SOFTWARE RELEASE NOTICE

1. SRN Number: PA-SRN-264

2. Project Title: TSPAI Code Development – TPA	Project No. 20.01402.762
3. SRN Title: Graphical Post-Processor Version 1.01 for the TPA Code (Version 4.0)	
4. Originator/Requestor: Osvaldo Pensado	Date: March 8, 2002

5. Summary of Actions

× Release of new software

☐ Release of modified software:

☐ Enhancements made

☐ Corrections made

☐ Change of access software

☐ Software Retirement

6. Validation Status

☐ Validated

☐ Limited Validation

× Not Validated — Explain: New software, need to reach maturity before validation

7. Persons Authorized Access

Name	Read Only/Read-Write	Addition/Change/Delete
CNWRA technical staff	Read only	
CNWRA TSPAI staff	Read-write	Addition/Change/Delete
NRC staff	Read only	
NRC PA staff	Read-write	Addition/Change/Delete

8. Element Manager Approval: FOR GORDON WITTMEYER Date: 3/8/02

9. Remarks: Version 1.01 fixes a number of bugs noted in Version 1.0. The bugs are described in SCR 401.

CNWRA Form TOP-6 (09/01)

SOFTWARE SUMMARY FORM

01. Summary Date: March 8, 2002	02. Summary prepared by (Name and phone) Osvaldo Pensado, (210) 522 6084	03. Summary Action: REPLACEMENT
04. Software Date: February 28, 2002	05. Short Title: GPP	
06. Software Title: Graphical Post-Processor Version 1.01 for the TPA Code (Version 4.0)		07. Internal Software ID: 02-02-28

08. Software Type:	09. Processing Mode:	10. Application Area
☐ Automated Data System	× Interactive	a. General: ☐ Scientific/Engineering ☐ Auxiliary Analyses × Total System PA ☐ Subsystem PA ☐ Other
× Computer Program	☐ Batch	
☐ Subroutine/Module	☐ Combination	b. Specific: Tool for the graphic display of specific TPA Code output data, and to perform influence analyses

11. Submitting Organization and Address:	12. Technical Contact(s) and Phone:
CNWRA/SwRI 6220 Culebra Road San Antonio, TX 78228	Joanne Damours Bayesian Systems, Inc. Gaitherburg, MD (301) 987-5400

13. Software Application:

The Graphical Post-Processor supports visualization of specific data generated with the Total-system Performance Assessment (TPA) Version 4.0 code. By plotting relevant TPA output variables, the graphical post-processor is intended as a tool for the quick display of the influence of TPA input parameters on relevant variables, and the interrelation among these variables. The graphical post-processor is also intended as a tool for the visualization of uncertainty propagation.

The technical description of the application is presented in the User's Manual. The User's Manual includes installation procedures of the graphical post-processor and basic instructions for the graphic display of TPA data, as well as highlights of available features.

14. Computer Platform Pentium II x86 Family 6 Model 5 Stepping 2 AT/AT Compatible 130,468 KB RAM Make: NetForce Net name: Dakath	15. Computer Operating System: Windows NT Version 4.0	16. Programming Language(s): Java™ 2	17. Number of Source Program Statements: 20,000 lines of code
18. Computer Memory Requirements: At least 96 MB	19. Tape Drives: NA	20. Disk Units: NA	21. Graphics: OpenGL 1.1.2 Java™ 3D 1.1.X

22. Other Operational Requirements
Java™ Runtime Environment 1.3 or Java™ Development Kit 1.3
Colt.jar library, included in the installation CD
Visad.jar library, included in the installation CD
Access to TPA Code output files. A particular set of files must be available for plots to be displayed. The complete set of needed files is explained in the User's manual
Complete installation instructions are available in the User's manual.

23. Software Availability: ☐ Available ☒ Limited ☐ In-House ONLY	24. Documentation Availability: ☐ Available ☒ Preliminary ☐ In-House ONLY

25. On behalf of Bayesian Systems, Inc.

Software Developer: [signature] Date: 3/8/2007

CNWRA Form TOP-4-1 (05/98)

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QA VERIFICATION REPORT
FOR
→ *DEVELOPED OR ACQUIRED TO BE MODIFIED SOFTWARE* ←

Software Title/Name: Graphical Post-Processor for TPA Version 4.0
Version: GPP Version 1.01
Demonstration workstation: "Wakath" Room A126-Bldg. 189
Operating System: Windows NT 4.0
Developer: Bayesian Systems Inc.

Software Requirements Description (SRD) [TOP-018, Section 5.3]

SRD Version: SRD Dated July 14, 2000
SRD Approval Date: July 14, 2000

SRD and any changes thereto reviewed in accordance with QAP-002 requirements?

Yes: ☐ No: ☐ N/A: ☑

Is a Software Change Report(s) (SCR) used for minor modifications (i.e., acquired code), problems or changes to a configured version of software?

Yes: ☑ No: ☐ N/A: ☐

Comments: SCR Number 401

Software Development Plan (SDP) [TOP-018, Section 5.4]

SDP Version: GPP for TPA 8/17/2000
SDP (EM) Approval Date: August 17, 2000

The SDP addresses applicable sections of TOP-018, Appendix B, SDP Template?

Yes: ☐ No: ☐ N/A: ☑

Is the waiver (if used) in accordance with specified guidelines?

Yes: ☐ No: ☐ N/A: ☑

Comments: Refer to SCR Number 401

Design and Development [TOP-018, Section 5.5.1 - 5.5.4]

Is code development in accordance with the conventions (i.e., coding conventions)described in the SDP/SCR?

Yes: ☑ No: ☐ N/A: ☐ DPR 4/19/2002

Module(s) Reviewed:

Comments: Changes were made using the same conventions as the code.

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Is code internally documented to allow a user to understand the function(s) being performed and to follow the flow of execution of individual routines?

Yes: ☑ No: ☐ N/A: ☐

Module(s) Reviewed:

Comments: Changes did not affect internal documentation.

Is development of the code and informal module/subroutine-level testing documented in scientific notebook and/or SCR?

Yes: ☑ No: ☐ N/A: ☐

SCR's and/or Scientific Notebook(s) Reviewed:

Comments: Both the development and the appropriate testing is contained or referenced in Scientific Notebook 376-2E and/or the SCR.

Software designed so that individual runs are uniquely identified by date, time, name of software and version?

Yes: ☐ No: ☐ N/A: ☑

Date and Time Displayed: _____

Name/Version Displayed: _____

Comments: Verified by Version 1.0

Medium and Header Documentation [TOP-018, Section 5.5.6]

A program title block of main program contains: Program Title, Customer Name, Customer Office/Division, Customer Contact(s), Customer Phone Number, Associated Documentation, Software Developer and Phone Number, Date, and Disclaimer Notice?

Yes: ☐ No: ☐ N/A: ☑

Comments: Verified by Version 1.0.

Source code module headers contain: Program Name, Client Name, Contract reference, Revision Number, Revision History, and Reference to SRD/SCR requirement(s)?

Yes: ☑ No: ☐ N/A: ☐

Module(s) Reviewed: Each file of the source code developed or contains the necessary information. For the files which were changed version 1.0 is now referenced.

Comments:

The physical labeling of software medium (tapes, disks, etc.) contains: Program Name, Module/Name/Title, Module Revision, File type (ASCII, OBJ, EXE), Recording Date, and Operating System(s)?

Yes: ☑ No: ☐ N/A: ☐

Comments: See the CD contained in the QA Records File.

