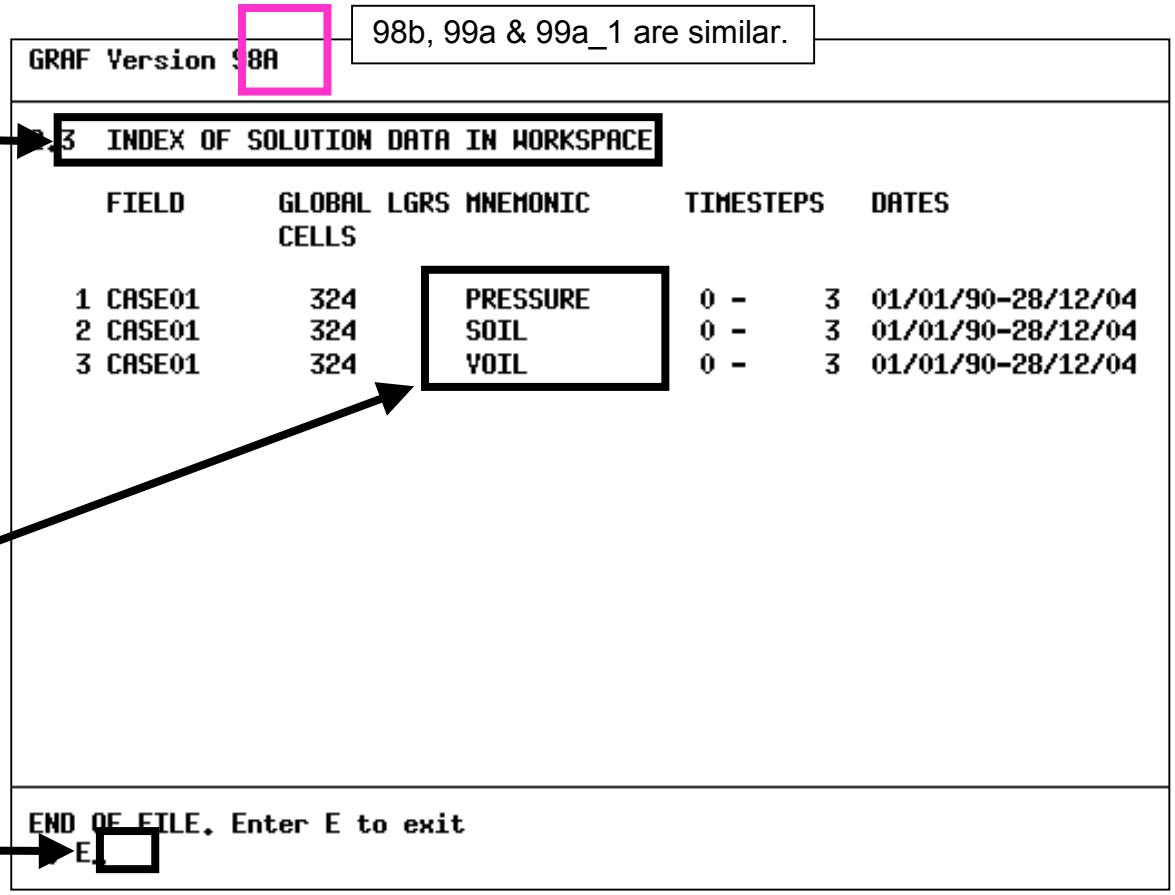
2 - Index, Print, Save, & Restart - Solution Data

Menu 0.2 -> 0.2.3.

1. Review the solution data.

98b, 99a & 99a_1 are similar.

Menu 2.3.



3. These mnemonics were requested by the OUTSOL keyword in the SOLUTION section of CASE01.DATA

4. Type E <cr>
Return to menu 2.

2 - Index, Print, Save, & Restart - Well Data

Menu 0.2 -> 0.2.7.

98b, 99a & 99a_1 are similar.

GRAF automatically returned to menu 2.

```
GRAF Version 98A

 2  PRINT OR INDEX LOADED INFORMATION


 0 Return to primary menu
 1 Index of data vectors
 2 Index of field data
 3 Index of solution data
 4 Index of pictures
 5 Print index
 6 Print data
 7 Index of wells
 8 Index of VFP tables
 9 Index of calculations

:7_
```

GRAF's Workflow

Workflow is generally from the top down.

D. Work down the menu choices.
"Index of field data."

3. Type 7 <cr>
(Down the next hierarchy.)

4. GeoQuest abbreviates this combination as menu 2.7.
(See the top of the next slide.)

2 - Index, Print, Save, & Restart - Well Data

Menu 0.2 -> 0.2.7.

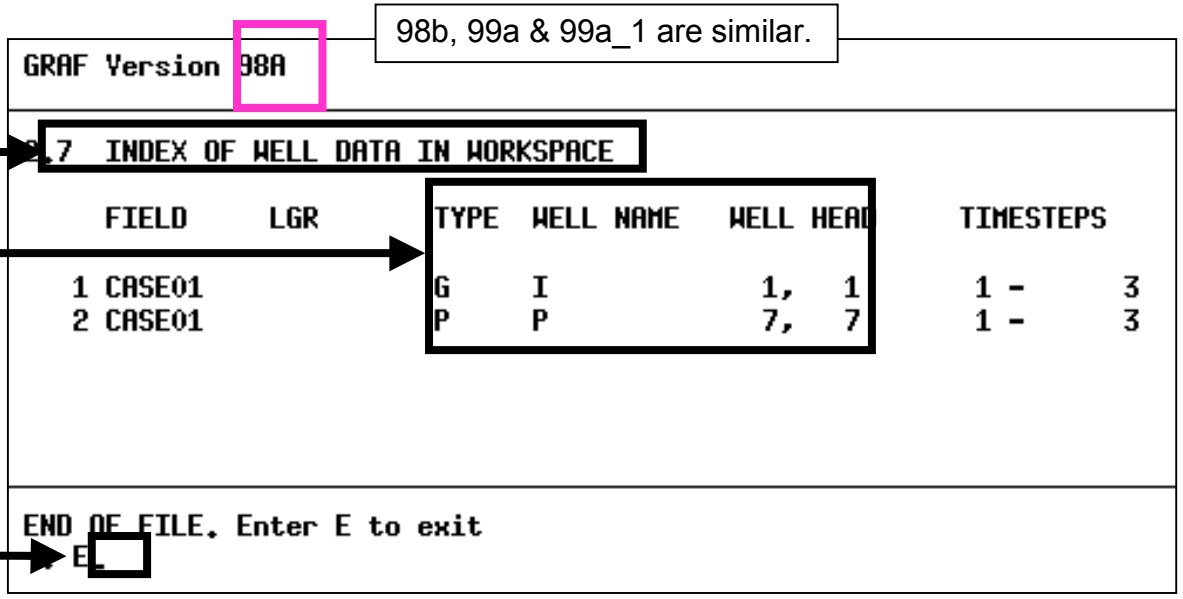
1. Review the well data.

98b, 99a & 99a_1 are similar.

Menu 2.7.

3. Well information

4. Type E <cr>
Return to menu 2.



2 - Index, Print, Save, & Restart - *. index.RSM

Menu 0.2 -> 0.2.5.

GRAF automatically returned to menu 2.

GRAF's Workflow

Workflow is generally from the top down.

D. Work down the menu choices.
"Print index."

3. Type 5 <cr>.

4. Type CASE01.INDEX <cr>.

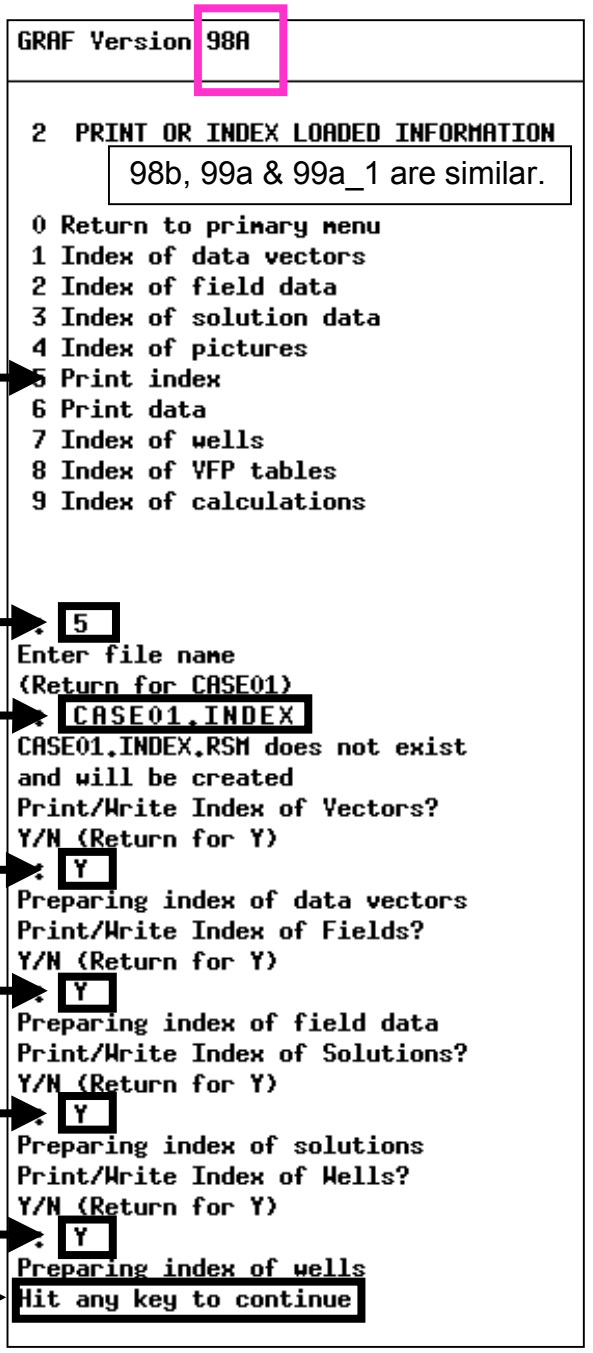
5. Type Y <cr>.

6. Type Y <cr>.

7. Type Y <cr>.

8. Type Y <cr>.

9. Type <cr>.
Return to menu 2.



2 - Index, Print, Save, & Restart - *. index.RSM

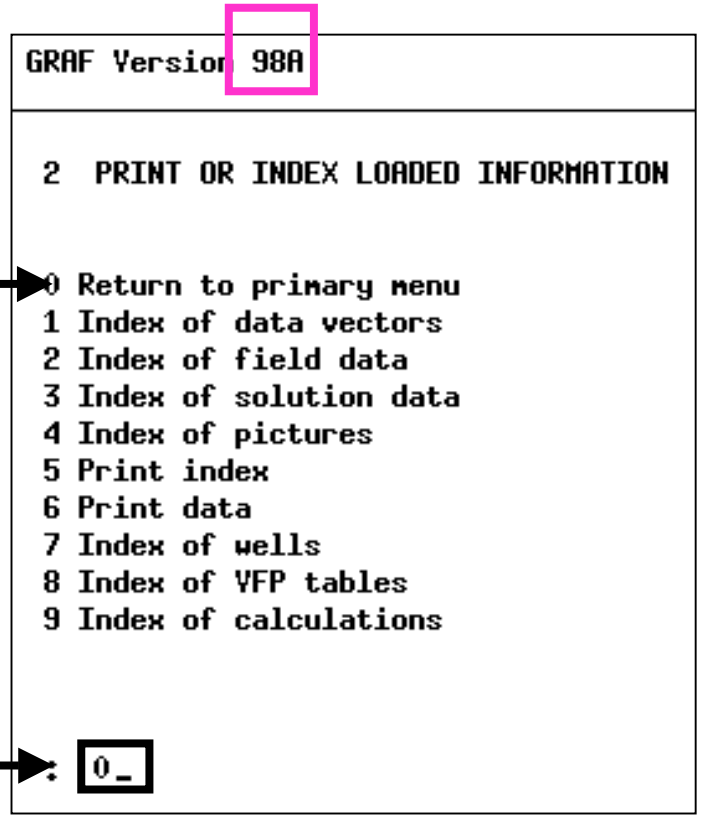
Menu 0.2 -> 0.

GRAF automatically returned to menu 2.

98b, 99a & 99a_1 are similar.

GRAF's Workflow

Workflow is generally from the top down.
E. Go back up one level.
"Return to primary menu."



3. Type 0 <cr>.

2 - Index, Print, Save, & Restart - *.index.RSM

Menu 0.2 -> 0.

DISCUSSION

There are other indices. (See menus 2.4, 2.8, and 2.9.) So far, this example has no pictures. (You will create pictures that contain graphs later.) There are no vertical-flow-profile tables. We will not be doing any calculations. (See menu 11.4, volumetric calculations.)

REVIEW

Menus 2.1, 2.2, 2.3, and 2.7 imported INDEX information from e300 results for CASE01.DATA.

Menu 2.5 printed the indices to CASE01.INDEX.RSM

COMING UP

Interruptions happen. It is possible to:

save the data and

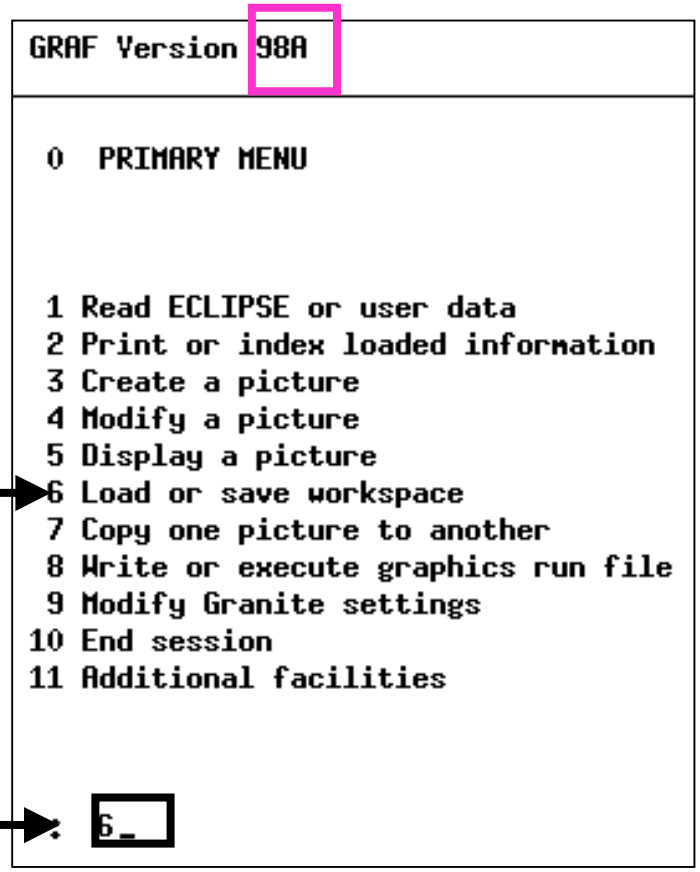
exit GRAF.

GRAF writes the indices to CASE01.RSM as it closes.

2 - Index, Print, Save, & Restart - *.DWS

Menu 0 -> 0.6.

98b, 99a & 99a_1 are similar.



GRAF's Workflow

Workflow is generally from the top down.

E. Go back up one level.
"Load or save workspace."

2. Type 6 <cr>.

2 - Index, Print, Save, & Restart - *.DWS

Menu 0.6 -> 0.6.4.

98b, 99a & 99a_1 are similar.

```
GRAF Version 98A

 6  LOAD OR SAVE WORKSPACE


Will use unformatted files


 0 Return to primary menu
 1 Load picture workspace
 2 Load data workspace
 3 Save picture workspace
 4 Save data workspace
 5 Clear data workspace
 6 Clear picture workspace
 7 Change to formatted I/O
 8 Save vectors as user data file
 9 Save solutions as user data file
10 Show workspace usage
11 Show date stamps



 :  4
Enter name of file
(Return for CASE01)
 :
File CASE01.DWS does not exist - will be created
Workspace successfully saved
 Vectors      :    176   Grids  :  2   Solutions :     42
 Calculations :      0   Tables :  0
Hit any key to continue
```

GRAF's Workflow

Workflow is generally from the top down.

D. Work down the menu choices.
"Save data workspace."

2. Type 4 <cr>.

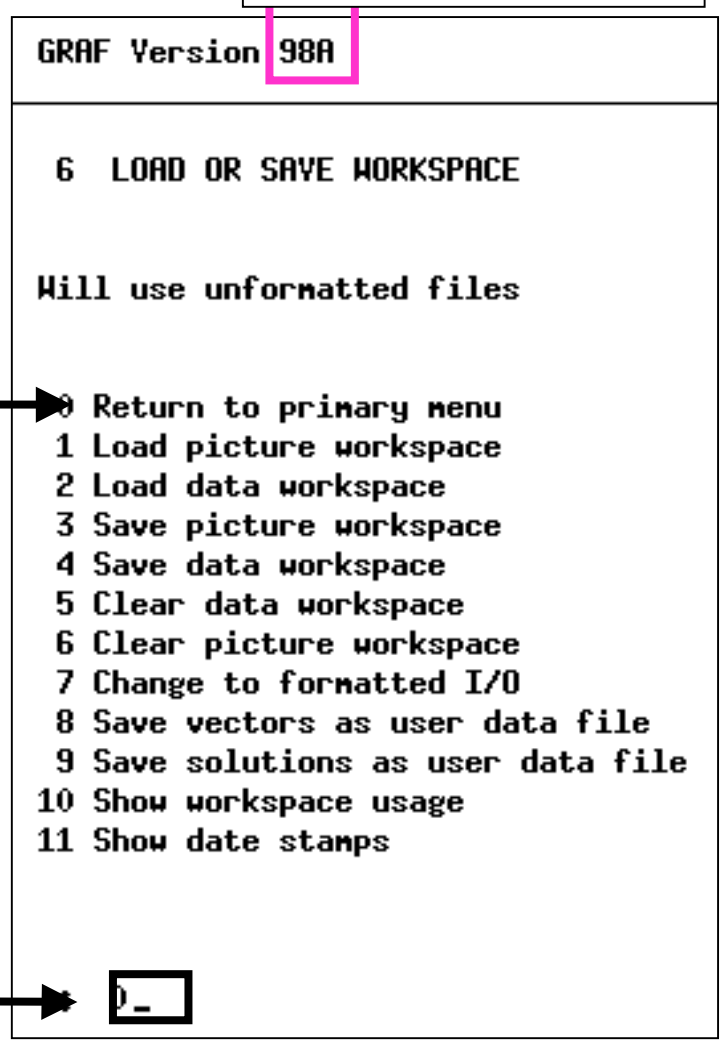
3. Observe.

4. Type <cr>.

2 - Index, Print, Save, & Restart - End Session

Menu 0.6 -> 0.

98b, 99a & 99a_1 are similar.



GRAF's Workflow

Workflow is generally from the top down.

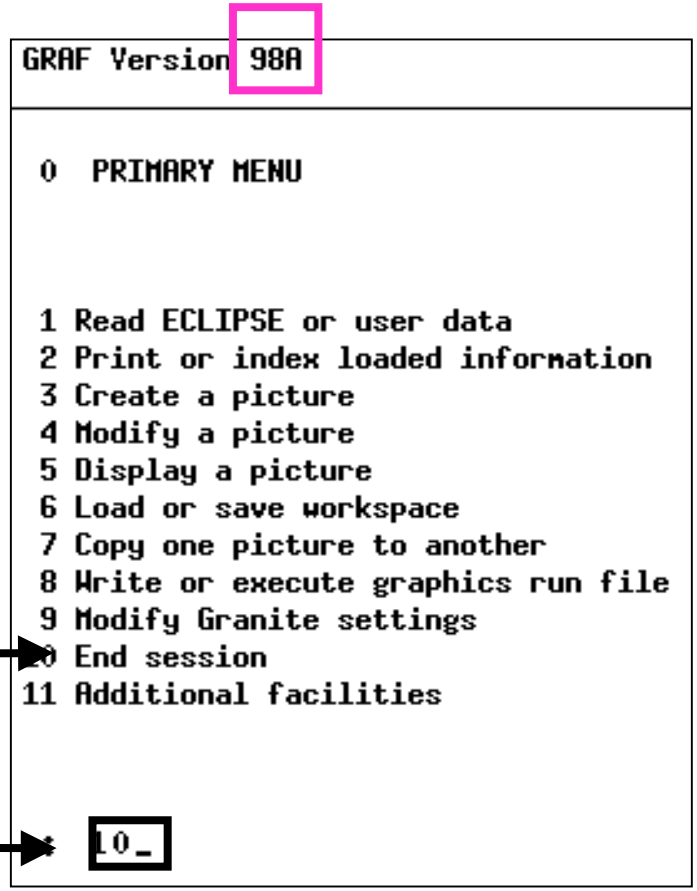
E. Go back up one level.
Return to the primary menu.

2. Type 0 <cr>.

2 - Index, Print, Save, & Restart - End Session

Menu 0 -> 0.10.

98b, 99a & 99a_1 are similar.



GRAF's Workflow

Ending now forces GRAF to write CASE01.RSM.

2. Type 10 <cr>.

2 - Index, Print, Save, & Restart - End Session

Menu 0 -> 0.2 -> 0.10.

SUMMARY

GRAF's default combines index, vector, and solution data in on *.RSM file.
GRAF's "print data" command is limited to a screen display.

It is much more useful to save separate *.RSM files:

*.INDEX.RSM	(easy reference supplements "print data.")
*.VECTOR.RSM	(easy import into spreadsheet for plotting.)
*.SOLUTION.RSM	(easy import into mapping software.)

Separate *.RSM files may be:
- viewed (with vi.)
- printed.
- FTPed to a Windows PC

Menu 0.2.5:
defaults to CASE01.RSM (because CASE01 is the root), or
allows the user to specify separate files (*e.g.*,CASE01.INDEX.RSM.)

2 - Index, Print, Save, & Restart - End Session

Menu 0 -> 0.2 -> 0.10.

REVIEW of WORKFLOW

0	Primary Menu
0	Primary Menu
0.2	Print or index loaded information
0.2.1	Index data vectors
0.2	Print or index loaded information
0.2.2	Index field data
0.2	Print or index loaded information
0.2.3	Index solution data
0.2	Print or index loaded information
0.2.7	Index wells
0.2	Print or index loaded information
0.2.5	Print index
----------	The boss interrupts by inviting you to a meeting.
0.2	Print or index loaded information
0	Primary Menu
0.6	Load or save workspace
0.6.4	Save data workspace
0.6	Load or save workspace
0	Primary Menu
0.10	End session

2 - Index, Print, Save, & Restart - End Session

Menu 0 -> 0.2 -> 0.10.

REVIEW

The data workspace has been saved.

This GRAF session has been ended.

Menu 0.10 forced GRAF to write the indices to CASE01.INDEX.RSM.