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Code Reviews [TOP-018, Section 5.5.6]

Are code reviews (if implemented) documented in a scientific notebook or in another format that allows others to understand the code review process and results?

Yes: ☐ No: ☐ N/A: ☑

Documented in Scientific Notebook No.: N/A

Comments: None implemented.

Acceptance and Installation Testing [TOP-018, Section 5.6]

Does *acceptance testing* demonstrate whether or not requirements in the SRD and/or SCR(s) have been fulfilled?

Information is contained in Scientific Notebook 376-2E.

Yes: ☑ No: ☐ N/A: ☐

Has *acceptance testing* been conducted for each intended computer platform and operating system?

Yes: ☑ No: ☐ N/A: ☐

Computer Platforms: PC Operating Systems: Windows NT 4.0

Location of Acceptance Test Results: SN 376-2E

Comments:

Has *installation testing* been conducted for each intended computer platform and operating system?

Yes: ☐ No: ☐ N/A: ☑

Computer Platforms: _____ Operating Systems: _____

Location of Acceptance Test Results: _____

Comments: Change had no effect on installation testing previously performed.

User Documentation [TOP-018, Section 5.5.7]

Is there a Users' Manual for the software and is it up-to-date?

Yes: ☐ No: ☐ N/A: ☑

User's Manual Version and Date: _____

Comments: Changes had no impact on Users Manual.

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Are there basic instructions for the *installation* and *use* of the software?

Yes: ☐ No: ☐ N/A: ☑

Location of Instructions: _____

Comments: Change has no impact on the installation and use of the software.

Configuration Control [TOP-018, Section 5.7, 5.9.3]

Is the Software Summary Form (Form TOP-4-1) completed and signed?

Yes: ☑ No: ☐ N/A: ☐

Date of Approval: 03/08/2002

Is the list of files attached to the Software Summary Form complete and accurate?

Yes: ☑ No: ☐ N/A: ☐

Comments: List provided and reviewed on April 4, 2002

Is the source code available or, is the executable code available in the case of (acquired/commercial codes)?

Yes: ☑ No: ☐ N/A: ☐

Location of Source Code: Contained on the CD submitted to QA records in the software file.

Comments:

Have all the script/make files and executable files been submitted to the Software Custodian?

Yes: ☑ No: ☐ N/A: ☐

Location of script/make files: QA Records Room

Comments: N/A

Software Release [TOP-018, Section 5.9]

Upon acceptance of the software as verified above, has a Software Release Notice (SRN), Form TOP-6 been issued and does the version number of the software match the documentation?

Yes: ☑ No: ☐ N/A: ☐

SRN Number: PA-SRN-264

Comments: Dated 3/8/02

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Software Validation [TOP-018, Section 5.10]

Has a Software Validation Test Plan (SVTP) been prepared for the range of application of the software?

Yes: ☐ No: ☑ N/A: ☐

Version and Date of SVTP: Not as of April 2002

Date Reviewed and Approved via QAP-002: N/A

Comments: This software was presented to the NRC in February 2002. Validation will be as directed by the NRC.

Has a Software Validation Test Report (SVTR) been prepared that documents the results of the validation cases, interpretation of the results, and determination if the software has been validated?

Yes: ☐ No: ☑ N/A: ☐

Version and Date of SVTR: N/A

Date Reviewed and Approved via QAP-002: N/A

Comments: See above comments.

Additional Comments:

On behalf of Bayesian Systems, Inc.

Software Developer/Date

Software Custodian/Date 4/4/2002

Graphical Post-Processor Version 1.0.1
April 4, 2002
List of files in the CD

R:\compileJava.bat
R:\gpp
R:\java
R:\launch.bat
R:\libraries
R:\NuclNames.txt
R:\readme.txt
R:\Repository Performance Visualization.pdf
R:\Repository Performance Visualization.wpd
R:\TPAData
R:\gpp\02-02-28
R:\gpp\api-doc
R:\gpp\02-02-28\com
R:\gpp\02-02-28\gpp.properties
R:\gpp\02-02-28\logCriteria.properties
R:\gpp\02-02-28\log.properties
R:\gpp\02-02-28\net
R:\gpp\02-02-28\outputfiles.properties
R:\gpp\02-02-28\ptolemy
R:\gpp\02-02-28\variables.properties
R:\gpp\02-02-28\variable_abbrevs.properties
R:\gpp\02-02-28\com\bayes
R:\gpp\02-02-28\com\microstar
R:\gpp\02-02-28\com\bayes\gpp
R:\gpp\02-02-28\com\bayes\gpp\a
R:\gpp\02-02-28\com\bayes\gpp\a1
R:\gpp\02-02-28\com\bayes\gpp\a1p
R:\gpp\02-02-28\com\bayes\gpp\a1v
R:\gpp\02-02-28\com\bayes\gpp\a3
R:\gpp\02-02-28\com\bayes\gpp\a4
R:\gpp\02-02-28\com\bayes\gpp\a5
R:\gpp\02-02-28\com\bayes\gpp\a6
R:\gpp\02-02-28\com\bayes\gpp\aa
R:\gpp\02-02-28\com\bayes\gpp\Changes.txt
R:\gpp\02-02-28\com\bayes\gpp\Constants.class
R:\gpp\02-02-28\com\bayes\gpp\Constants.java
R:\gpp\02-02-28\com\bayes\gpp\DataSet.class
R:\gpp\02-02-28\com\bayes\gpp\DataSet.java
R:\gpp\02-02-28\com\bayes\gpp\FArray.class
R:\gpp\02-02-28\com\bayes\gpp\FArray.java
R:\gpp\02-02-28\com\bayes\gpp\FieldPanel$ListSelectionHandler.class
R:\gpp\02-02-28\com\bayes\gpp\FieldPanel.java
R:\gpp\02-02-28\com\bayes\gpp\FieldPanel.class
R:\gpp\02-02-28\com\bayes\gpp\Field.class
R:\gpp\02-02-28\com\bayes\gpp\Field.java
R:\gpp\02-02-28\com\bayes\gpp\Fmt.class
R:\gpp\02-02-28\com\bayes\gpp\Fmt.java
R:\gpp\02-02-28\com\bayes\gpp\GPPApplet$5.class
R:\gpp\02-02-28\com\bayes\gpp\GPPApplet$6.class
R:\gpp\02-02-28\com\bayes\gpp\GPPApplet$7.class
R:\gpp\02-02-28\com\bayes\gpp\GPPApplet$8.class
R:\gpp\02-02-28\com\bayes\gpp\GPPApplet.class
R:\gpp\02-02-28\com\bayes\gpp\GPPApplet$FileNameGenerator.class
R:\gpp\02-02-28\com\bayes\gpp\GPPApplet$RadioListenerWindow.class
R:\gpp\02-02-28\com\bayes\gpp\GPPApplet$RadioListenerTPA.class
R:\gpp\02-02-28\com\bayes\gpp\GPPApplet$SnapThread.class
R:\gpp\02-02-28\com\bayes\gpp\GPPApplet$1.class

R:\gpp\02-02-28\com\bayes\gpp\GPPApplet.html
R:\gpp\02-02-28\com\bayes\gpp\GPPApplet.java
R:\gpp\02-02-28\com\bayes\gpp\GPPApplet$2.class
R:\gpp\02-02-28\com\bayes\gpp\GPPApplet$3.class
R:\gpp\02-02-28\com\bayes\gpp\GPPApplet$4.class
R:\gpp\02-02-28\com\bayes\gpp\Legend$1.class
R:\gpp\02-02-28\com\bayes\gpp\Legend.java
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R:\gpp\02-02-28\com\bayes\gpp\MultiFamilyTimeBasedPlot.class
R:\gpp\02-02-28\com\bayes\gpp\MultiFamilyTimeBasedPlot.java
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R:\gpp\02-02-28\com\bayes\gpp\ParameterReference.class
R:\gpp\02-02-28\com\bayes\gpp\ParameterReference.java
R:\gpp\02-02-
28\com\bayes\gpp\PlotControlFrame$VarListSelectionHandler.class
R:\gpp\02-02-28\com\bayes\gpp\PlotControlFrame$RadioListenerField.class
R:\gpp\02-02-28\com\bayes\gpp\PlotControlFrame.class
R:\gpp\02-02-
28\com\bayes\gpp\PlotControlFrame$PcListSelectionHandler.class
R:\gpp\02-02-28\com\bayes\gpp\Place.class
R:\gpp\02-02-28\com\bayes\gpp\Place.java
R:\gpp\02-02-
28\com\bayes\gpp\PlotControlFrame$ParamListSelectionHandler.class
R:\gpp\02-02-28\com\bayes\gpp\PlotControlFrame$6.class
R:\gpp\02-02-28\com\bayes\gpp\PlotControlFrame$5.class
R:\gpp\02-02-28\com\bayes\gpp\PlotControlFrame$1.class
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R:\gpp\02-02-28\com\bayes\gpp\PlotControlFrame$4.class
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R:\gpp\02-02-28\com\bayes\gpp\PlottableData.class
R:\gpp\02-02-28\com\bayes\gpp\PlottableData.java
R:\gpp\02-02-28\com\bayes\gpp\PlottableRawData.class
R:\gpp\02-02-28\com\bayes\gpp\PlottableRawData.java
R:\gpp\02-02-28\com\bayes\gpp\PlottableRegularizedData.class
R:\gpp\02-02-28\com\bayes\gpp\PlottableRegularizedData.java
R:\gpp\02-02-28\com\bayes\gpp\PlotterBase$FileNameGenerator.class
R:\gpp\02-02-28\com\bayes\gpp\PlotterBase.java
R:\gpp\02-02-28\com\bayes\gpp\PlotterBase.class
R:\gpp\02-02-28\com\bayes\gpp\PromptDialog.class
R:\gpp\02-02-28\com\bayes\gpp\PromptDialog$5.class
R:\gpp\02-02-28\com\bayes\gpp\PromptDialog2$5.class
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R:\gpp\02-02-28\com\bayes\gpp\PromptDialog$4.class
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R:\gpp\02-02-28\com\bayes\gpp\PtolemaicInput.java
R:\gpp\02-02-28\com\bayes\gpp\RegularizedTPAData.class

R:\gpp\02-02-28\com\bayes\gpp\RegularizedTPAData.java
R:\gpp\02-02-28\com\bayes\gpp\temp.txt
R:\gpp\02-02-28\com\bayes\gpp\TPAData.class
R:\gpp\02-02-28\com\bayes\gpp\TPAData.java
R:\gpp\02-02-
28\com\bayes\gpp\TPADCAGWInputValuesOutputLoadStrategy.class
R:\gpp\02-02-28\com\bayes\gpp\TPADCAGWInputValuesOutputLoadStrategy.java
R:\gpp\02-02-28\com\bayes\gpp\TPADCFOutputLoadStrategy.class
R:\gpp\02-02-28\com\bayes\gpp\TPADCFOutputLoadStrategy.java
R:\gpp\02-02-28\com\bayes\gpp\TPANoRealizationsOutputLoadStrategy.class
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R:\gpp\02-02-28\com\bayes\gpp\TPANuclideOnlyOutputLoadStrategy.class
R:\gpp\02-02-28\com\bayes\gpp\TPANuclideOnlyOutputLoadStrategy.java
R:\gpp\02-02-28\com\bayes\gpp\TPAOutput.class
R:\gpp\02-02-28\com\bayes\gpp\TPAOutput.java
R:\gpp\02-02-28\com\bayes\gpp\TPAOutputLoadStrategy.class
R:\gpp\02-02-28\com\bayes\gpp\TPAOutputLoadStrategy.java
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28\com\bayes\gpp\TPAPeakDosePeakTimeOutputLoadStrategy.class
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R:\gpp\02-02-28\com\bayes\gpp\TPARun.class
R:\gpp\02-02-28\com\bayes\gpp\TPARun.java
R:\gpp\02-02-
28\com\bayes\gpp\TPASinglePointByNuclideOutputLoadStrategy.class
R:\gpp\02-02-
28\com\bayes\gpp\TPASinglePointByNuclideOutputLoadStrategy.java
R:\gpp\02-02-28\com\bayes\gpp\TPASparseTimeOutputLoadStrategy.class
R:\gpp\02-02-28\com\bayes\gpp\TPASparseTimeOutputLoadStrategy.java
R:\gpp\02-02-28\com\bayes\gpp\TPASubareaByTimeOutputLoadStrategy.class
R:\gpp\02-02-28\com\bayes\gpp\TPASubareaByTimeOutputLoadStrategy.java
R:\gpp\02-02-
28\com\bayes\gpp\TPASubareaNuclideByTimeOutputLoadStrategy.class
R:\gpp\02-02-
28\com\bayes\gpp\TPASubareaNuclideByTimeOutputLoadStrategy.java
R:\gpp\02-02-28\com\bayes\gpp\Utils.class
R:\gpp\02-02-28\com\bayes\gpp\Utils.java
R:\gpp\02-02-28\com\bayes\gpp\Variable.class
R:\gpp\02-02-28\com\bayes\gpp\Variable.java
R:\gpp\02-02-28\com\bayes\gpp\ViewControlFrame$1.class
R:\gpp\02-02-28\com\bayes\gpp\ViewControlFrame.java
R:\gpp\02-02-28\com\bayes\gpp\ViewControlFrame$2.class
R:\gpp\02-02-28\com\bayes\gpp\ViewControlFrame$3.class
R:\gpp\02-02-28\com\bayes\gpp\ViewControlFrame.class
R:\gpp\02-02-28\com\bayes\gpp\View.class
R:\gpp\02-02-28\com\bayes\gpp\View.java
R:\gpp\02-02-28\com\microstar\xml
R:\gpp\02-02-28\com\microstar\xml\demo
R:\gpp\02-02-28\com\microstar\xml\HandlerBase.class
R:\gpp\02-02-28\com\microstar\xml\SAXDriver.class
R:\gpp\02-02-28\com\microstar\xml\XmlException.class
R:\gpp\02-02-28\com\microstar\xml\XmlHandler.class
R:\gpp\02-02-28\com\microstar\xml\XmlParser.class
R:\gpp\02-02-28\com\microstar\xml\demo\DtdDemo.class
R:\gpp\02-02-28\com\microstar\xml\demo\EventDemo.class
R:\gpp\02-02-28\com\microstar\xml\demo\ReaderDemo.class
R:\gpp\02-02-28\com\microstar\xml\demo\StreamDemo.class
R:\gpp\02-02-28\com\microstar\xml\demo\TimerDemo.class
R:\gpp\02-02-28\com\microstar\xml\demo\XmlApp.class
R:\gpp\02-02-28\com\microstar\xml\demo\XmlApplet.class