EXTRA CREDIT

Use the vi tutorial (vi.ppt) to view CASE01.INDEX.RSM.

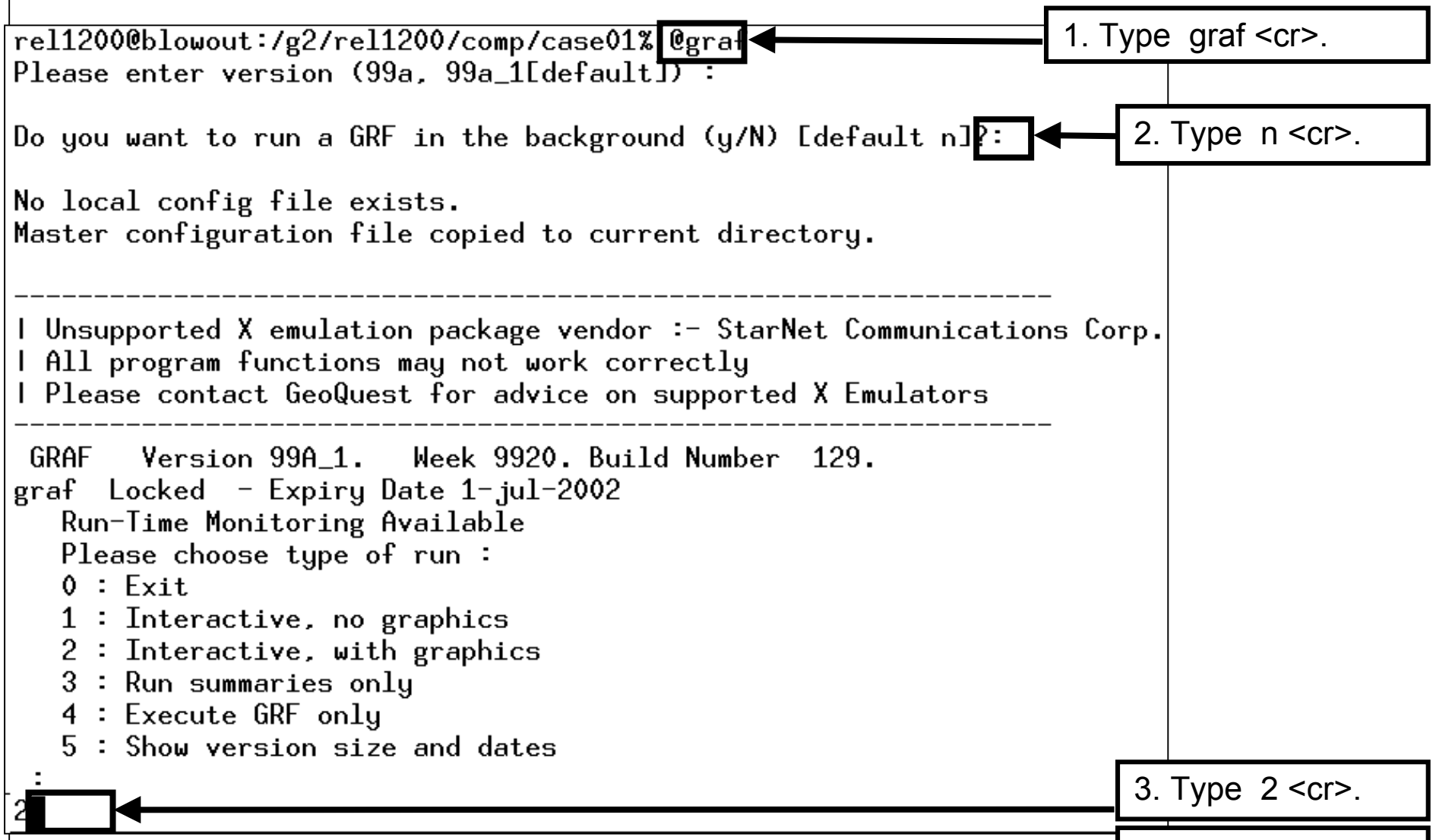
COMING UP

Back to work (the meeting ended.)

- Restart GRAF.
- Load workspace (previous work.)
- “Print” indices to the screen (only.)

2 - Index, Print, Save, & Restart

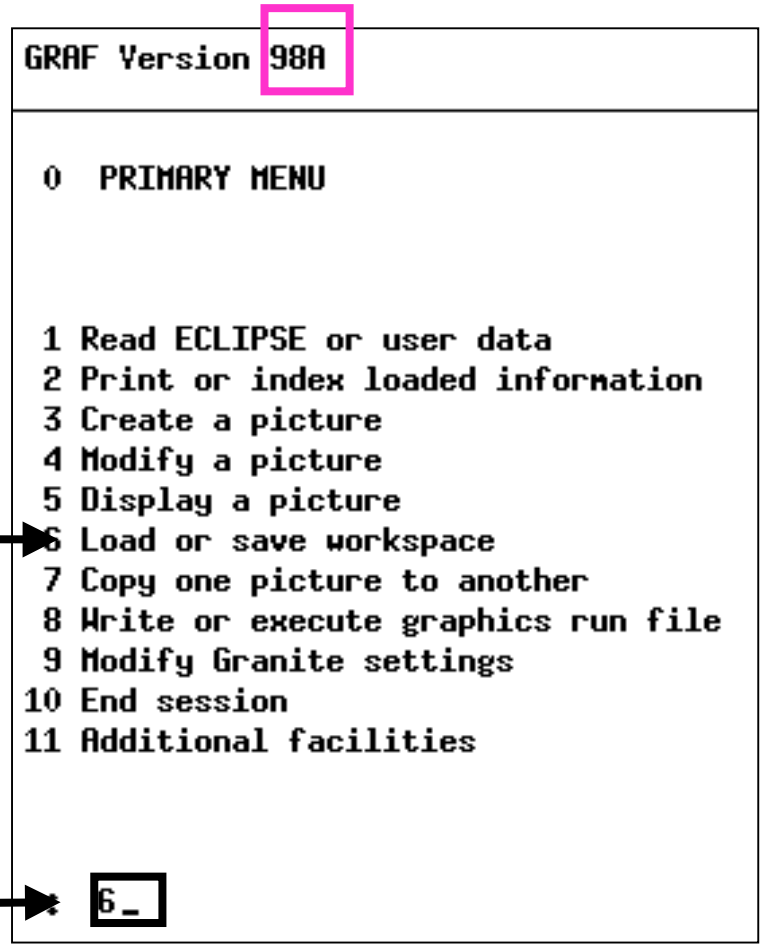
@graf



2 - Index, Print, Save, & Restart

Menu 0 -> 0.6.

98b, 99a & 99a_1 are similar.



GRAF's Workflow

Workflow is generally from the top down.

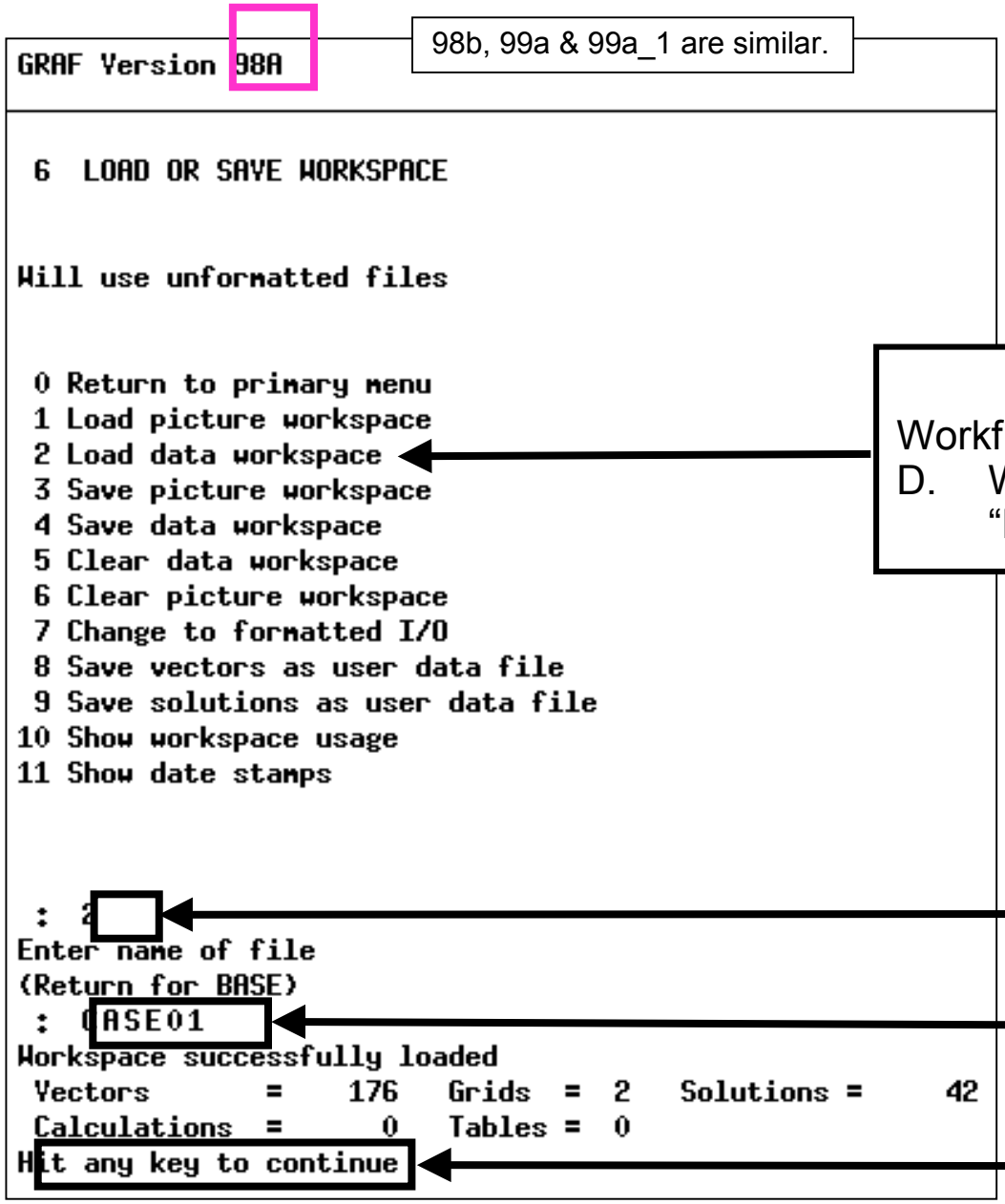
B. Go down one level in the hierarchy.
"Load or save workspace."

2. Type 6 <cr>
(Down the next hierarchy.)

2 - Index, Print, Save, & Restart

Menu 0.6 -> 0.6.2.

98b, 99a & 99a_1 are similar.



Load CASE01.DWS

GRAF's Workflow

Workflow is generally from the top down.

D. Work down the menu choices.
"Load data workspace."

3. Type 2 <cr>.

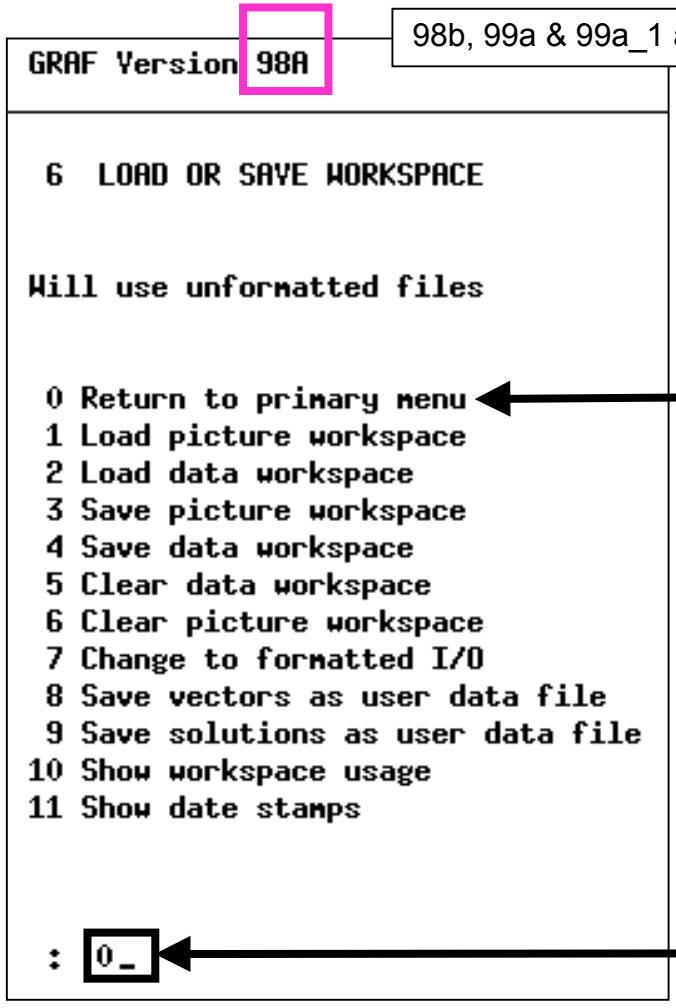
4. Type CASE01 <cr>.
CASE01 is the "root" of the filename.

5. Type <cr>.

2 - Index, Print, Save, & Restart

Menu 0.6 -> 0.

98b, 99a & 99a_1 are similar.



GRAF's Workflow

Workflow is generally from the top down.

E. Go back up one level.

3. Type 0 <cr>.

2 - Index, Print, Save, & Restart

Menu 0 -> 0.2.

REVIEW

Learned how to restart an interrupted GRAF session.
Restarted GRAF after an interruption.
Loaded CASE01.DWS (workspace.)

PREVIEW

Menu 2.6 is an easy way to separate VECTOR results from SOLUTION results. The workflow will be:

- 2.6.1 Change name of file.
- 2.6.2 Print data vectors.
- 2.6.5 Change parameters for vector output.

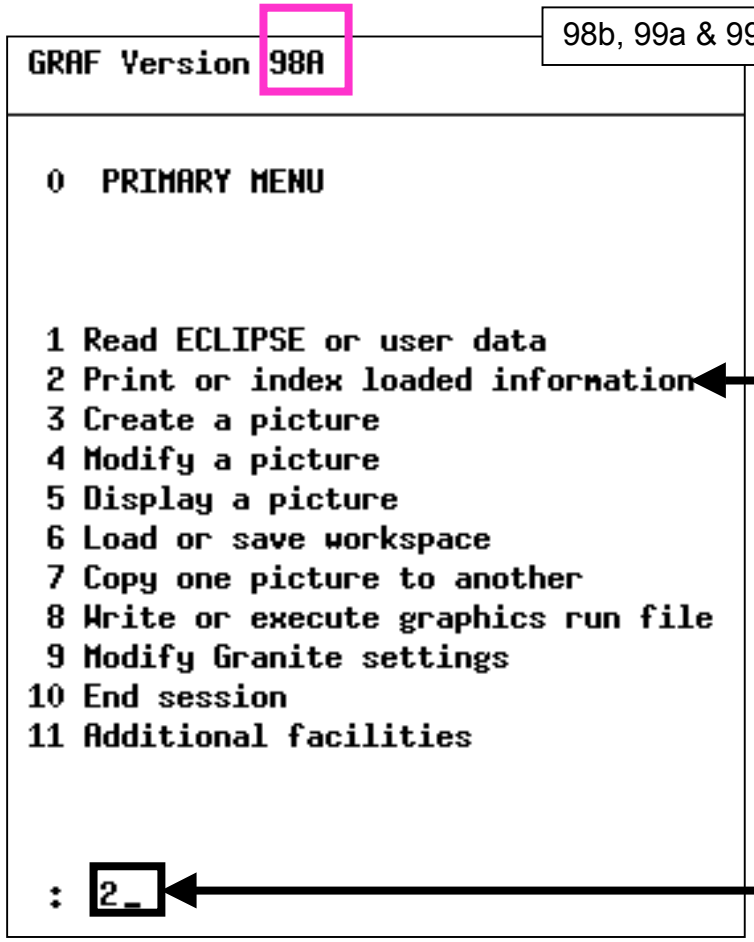
Create a new root, CASE01.VECTOR. This root will contain only VECTOR results (such as FOPR and WXMF_6.)

COMING UP

Print vector data (but only to the screen.)

2 - Index, Print, Save, & Restart - *.vector.RSM

Menu 0 -> 0.2.



98b, 99a & 99a_1 are similar.

GRAF's Workflow

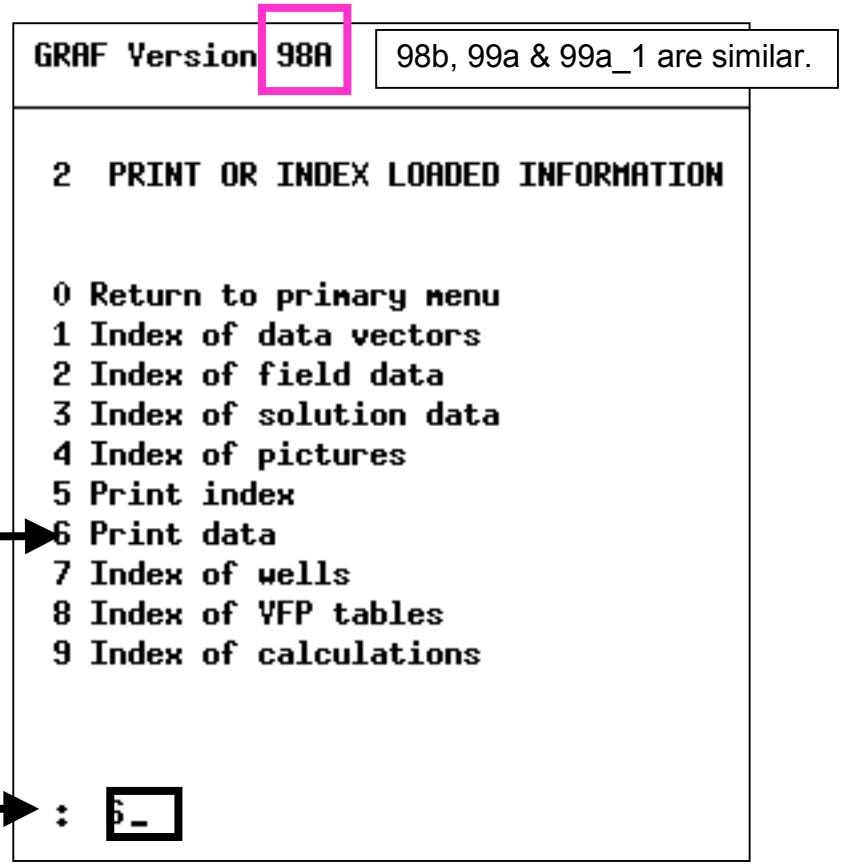
Workflow is generally from the top down.

B. Go down one level in the hierarchy. "Print or index loaded information."

3. Type 2 <cr>.

2 - Index, Print, Save, & Restart - *.vector.RSM

Menu 0.2 -> 0.2.6.



98b, 99a & 99a_1 are similar.

GRAF's Workflow

Workflow is generally from the top down.

D. Work down the menu choices.
"Print data."

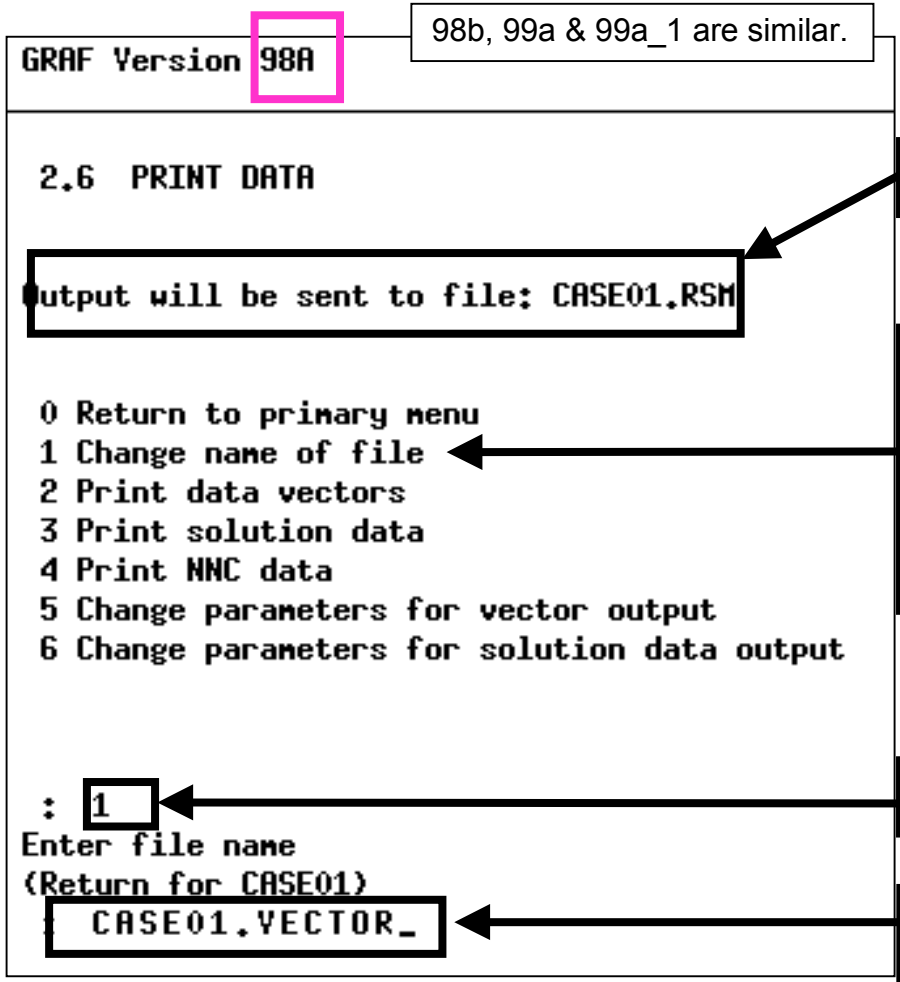
2. Type 6 <cr>
(Down the next hierarchy.)

3. GeoQuest abbreviates this combination as menu 2.6.
(See the top of the next slide.)

2 - Index, Print, Save, & Restart - *.vector.RSM

Menu 0.2.6 -> 0.2.6.1.

98b, 99a & 99a_1 are similar.



1. Observe default filename.

GRAF's Workflow

Workflow is generally from the top down.