R:\gpp\02-02-28\net\mirabile
R:\gpp\02-02-28\net\mirabile\logger
R:\gpp\02-02-28\net\mirabile\Util.class
R:\gpp\02-02-28\net\mirabile\Util.java
R:\gpp\02-02-28\net\mirabile\logger\Appender.class
R:\gpp\02-02-28\net\mirabile\logger\Appender.java
R:\gpp\02-02-28\net\mirabile\logger\Category$CategoryNode.class
R:\gpp\02-02-28\net\mirabile\logger\Category.java
R:\gpp\02-02-28\net\mirabile\logger\Category$ProvisionNode.class
R:\gpp\02-02-28\net\mirabile\logger\Category.class
R:\gpp\02-02-28\net\mirabile\logger\FileAppender.class
R:\gpp\02-02-28\net\mirabile\logger\FileAppender.java
R:\gpp\02-02-28\net\mirabile\logger\ILog.class
R:\gpp\02-02-28\net\mirabile\logger\ILog.java
R:\gpp\02-02-28\net\mirabile\logger\Layout.class
R:\gpp\02-02-28\net\mirabile\logger\Layout.java
R:\gpp\02-02-28\net\mirabile\logger\Log.class
R:\gpp\02-02-28\net\mirabile\logger\Log.java
R:\gpp\02-02-28\net\mirabile\logger\MyLayout.class
R:\gpp\02-02-28\net\mirabile\logger\MyLayout.java
R:\gpp\02-02-28\net\mirabile\logger\NDC$DiagnosticContext.class
R:\gpp\02-02-28\net\mirabile\logger\NDC.class
R:\gpp\02-02-28\net\mirabile\logger\NDC.java
R:\gpp\02-02-28\net\mirabile\logger\NOPLog.class
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R:\gpp\02-02-28\ptolemy\gui
R:\gpp\02-02-28\ptolemy\plot
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R:\gpp\02-02-28\ptolemy\gui\demo
R:\gpp\02-02-28\ptolemy\gui\gui.jar
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R:\gpp\02-02-28\ptolemy\gui\Message$1.class
R:\gpp\02-02-28\ptolemy\gui\Message.java
R:\gpp\02-02-28\ptolemy\gui\Message$2.class
R:\gpp\02-02-28\ptolemy\gui\Message.class
R:\gpp\02-02-28\ptolemy\gui\Query$QueryActionListener.class
R:\gpp\02-02-28\ptolemy\gui\Query$QueryFocusListener.class
R:\gpp\02-02-28\ptolemy\gui\Query$QueryItemListener.class
R:\gpp\02-02-28\ptolemy\gui\Query$SliderListener.class
R:\gpp\02-02-28\ptolemy\gui\QueryListener.class
R:\gpp\02-02-28\ptolemy\gui\QueryListener.java
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R:\gpp\02-02-28\ptolemy\gui\StatusBar.java

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R:\gpp\02-02-28\ptolemy\plot\CmdLineArgException.class
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R:\gpp\02-02-28\ptolemy\plot\EditablePlot$EditMouseListener.class
R:\gpp\02-02-28\ptolemy\plot\EditablePlot.java
R:\gpp\02-02-28\ptolemy\plot\EditablePlot$ModifyListener.class
R:\gpp\02-02-28\ptolemy\plot\EditablePlot$UndoListener.class
R:\gpp\02-02-28\ptolemy\plot\EditablePlot.class
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R:\gpp\02-02-28\ptolemy\plot\PlotFrame.class
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R:\gpp\02-02-28\ptolemy\plot\PlotBox.class
R:\gpp\02-02-28\ptolemy\plot\Plot.jbx
R:\gpp\02-02-28\ptolemy\plot\Plot$$3.class
R:\gpp\02-02-28\ptolemy\plot\Plot$1.class
R:\gpp\02-02-28\ptolemy\plot\Plot$2.class
R:\gpp\02-02-28\ptolemy\plot\Plot$Format.class
R:\gpp\02-02-28\ptolemy\plot\PlotApplet.class
R:\gpp\02-02-28\ptolemy\plot\PlotApplet.java
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R:\gpp\02-02-28\ptolemy\plot\PlotApplication.java
R:\gpp\02-02-28\ptolemy\plot\PlotApplication.class
R:\gpp\02-02-28\ptolemy\plot\PlotBox$CommandListener.class
R:\gpp\02-02-28\ptolemy\plot\PlotBox.java
R:\gpp\02-02-28\ptolemy\plot\PlotBox$DragListener.class
R:\gpp\02-02-28\ptolemy\plot\PlotBox$FillButtonListener.class
R:\gpp\02-02-28\ptolemy\plot\PlotBox$ZoomListener.class
R:\gpp\02-02-28\ptolemy\plot\PlotFrame$1.class
R:\gpp\02-02-28\ptolemy\plot\PlotFrame.java
R:\gpp\02-02-28\ptolemy\plot\PlotFrame$2.class
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R:\gpp\02-02-28\ptolemy\plot\PlotFrame$FormatListener.class
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R:\gpp\02-02-28\ptolemy\plot\PlotPoint.class
R:\gpp\02-02-28\ptolemy\plot\PlotPoint.java
R:\gpp\02-02-28\ptolemy\plot\Plot.class
R:\gpp\02-02-28\ptolemy\plot\Plot.java
R:\gpp\02-02-28\ptolemy\plot\whisker
R:\gpp\02-02-28\ptolemy\plot\whisker.dtd
R:\gpp\02-02-28\ptolemy\plot\plotml\EditablePlotMLApplication.class
R:\gpp\02-02-28\ptolemy\plot\plotml\EditablePlotMLApplet$$1.class
R:\gpp\02-02-28\ptolemy\plot\plotml\EditablePlotMLApplet.java
R:\gpp\02-02-
28\ptolemy\plot\plotml\EditablePlotMLApplet$ChoiceListener.class
R:\gpp\02-02-28\ptolemy\plot\plotml\EditablePlotMLApplication.java
R:\gpp\02-02-28\ptolemy\plot\plotml\EditablePlotMLApplet.class
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28\ptolemy\plot\plotml\EditablePlotMLApplication$SelectListener.class
R:\gpp\02-02-28\ptolemy\plot\plotml\PlotBoxMLParser.class
R:\gpp\02-02-28\ptolemy\plot\plotml\PlotBoxMLParser.java
R:\gpp\02-02-28\ptolemy\plot\plotml\PlotMLApplet.class
R:\gpp\02-02-28\ptolemy\plot\plotml\PlotMLApplet.java
R:\gpp\02-02-28\ptolemy\plot\plotml\PlotMLApplication.class