B. Go down one level in the hierarchy.

C. Start at the top menu choice. "Change name of file."

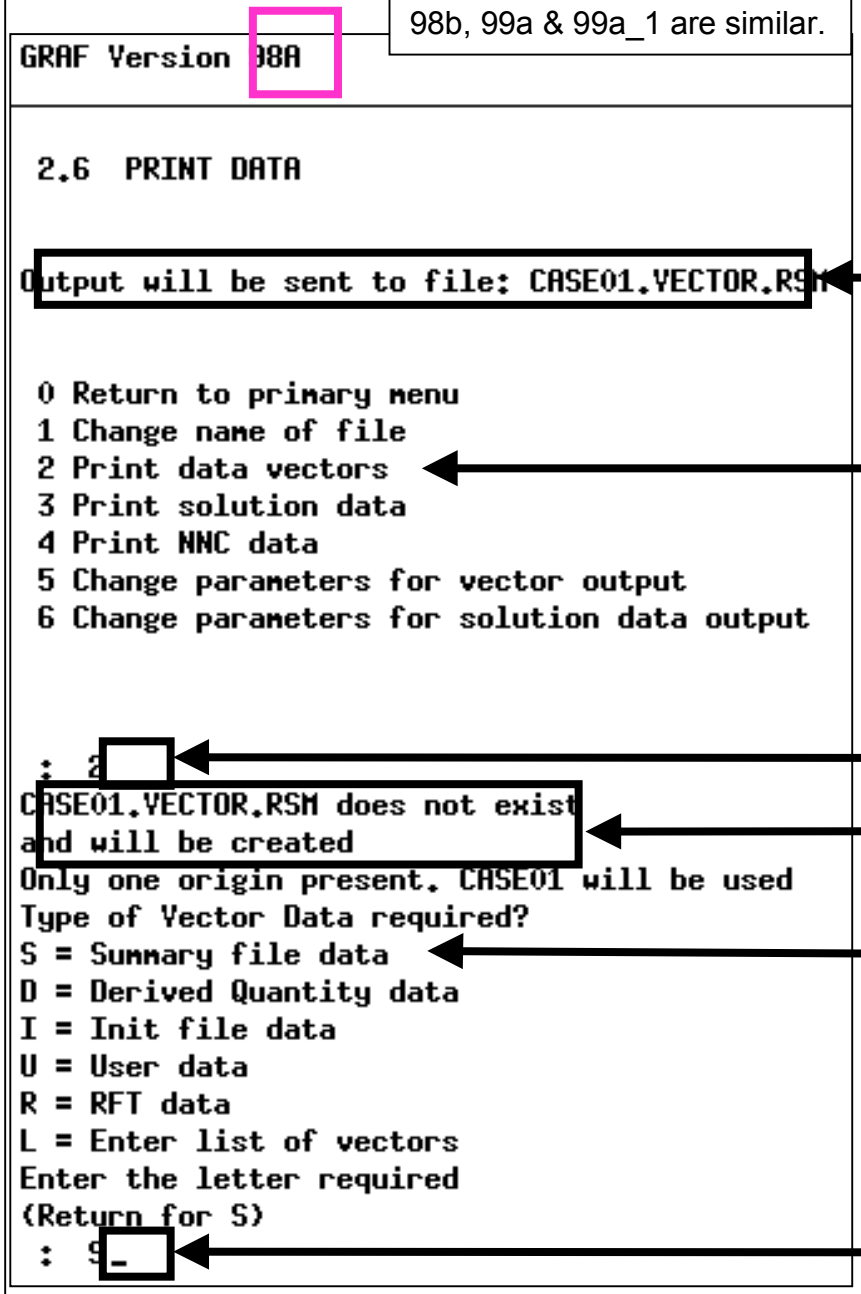
3. Type 1 <cr>.

4. Type CASE01.VECTOR <cr>.
Create a new root (for vector data.)

2 - Index, Print, Save, & Restart - *.vector.RSM

Menu 0.2.6 -> 0.2.6.2.

98b, 99a & 99a_1 are similar.



1. Observe complete, preferred filename.

GRAF's Workflow

Workflow is generally from the top down.

D. Work down the menu choices.
"Print vector data."

3. Type 2 <cr>.

4. Observe.

5. Observe.

6. Type S <cr>.
Print all vectors.

2 - Index, Print, Save, & Restart - *.vector.RSM

Menu 0.2.6 -> 0.2.6.5.

98b, 99a & 99a_1 are similar.

```
GRAF Version 98A

 2.6  PRINT DATA

Output will be sent to file: CASE01.VECTOR.RSM

 0 Return to primary menu
 1 Change name of file
 2 Print data vectors
 3 Print solution data
 4 Print NNC data
 5 Change parameters for vector output
 6 Change parameters for solution data output

 : 5
Enter new value for number of columns
(Return for 13)
 : 13
Enter new value for width of columns
(Return for 10)
 : 10
Align decimal points in the numbers? Y/N
(Return for N)
 : N
Write TIME vector in DATE format ? Y/N
(Return for N)
 : N_
```

Use defaults for number of columns, etc.

GRAF's Workflow

Workflow is generally from the top down.

D. Work down the menu choices. "Change vector storage format."

3. Type 5<cr>.

4. Type 13<cr>. (13 columns / page.)

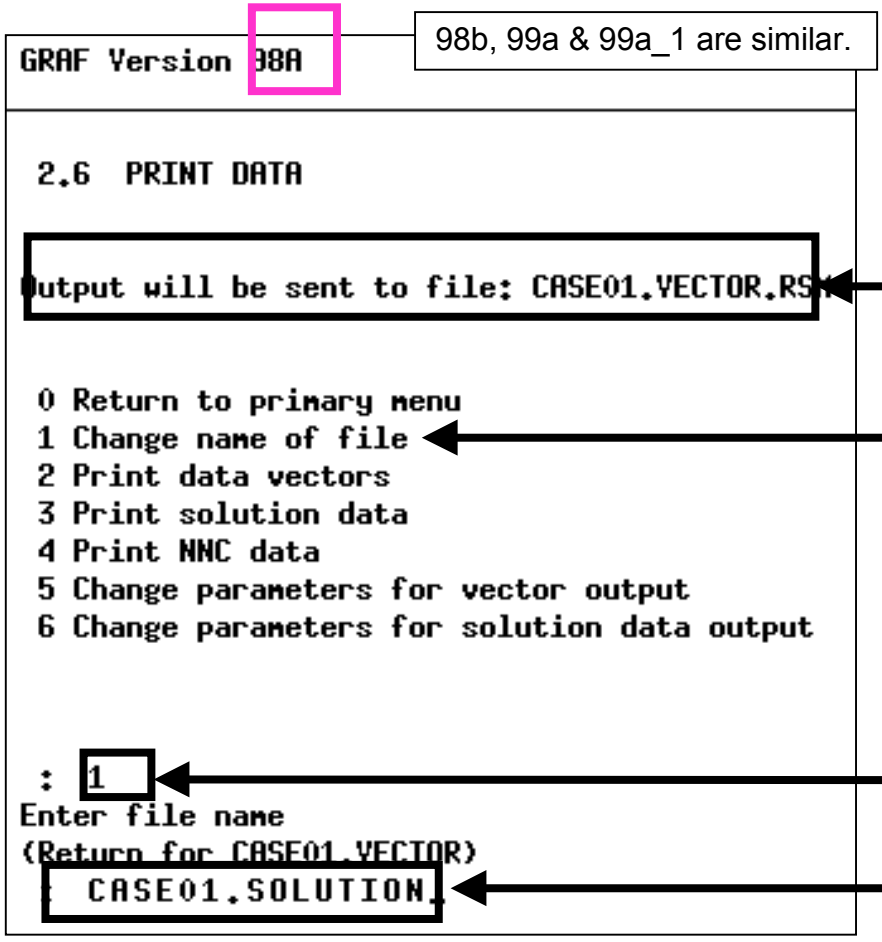
5. Type 10<cr>. (10 characters /column.)

6. Type <cr>.

7. Type <cr>.

2 - Index, Print, Save, & Restart - *.vector.RSM

Menu 0.2.6 -> 0.2.6.1.



1. Observe the “default” filename.

GRAF’s Workflow

Workflow is generally from the top down.
This is an exception.
Results are going to individual files.

3. Type 1 <cr>.

4. Type CASE01.SOLUTION <cr>.
This creates a new root (for grid data.)

REVIEW

Menus 2.6.1, 2.6.2, and 2.6.5 are done.

Vector results (from E300) are now in a separate file.

The default format is sets of 13 VECTORs (in vertical columns.)
- Each column is 10 characters wide.
- Fixed-width columns import easily into spreadsheets
- This gives the user a choice:
  - Plot VECTORs with GRAF, or
  - Plot VECTORs with a spreadsheet.

Originally this was for 132-column line printers. Word processors can easily print 130 columns (in landscape orientation) with an 8-point, fixed-pitch font (*e.g.*, courier.) This is 15 characters / inch: (120 points / inch) / (8 points / character.)

2 - Index, Print, Save, & Restart - *.solution.RSM

0.2.6.1 -> 0.2.6.3 -> 0.2.6.6.

DISCUSSION

The OUTSOL “card” tells e300 to OUTput SOLution data about cell pressures, oil saturations and oil viscosities. (See the solutions section of case01.data.)

The TSTEP “cards” tell OUTSOL when to save SOLUTION data.
E300 saves initial data as the 0th timestep for SOLUTION data.
There are three TSTEP “cards” in the SCHEDULE section.
Thus e300 saves four sets of contour-map data. (See case01.data.)

COMING UP

Menu 2.6 is also an easy way to separate SOLUTION results. The workflow is:

2.6.1Change name of file.

2.6.3Print solution data (Save grid-cell pressures for timesteps.)
2.6.3Print solution data. (Save oil saturation by cell and timestep.)
2.6.3Print solution data. (Save oil viscosity by cell and timestep.)

2.6.6Change parameters for solution data output.

Create a new root, CASE01.SOLUTION. This root will contain only cell results including Pressure, Soil, and Voil.

2 - Index, Print, Save, & Restart - *.solution.RSM

0.2.6 -> 0.2.6.3 (1st pass.)

98b, 99a & 99a_1 are similar.

```
GRAF Version 98A

 2.6  PRINT DATA

Output will be sent to file: CASE01.SOLUTION.RSM


 0 Return to primary menu
 1 Change name of file
 2 Print data vectors
 3 Print solution data
 4 Print NNC data
 5 Change parameters for vector output
 6 Change parameters for solution data output



 :  3
CASE01.SOLUTION.RSM does not exist
and will be created
One grid loaded using CASE01
Enter name of solution data required
(Return for PRESSURE)
 :
Enter lower time step required
(Return for 0)
 :
Enter upper time step required
(Return for 3)
 :
```

1. Observe complete, preferred filename.

GRAF's Workflow

Workflow is generally from the top down.
There are more cell results to "print."
"Print solution data."

3. Type 3 <cr>.

Observe default solution mnemonic.

5. Type <cr>. (Save cell-pressure results.)

6. Type <cr>. (Start at the 0th timestep.)

7. Type <cr>. (End at the 3rd timestep.)

2 - Index, Print, Save, & Restart - *.solution.RSM

0.2.6 -> 0.2.6.3 (2nd pass.)

98b, 99a & 99a_1 are similar.

```
GRAF Version 98A

 2.6  PRINT DATA


Output will be sent to file: CASE01.SOLUTION.RSM


 0 Return to primary menu
 1 Change name of file
 2 Print data vectors
 3 Print solution data
 4 Print NNC data
 5 Change parameters for vector output
 6 Change parameters for solution data output



 : 3
One grid loaded using CASE01
Enter name of solution data required
(Return for PRESSURE)
 : SOIL
Enter lower time step required
(Return for 0)
 :
Enter upper time step required
(Return for 3)
 :
```

GRAF's Workflow

Workflow is generally from the top down.
Save the 2nd set of cell results.
"Print solution data."

Observe default solution mnemonic.

3. Type **SOIL** <cr>. (Save oil saturations.)

4. Type <cr>.

5. Type <cr>.

2 - Index, Print, Save, & Restart - *.solution.RSM

0.2.6 -> 0.2.6.3 (3rd pass.)

98b, 99a & 99a_1 are similar.

```
GRAF Version 98A

 2.6  PRINT DATA


Output will be sent to file: CASE01.SOLUTION.RSM


 0 Return to primary menu
 1 Change name of file
 2 Print data vectors
 3 Print solution data
 4 Print NNC data
 5 Change parameters for vector output
 6 Change parameters for solution data output



 :  3
One grid loaded using CASE01
Enter name of solution data required
(Return for SOIL)
 :  VOIL
Enter lower time step required
(Return for 0)
 :
Enter upper time step required
(Return for 3)
 :
```

GRAF's Workflow

Workflow is generally from the top down.
Save the 3rd set of cell results.
"Print solution data."

Observe default solution mnemonic.

3. Type **VOIL** <cr>. (Save oil viscosities.)

4. Type <cr>.

5. Type <cr>.

2 - Index, Print, Save, & Restart - *.solution.RSM

Menu 0.2.6 -> 0.2.6.6.

98b, 99a & 99a_1 are similar.

```
GRAF Version 98A

 2.6  PRINT DATA


Output will be sent to file: CASE01.SOLUTION.RSM


 0 Return to primary menu
 1 Change name of file
 2 Print data vectors
 3 Print solution data
 4 Print NNC data
 5 Change parameters for vector output
 6 Change parameters for solution data output


 : 6
Enter new value for number of columns
(Return for 15)
 : 15
Enter order to vary solution array indices, e.g. IJK or JIK or KJI
(Return for IJK)
 : IJK_
```

Use defaults for number of columns, etc.

GRAF's Workflow

Workflow is generally from the top down.

D. Work down the menu choices.
"Change parameters for ...."

3. Type 6<cr>.

4. Type 13<cr>. (15 cols / page.)

5. Type IJK<cr>.

2 - Index, Print, Save, & Restart - *.RSM & *.DWS

0.2.6.1 -> 0.2.6.3 -> 0.2.6.6.

WISDOM

This is a good time to save to the picture workspace.
See menu 0.6.3.

REVIEW

Menus 2.6.1, 2.6.3 (3 times), and 2.6.6 are done.

E300 results are now in three separate files:
INDEX (names of variables, wells, etc.),
VECTOR (raw data for xy-plots), and
SOLUTION (contour-map) results.

CASE01.INDEX.RSM is a useful reference for variable names.

CASE01.VECTOR.RSM holds all the time-dependent (xy) results. Sets of 13 VECTORs are stored in fixed-width columns. It is easy to import fixed-width columns into Excel. This gives the user a choice. VECTORs may be plotted with GRAF or with a spreadsheet.

CASE01.SOLUTION.RSM stores the contour-map results. There is a value of PRESSURE, SOIL, and VOIL for each cell at the four requested timesteps. This also gives the user a choice. Contour may be plotted in GRAF or with mapping software.

2 - Index, Print, Save, & Restart - *.RSM & *.DWS

Menu 0 -> 0.6.2 -> 0.2.6.

REVIEW of WORKFLOW

```
------ Resume work after the interruption.
0           Primary Menu
0.6               Load or save workspace
0.6.2                   Load data workspace
0.6               Load or save workspace
0           Primary Menu
0.2               Print or index loaded information
0.2.6             Print data
0.2.6.1                       Change name of file
0.2.6.2                       Print data vectors
0.2.6.5                       Change parameters for vector output
0.2.6.1                       Change name of file
0.2.6.3                       Print solution data    (pressure,      1st pass)
0.2.6.3                       Print solution data    (oil saturation, 2nd pass)
0.2.6.3                       Print solution data    (oil viscosity,  3rd pass)
0.2.6.6                       Change parameters for solution data
0.2.6             Print data
0           Primary Menu
```

2 - Index, Print, Save, & Restart - *.RSM & *.DWS

Menu 0.2.

3 - Create, Display, & Save Graphics

Menu 0.3.

PROGRESS

Index, vector, and solution data have been “printed” to 3 separate files.
The *.RSM files will be closed next time the user exits GRAF.

The data workspace has been updated for index, vector, and solution data.
The *.DWS file will be closed next time the user exits GRAF.

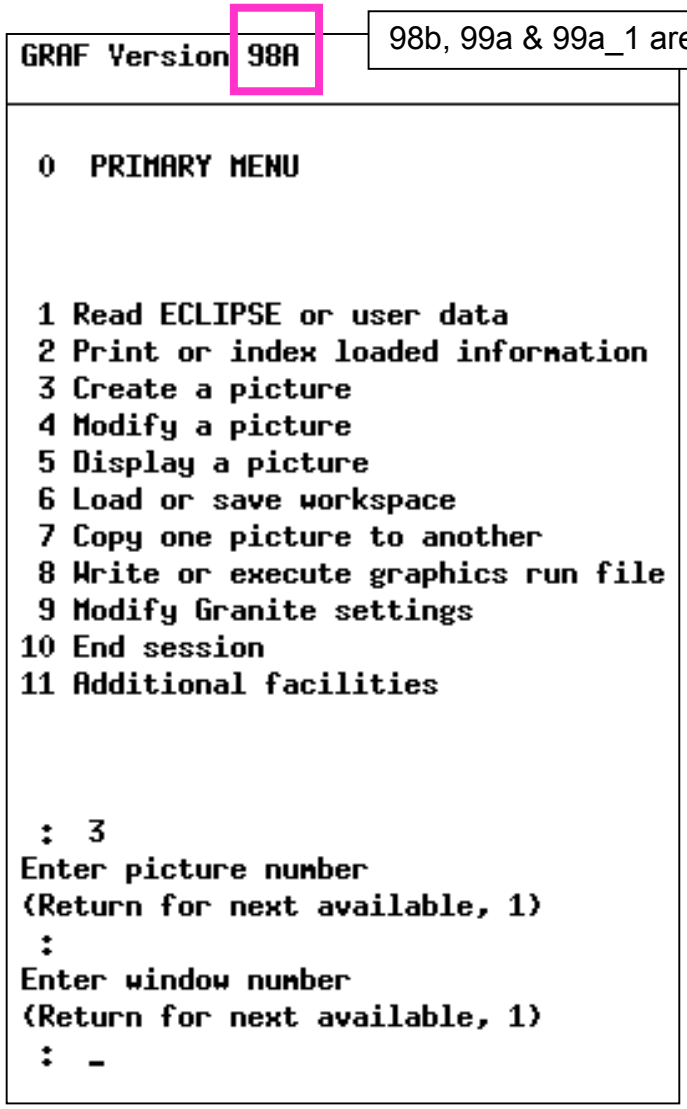
COMING UP

Creating pictures.
Creating windows.
Saving picture workspaces.

3 - Create, Display, & Save Graphics

Menu 0. -> 0.3.

98b, 99a & 99a_1 are similar.



3 - Create, Display, & Save Graphics

Menu 0.3 -> 0.3.1.

98b, 99a & 99a_1 are similar.

```
GRAF Version 98A

 3  CREATE DISPLAY 1 IN PICTURE 1


 0 Return to primary menu
 1 Enter line graph
 2 Enter grid display
 3 Enter line from grid data
 4 Enter special line displays
 5 Enter arbitrary cross-section display
 6 Next window
 7 Display picture



 :  1
Enter X-mnemonic
(Return for TIME)
 :
Mnemonic TIME found
Enter Y-mnemonic
(Return for TIME)
 :  FPR
Mnemonic FPR found
Hit any key to continue
```

3 - Create, Display, & Save Graphics

Menu 0.3 -> 0.3.7.

98b, 99a & 99a_1 are similar.

```
GRAF Version 98A

3  CREATE DISPLAY 1 IN PICTURE 1

0 Return to primary menu
1 Enter line graph
2 Enter grid display
3 Enter line from grid data
4 Enter special line displays
5 Enter arbitrary cross-section display
6 Next window
7 Display picture

: 7_
```

3 - Create, Display, & Save Graphics

Menu 0.3.7

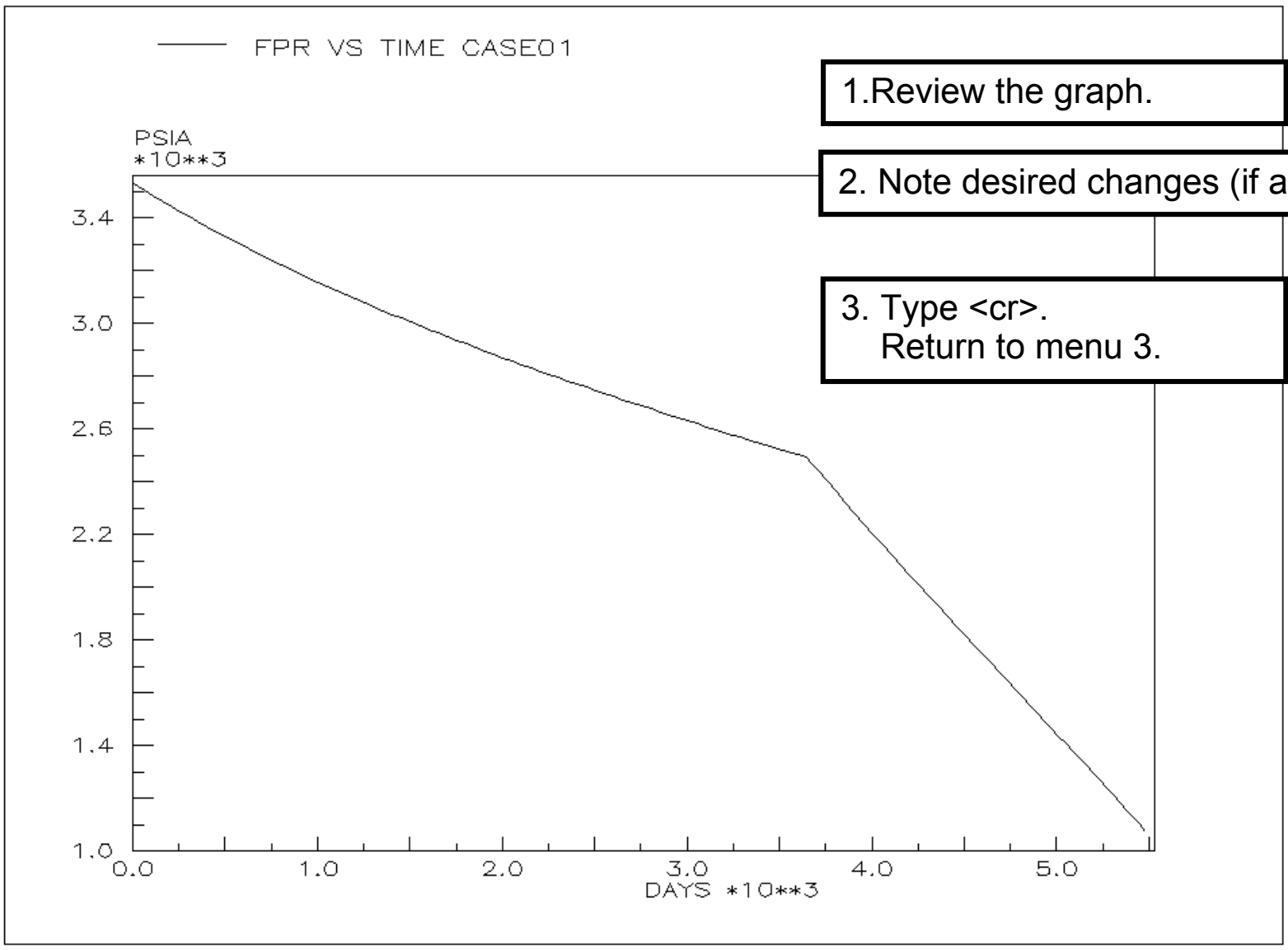


Figure 1 31/08/99 at 14:41:48

1.Review the graph.

2. Note desired changes (if any.)

3. Type <cr>.
Return to menu 3.

3 - Create, Display, & Save Graphics

Menu 0.3

WISDOM

Use menu 0.6.3, Save picture workspace.

Observe the difference between:
- Saving a picture workspace, and
- Saving a data workspace.

REVIEW

Created and displayed picture1, window 1
Window 1 of picture 1 is a vector plot.

COMING UP

Create a 2nd window for picture 1.
Create a solution map in window 2.

3 - Create, Display, & Save Graphics

Menu 0.3 -> 0.3.6.

98b, 99a & 99a_1 are similar.

```
GRAF Version 98A

 3  CREATE DISPLAY 1 IN PICTURE 1


 0 Return to primary menu
 1 Enter line graph
 2 Enter grid display
 3 Enter line from grid data
 4 Enter special line displays
 5 Enter arbitrary cross-section display
 6 Next window
 7 Display picture



 :  6
Enter window number
(Return for next available, 2)
 :  _
```

Avoid creating two pictures in a single window

3 - Create, Display, & Save Graphics

Menu 0.3 -> 0.3.2.

98b, 99a & 99a_1 are similar.

```
GRAF Version 98A

 3  CREATE DISPLAY 2 IN PICTURE 1


 0 Return to primary menu
 1 Enter line graph
 2 Enter grid display
 3 Enter line from grid data
 4 Enter special line displays
 5 Enter arbitrary cross-section display
 6 Next window
 7 Display picture



 :  2
```

```
GRAF Version 98A

 3  CREATE DISPLAY 2 IN PICTURE 1


 0 Return to primary menu
 1 Enter line graph
 2 Enter grid display
 3 Enter line from grid data
 4 Enter special line displays
 5 Enter arbitrary cross-section display
 6 Next window
 7 Display picture



 :  2
Enter name of grid required
(Return for CASE01)
 :
Mnemonic CASE01 found
Enter type of section (YZ,XZ,XY or 3D)
(Return for XY)
 :
Grid planes in Z-direction are from 1 to 4
Enter first plane required
(Return for 1)
 :
Enter last plane required
(Return for 2)
 :  1
Geometry, Contour, Solution,
Arrow, Transmissibility or Well display?
Enter G/C/S/A/T/W (Return for S)
 :  S
Enter property required
(Return for SOIL)
 :  SOIL
Enter first time step required
(Return for 0)
 :  0
Enter last time step required
(Return for 3)
 :  3_
```

3 - Create, Display, & Save Graphics

Menu 0.3 -> 0.3.2.

```
Mnemonic CASE01 found
Enter type of section (YZ,XZ,XY or 3D)
(Return for XY)
 :
Grid planes in Z-direction are from 1 to 4
Enter first plane required
(Return for 1)
 :
Enter last plane required
(Return for 2)
 :  1
Geometry, Contour, Solution,
Arrow, Transmissibility or Well display?
Enter G/C/S/A/T/W (Return for S)
 :  S
Enter property required
(Return for SOIL)
 :  SOIL
Enter first time step required
(Return for 0)
 :  0
Enter last time step required
(Return for 3)
 :  3_
```

```
GRAF Version 98A

 3  CREATE DISPLAY 2 IN PICTURE 1


 0 Return to primary menu
 1 Enter line graph
 2 Enter grid display
 3 Enter line from grid data
 4 Enter special line displays
 5 Enter arbitrary cross-section display
 6 Next window
 7 Display picture



 :  2
Enter name of grid required
(Return for CASE01)
 :
Mnemonic CASE01 found
Enter type of section (YZ,XZ,XY or 3D)
(Return for XY)
 :
Grid planes in Z-direction are from 1 to 4
Enter first plane required
(Return for 1)
 :
Enter last plane required
(Return for 2)
 :  1
Geometry, Contour, Solution,
Arrow, Transmissibility or Well display?
Enter G/C/S/A/T/W (Return for S)
 :  S
Enter property required
(Return for SOIL)
 :  SOIL
Enter first time step required
(Return for 0)
 :  0
Enter last time step required
(Return for 3)
 :  3_
```

3 - Create, Display, & Save Graphics

Menu 0.3 -> 0.3.2.

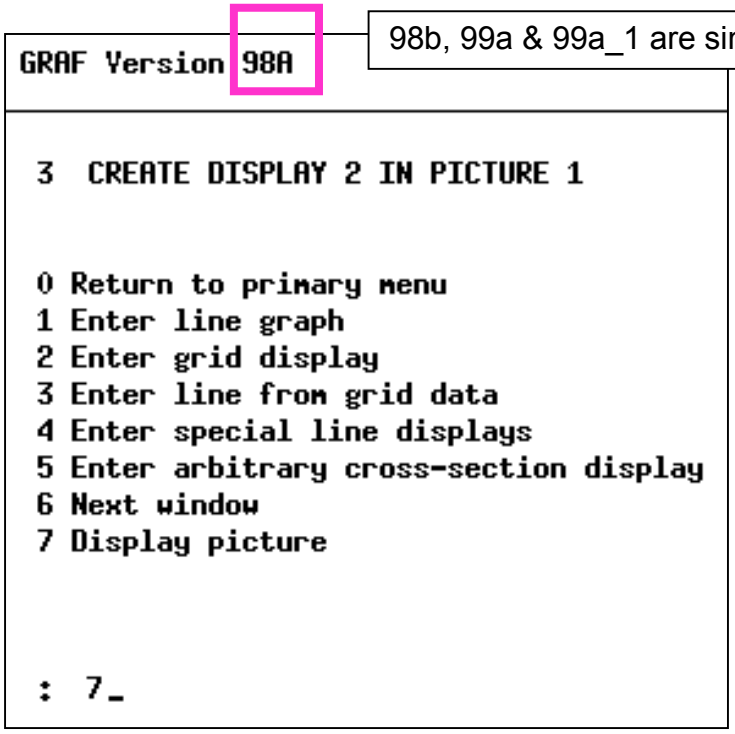
```
Display Top, Mid-Cell or Bottom Face?
T/M/B (Return for T)
 :  T

Hit any key to continue
```

```
Range is 0. to 0.238

Display Top, Mid-Cell or Bottom Face?
T/M/B (Return for T)
 :  T
X axis exists with range 0.  TO 2666.1
Reuse this for current line? Y/N
(Return for Y)
 :  Y
Y axis exists with range 0.  TO 5598.8
Reuse this for current line? Y/N
(Return for Y)
 :  Y
Hit any key to continue
```

3 - Create, Display, & Save Graphics

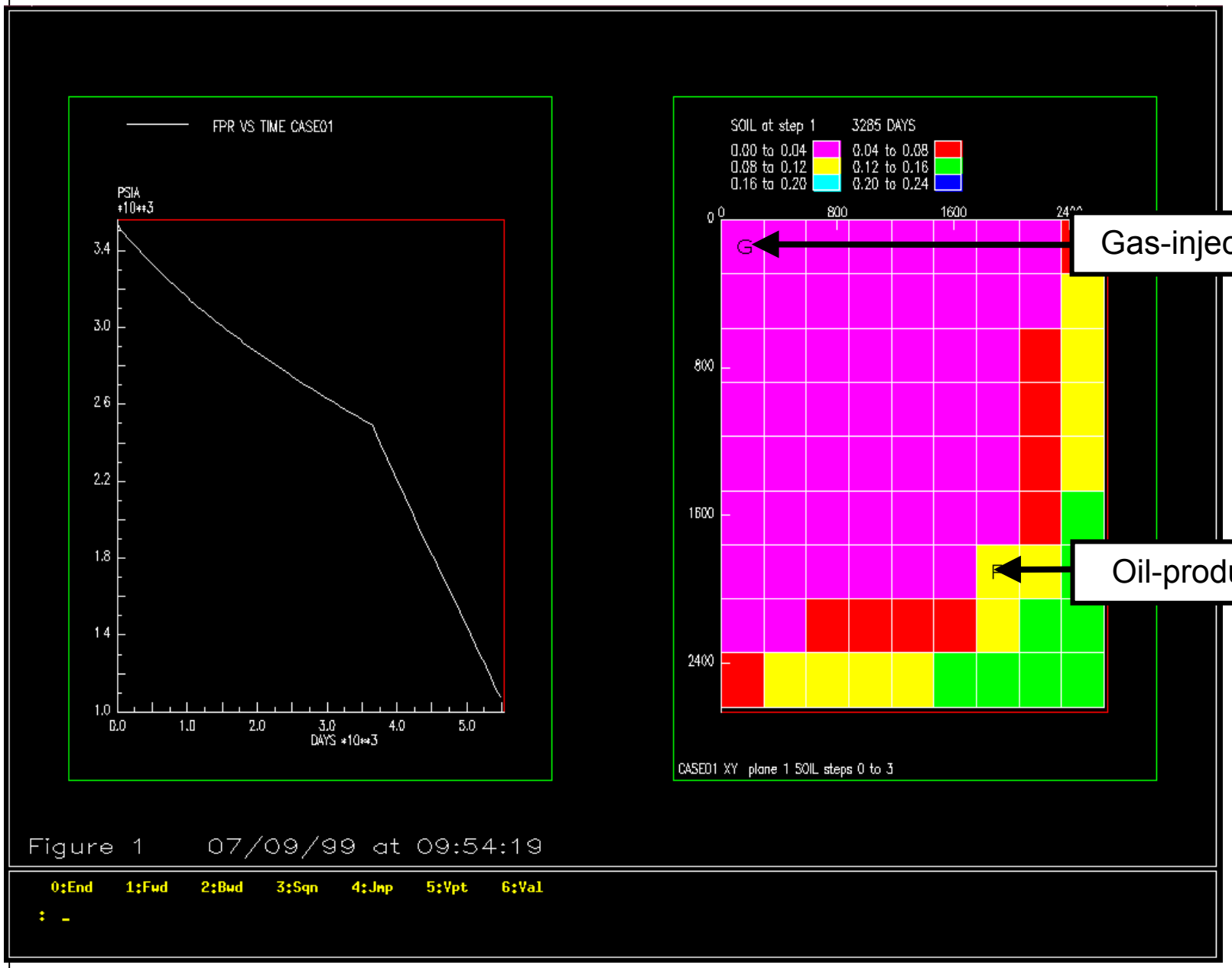
Menu 0.3 -> 0.3.7.

98b, 99a & 99a_1 are similar.



3 - Create, Display, & Save Graphics

Menu 0.3.7.

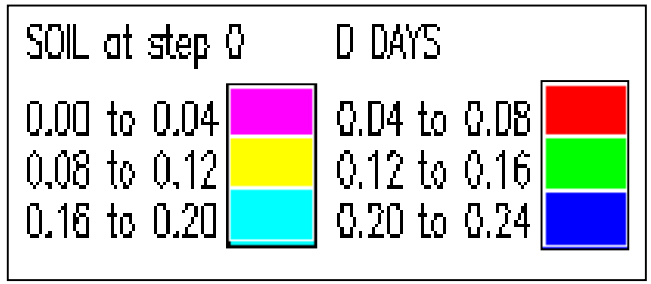


Gas-injection well

Oil-production well

3 - Create, Display, & Save Graphics

Menu 0.3.7.



COLOR KEY

1	Pink	Pink (magenta)	Low value
2	Red	Red	
3	Yellow	Yellow	
4	Green	Green	
5	Turquoise	Turquoise (cyan)	
6	Blue	Blue	High value.

3 - Create, Display, & Save Graphics

Menu 0.3.7.

MINI-MENU KEY

0:End	Go back to the menu that requested this display.
1:Fwd	Move the Solution ahead one timestep.
2:Bwd	Move the Solution back one timestep.
3:Sqn	Sequence (animate) to the last Solution timestep.
4:Jmp	Jump to one of the Solution timesteps
5:Vpt	Select another *viewport* as the current *viewport*.
	(Locate the cross-hairs in a particular *viewport*.)
6:Val	Show the cell value at the cross-hairs.
	(Use the mouse to move the cross-hairs.)
	Click outside the grid area to return to mini-menu.

```
 0:End    1:Fwd    2:Bwd    3:Sqn    4:Jmp    5:Vpt    6:Val
: _
```

3 - Create, Display, & Save Graphics

Menu 0.3.7.

View multiple solution timesteps

2. Type 1 <cr> step forward.

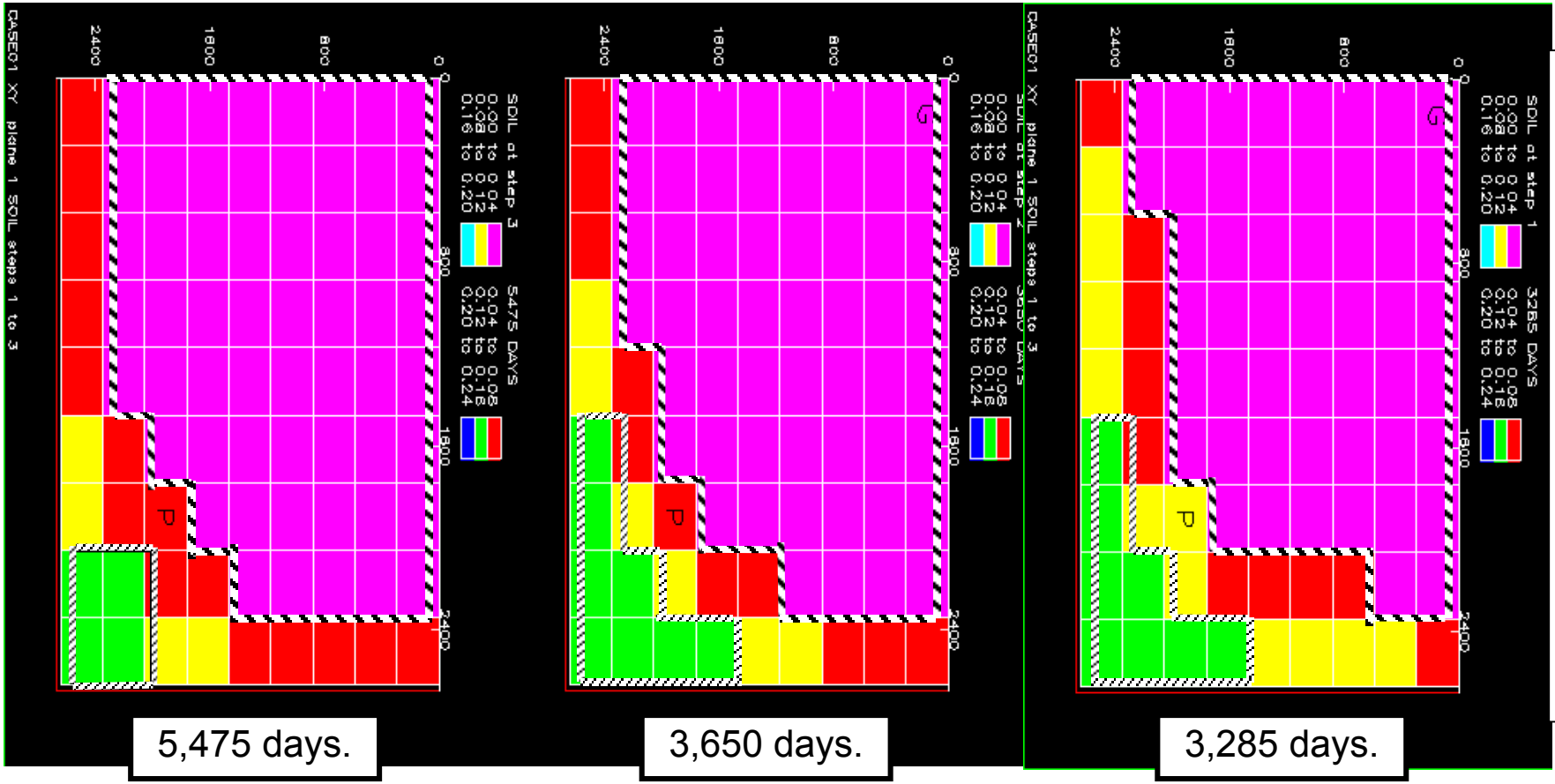
3. Type 1 <cr> step forward again.

4. Type 2 <cr> to step backward.

5. Type 0 <cr> to go up one level.

Border for $0.00 < S_{OIL} < 0.04$

Border for $0.12 < S_{OIL} < 0.16$



5,475 days.

3,650 days.

3,285 days.

3 - Create, Display, & Save Graphics

Menu 0.3.7.

WISDOM

Use menu 0.6.3, Save picture workspace.

REVIEW

Created and displayed picture 1, window 2.
- Window 2 is a solution plot.
- Typing 1 <cr> moves window 2 forward in time.
- Typing 2 <cr> moves window 2 back in time.
- Typing 6 <cr> and moving the mouse:
  - shows grid (cell) addresses, and
  - shows grid (cell) values.

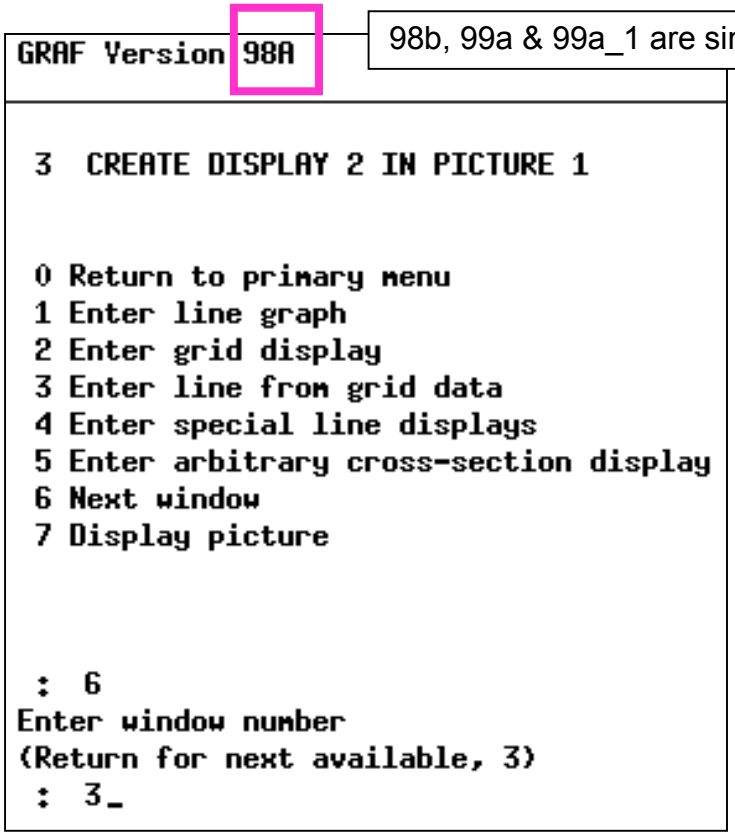
COMING UP

Create a 3rd window for picture 1.
Create a vector plot from a line of cells.

3 - Create, Display, & Save Graphics

Menu 0.3 -> 0.3.6.

98b, 99a & 99a_1 are similar.

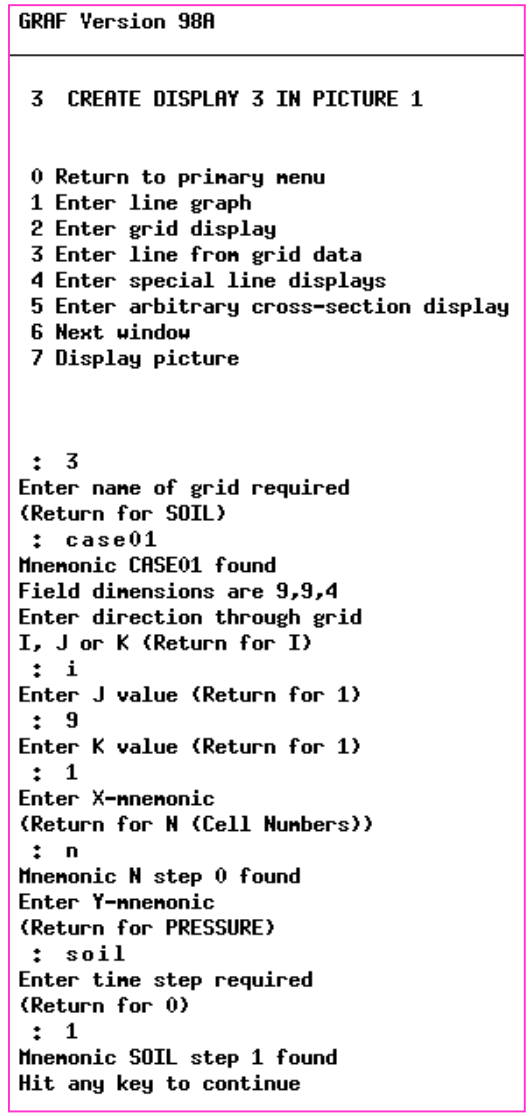


3 - Create, Display, & Save Graphics

Menu 0.3 -> 0.3.3.