R:\gpp\02-02-28\ptolemy\plot\plotml\PlotMLApplication.java
R:\gpp\02-02-28\ptolemy\plot\plotml\PlotMLFrame.class
R:\gpp\02-02-28\ptolemy\plot\plotml\PlotMLFrame.java
R:\gpp\02-02-28\ptolemy\plot\plotml\PlotMLParser.class
R:\gpp\02-02-28\ptolemy\plot\plotml\PlotMLParser.java
R:\gpp\02-02-28\ptolemy\plot\whisker\whisker.bat
R:\gpp\02-02-28\ptolemy\plot\whisker\whisker.dtd
R:\gpp\02-02-28\ptolemy\plot\whisker\whisker.htm
R:\gpp\02-02-28\ptolemy\plot\whisker\whisker.xml
R:\gpp\02-02-28\ptolemy\plot\whisker\whisker-DOUG.htm
R:\gpp\02-02-28\ptolemy\plot\whisker\whisker-A.xml
R:\gpp\02-02-28\ptolemy\plot\whisker\whisker-B.xml
R:\gpp\02-02-28\ptolemy\plot\whisker\whisker-C.xml
R:\gpp\02-02-28\ptolemy\plot\whisker\whisker-SAVE.xml
R:\gpp\api-doc\allclasses-frame.html
R:\gpp\api-doc\com
R:\gpp\api-doc\deprecated-list.html
R:\gpp\api-doc\generate_javadoc.bat
R:\gpp\api-doc\help-doc.html
R:\gpp\api-doc\index-all.html
R:\gpp\api-doc\index.html
R:\gpp\api-doc\overview-tree.html
R:\gpp\api-doc\package-list
R:\gpp\api-doc\packages.html
R:\gpp\api-doc\serialized-form.html
R:\gpp\api-doc\setclassp.bat
R:\gpp\api-doc\stylesheet.css
R:\gpp\api-doc\com\bayes
R:\gpp\api-doc\com\bayes\gpp
R:\gpp\api-doc\com\bayes\gpp\Constants.html
R:\gpp\api-doc\com\bayes\gpp\DataSet.html
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R:\gpp\api-doc\com\bayes\gpp\FieldPanel.html
R:\gpp\api-doc\com\bayes\gpp\FieldPanel.ListSelectionHandler.html
R:\gpp\api-doc\com\bayes\gpp\Field.html
R:\gpp\api-doc\com\bayes\gpp\Fmt.html
R:\gpp\api-doc\com\bayes\gpp\GPPApplet.SnapThread.html
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R:\gpp\api-doc\com\bayes\gpp\GPPApplet.RadioListenerWindow.html
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R:\gpp\api-doc\com\bayes\gpp\Lines.html
R:\gpp\api-doc\com\bayes\gpp\MultiFamilyTimeBasedPlot.html
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R:\gpp\api-doc\com\bayes\gpp\Parameter.html
R:\gpp\api-doc\com\bayes\gpp\ParameterReference.html
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R:\java\jre\j2sdk13-features.htm
R:\java\jre\java_sun_com Downloading FAQ.htm
R:\java\jre\jre-130-readme.txt
R:\java\jre\jre-130-changes.txt
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R:\libraries\java3d
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R:\libraries\colt\colt-home.htm
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R:\libraries\colt\license.htm
R:\libraries\colt\src.zip
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R:\libraries\colt\download\colt1.0.1.zip
R:\libraries\java3d\java3d1_1_2-win32-opengl-sdk.exe
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R:\libraries\opengl\origin.txt
R:\libraries\visad\download
R:\libraries\visad\top-doc
R:\libraries\visad\visad.jar
R:\libraries\visad\download\v-doc.jar
R:\libraries\visad\download\v-eg.jar
R:\libraries\visad\download\v-mail.zip
R:\libraries\visad\download\v-src.jar
R:\libraries\visad\download\v-tutor.jar
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R:\TPAData\cumrel.res
R:\TPAData\dcagw.ech
R:\TPAData\dcf.cum
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R:\TPAData\ebsflo.dat
R:\TPAData\ebsrel.rlt
R:\TPAData\gwpkdos.res
R:\TPAData\infilper.res
R:\TPAData\nfenv.rlt
R:\TPAData\samplpar.hdr
R:\TPAData\samplpar.res
R:\TPAData\szft.rlt
R:\TPAData\totdose.res
R:\TPAData\tpa.inp
R:\TPAData\uzflow.rlt
R:\TPAData\uzft.rlt

com.bayes.gpp

Class MultiFamilyTimeBasedPlot

```
java.lang.Object
  |
  +--com.bayes.gpp.PlotterBase
        |
        +--com.bayes.gpp.MultiFamilyTimeBasedPlot
```

public class **MultiFamilyTimeBasedPlot**
extends PlotterBase

Program Name:	Graphical Post-Processor for the TPA Code Version 4.0
File Date:	2001-09-03
Release Version:	1.0.1
Client Name:	U.S. NRC U.S. Nuclear Regulatory Commission NRC Office of Nuclear Material Safety and Safeguards Division of Waste Management
Contract Number:	NRC 02-97-009
NRC Contact:	James Firth (301) 415-6628
CNWRA Contact:	Osvaldo Pensado (210) 522-6084 Center for Nuclear Waste Regulatory Analyses San Antonio, Texas 78238-5166 opensado@swri.edu
Author:	John Emmerling Bayesian Systems, Inc., Gaithersburg, MD
Contact:	Joanne Damours (301) 987-5400 joanne@bayes.com
Documentation:	A Graphical Post-Processor for TPA Code Version 4.0, User's Guide. Version 1.0 Center for Nuclear Waste Regulatory Analyses
NUREG-Series Designator:	N/A

DISCLAIMER

The MultiFamilyTimeBasedPlot class is the encapsulation of the procedural approach required to construct a VisAD plot given a collection of DataSets. By multi-family is meant the approach that Doug devised to defining multiple "families" of curves to which different colors might be assigned.

This is where the font for the axis labels is set as well as the conversion of log tickmark labels to antilog values is done, not because it makes sense from a design perspective but because it has to be.

Version 1.0.1 is an update to address bugs reported in the SCR 401. See the file Changes.txt for particular details in the implemented changes.

Since:

1.0

Inner classes inherited from class com.bayes.gpp.PlotterBase
PlotterBase.FileNameGenerator

Field Summary

(package private) static net.mirabile.logger.Category	**CFG** For use with Doug's logging package.
(package private) static java.lang.String	**CLS** For use with Doug's logging package.
private visad.ScalarMap[]	**crv_rng_dsp_map** The Scalar Maps for the ranges of each of the "families".
private visad.ScalarMap	**curve_dom_dsp_map** The Scalar Map for the domain i.e.
private visad.FieldImpl[]	**curves_fields** Set of FieldImpls used to represent fields.

(package private) static net.mirabile.logger.Category	**EXC** For use with Doug's logging package.
(package private) static net.mirabile.logger.Category	**HST** For use with Doug's logging package.
private DataSet[]	**myDataSets** The DataSets to be displayed by the plot.
private int	**n_families** Number of "families" making up this plot.
private int	**n_variables** Number of variables represented by this plot.
(package private) static net.mirabile.logger.Category	**PER** For use with Doug's logging package.
private int	**realTypeCounter** counter used to generate unique name for realType.
private visad.DataReference[]	**refs** Set of DataReferences needed by the plot.
(package private) static net.mirabile.logger.Category	**TRC** For use with Doug's logging package.
private boolean	**xLog** Indicates the X axis is logarithmic, so that special logic concerning the labels may be activated.
private boolean	**yLog** Indicates the Y axis is logarithmic, so that special logic concerning the labels may be activated.

Fields inherited from class com.bayes.gpp.PlotterBase

DEFAULT_ASPECT_RATIO, DEFAULT_BG_COLOR, display, place, POLYGON_FILL, POLYGON_LINE, POLYGON_POINT, ps, use_3d

Constructor Summary

MultiFamilyTimeBasedPlot(float line_width, Place place, boolean scale_enable, boolean use_3d, int n_families, int n_variables, DataSet[] dataSets, boolean yLog, boolean xLog)
Constructor

Method Summary

private void	**fixDomainLabels**(visad.ScalarMap domainMap, boolean xLog) Fixes the labels on the X axis.
visad.AxisScale	**getAxisScale**(int f_no) Gets AxisScale object for a given family.

double[]	**getRange**(int f_no) Returns the range of values represented by a given "family".
static void	**main**(java.lang.String[] args) Main routine for unit testing.
void	**render**() This is the method that puts togther the structure of objects required by VisAD to produce a plot.