98b, 99a & 99a_1 are similar.

```
GRAF Version 98A

 3  CREATE DISPLAY 3 IN PICTURE 1


 0 Return to primary menu
 1 Enter line graph
 2 Enter grid display
 3 Enter line from grid data
 4 Enter special line displays
 5 Enter arbitrary cross-section display
 6 Next window
 7 Display picture



 : 3
Enter name of grid required
(Return for CASE01)
 : CASE01
```



3 - Create, Display, & Save Graphics

Menu 0.3 -> 0.3.3.

```
Mnemonic CASE01 found
Field dimensions are 9,9,4
Enter direction through grid
I, J or K (Return for I)
 :  I
Enter J value (Return for 9)
 :  9
Enter K value (Return for 1)
 :  1
Enter X-mnemonic
(Return for N (Cell Numbers))
 :  N
Mnemonic N step 0 found
Enter Y-mnemonic
(Return for SOIL)
 :  SOIL
Enter time step required
(Return for 0)
 :  1
Mnemonic SOIL step 1 found
Hit any key to continue
```

```
GRAF Version 98A

 3  CREATE DISPLAY 3 IN PICTURE 1


 0 Return to primary menu
 1 Enter line graph
 2 Enter grid display
 3 Enter line from grid data
 4 Enter special line displays
 5 Enter arbitrary cross-section display
 6 Next window
 7 Display picture



 :  3
Enter name of grid required
(Return for SOIL)
 :  case01
Mnemonic CASE01 found
Field dimensions are 9,9,4
Enter direction through grid
I, J or K (Return for I)
 :  i
Enter J value (Return for 1)
 :  9
Enter K value (Return for 1)
 :  1
Enter X-mnemonic
(Return for N (Cell Numbers))
 :  n
Mnemonic N step 0 found
Enter Y-mnemonic
(Return for PRESSURE)
 :  soil
Enter time step required
(Return for 0)
 :  1
Mnemonic SOIL step 1 found
Hit any key to continue
```

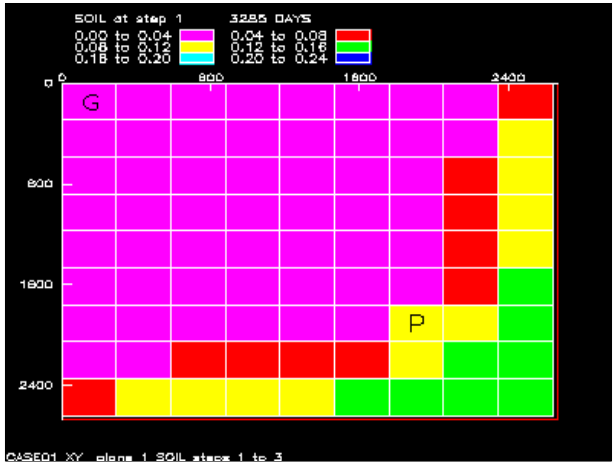
3 - Create, Display, & Save Graphics

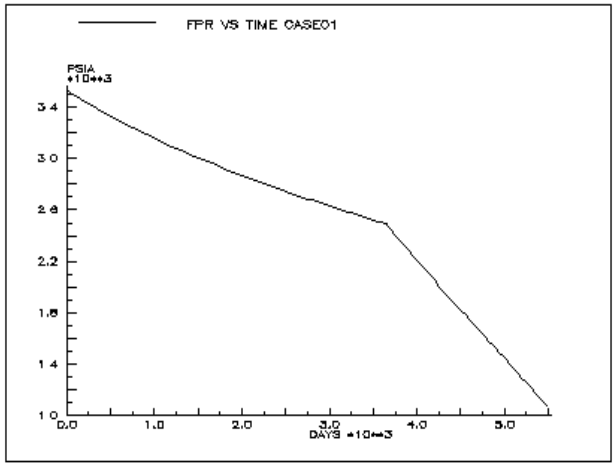
Menu 0.3 -> 0.3.7.

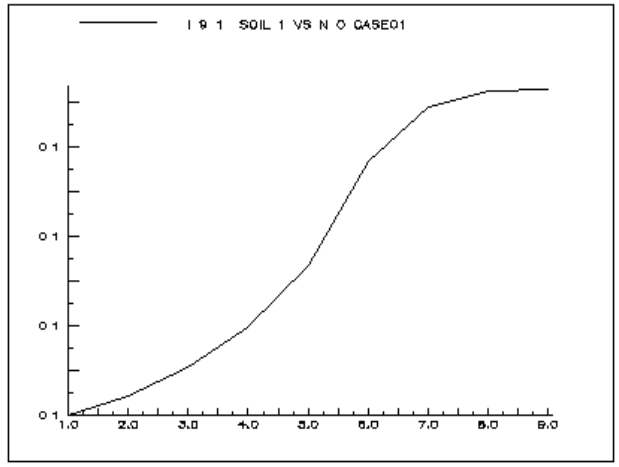
0.3.7 display picture ?????

3 - Create, Display, & Save Graphics

Menu 0.3.7.







Window 3

Figure 1 07/09/99 at 10:17:25

0:End 1:Fwd 2:Bwd 3:Sqn 4:Jmp 5:Vpt 6:Val

: 0

3 - Create, Display, & Save Graphics

Menu 0.3.

WISDOM

Use menu 0.6.3, Save picture workspace.

REVIEW

Created and displayed picture 1, window 3.
Window 3 is a vector plot of solution data.

COMING UP

Create a 4th window for picture 1.
Create a special vector plot for average, field S_O.

3 - Create, Display, & Save Graphics

Menu 0.3 -> 0.3.6.

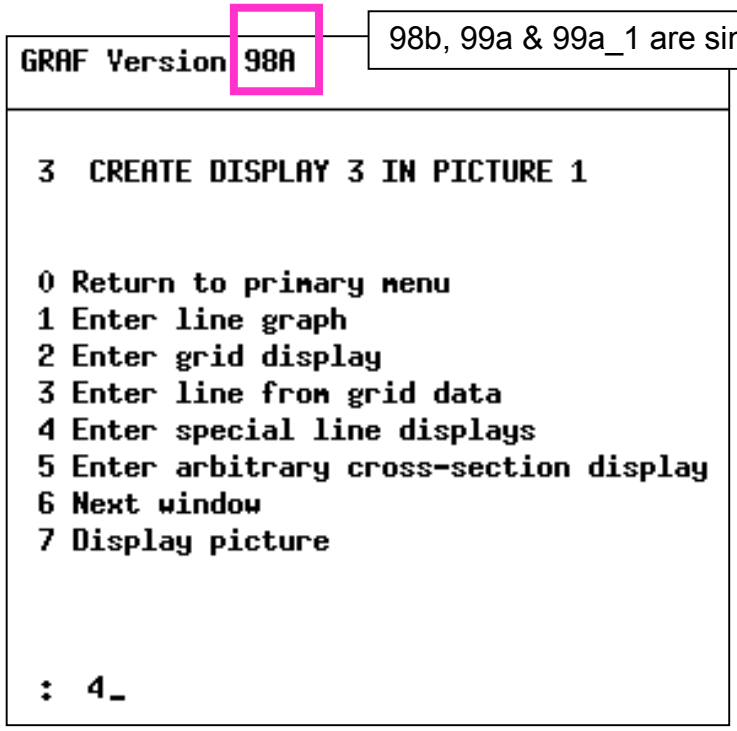
98b, 99a & 99a_1 are similar.

```
GRAF Version 98A

 3  CREATE DISPLAY 3 IN PICTURE 1


 0 Return to primary menu
 1 Enter line graph
 2 Enter grid display
 3 Enter line from grid data
 4 Enter special line displays
 5 Enter arbitrary cross-section display
 6 Next window
 7 Display picture



 :  6_
Enter window number
(Return for next available, 4)
 :  4_
```

3 - Create, Display, & Save Graphics

Menu 0.3 -> 0.3.4.

98b, 99a & 99a_1 are similar.



3 - Create, Display, & Save Graphics

Menu 0.3.4 -> 0.3.4.3.

98b, 99a & 99a_1 are similar.

```
GRAF Version 98A

 3.4  CREATE SPECIAL LINE DISPLAYS IN PICTURE 1 DISPLAY 4


 0 Return to primary menu
 1 Enter VFP table display
 2 Enter RFT or PLT display
 3 Enter Field Average display
 4 Enter Saturation function display (Endpoint scaling)
 5 Enter Saturation table display (Unscaled data)
 6 Enter PVT vector display
 7 Enter PVT table display
 8 Display picture



 : 3
Enter name of grid required
 : CASE01
Mnemonic CASE01 found
Enter name of solution required
(PRESSURE,SGAS,SOIL,SWAT)
(Return for PRESSURE )
 : SOIL
```

```
GRAF Version 98A

 3.4  CREATE SPECIAL LINE DISPLAYS IN PICTURE 1 DISPLAY 4


 0 Return to primary menu
 1 Enter VFP table display
 2 Enter RFT or PLT display
 3 Enter Field Average display
 4 Enter Saturation function display (Endpoint scaling)
 5 Enter Saturation table display (Unscaled data)
 6 Enter PVT vector display
 7 Enter PVT table display
 8 Display picture



 : 3
Enter name of grid required
 : CASE01
Mnemonic CASE01 found
Enter name of solution required
(PRESSURE,SGAS,SOIL,SWAT)
(Return for PRESSURE )
 : SOIL
Enter first time step required
(Return for 0)
 : 0
Enter last time step required
(Return for 3)
 : 3
enter weighting factor type (1,2 or 3)
1 = simple averaging
2 = pore volume weighted
3 = hydrocarbon pore volume weighted
(Return for 3 )
 : 1
Mnemonic CASE01 found
Mnemonic SOIL step 0 found
Mnemonic SOIL step 1 found
Mnemonic SOIL step 2 found
Mnemonic SOIL step 3 found
Mnemonic SO_AV created
Mnemonic TIME_R created
Hit any key to continue
```

3 - Create, Display, & Save Graphics

Menu 0.3.4 -> 0.3.4.3.

```
Enter first time step required
(Return for 0)
 :  0
Enter last time step required
(Return for 3)
 :  3
enter weighting factor type (1,2 or 3)
1 = simple averaging
2 = pore volume weighted
3 = hydrocarbon pore volume weighted
(Return for 3 )
 :  1
Mnemonic CASE01 found
Mnemonic SOIL step 0 found
Mnemonic SOIL step 1 found
Mnemonic SOIL step 2 found
Mnemonic SOIL step 3 found
Mnemonic SO_AV created
Mnemonic TIME_R created
Hit any key to continue
```

```
GRAF Version 98A

 3.4  CREATE SPECIAL LINE DISPLAYS IN PICTURE 1 DISPLAY 4


 0 Return to primary menu
 1 Enter VFP table display
 2 Enter RFT or PLT display
 3 Enter Field Average display
 4 Enter Saturation function display (Endpoint scaling)
 5 Enter Saturation table display (Unscaled data)
 6 Enter PVT vector display
 7 Enter PVT table display
 8 Display picture



 :  3
Enter name of grid required
 :  CASE01
Mnemonic CASE01 found
Enter name of solution required
(PRESSURE,SGAS,SOIL,SWAT)
(Return for PRESSURE )
 :  SOIL
Enter first time step required
(Return for 0)
 :  0
Enter last time step required
(Return for 3)
 :  3
enter weighting factor type (1,2 or 3)
1 = simple averaging
2 = pore volume weighted
3 = hydrocarbon pore volume weighted
(Return for 3 )
 :  1
Mnemonic CASE01 found
Mnemonic SOIL step 0 found
Mnemonic SOIL step 1 found
Mnemonic SOIL step 2 found
Mnemonic SOIL step 3 found
Mnemonic SO_AV created
Mnemonic TIME_R created
Hit any key to continue
```

3 - Create, Display, & Save Graphics

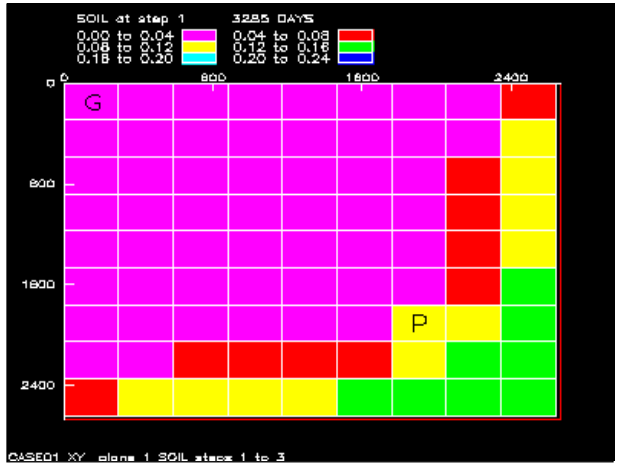
Menu 0.3.4 -> 0.3.4.8.

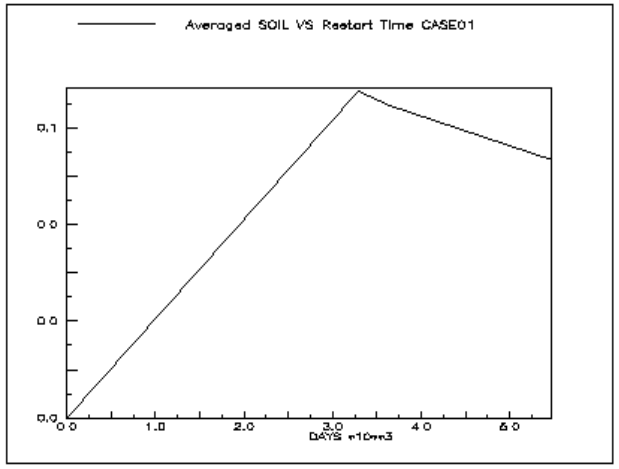
98b, 99a & 99a_1 are similar.

```
GRAF Version 98A

 3.4  CREATE SPECIAL LINE DISPLAYS IN PICTURE 1 DISPLAY 4


 0 Return to primary menu
 1 Enter VFP table display
 2 Enter RFT or PLT display
 3 Enter Field Average display
 4 Enter Saturation function display (Endpoint scaling)
 5 Enter Saturation table display (Unscaled data)
 6 Enter PVT vector display
 7 Enter PVT table display
 8 Display picture



 :  8_
```

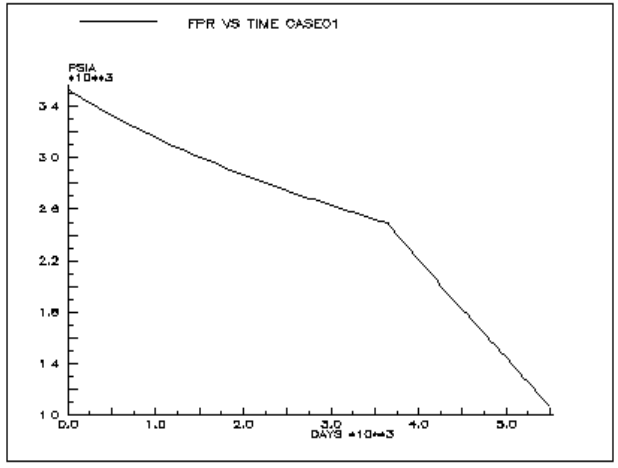
3 - Create, Display, & Save Graphics

Menu 0.3.4 -> 0.3.4.8.





Window 4



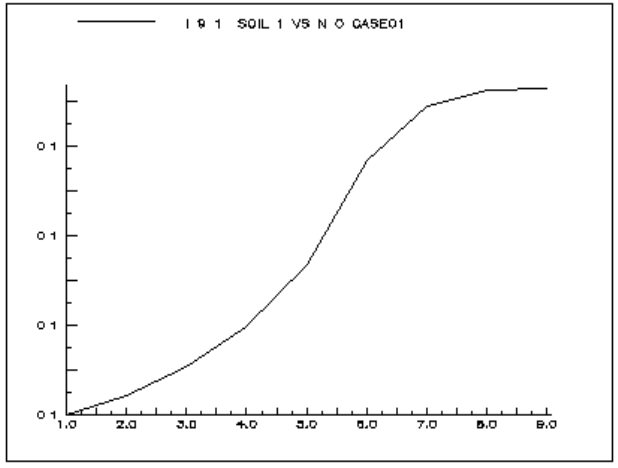


Figure 1 07/09/99 at 10:17:25

0:End 1:Fwd 2:Bwd 3:Sqn 4:Jmp 5:Vpt 6:Val

: 0

3 - Create, Display, & Save Graphics

Menu 0.3 -> 0.3.6 -> 0.3.4.

REVIEW

Created and displayed picture 1, window 4.
Window 3 is a vector plot of field-average solution data.

Picture 1, with 4 windows, is complete.

COMING UP

Saving a picture workspace.

3 - Create, Display, & Save Graphics

Menu 0.3.4 -> 0.

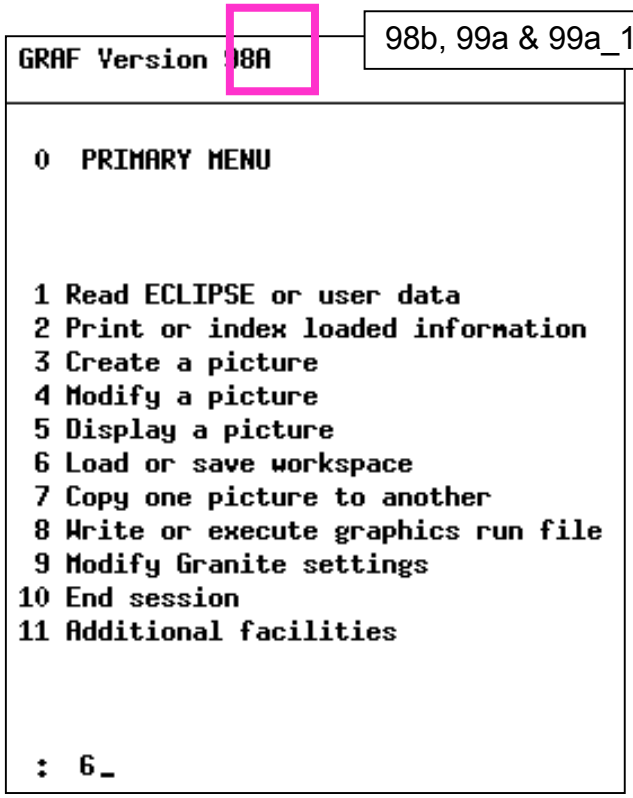
98b, 99a & 99a_1 are similar.

```
GRAF Version 98A

 3.4  CREATE SPECIAL LINE DISPLAYS IN PICTURE 1 DISPLAY 4


 0 Return to primary menu
 1 Enter VFP table display
 2 Enter RFT or PLT display
 3 Enter Field Average display
 4 Enter Saturation function display (Endpoint scaling)
 5 Enter Saturation table display (Unscaled data)
 6 Enter PVT vector display
 7 Enter PVT table display
 8 Display picture



 :  0_
```

3 - Create, Display, & Save Graphics

Menu 0. -> 0.6.

98b, 99a & 99a_1 are similar.



3 - Create, Display, & Save Graphics

Menu 0.6 -> 0.6.3.

98b, 99a & 99a_1 are similar.

```
GRAF Version 98A

 6  LOAD OR SAVE WORKSPACE


Will use unformatted files


 0 Return to primary menu
 1 Load picture workspace
 2 Load data workspace
 3 Save picture workspace
 4 Save data workspace
 5 Clear data workspace
 6 Clear picture workspace
 7 Change to formatted I/O
 8 Save vectors as user data file
 9 Save solutions as user data file
10 Show workspace usage
11 Show date stamps



 :  3
Enter name of file
(Return for CASE01)
 :  CASE01
File CASE01.PWS already exists
Do you want to overwrite it? Y/N (Return for Y)
 :  Y
Workspace successfully saved
Hit any key to continue
```

3 - Create, Display, & Save Graphics

Menu 0.6 -> 0.

98b, 99a & 99a_1 are similar.

```
GRAF Version 98A

 6  LOAD OR SAVE WORKSPACE


Will use unformatted files


 0 Return to primary menu
 1 Load picture workspace
 2 Load data workspace
 3 Save picture workspace
 4 Save data workspace
 5 Clear data workspace
 6 Clear picture workspace
 7 Change to formatted I/O
 8 Save vectors as user data file
 9 Save solutions as user data file
10 Show workspace usage
11 Show date stamps



 :  0_
```

3 - Create, Display, & Save Graphics

Menu 0.3 -> 0.6 -> 0.

REVIEW of WORKFLOW

0	Primary Menu	
0.3	Create a picture	
0.3.1	Enter line graph	(picture 1, window 1)
0.3.7	Display picture	(picture 1, window 1)
	<cr>	(Exit display.)
0.3.6	Next window	(picture 1, window 2)
0.3.2	Enter grid display	
0.3.7	Display picture	(picture 1, windows 1 and 2)
----------View other timesteps and read values		
	1 <cr>	(Solution map moves forward one timestep.)
	2 <cr>	(Solution map moves back one timestep.)
	6 <cr>	(Use mouse to get cell address and value.)
	0 <cr>	(End mini-menu. [Exit display.])
0.3.6	Next window	(picture 1, window 3)
0.3.3	Enter line from grid data	(picture 1, window 3)
0.3.7	Display picture	(picture 1, windows 1, 2, and 3)
0.3.6	Next window	(picture 1, window 4)
0.3.4	Enter special line display	
0.3.4.3	Enter field average display	
0.3.4.8	Display picture	
0	Primary Menu	

3 - Create, Display, & Save Graphics

Menu 0.3 -> 0.6 -> 0.

REVIEW of WORKFLOW (continued)

----------Save the picture workspace (1 picture with 4 windows)
0 Primary Menu
0.6 Load or save workspace
0.6.3 Save picture workspace
0 Primary Menu

REVIEW

Created picture 1, windows 1 to 4.
Created a vector plot.
Created a solution map.
Created a vector plot from a line of solution data.
Created a field-average vector plot from solution data.

Saved picture 1 (all 4 windows) as CASE01.PWS

COMING UP

Creating more pictures.
A vector plot.
A contour (solution) map.

Saving the new pictures.

3 - Create, Display, & Save Graphics

Menu 0. -> 0.3.

98b, 99a & 99a_1 are similar.

```
GRAF Version 98A

 0  PRIMARY MENU



 1 Read ECLIPSE or user data
 2 Print or index loaded information
 3 Create a picture
 4 Modify a picture
 5 Display a picture
 6 Load or save workspace
 7 Copy one picture to another
 8 Write or execute graphics run file
 9 Modify Granite settings
10 End session
11 Additional facilities



 :  3
Enter picture number
(Return for next available, 2)
 :  2
Enter window number
(Return for next available, 1)
 :  1_
```

3 - Create, Display, & Save Graphics

Menu 0.3 -> 0.3.1.

98b, 99a & 99a_1 are similar.

```
GRAF Version 98A

 3  CREATE DISPLAY 1 IN PICTURE 2


 0 Return to primary menu
 1 Enter line graph
 2 Enter grid display
 3 Enter line from grid data
 4 Enter special line displays
 5 Enter arbitrary cross-section display
 6 Next window
 7 Display picture



 :  1
Enter X-mnemonic
(Return for TIME)
 :
Mnemonic TIME not unique
Enter origin
(Return for CASE01)
 :
Mnemonic TIME found
Enter Y-mnemonic
(Return for FPR)
 :  FOPR
Mnemonic FOPR not unique
Enter origin
(Return for CASE01)
 :
Mnemonic FOPR found
Hit any key to continue
```

3 - Create, Display, & Save Graphics

Menu 0.3 -> 0.3.7.

98b, 99a & 99a_1 are similar.

```
GRAF Version 98A

 3  CREATE DISPLAY 1 IN PICTURE 2


 0 Return to primary menu
 1 Enter line graph
 2 Enter grid display
 3 Enter line from grid data
 4 Enter special line displays
 5 Enter arbitrary cross-section display
 6 Next window
 7 Display picture



 :  7_
```

3 - Create, Display, & Save Graphics

Menu 0.3 -> 0.3.7.

Picture 2, Window 1

Plot of oil production versus time.

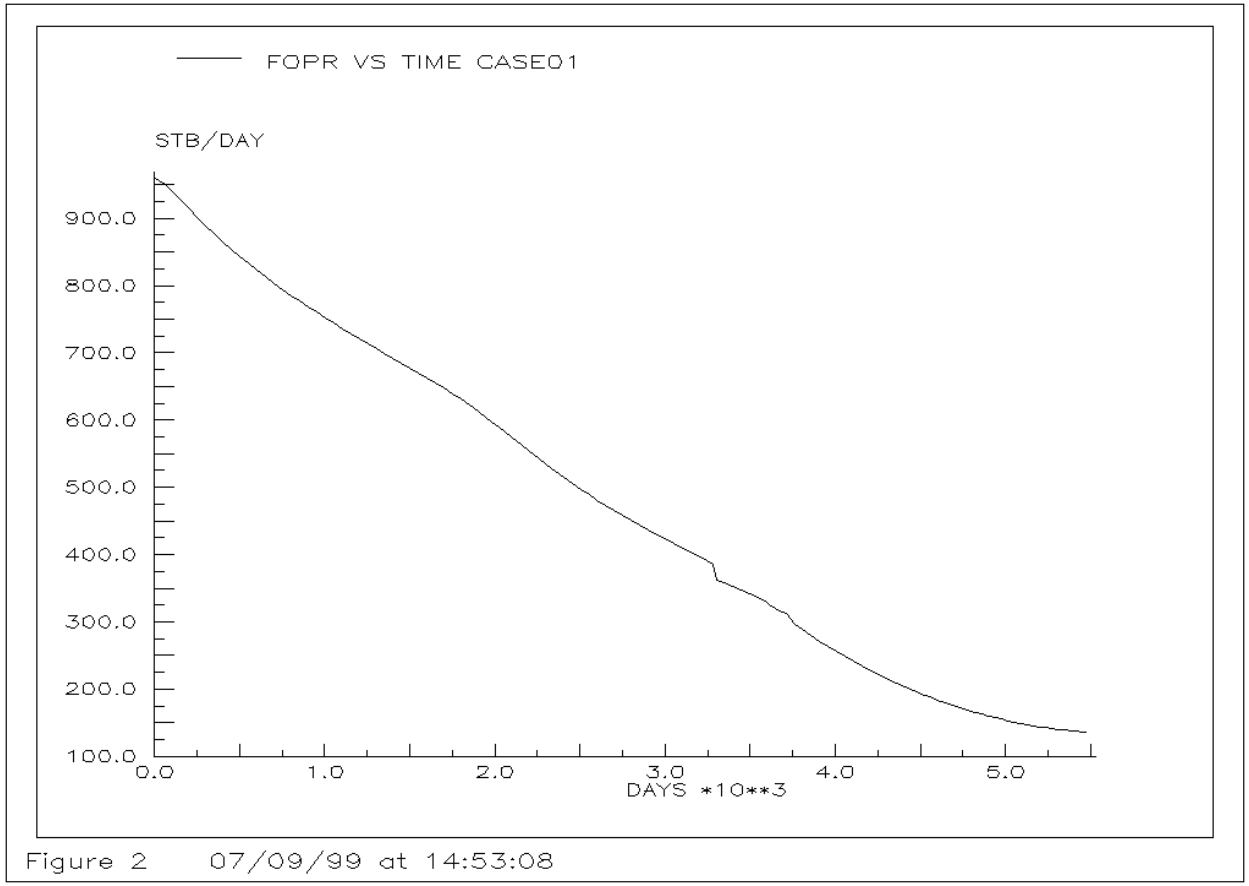


Figure 2 07/09/99 at 14:53:08

2. Type <cr> to return to the requesting menu.

3 - Create, Display, & Save Graphics

Menu 0.3 -> 0.

3 - Create, Display, & Save Graphics

Menu 0.3. -> 0.3.2.

```
GRAF Version 99A_1

 0  PRIMARY MENU



 1 Read ECLIPSE or user data
 2 Print or index loaded information
 3 Create a picture
 4 Modify a picture
 5 Display a picture
 6 Load or save workspace
 7 Copy one picture to another
 8 Write or execute graphics run file
 9 Modify Granite settings
10 End session
11 Additional facilities



 :  3
Enter picture number
(Return for next available, 3)
 :  3
Enter window number
(Return for next available, 1)
 :  1_
```

Create a contour pressure plot.

3 - Create, Display, & Save Graphics

Menu 0.3 -> 0.3.2.

```
GRAF Version 99A_1

 3  CREATE DISPLAY 1 IN PICTURE 3


 0 Return to primary menu
 1 Enter line graph
 2 Enter grid display
 3 Enter line from grid data
 4 Enter special line displays
 5 Enter arbitrary cross-section display
 6 Next window
 7 Display picture



 :  2
Enter name of grid required
(Return for CASE01)
 :  CASE01
Mnemonic CASE01 found
Enter type of section (YZ,XZ,XY or 3D)
(Return for XY)
 :  XY
```

```
GRAF Version 99A_1

 3  CREATE DISPLAY 1 IN PICTURE 3


 0 Return to primary menu
 1 Enter line graph
 2 Enter grid display
 3 Enter line from grid data
 4 Enter special line displays
 5 Enter arbitrary cross-section display
 6 Next window
 7 Display picture



 :  2
Enter name of grid required
(Return for CASE01)
 :  CASE01
Mnemonic CASE01 found
Enter type of section (YZ,XZ,XY or 3D)
(Return for XY)
 :  XY
Grid planes in Z-direction are from 1 to 4
Enter first plane required
(Return for 1)
 :  1
Enter last plane required
(Return for 1)
 :  1
Geometry, Contour, Solution,
Arrow, Transmissibility or Well display?
Enter G/C/S/A/T/W (Return for C)
 :  C
Enter property required
(Return for PRESSURE)
 :  PRESSURE
Enter first time step required
(Return for 0)
 :  1
Enter last time step required
(Return for 3)
 :  1_
```

3 - Create, Display, & Save Graphics

Menu 0.3 -> 0.3.2.

```
Grid planes in Z-direction are from 1 to 4
Enter first plane required
(Return for 1)
 :  1
Enter last plane required
(Return for 1)
 :  1
Geometry, Contour, Solution,
Arrow, Transmissibility or Well display?
Enter G/C/S/A/T/W (Return for C)
 :  C
Enter property required
(Return for PRESSURE)
 :  PRESSURE
Enter first time step required
(Return for 0)
 :  1
Enter last time step required
(Return for 3)
 :  1_
```

```
GRAF Version 99A_1

 3  CREATE DISPLAY 1 IN PICTURE 3


 0 Return to primary menu
 1 Enter line graph
 2 Enter grid display
 3 Enter line from grid data
 4 Enter special line displays
 5 Enter arbitrary cross-section display
 6 Next window
 7 Display picture



 :  2
Enter name of grid required
(Return for CASE01)
 :  CASE01
Mnemonic CASE01 found
Enter type of section (YZ,XZ,XY or 3D)
(Return for XY)
 :  XY
Grid planes in Z-direction are from 1 to 4
Enter first plane required
(Return for 1)
 :  1
Enter last plane required
(Return for 1)
 :  1
Geometry, Contour, Solution,
Arrow, Transmissibility or Well display?
Enter G/C/S/A/T/W (Return for C)
 :  C
Enter property required
(Return for PRESSURE)
 :  PRESSURE
Enter first time step required
(Return for 0)
 :  1
Enter last time step required
(Return for 3)
 :  1_
```

3 - Create, Display, & Save Graphics

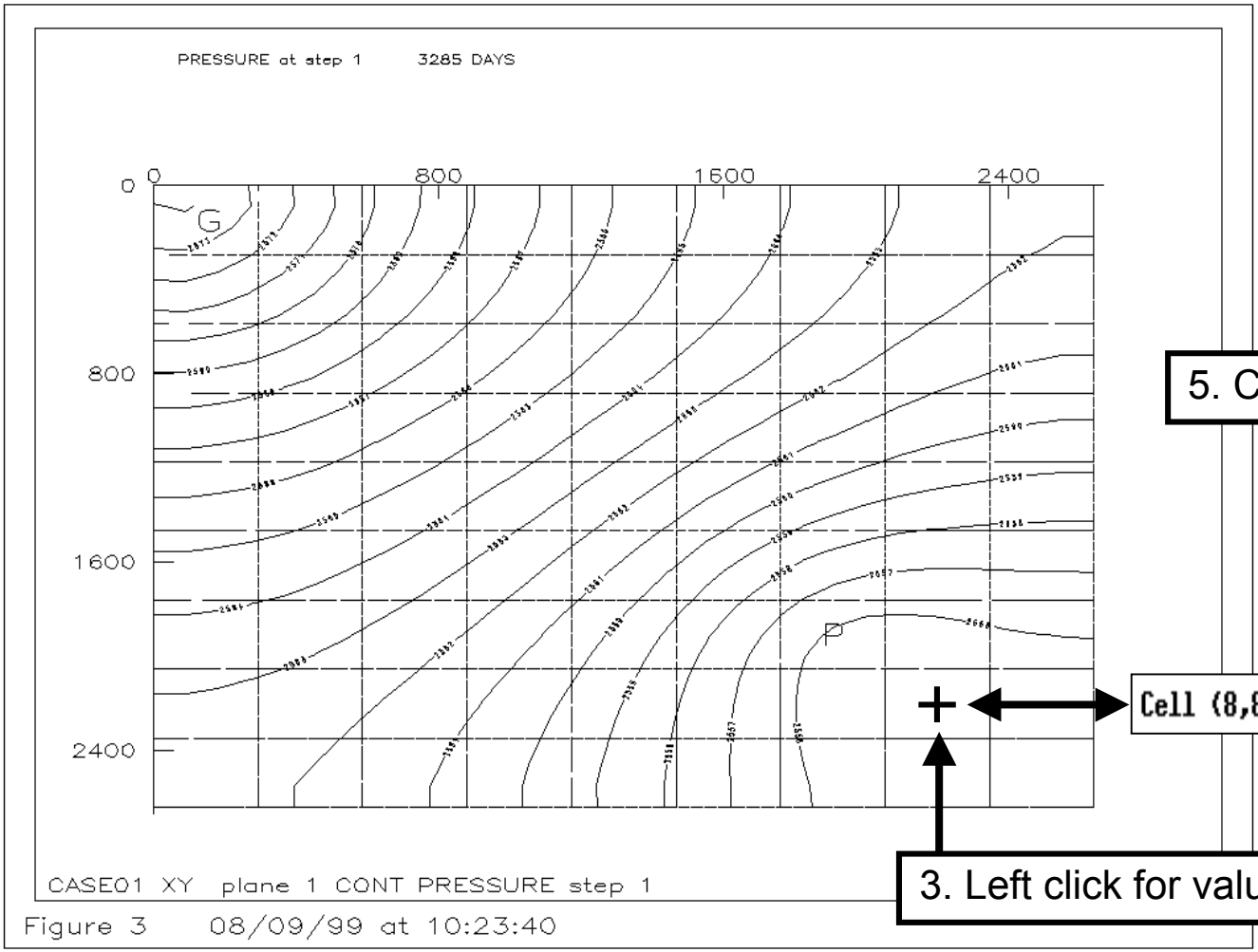
Menu 0.3 -> 0.3.2 -> 0.3.7.

```
Display Top, Mid-Cell or Bottom Face?
T/M/B (Return for T)
 :  T

Hit any key to continue
```

```
GRAF Version 99A_1

 3  CREATE DISPLAY 1 IN PICTURE 3


 0 Return to primary menu
 1 Enter line graph
 2 Enter grid display
 3 Enter line from grid data
 4 Enter special line displays
 5 Enter arbitrary cross-section display
 6 Next window
 7 Display picture



 :  7_
```

3 - Create, Display, & Save Graphics

Menu 0.3 -> 0.3.7.



5. Click any cell twice to exit.

4. Read value.

Cell (8,8,1) Value: 2555.04

3. Left click for values.

0:End 1:Fwd 2:Bwd 3:Sqn 4:Jmp 5:Vpt 6:Val

6_

1. Type 6 <cr>. Activate cross hairs.

2. Mouse moves cross-hairs.

Select cells with cursor

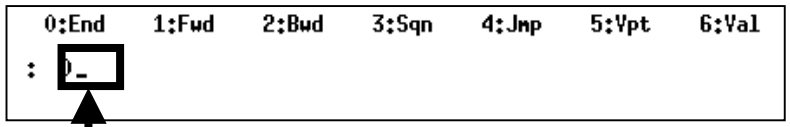
To exit press enter twice or select a point outside the grid

3 - Create, Display, & Save Graphics

Menu 0.3 -> 0.3.7.

Cannot read contour labels.

Zoom the pressure contour map.



1. Type 0 <cr>. Up one menu level.

3 - Create, Display, & Save Graphics

REVIEW of WORKFLOW

```
0         Primary Menu
0.3             Create a picture      (picture 2, window 1)
0.3.1                 Enter line graph
0.3.7                 Display picture
                      <cr> to exit display
0         Primary Menu
0.3             Create a picture      (picture 3, window 1)
0.3.2                 Enter a grid display
0.3.7                 Display picture
                      0 <cr>          (End mini-menu. [Exit display.])

0         Primary Menu
```

3 - Create, Display, & Save Graphics

Menu 0.3.

4 - Modify and Save Graphics

Menu 0.4.

WISDOM

Use menu 0.6.3, Save picture workspace.

REVIEW

Created and displayed pictures 2 and 3.
- Each picture has 1 window.
- Viewed cell addresses and values on the grid map.

Updated the picture workspace.
- Overwrote CASE01.PWS to include all three pictures.

COMING UP

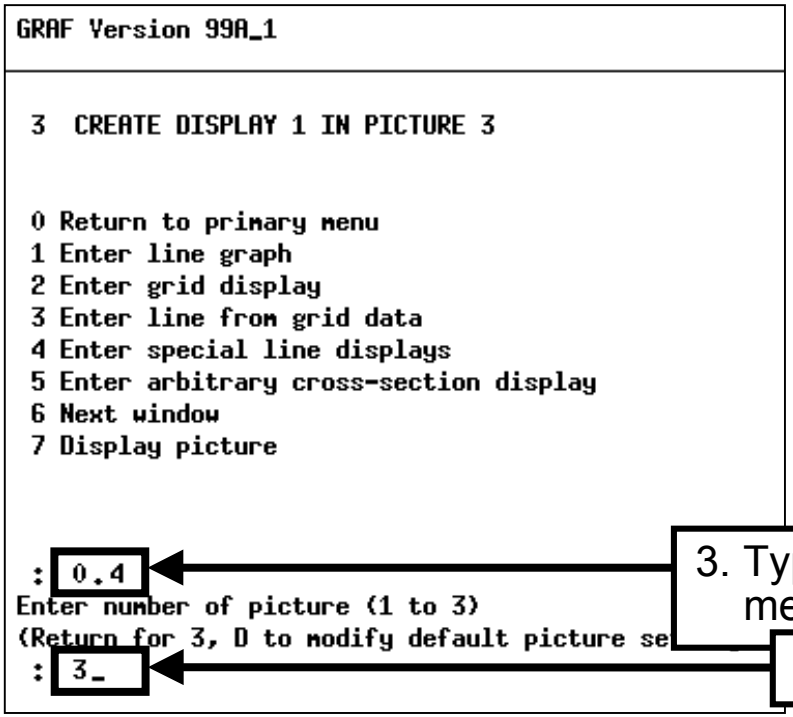
Modify graphics.
Save modified graphics.

4 - Modify and Save Graphics

Menu 0.3 -> 0.4.

WISDOM

Memorize the use of 0.X.Y.Z
to jump directly to a submenu.



3. Type 0.4 <cr>. Jump to the "Modify" menu.

4. Type 3 <cr>. Modify picture 3 (only.).

4 - Modify and Save Graphics

Menu 0.4 -> 0.4.6.

```
GRAF Version 99A_1

 4  MODIFY PICTURE 3


 0 Return to primary menu
 1 Change picture number                    (3)
 2 Change number of displays                (1)
 3 Change picture title & boundary
 4 Change LOGO
 5 Change a display                         (1 to 1)
 6 Zoom
 7 Unzoom
 8 Display current picture



 :  6
Enter type of Zoom - P = Picture, D = Display (Return for P)
 :  P_
```

Zoom the pressure contour map.

4 - Modify and Save Graphics

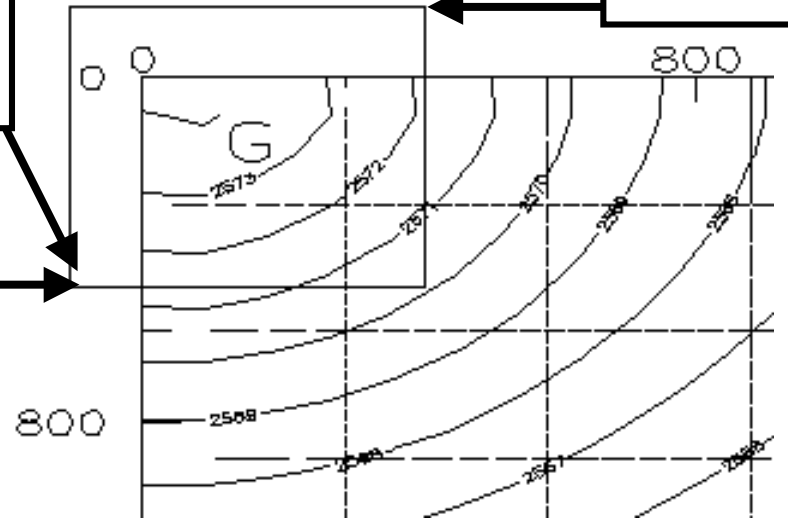
Menu 0.4 -> 0.4.6.

Zoom the pressure contour map.

6. Mouse-drag to mark the zoom area.

5. Left-mouse-down (to mark the lower-left-hand corner of the area to be zoomed.)

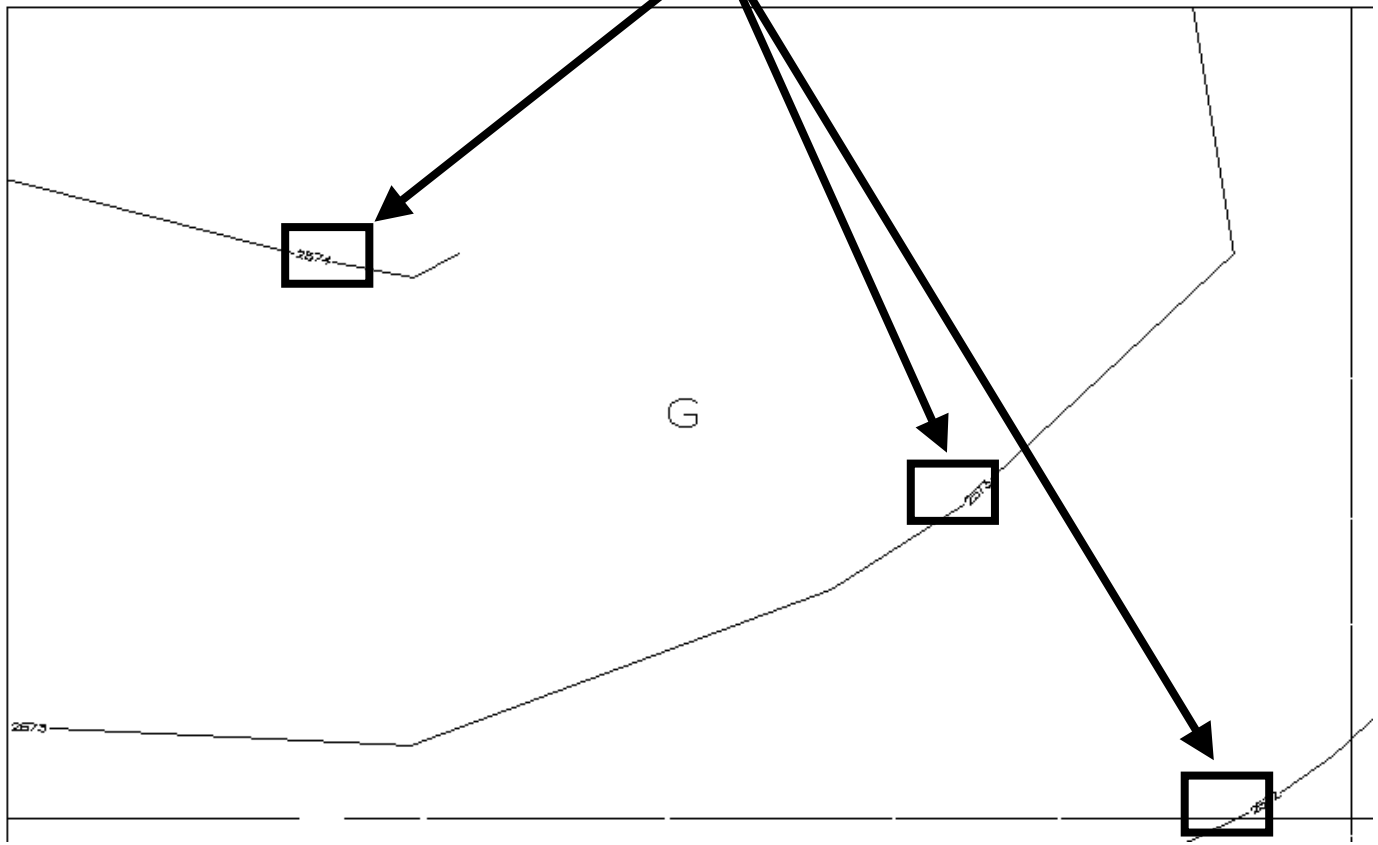
4. Move the mouse to the lower-left-hand corner of the area to be zoomed.



7. Click (to display the zoom.)

4 - Modify and Save Graphics

Menu 0.4 -> 0.4.6.



2. Type 0. <cr>. Up on menu level.

4 - Modify and Save Graphics

Menu 0.4 -> 0.4.7.

.Unzoom ?????

4 - Modify and Save Graphics

Menu 0.4 -> 0.4.5.

```
GRAF Version 99A_1

 4  MODIFY PICTURE 3


 0 Return to primary menu
 1 Change picture number                  (3)
 2 Change number of displays              (1)
 3 Change picture title & boundary
 4 Change LOGO
 5 Change a display                       (1 to 1)
 6 Zoom
 7 Unzoom
 8 Display current picture



 :  5_
```

.Unzoom ?????

Change the contour display.

4 - Modify and Save Graphics

Menu 0.4.5 -> 0.4.5.7.

```
GRAF Version 99A_1

 4.5  MODIFY DISPLAY 1 IN PICTURE 3


 0 Return to primary menu
 1 Different display
 2 Change viewport title & boundary
 3 Change graph title & boundary
 4 Change an axis
 5 Change a caption
 6 Change a line
 7 Change a grid display
 8 Add a caption,line or grid display
 9 Change key to line display
10 Display current picture



 :  7_
```

.Unzoom ?????