Methods inherited from class com.bayes.gpp.PlotterBase
addToParent, getDisplay, getDisplay, hsbToRGB, pickAColor, refresh, removeFromParent, setAspect, setAspect, setAspect, setBGColor, setBGColor, setBGColor, setBoxColor, setBoxOn, setColorMaps, setColorMaps, setLineWidth, setParallelProjection, setPointMode, setPointSize, setPolygonMode, setScaleEnable, setSharpness, snap, snap

Methods inherited from class java.lang.Object
, clone, equals, finalize, getClass, hashCode, notify, notifyAll, registerNatives, toString, wait, wait, wait

Field Detail

CFG

```
static net.mirabile.logger.Category CFG
```

For use with Doug's logging package.

EXC

```
static net.mirabile.logger.Category EXC
```

For use with Doug's logging package.

HST

```
static net.mirabile.logger.Category HST
```

For use with Doug's logging package.

PER

```
static net.mirabile.logger.Category PER
```

For use with Doug's logging package.

TRC

```
static net.mirabile.logger.Category TRC
```

For use with Doug's logging package.

CLS

```
static java.lang.String CLS
```

For use with Doug's logging package.

---

realTypeCounter

```
private int realTypeCounter
```

counter used to generate unique name for realType.

---

curve_dom_dsp_map

```
private visad.ScalarMap curve_dom_dsp_map
```

The Scalar Map for the domain i.e. Time (X-Axis)

---

crv_rng_dsp_map

```
private visad.ScalarMap[] crv_rng_dsp_map
```

The Scalar Maps for the ranges of each of the "families".

---

curves_fields

```
private visad.FieldImpl[] curves_fields
```

Set of FieldImpls used to represent fields.

---

refs

Changes since version 02-02-07

MultiFamilyTimeBasedPlot.java
TPAData.java
TPASparseTimeOutputLoadStrategy.java

The changes to the above files are intended to address the bugs reported in the SCR 401.
The reported bugs are:

[Bug 1]
Plotting the time axis in log scale will produce an error for the following variables:
Avg_Infiltration [mm/yr], Avg_Reflux [mm/yr], Avg_Diversion [mm/yr]

[Bug 2]
It is not possible to overlap two specific variables, under particular conditions.

Time scale : logarithmic
Variable 1: Water Hitting WP
Variable 2: Avg Diversion or Avg Infiltration or Avg Reflux

The plot for the "Water Hitting WP" is not correct.

A correct plot is displayed if the time scale is selected linear.

Unexpected results are displayed when Variable 1, any Variable 2, and any other variable are mixed in the same plot, and the time-scale is selected logarithmic. A correct plot is shown if the time-scale is linear.

[Bug 3]
Fraction of WPs failed ranges from 0 to 1 when log scale is selected. Lower vertical label should be given a label different than 0 when log scale is selected.

[Bug 4]
Avg Diversion, Avg Infiltration, Avg Reflux

The abscissae values for the above variables are shifted one time step downwards, leaving the last time step without abscissae value. Some garbage is assigned to the last time step, usually zero.

Additional explanation of the above bugs were documented in Scientific Notebook 376-2E, section maintained by Osvaldo Pensado.

Specific changes

```
================================================
MultiFamilyTimeBasedPlot.java
Comparing files MultiFamilyTimeBasedPlot.java and C:\GPP\02-02-
07\COM\BAYES\GPP\MULTIFAMILYTIMEBASEDPLOT.JAVA
***** MultiFamilyTimeBasedPlot.java
  421:                int dpIndex = temp.indexOf(".");
  422:                if (antiLog < 0.1) {
  423:                  newLabel = temp;
  424:                } else {
  425:                  newLabel = temp.substring(0,dpIndex+2);
  426:                }
```

```
  196:      boolean first_pass = true;
  197:      String old_value_s=null;
*****

***** TPASparseTimeOutputLoadStrategy.java
  207:          { try
  208:            {
  209:              if (skip_read) {
  210:                skip_read = false;
  211:              } else {
  212:                time_line.read(in);
  213:              }
  214:            } catch (NullPointerException npe)
***** C:\GPP\02-02-07\COM\BAYES\GPP\TPASPARSETIMEOUTPUTLOADSTRATEGY.JAVA
  206:          { try
  207:            { time_line.read(in);
  208:            } catch (NullPointerException npe)
*****

***** TPASparseTimeOutputLoadStrategy.java
  229:                        timesLoaded = true;
  230:                        skip_read = true;
  231:                        break TIME_LOOP;
***** C:\GPP\02-02-07\COM\BAYES\GPP\TPASPARSETIMEOUTPUTLOADSTRATEGY.JAVA
  223:                        timesLoaded = true;
  224:                        break TIME_LOOP;
*****

***** TPASparseTimeOutputLoadStrategy.java
  236:                    if (!timesLoaded) {
  237:                      System.out.println("Time["+ti_no+"]:
"+value_s);
  238:                      value_f = Float.parseFloat(value_s);
***** C:\GPP\02-02-07\COM\BAYES\GPP\TPASPARSETIMEOUTPUTLOADSTRATEGY.JAVA
  229:                    if (!timesLoaded) {
  230:                      value_f = Float.parseFloat(value_s);
*****

***** TPASparseTimeOutputLoadStrategy.java
  243:                    value_f = Float.parseFloat(value_s);
  244:                    if (rz_no == 1 && col_no == 1) {
  245:                      System.out.println("Data Value["+ti_no+"]:
"+value_s);
  246:                    }
  247:                    tpa.getCurve(col_no-1,sa_no,0,rz_no) [ti_no] =
value_f;
***** C:\GPP\02-02-07\COM\BAYES\GPP\TPASPARSETIMEOUTPUTLOADSTRATEGY.JAVA
  235:                    value_f = Float.parseFloat(value_s);
  236:                    tpa.getCurve(col_no-1,sa_no,0,rz_no) [ti_no] =
value_f;
*****
================================================================================
==========
```

```
  427:              }
***** C:\GPP\02-02-07\COM\BAYES\GPP\MULTIFAMILYTIMEBASEDPLOT.JAVA
  421:                int dpIndex = temp.indexOf(".");
  422:                newLabel = temp.substring(0,dpIndex+2);
  423:              }
*****

***** MultiFamilyTimeBasedPlot.java
  509:              int dpIndex = temp.indexOf(".");
  510:              if (dpIndex > -1) {
  511:                newLabel = temp.substring(0,dpIndex);
  512:              } else {
  513:                newLabel = el;
  514:              }
  515:            } else {
***** C:\GPP\02-02-07\COM\BAYES\GPP\MULTIFAMILYTIMEBASEDPLOT.JAVA
  505:              int dpIndex = temp.indexOf(".");
  506:              newLabel = temp.substring(0,dpIndex);
  507:            } else {
*****
==================================================
==================================================

TPAData.java

Comparing files TPAData.java and C:\GPP\02-02-
07\COM\BAYES\GPP\TPADATA.JAVA
***** TPAData.java
  344:        float val = 0.0f;
  345:        int limit = numTimes-1;
  346:        for (int i=0; i<numTimes; i++) {
***** C:\GPP\02-02-07\COM\BAYES\GPP\TPADATA.JAVA
  344:        float val = 0.0f;
  345:        for (int i=0; i<numTimes; i++) {
*****

***** TPAData.java
  349:            timeDomain.setVal(i,0,0,val);
  350:            if (i<limit) {
  351:              val =
(float)((float)Math.log(times[i+1])/FArray.LOG10);
  352:            }
  353:          } else {
***** C:\GPP\02-02-07\COM\BAYES\GPP\TPADATA.JAVA
  348:            timeDomain.setVal(i,0,0,val);
  349:            val += incr;
  350:          } else {
*****
==================================================
==================================================


TPASparseTimeOutputLoadStrategy.java

Comparing files TPASparseTimeOutputLoadStrategy.java and C:\GPP\02-02-
07\COM\BAYES\GPP\TPASPARSETIMEOUTPUTLOADSTRATEGY.JAVA
***** TPASparseTimeOutputLoadStrategy.java
  196:      boolean first_pass = true;
  197:      boolean skip_read = false;
  198:      String old_value_s=null;
***** C:\GPP\02-02-07\COM\BAYES\GPP\TPASPARSETIMEOUTPUTLOADSTRATEGY.JAVA
```