Change the contour display.

4 - Modify and Save Graphics

Menu 0.4.5.7 -> 0.4.5.7.7.

```
GRAF Version 99A_1

 4.5.7  MODIFY GRID 1 GRAPH 1 PICTURE 3


 0 Return to primary menu
 1 Change grid layout (title, key, aspect ratio etc.)
 2 Change grid overlays
 3 Change well markers and labels
 4 Change colour shading / limits
 5 Change 3D parameters
 6 Change dual porosity parameters
 7 Change a contour display
 8 Change a vertical equilibrium display
 9 Change an arrow plot
10 Change transmissibility or NNC display
11 Display current picture



 :  7_
```

4 - Modify and Save Graphics

Menu 0.4.5.7.7 -> 0.4.5.7.7.4.

```
GRAF Version 99A_1

 4.5.7.7  MODIFY CONTOUR DISPLAY 1, PICTURE 3


 Solution data ranges from 2552.5 to 2584.2


 0 Return to primary menu
 1 Change contour intervals             (0.2 & 1)
 2 Change contour quality               (1)
 3 Display contours                     (Yes)
 4 Change contours and contour labels
 5 Display colour fill                  (No)
 6 Change interpolation method          (Method 1 / faults honoured)
 7 Change search radius                 (0.3)
 8 Change truncation limits             (Auto)
 9 Change truncation tolerance          (Auto)
10 Change interpolation damping         (Auto)
11 Display current picture



 :  4_
```

4 - Modify and Save Graphics

0.4.5.7.7.4 -> 0.4.5.7.7.4.6.

```
GRAF Version 99A_1

 4.5.7.7.4  MODIFY CONTOURS AND LABELS IN DISPLAY 1, PICTURE 3


 0 Return to primary menu
 1 Change pen for minor contours              (2)
 2 Change pen for major contours              (3)
 3 Change number of decimal places in labels (1)
 4 Change text number used for labels         (2)
 5 Change height of minor labels              (0.)
 6 Change height of major labels              (0.005)
 7 Change contour spacing factor              (Auto)
 8 Change label spacing between contours      (Auto)
 9 Change label separation on contours        (Auto)
10 Display current picture



 : 6
Enter height for major contour labels (Return for 0.005)
 : 0.02_
```

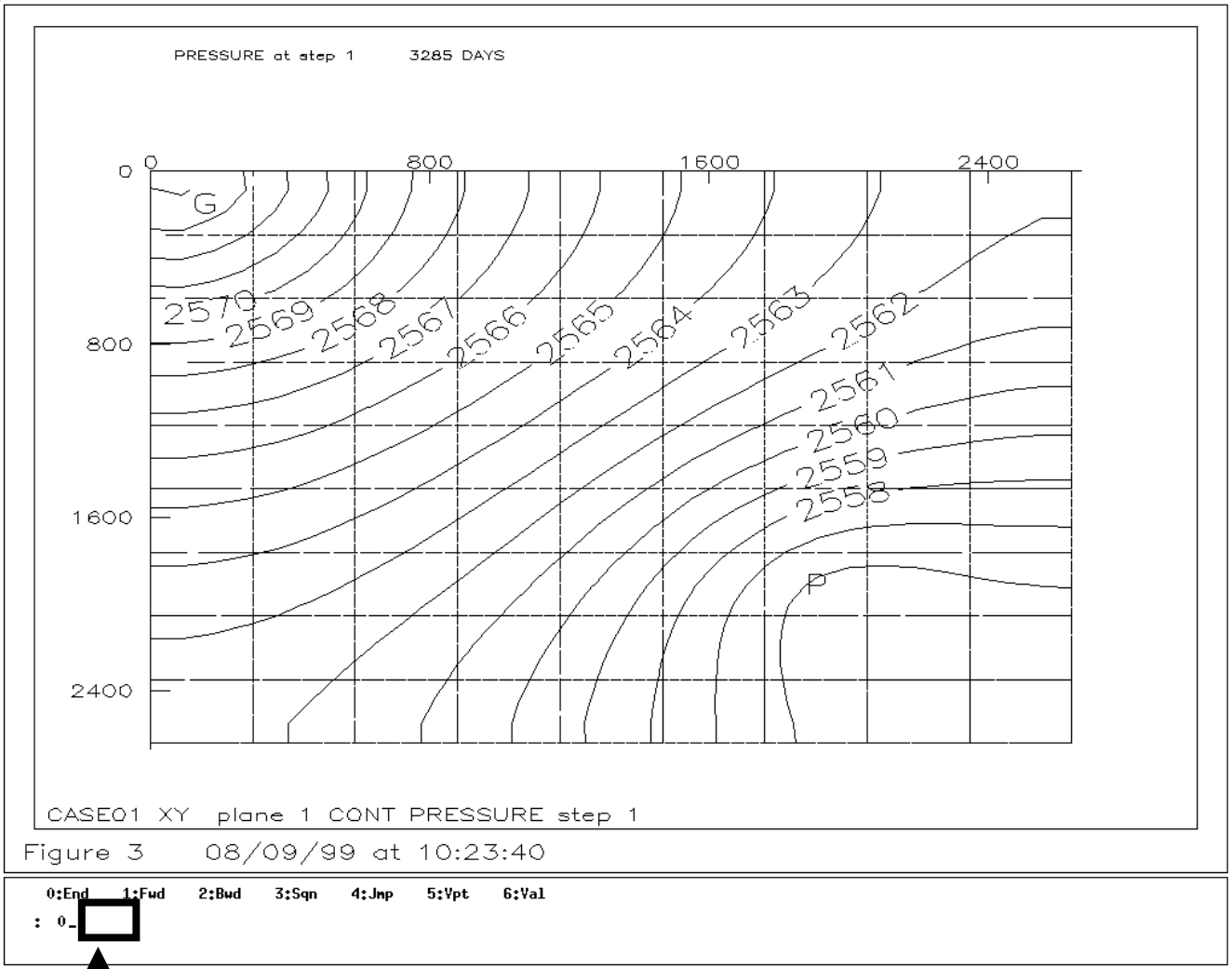
4 - Modify and Save Graphics

0.4.5.7.7.4 -> 0.4.5.7.7.4.10.

```
GRAF Version 99A_1

 4.5.7.7.4  MODIFY CONTOURS AND LABELS IN DISPLAY 1, PICTURE 3


 0 Return to primary menu
 1 Change pen for minor contours              (2)
 2 Change pen for major contours              (3)
 3 Change number of decimal places in labels (1)
 4 Change text number used for labels         (2)
 5 Change height of minor labels              (0.)
 6 Change height of major labels              (0.02)
 7 Change contour spacing factor              (Auto)
 8 Change label spacing between contours      (Auto)
 9 Change label separation on contours        (Auto)
10 Display current picture



 : 10_
```

4 - Modify and Save Graphics

0.4.5.7.7.4.10 -> 0.4.5.7.7.4.



1. Type 0 <cr>. Up one menu level.

4 - Modify and Save Graphics

Menu 0.4.5.7.7.4 -> 0.

```
GRAF Version 99A_1

 4.5.7.7.4  MODIFY CONTOURS AND LABELS IN DISPLAY 1, PICTURE 3


 0 Return to primary menu
 1 Change pen for minor contours             (2)
 2 Change pen for major contours             (3)
 3 Change number of decimal places in labels (1)
 4 Change text number used for labels        (2)
 5 Change height of minor labels             (0.)
 6 Change height of major labels             (0.005)
 7 Change contour spacing factor             (Auto)
 8 Change label spacing between contours     (Auto)
 9 Change label separation on contours       (Auto)
10 Display current picture



 :  0_
```

Overwriting the picture workspace.

4 - Modify and Save Graphics

Menu 0 -> 0.6.

98b, 99a & 99a_1 are similar.

```
GRAF Version 98A

 0  PRIMARY MENU



 1 Read ECLIPSE or user data
 2 Print or index loaded information
 3 Create a picture
 4 Modify a picture
 5 Display a picture
 6 Load or save workspace
 7 Copy one picture to another
 8 Write or execute graphics run file
 9 Modify Granite settings
10 End session
11 Additional facilities



 :  6_
```

4 - Modify and Save Graphics

Menu 0.6 -> 0.6.3.

GRAF Version 98A

98b, 99a & 99a_1 are similar.

```
 6  LOAD OR SAVE WORKSPACE


Will use unformatted files


 0 Return to primary menu
 1 Load picture workspace
 2 Load data workspace
 3 Save picture workspace
 4 Save data workspace
 5 Clear data workspace
 6 Clear picture workspace
 7 Change to formatted I/O
 8 Save vectors as user data file
 9 Save solutions as user data file
10 Show workspace usage
11 Show date stamps



 :  3
Enter name of file
(Return for CASE01)
 :  CASE01
File CASE01.PWS already exists
Do you want to overwrite it? Y/N (Return for Y)
 :  Y
Workspace successfully saved
Hit any key to continue
```

4 - Modify and Save Graphics

Menu 0.6 -> 0.

```
GRAF Version 99A_1

 6  LOAD OR SAVE WORKSPACE


Will use unformatted files


 0 Return to primary menu
 1 Load picture workspace
 2 Load data workspace
 3 Save picture workspace
 4 Save data workspace
 5 Clear data workspace
 6 Clear picture workspace
 7 Change to formatted I/O
 8 Save vectors as user data file
 9 Save solutions as user data file
10 Display information about GRAF



 :  0_
```

4 - Modify and Save Graphics

0.4.6 -> 0.4.7 -> 0.4.5 -> 0.6.3

REVIEW of WORKFLOW

0	Primary Menu
0.4	Print or index loaded information
0.4.1	Print data
0.4.	Change name of file
0.4.	Print data vectors
0.4.	Change parameters for vector output
0.4.	Change name of file
0.4.	Change parameters for solution data
0.3.	Print data
0	Primary Menu

4 - Modify and Save Graphics

0.4.6 -> 0.4.7 -> 0.4.5 -> 0.6.3

SEE IDEAS ON NEXT SLIDE TOO!

WISDOM

Use menu 0.6.3, Save picture workspace.

REVIEW

Created and displayed pictures 2 and 3.
- Each picture has 1 window.
- Viewed cell addresses and values on the grid map.

Updated the picture workspace.
- Overwrote CASE01.PWS to include all three pictures.

COMING UP

Modify graphics.
Save modified graphics.

4 - Modify and Save Graphics

0.4.6 -> 0.4.7 -> 0.4.5 -> 0.6.3

All four windows of picture 1 were previously saved in CASE01.PWS.

DISCUSSION

There are no INIT files for CASE01.

INIT files are required to plot relative permeability.

INIT files are required to plot capillary pressure.

2. Save pictures 1, 2, and 3 as a picture workspace. (Overwrite CASE01.PWS).

It is possible to save multiple picture workspaces for one data workspace (such as CASE01.a.PWS and CASE01.b.PWS)

Each PWS includes pointers to the DWS.

4 - Modify and Save Graphics

Menu 0 -> 0.4.

```
GRAF Version 99A_1

 0  PRIMARY MENU



 1 Read ECLIPSE or user data
 2 Print or index loaded information
 3 Create a picture
 4 Modify a picture
 5 Display a picture
 6 Load or save workspace
 7 Copy one picture to another
 8 Write or execute graphics run file
 9 Modify Granite settings
10 End session
11 Additional facilities



 :  4
Enter number of picture (1 to 2)
(Return for 2, 0 to modify default picture settings)
 :  2_
```

Choice:
- modify a specific picture
- modify all pictures at once.

4 - Modify and Save Graphics

Menu 0.4 -> 0.4.1.

```
GRAF Version 99A_1

 4  MODIFY PICTURE 2


 0 Return to primary menu
 1 Change picture number                  (2)
 2 Change number of displays              (1)
 3 Change picture title & boundary
 4 Change LOGO
 5 Change a display                       (1 to 1)
 6 Zoom
 7 Unzoom
 8 Display current picture



 : 1
Enter new picture number
 : 2_
```

Pick the picture number to change.

4 - Modify and Save Graphics

Menu 0.4 -> 0.4.2.

```
GRAF Version 99A_1

 4  MODIFY PICTURE 2


 0 Return to primary menu
 1 Change picture number                    (2)
 2 Change number of displays                (1)
 3 Change picture title & boundary
 4 Change LOGO
 5 Change a display                         (1 to 1)
 6 Zoom
 7 Unzoom
 8 Display current picture



 : 2
Enter new number of displays
 : 2_
```

Change the number of windows in a picture.

4 - Modify and Save Graphics

Menu 0.4 -> 0.4.3.

```
GRAF Version 99A_1

4  MODIFY PICTURE 2


0 Return to primary menu
1 Change picture number                    (2)
2 Change number of displays                (2)
3 Change picture title & boundary
4 Change LOGO
5 Change a display                         (1 to 2)
6 Zoom
7 Unzoom
8 Display current picture



:  3_
```

4 - Modify and Save Graphics

Menu 0.4.3 -> 0.4.3.1.

```
GRAF Version 99A_1

 4.3  MODIFY PICTURE 2


 Picture title :
 Chg Pic2 Title (4.3.2)


 0 Return to primary menu
 1 Change text number for picture title       (1)
 2 Change title content
 3 Change title position
 4 Change text height for picture title       (0.016)
 5 Change date format for picture title       (DD/MM/YY)
 6 Change pen for picture boundary            (1)
 7 Change picture position
 8 Display current picture



 : 1
Enter new text number
 : 7_
```

Change the picture title's font.

4 - Modify and Save Graphics

Menu 0.4.3 -> 0.4.3.2.

```
GRAF Version 99A_1

 4.3  MODIFY PICTURE 2


 Picture title :
 Figure @PICNUM  @PICDATE at  @PICTIME


 0 Return to primary menu
 1 Change text number for picture title       (7)
 2 Change title content
 3 Change title position
 4 Change text height for picture title       (0.016)
 5 Change date format for picture title       (DD/MM/YY)
 6 Change pen for picture boundary            (1)
 7 Change picture position
 8 Display current picture



 : 2
Enter new string
 : Figure @PICNUM @PICDATE at @PICTIME (Chg w/ 4.3.2)_
```

4 - Modify and Save Graphics

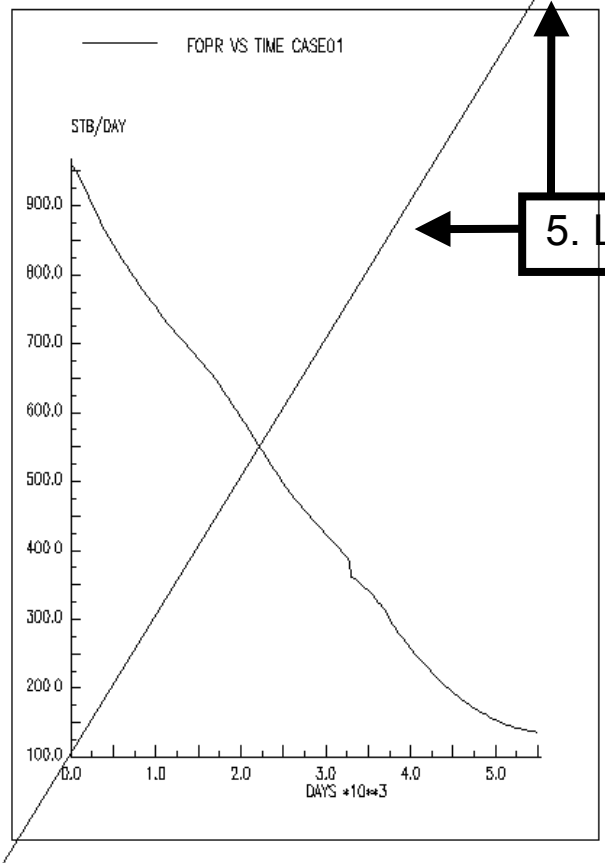
Menu 0.4.3 -> 0.4.3.3.

```
GRAF Version 99A_1

4.3  MODIFY PICTURE 2

Picture title :
Figure @PICNUM @PICDATE at @PICTIME (Chg w/ 4.3.2)

0 Return to primary menu
1 Change text number for picture title       (7)
2 Change title content
3 Change title position
4 Change text height for picture title       (0.016)
5 Change date format for picture title       (DD/MM/YY)
6 Change pen for picture boundary            (1)
7 Change picture position
8 Display current picture

 : 3
Centralise the title? Y/N (Return for N)
 : N_
```

4 - Modify and Save Graphics

Menu 0.4.3.3.

6. New title location.



5. Line helps track the move.

1. Added 2nd window to picture 2.

Figure 2 07/09/99 at 14:53:08 (Chg w/ 4.3.2)

2. & 3. Changed font and content.

Position text with locator

4. Mouse relocates lower-left-hand corner of title.

4 - Modify and Save Graphics

Menu 0.4.3 -> 0.4.3.4.

```
GRAF Version 99A_1

 4.3  MODIFY PICTURE 2


 Picture title :
 Figure @PICNUM @PICDATE at @PICTIME (Chg w/ 4.3.2)


 0 Return to primary menu
 1 Change text number for picture title       (7)
 2 Change title content
 3 Change title position
 4 Change text height for picture title       (0.016)
 5 Change date format for picture title       (DD/MM/YY)
 6 Change pen for picture boundary            (1)
 7 Change picture position
 8 Display current picture



 : 4
Enter new text height
 : 0.1_
```

4 - Modify and Save Graphics

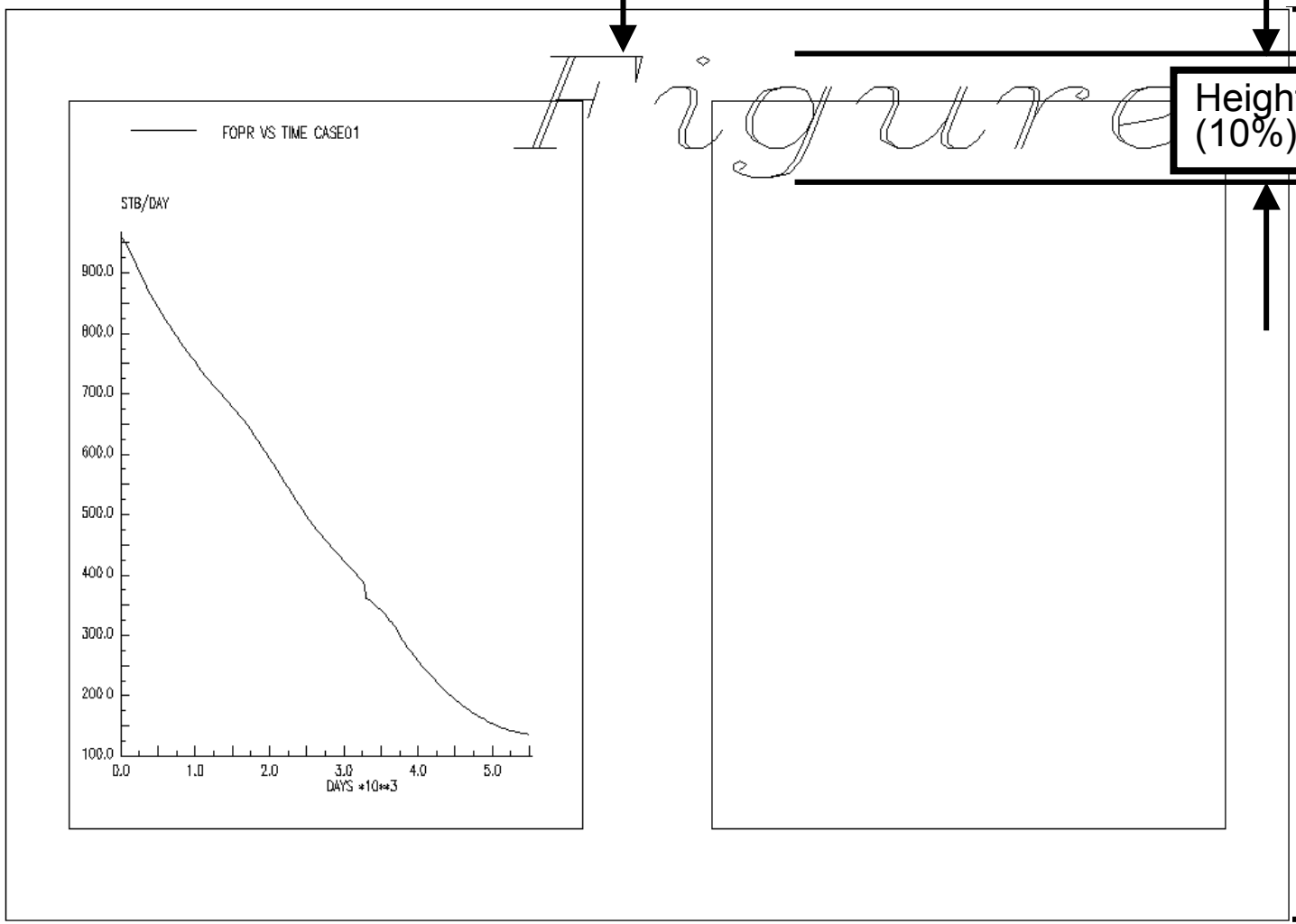
Menu 0.4.3 -> 0.4.3.8.

```
GRAF Version 99A_1

4.3  MODIFY PICTURE 2


Picture title :
Figure @PICNUM @PICDATE at @PICTIME (Chg w/ 4.3.2)


0 Return to primary menu
1 Change text number for picture title       (7)
2 Change title content
3 Change title position
4 Change text height for picture title       (0.1)
5 Change date format for picture title       (DD/MM/YY)
6 Change pen for picture boundary            (1)
7 Change picture position
8 Display current picture



: 8_
```

4 - Modify and Save Graphics

Menu 0.4.3.8.

Height at 0.10 (i.e. 10%) of box height is too much.



4 - Modify and Save Graphics

Menu 0.4.3 -> 0.4.3.4.

```
GRAF Version 99A_1

4.3  MODIFY PICTURE 2

Picture title :
Figure @PICNUM @PICDATE at @PICTIME (Chg w/ 4.3.2)

0 Return to primary menu
1 Change text number for picture title       (7)
2 Change title content
3 Change title position
4 Change text height for picture title       (0.1)
5 Change date format for picture title       (DD/MM/YY)
6 Change pen for picture boundary            (1)
7 Change picture position
8 Display current picture

 : 4
Enter new text height
 : 0.016_
```

Change height back to 0.016 (i.e. 1.6%.)

4 - Modify and Save Graphics

Menu 0.4.3 -> 0.4.3.8.

```
GRAF Version 99A_1

 4.3  MODIFY PICTURE 2


 Picture title :
 Figure @PICNUM @PICDATE at @PICTIME (Chg w/ 4.3.2)


 0 Return to primary menu
 1 Change text number for picture title       (7)
 2 Change title content
 3 Change title position
 4 Change text height for picture title       (0.016)
 5 Change date format for picture title       (DD/MM/YY)
 6 Change pen for picture boundary            (1)
 7 Change picture position
 8 Display current picture



 : 8_
```

2. Type 8 <cr> (View the picture.)

4 - Modify and Save Graphics

Menu 0.4.3 -> 0.4.3.8.

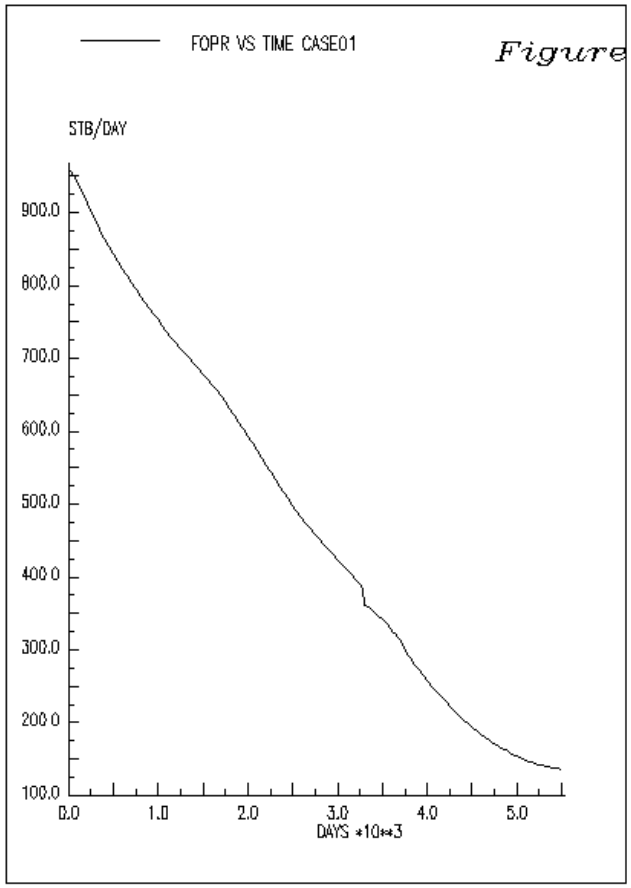


Figure 2 07/09/99 at 14:53:08 (Chg w/ 4.3.2)

4 - Modify and Save Graphics

0.4.3.1 -> 0.4.3.2 -> 0.4.3.3

REVIEW of WORKFLOW

0	Primary Menu
0.4	Print or index loaded information
0.4.3	P
0.4.	Change name of file
0.4.	Print data vectors
0.4.	Change parameters for vector output
0.4.	Change name of file
0.4.	Change parameters for solution data
0.3.	Print data
0	Primary Menu

4 - Modify and Save Graphics

0.4.3.1 -> 0.4.3.2 -> 0.4.3.3

This is a work in progress

REVIEW

Modified picture 2

- added 2nd window
- changed title font
- Changed title contents
- Moved title
- Changed title size
- ?????

COMING UP

Modifying a window within a picture.

- 4.3 C
- 4.3 C

This is a work in progress

4 - Modify and Save Graphics

Menu 0.4.3 -> 0.4.5.

This is a work in progress

4 - Modify and Save Graphics

Menu 0.6. -> 0.

This is a work in progress

4 - Modify and Save Graphics

Menu 0.4. -> 0.4.5.

This is a work in progress

```
GRAF Version 99A_1

 4  MODIFY PICTURE 2


 0 Return to primary menu
 1 Change picture number                    (2)
 2 Change number of displays                (2)
 3 Change picture title & boundary
 4 Change LOGO
 5 Change a display                         (1 to 2)
 6 Zoom
 7 Unzoom
 8 Display current picture



 : 5
Enter number of display to be modified (1 to 2)
(Return for 1)
 : 2_
```

4 - Modify and Save Graphics

Menu 0.4. -> 0.4.5.4.

This is a work in progress

REVIEW

Modified picture 2

- Changed non-calendar axis
- ?????

COMING UP

Modifying a window within a picture.

- 4.5.4 Change a non-calendar axis
  - 4.5.4.1 Axis position
  - 4.5.4.3 Axis position offset
  - 4.5.4.4 Axis lower bound
  - 4.5.4.5 Axis upper bound

4 - Modify and Save Graphics

Menu 0.4. -> 0.4.5.4.

This is a work in progress

COMING UP

Modifying a window within a picture.

- 4.5.4.6 Change ticks and scales
  - 4.5.4.6.1 Primary tick spacing
  - 4.5.4.6.4 Primary tick height
  - 4.5.4.6.7 Number of scale digits
  - 4.5.4.6.8 Digits before decimal point
  - 4.5.4.6.9 Multiplying factor
- 4.5.4 Change a calendar axis
  - 4.5.4.6.9 Date format
- 4.5.4.9 Invert axis
- 4.5.4.10 Change axis type
  - (calendar, logarithmic, linear)

4 - Modify and Save Graphics

Menu 0.4. -> 0.4.5.6.

This is a work in progress

REVIEW

Modified picture 2

- Changed calendar axis
- ?????

COMING UP

Modifying a window within a picture.

- 4.5.6 Change a plotted line
  - 4.5.6.1 Select line to change
  - 4.5.6.2 Line, histogram, or marker
  - 4.5.6.3 Solid, dash, dot, etc.

4 - Modify and Save Graphics

Menu 0.4. -> 0.4.5.7.

This is a work in progress

REVIEW

Modified picture 2
- Changed plotted line type
- ?????

COMING UP

Modifying a window within a picture.
- 4.5.7 Change a grid display
- 4.5 7.2 Inactive cells, boundaries, faults
- 4.5.7.3 Well markers
- 4.5.7.5 3-D
- 4.5.7.6 Dual porosity
- 4.5.7.7 Contour fill, frequency, labels
- 4.5.7.8 Vertical Equilibrium
- 4.5.7.9 Arrow plot parameters
- 4.5.7.10 Modify grid, graph, picture
- 4.5.7.10.2 Non-neighbor connections

4 - Modify and Save Graphics

Menu 0.4. -> 0.4.5.8.

This is a work in progress

REVIEW

Modified picture 2
- Changed grid display
- ?????

COMING UP

Modifying a window within a picture.

4.5.8 Add:
- Caption
- Line
- Grid

4 - Modify and Save Graphics

Menu 0.4. -> 0.4.5.9.

This is a work in progress

REVIEW

Modified picture 2
- Added a caption
- ?????

COMING UP

Modifying a window within a picture.
- 4.5.9 Change the key
  - 4.5.9.1 Position
  - 4.5.9.2 Spacing
  - 4.5.9.3 Number of columns
  - 4.5.9.4 Height of text

4 - Modify and Save Graphics

Menu 0.4. -> 0.4.6.

This is a work in progress

REVIEW

Modified picture 2
- Changed the line key
- ?????

COMING UP

Modifying a window within a picture.

4.6 Zoom
- Full screen
- Full window

4.6 Unzoom

4 - Modify and Save Graphics

Menu 0.4. -> 0.4.1.

This is a work in progress

REVIEW of WORKFLOW

0	Primary Menu
0.4	Print or index loaded information
0.4.1	Print data
0.4.	Change name of file
0.4.	Print data vectors
0.4.	Change parameters for vector output
0.4.	Change name of file
0.4.	Change parameters for solution data
0.3.	Print data
0	Primary Menu

4 - Modify and Save Graphics

Menu 0.4. -> 0.4.1.

This is a work in progress

SUMMARY

P

?

4 - Modify and Save Graphics

Menu 0.4.

This is a work in progress

5 - Display Options

Menu 0.5.

5 - Display Options

Menu 0.4.3 -> 0.5.

This is a work in progress

OVERVIEW

P

?

5 - Display Options

Menu 0.5. -> 0.5.8.

This is a work in progress

COMING UP

Displays

5.8 Repeat sequencing

All timesteps

Pause

This is a work in progress

DISSCUSSION

P

?

This is a work in progress

REVIEW

P

?

5 - Display Options

Menu 0.5. -> 0.5.9.

This is a work in progress

COMING UP

Displays

5.9 Picture rotation

This is a work in progress

DISSCUSSION

P

?

This is a work in progress

REVIEW

P

?

5 - Display Options

Menu 0.5. -> 0.5.10.

This is a work in progress

COMING UP

Displays

- 5.10 Plotter options
  - 5.10.2 Picture size
  - 5.10.4 Paper saving

This is a work in progress

DISSCUSSION

P

?

This is a work in progress

REVIEW

P

?

5 - Display Options

Menu 0.5. -> 0.5.11.

This is a work in progress

COMING UP

Displays

5.11 Plot while simulation runs

This is a work in progress

DISSCUSSION

P

?

This is a work in progress

REVIEW

P

?

5 - Display Options

Menu 0.5. -> 0.5.

This is a work in progress

REVIEW of WORKFLOW

0	Primary Menu
0.5	Print or index loaded information
0.5.1	Print data
0	Primary Menu

5 - Display Options

Menu 0.5. -> 0.5.

This is a work in progress

SUMMARY

P

?

6 - Using Workspaces

Menu 0. -> 0.6.

This is a work in progress

COMING UP

0	Primary Menu
0.6	Print or index loaded information
0.6.1	Print data
0	Primary Menu

6 - Using Workspaces

Menu 0. -> 0.6.

This is a work in progress

DISSCUSSION

P

?

6 - Using Workspaces

Menu 0. -> 0.6.

This is a work in progress

REVIEW

P

?

6 - Using Workspaces

Menu 0. -> 0.6.

This is a work in progress

SUMMARY

P

?

7 - Copying Pictures

Menu 0. -> 0.7.

This is a work in progress

COMING UP

0	Primary Menu
0.7	Print or index loaded information
0.7.1	Print data
0	Primary Menu

7 - Copying Pictures

Menu 0. -> 0.7.

This is a work in progress

DISSCUSSION

P

?

7 - Copying Pictures

Menu 0. -> 0.7.

This is a work in progress

REVIEW

P

?

7 - Copying Pictures

Menu 0. -> 0.7.

This is a work in progress

SUMMARY

P

?

8 - Graphics Run Files

Menu 0. -> 0.8.

This is a work in progress

COMING UP

0	Primary Menu
0.8	Print or index loaded information
0.8.1	Print data
0	Primary Menu

8 - Graphics Run Files

Menu 0. -> 0.8.

This is a work in progress

DISSCUSSION

P

?

8 - Graphics Run Files

Menu 0. -> 0.8.

This is a work in progress

REVIEW

P

?

8 - Graphics Run Files

Menu 0. -> 0.8.

This is a work in progress

SUMMARY

P

?

9 - Changing Granite Settings

Menu 0. -> 0.9.

This is a work in progress

COMING UP

0	Primary Menu
0.9	Print or index loaded information
0.9.1	Print data
0	Primary Menu

9 - Changing Granite Settings

Menu 0. -> 0.9.

This is a work in progress

DISSCUSSION

P

?

9 - Changing Granite Settings

Menu 0. -> 0.9.

This is a work in progress

REVIEW

P

?

9 - Changing Granite Settings

Menu 0. -> 0.9.

This is a work in progress

SUMMARY

P

?

10 - Customizing GRAF

Menu 0. -> 0.10.

This is a work in progress

COMING UP

0 Primary Menu
0.10 Print or index loaded information
0.10.1 Print data

0 Primary Menu

10 - Customizing GRAF

This is a work in progress

DISSCUSSION

P

?

10 - Customizing GRAF

Menu 0. -> 0.10.

This is a work in progress

REVIEW

P

?

10 - Customizing GRAF

This is a work in progress

SUMMARY

P

?

11 - Other Features

Menu 0. -> 0.11.

This is a work in progress

COMING UP

0 Primary Menu
0.11 Print or index loaded information
0.11.1 Print data

0 Primary Menu

11 - Other Features

Menu 0. -> 0.11.

This is a work in progress

DISSCUSSION

P

?

11 - Other Features

Menu 0. -> 0.11.

This is a work in progress

REVIEW

P

?

11 - Other Features

Menu 0. -> 0.11.

This is a work in progress

SUMMARY

P

?

12 - vi (ASCII) editor

WISDOM

Good News

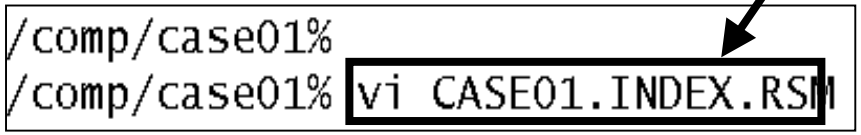
- All UNIX computers come with vi.
- If you can use vi, you can always view (and edit) UNIX files.
- This tutorial contains more than enough vi commands to get your started.

Bad news

- There are many UNIX editors that are easier to use.
- You will eventually want to edit a file on a UNIX computer without your preferred editor.

1. Use the UNIX text editor called vi to view case10.RSM.

1. Type vi CASE01.INDEX.RSM <cr>.



Minimum list of vi commands

DEFINITIONS

<cr>	Type a carriage return (by pressing the Enter key.)
vi	Run the visual editor.
^	Hold the control (or Ctrl) key down while pressing another key.
Esc	Press the escape (or Esc) key.

COMMANDS

OPEN FILE FOR EDITING

vi case01.RSMView (or edit) the file named case01.RSM.

CLOSE EDITED FILE

:q!<cr>	Exit the current file without saving any changes.
:q<cr>	Exit the current file (provided there have been no changes.)
:w	Write (save) the changes and continue editing
:wq	Write (save) the changes and quit editing
:wfilename	Write (save) to another file (called filename.) Continue editing the original file.

MOVE CURSOR

^f	Forward scroll (down the page) one window.
^b	Backward scroll (up the page) one window.
1G	Go to the first line of the file.
G	Go to the last line of the file.
^G	Print the current line number.
0	Go to the beginning of the current line. (This is a zero.)
$	Go to the end of the current line.
Arrow keys	Go one character left or right. Go one line up or down.

Minimum list of vi commands

COMMANDS

SEARCH FOR A STRING OF CHARACTERS

/abc	Search forward (down the page) for abc.
?def	Search backward (up the page) for def.
n	Repeat the last search in the same direction.
N	Repeat the last search, but in the opposite direction.

STOP EDITING

esc	Stop adding (appending, and inserting) text.

EDITING (INSERT TEXT)

a	Append text after the cursor.
A	Append text at the end of the current line.
i	Insert text before the cursor. (Lower-case i.)
I	Insert text at the beginning of the current line. (Upper-case i.)
o	Open a new (blank) line above the line with the cursor.
O	Open a new (blank) line below the line with the cursor.

EDITING (OVERWRITE TEXT)

cc	Change the current line. Press the Esc key to stop changing.
C	Change from the cursor to the end of the line.
rz	Replace the character at the cursor with the letter z
R	Replace several characters (starting with the cursor character) until you press the Esc key. (The R does not appear in the text.)
sw	Substitute the letter w for the character at the cursor.
S	Substitute text until pressing Esc. (Deletes the current line.)

Minimum list of vi commands

COMMANDS

DELETING (CUTTING)

x	Delete the character at the cursor.
X	Delete the character before the cursor.
dd	Delete the current line.
3dd	Delete the current line. Delete the next two lines too.
D	Delete to the end of the current line. Deletes the cursor character.

COPYING

yy	Yank the current line (without deleting.)
4yy	Yank the current line and the next three lines too.

PASTING

p	Paste the most recent deletion (or yank) after the current line.
P	Paste the most recent deletion (or yank) before the current line.

UNDO

u	Undo the most recent edit command. This is a toggle.
U	Undo (restore) all changes to the current line.

REDO

.	Repeat the most recent edit command (once per period.)

JOIN

J	Join two lines. (Append the line after the current line to the current line)

1. vi opened the file named case10.RSM at line 1.

```
1 IN
0----------------------------------------------------------------------
      MNEMONIC  ORIGIN    UNITS      WELL       AQUIFER        NUMBER
                                     OR GROUP   CELL LGR       OF
                                                OR REGION      VALUES
0----------------------------------------------------------------------
   1  TIME      CASE01    DAYS                                    123
   2  YEARS     CASE01    YEARS                                   123
   3  FOPR      CASE01    STB/DAY                                 123
   4  WOPR      CASE01    STB/DAY    I                            123
   5  WOPR      CASE01    STB/DAY    P                            123
   6  FOPT      CASE01    STB                                     123
   7  WOPT      CASE01    STB        I                            123
   8  WOPT      CASE01    STB        P                            123
   9  FWPR      CASE01    STB/DAY                                 123
  10  WWPR      CASE01    STB/DAY    I                            123
  11  WWPR      CASE01    STB/DAY    P                            123
  12  FWPT      CASE01    STB                                     123
  13  WWPT      CASE01    STB        I                            123
  14  WWPT      CASE01    STB        P                            123
  15  FWIR      CASE01    STB/DAY                                 123
  16  WWIR      CASE01    STB/DAY    I                            123
  17  WWIR      CASE01    STB/DAY    P                            123
  18  FWIT      CASE01    STB                                     123
  19  WWIT      CASE01    STB        I                            123
  20  WWIT      CASE01    STB        P                            123
  21  FGPR      CASE01    MSCF/DAY                                123
  22  WGPR      CASE01    MSCF/DAY   I                            123
  23  WGPR      CASE01    MSCF/DAY   P                            123
  24  FGPT      CASE01    MSCF                                    123
  25  WGPT      CASE01    MSCF       I                            123
  26  WGPT      CASE01    MSCF       P                            123
  27  FGIR      CASE01    MSCF/DAY                                123
  28  WGIR      CASE01    MSCF/DAY   I                            123
  29  WGIR      CASE01    MSCF/DAY   P                            123
  30  FGIT      CASE01    MSCF                                    123
  31  WGIT      CASE01    MSCF       I                            123
  32  WGIT      CASE01    MSCF       P                            123
  33  FVPR      CASE01    RB/DAY                                  123
  34  WVPR      CASE01    RB/DAY     I                            123
  35  WVPR      CASE01    RB/DAY     P                            123
  36  FVPT      CASE01    RB                                      123
  37  WVPT      CASE01    RB         I                            123
```

2. Type ^f to forward scroll (down the page) one window.

1. This is the second window of case01.RSM.

36	FVPT	CASE01	RB		123
37	WVPT	CASE01	RB	I	123
38	WVPT	CASE01	RB	P	123
39	FVIR	CASE01	RB/DAY		123
40	WVIR	CASE01	RB/DAY	I	123
41	WVIR	CASE01	RB/DAY	P	123
42	FVIT	CASE01	RB		123
43	WVIT	CASE01	RB	I	123
44	WVIT	CASE01	RB	P	123
45	FWCT	CASE01			123
46	WWCT	CASE01		I	123
47	WWCT	CASE01		P	123
48	FGOR	CASE01	MSCF/STB		123
49	WGOR	CASE01	MSCF/STB	I	123
50	WGOR	CASE01	MSCF/STB	P	123
51	FWGR	CASE01	STB/MSCF		123
52	WWGR	CASE01	STB/MSCF	I	123
53	WWGR	CASE01	STB/MSCF	P	123
54	WBHP	CASE01	PSIA	I	123
55	WBHP	CASE01	PSIA	P	123
56	WTHP	CASE01	PSIA	I	123
57	WTHP	CASE01	PSIA	P	123
58	FOPR	CASE01	STB/DAY		123
59	FOPT	CASE01	STB		123
60	FGOR	CASE01	MSCF/STB		123
61	FPR	CASE01	PSIA		123
62	WXMF_1	CASE01		P	123
63	WXMF_2	CASE01		P	123
64	WXMF_3	CASE01		P	123
65	WXMF_4	CASE01		P	123
66	WXMF_5	CASE01		P	123
67	WXMF_6	CASE01		P	123
68	WXMF_7	CASE01		P	123
69	WXMF_8	CASE01		P	123
70	WXMF_9	CASE01		P	123
71	WYMF_1	CASE01		P	123
72	WYMF_2	CASE01		P	123
73	WYMF_3	CASE01		P	123
74	WYMF_4	CASE01		P	123
75	WYMF_5	CASE01		P	123
76	WYMF_6	CASE01		P	123
77	WYMF_7	CASE01		P	123
78	WYMF_8	CASE01		P	123

2. Type ^f to forward scroll (down the page) one window.

1. This is the last window of case01.RSM.

```
  77  WYMF_7     CASE01                P                                  123
  78  WYMF_8     CASE01                P                                  123
  79  WYMF_9     CASE01                P                                  123
  80  BVOIL      CASE01     CP                        7    7    4         123
  81  BSOIL      CASE01                               7    7    4         123
  82  BSWAT      CASE01                               7    7    4         123
  83  BSGAS      CASE01                               7    7    4         123
  84  BPRES      CASE01     PSIA                      1    1    1         123
  85  BXMF_6     CASE01                               1    1    1         123
  86  BYMF_6     CASE01                               1    1    1         123
  87  NEWTON     CASE01     DAYS                                           123
  88  IRPTSTEP   CASE01                                                    123
1 INDEX OF FIELD DATA IN WORKSPACE
0-------------------------------------------------------------------------
    FIELD    LOCAL            DIMENSIONS          ACTIVE LGC    GRID
             GRID         X        Y        Z     CELLS  GROUPS TYPE
0-------------------------------------------------------------------------
  1 CASE01               9        9        4       324 None   Non Radial
1 INDEX OF SOLUTION DATA IN WORKSPACE
0-------------------------------------------------------------------------
     FIELD      GLOBAL LGRS MNEMONIC       TIMESTEPS   DATES
                CELLS
0-------------------------------------------------------------------------
   1 CASE01       324       PRESSURE        0 -     3  01/01/90-28/12/04
   2 CASE01       324       SOIL            0 -     3  01/01/90-28/12/04
   3 CASE01       324       VOIL            0 -     3  01/01/90-28/12/04
1 INDEX OF WELL DATA IN WORKSPACE
0-------------------------------------------------------------------------
     FIELD     LGR        TYPE  WELL NAME   WELL HEAD     TIMESTEPS
0-------------------------------------------------------------------------
   1 CASE01               G     I             1,   1       1 -      3
   2 CASE01               P     P             7,   7       1 -      3
~
```

2. Type :q to exit vi. (Close case01.RSM.)

REVIEW

You can quickly look up available mnemonics while creating plots.

You learned how to view (and edit) UNIX files using vi.

Vi comes with all UNIX computers. You can edit files on any UNIX computer in the world using vi.

Other UNIX editors are easier to use. However, you may not be able to edit files if you go to another UNIX computer (unless you take the software with you.)

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This is a work in progress

REVIEW

You can

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This tutorial improves the author's personal productivity by serving as a memory aid that demonstrates how to use GeoQuest's Graf software to

Summary and Conclusions (2 of 2)

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Graf