Software Validation Test Report

GRAPHICAL POST-PROCESSOR VERSION 1.0.1 VALIDATION REPORT

Prepared by

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Center for Nuclear Waste Regulatory Analyses
San Antonio, Texas

February 2003

CONTENTS

CONTENTS (continued)

Section Page

VALIDATION REPORT FOR GRAPHICAL POST-PROCESSOR VERSION 1.0.1

The Graphical Post-Processor (GPP) supports visualization of data generated with the Total-system Performance Assessment (TPA) Version 4.0 code. By plotting relevant TPA Version 4.0 code output variables, the graphical post-processor is intended as a tool for the quick analysis of the influence of TPA input parameters on relevant variables, and the interrelation among these variables. The graphical post-processor is also intended as a tool for the analysis of uncertainty propagation.

1.0 SCOPE OF VALIDATION

The GPP is a tool for the display of data generated with the TPA Version 4.0 code. The GPP does not perform independent computations aside from sorting the data according to particular rules and computation of percentiles. These operations are simple enough for reproduction with analytical software such as Mathematica®. The validation technique used in this report is showing visual agreement between GPP displays and plots created with Mathematica.

The GPP is considered validated if the data displayed is accurate with respect to source data generated by the Total-system Performance Assessment Code Version 4.0 or 4.1. Also, the GPP is considered validated if it performs the actions described in the GPP user's manual for the display of influence diagrams. The reader is referred to the users' manual (Bayesian Systems, Inc., 2002) for definitions of the GPP functions.

The objective of this validation report is twofold: (1) showing that the data displayed by the GPP is in agreement with the source data in TPA Version 4.0 code output files and (2) showing that the strategy described in the user's manual for the display of influence diagrams is correctly followed by the GPP. With respect to point (1) the accuracy of three kinds of displays is investigated: (i) raw data, (ii) regularized data, and (iii) box and whiskers plots. With respect to point (2), the correctness of influence diagrams is investigated by comparison to influence diagrams created with Mathematica®, following the actions described in the user's manual.

2.0 REFERENCES

Bayesian Systems, Inc. "User's Guide to Version 1.0 of the Graphical Post-Processor for Total-system Performance Assessment (TPA) Version 4.0." San Antonio, Texas: CNWRA. 2002.

Pensado, O. "Software Release Notice PA–SRN–264: Graphical Post-Processor Version 1.0.1 for the TPA Code (Version 4.0)." San Antonio, Texas: CNWRA. 2002.

Pensado, O. "Software Summary Form: Graphical Post-Processor Version 1.0.1 for the TPA Code (Version 4.0)." San Antonio, Texas: CNWRA. 2002.

3.0 ENVIRONMENT

3.1 Software

Version validated: Graphical Post-Processor Version 1.0.1
Operating system: Windows NT 4.0
Supporting software to perform validation: Mathematica 4.1

Input data was generated with a run of the basecase of the TPA Version 4.1j code, 20 realizations, and 10 subareas. Table 3-1 contains the list of TPA Version 4.0 code output files from which the data are read. Table 3-1 also includes names used by the GPP to refer to particular variables.

Procedures developed for this validation activity in Mathematica are part of the electronic internal quality assurance records supporting this report and summarized in the Mathematica notebook file, ValidationTesting.nb. FORTRAN 77 routines were used to abstract data from the TPA Version 4.0 code output files and write them without text headers and in matrix form into text files that can be directly read by Mathematica. The source code for the FORTRAN 77 data-abstracting programs is also part of the quality assurance records supporting this validation report.

3.2 Hardware

- Pentium II x86 Family 6 Model 5 Stepping 2 AT/AT Compatible 130,468 KB RAM
- Make: NetForce
- Net name: Dakath

4.0 PREREQUISITES

- Requirements consistent with those described in the Software Summary Form and Software Release Notice (Pensado, 2002)

- Mathematica 4.1 installed in the test machine

5.0 ASSUMPTIONS AND CONSTRAINTS

Given the simplicity of the mathematical operations by the GPP (sorting and computation of percentiles) and that the same routines are used for all tasks, few tests are necessary to ensure accuracy of the display. The reader is referred to the test documentation submitted with the GPP Software Summary Form and Software Release Notice (Pensado, 2002) for additional test examples.

Table 3-1. GPP Variables and TPA Version 4.0 code Output Files Containing Source Data for the Graphic Display		
Graphical Post-Processor Internal Variable	**Variable Name in Plot Control Window**	**TPA Output File**
Repository_Temperature	Drift_Temp	nfenv.rlt
Waste_Package_Temperature	WP_Temp	nfenv.rlt
Waste_Package_Relative_Humidity	Relative_Humid_WP	nfenv.rlt
Water_Hitting_Waste_Package	Water_Hitting_WP	nfenv.rlt
Total_Dose	Total_Dose_Rate	totdose.res
Infiltration_per_subarea	Infiltration_per_SA	uzflow.rlt
Canister_failure_time	Fraction_of_WPs_Failed	ebsfail.rlt
Release_from_saturated_zone_per_subarea	Rel_from_SZ	szft.rlt
Release_from_lower_unsaturated_zone_per_subarea	Rel_from_UZ	uzft.rlt
Release_from_engineered_barrier_system_per_subarea	Rel_from_EBS	ebsrel.rlt
Mean_annual_temperature	Mean_AT	dcagw.ech
Mean_annual_precipitation	Mean_AP	dcagw.ech
Release_from_engineered_barrier_system_per_repository	Cum_Rel_EBS_per_Nucl	cumrel.res
Release_from_lower_unsaturated_zone_per_repository	Cum_Rel_UZ_per_Nucl	cumrel.res
Release_from_saturated_zone_per_repository	Cum_Rel_SZ_per_Nucl	cumrel.res
Peak_dose_for_compliance_period	Peak_Dose	gwpkdos.res
Average_infiltration_per_repository	Avg_Infiltration	infilper.res
Average_reflux_per_repository	Avg_Reflux	infilper.res
Average_diversion_per_repository	Avg_Diversion	infilper.res
DCF_pluvial_direct_exposure	DCF_Pluv_Dir_Exp	dcf.cum
DCF_pluvial_inhalation	DCF_Pluv_Inhale	dcf.cum
DCF_pluvial_ingestion_animal_prod	DCF_Pluv_Ani	dcf.cum
DCF_pluvial_ingestion_crops	DCF_Pluv_Crop	dcf.cum
DCF_pluvial_drinking_water	DCF_Pluv_Water	dcf.cum
DCF_pluvial_milk	DCF_Pluv_Milk	dcf.cum
DCF_nonpluvial_direct_exposure	DCF_Npluv_Dir_Exp	dcf.cum
DCF_nonpluvial_inhalation	DCF_Npluv_Inhale	dcf.cum
DCF_nonpluvial_ingestion_animal_prod	DCF_Npluv_Ani	dcf.cum
DCF_nonpluvial_ingestion_crops	DCF_Npluv_Crops	dcf.cum
DCF_nonpluvial_drinking_water	DCF_Npluv_Water	dcf.cum
DCF_nonpluvial_milk	DCF_Npluv_Milk	dcf.cum
Time_of_peak_dose_for_compliance_period	Time_of_Pk_Dose	gwpkdos.res
Properties of TPA run		tpa.inp
Parameter names		samplpar.hdr
Sampled parameter values		samplpar.res

6.0 TESTS

6.1 Correct Display of Raw Data

The objective of this test is to verify that data referred to as "raw" data are correctly displayed. Raw data are the direct realization data. In the raw data display, a realization curve (variable versus time) is displayed for each realization. In other words, the raw data display is the common "horse tail" representation.

6.1.1 Test Input

Some properties of the GPP are defined in the file, gpp.properties. See the User's Manual for additional details on the file, gpp.properties. For this test, the file, gpp.properties, contained the following lines:

```
#which_subarea=1
num_realizations=10
param_percentiles=33,66,100
nuclide_of_interest=none
```

For the test, TPA Version 4.1j code output files of a run of the basecase with 20 realizations were used. See Table 3-1.

6.1.2 Test Procedure

- Follow instructions described in the user's manual for the display of raw data for the multiple variables considered in the GPP Version 1.0.1 (see Table 3-1). Select a scale (logarithmic or linear) enhancing the differences between realizations. Only 10 realizations were displayed for better appreciation of realization data.
- Save plots as JPG or TIFF files.
- Use independent FORTRAN 77 procedures to remove text labels from TPA Version 4.0 code output files containing source data and use Mathematica functions to read data and plot realizations as functions of time.

6.1.3 Test Results

The comparison of GPP plots and Mathematica plots are displayed in the Tables 6.1–6.7. GPP plots are located on the left columns and Mathematica plots, on the right columns. The TPA Version 4.0 code output file containing the source data is indicated in each table. To enhance differences between realizations logarithmic scales were selected when needed. Note that, because of software limitations, the tick marks of Mathematica plots correspond to $\log_{10}(x)$ or $\log_{10}(y)$ where appropriate. Complete correspondence was obtained. Explanations are provided for those plots with apparent disagreement inside the test result tables.

6.2 Correct Display of Box and Whisker and Scatter Plots

The objective of this test is to verify that box and whisker and scatter plots are correctly displayed.

6.2.1 Test Input

Contents of gpp.properties:

```
#which_subarea=1
num_realizations=20
param_percentiles=33,66,100
nuclide_of_interest=none
```

Table 6.1. Comparison of Horse Tail Display for Data in File dcagw.ech

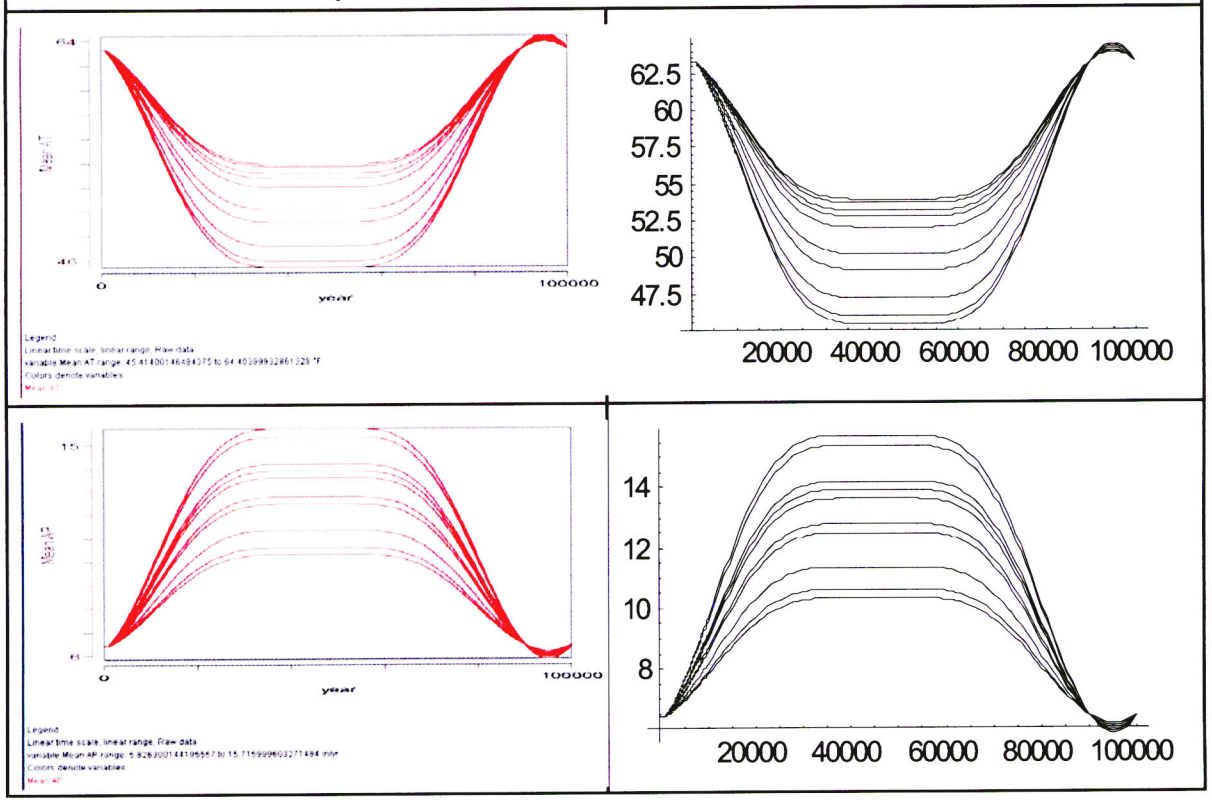


Table 6.2. Comparison of Horse Tail Display for Data in File uzflow.rlt

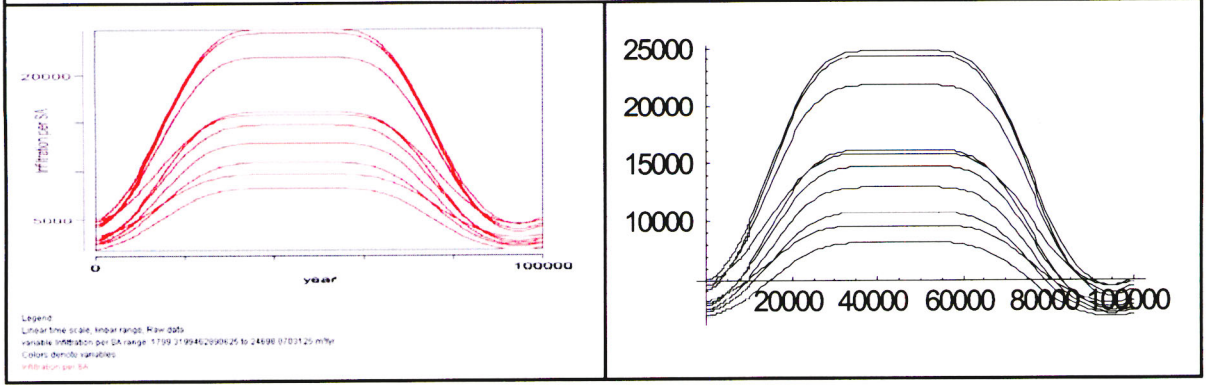


Table 6.3. Comparison of Horse Tail Display for Data in File infilper.res

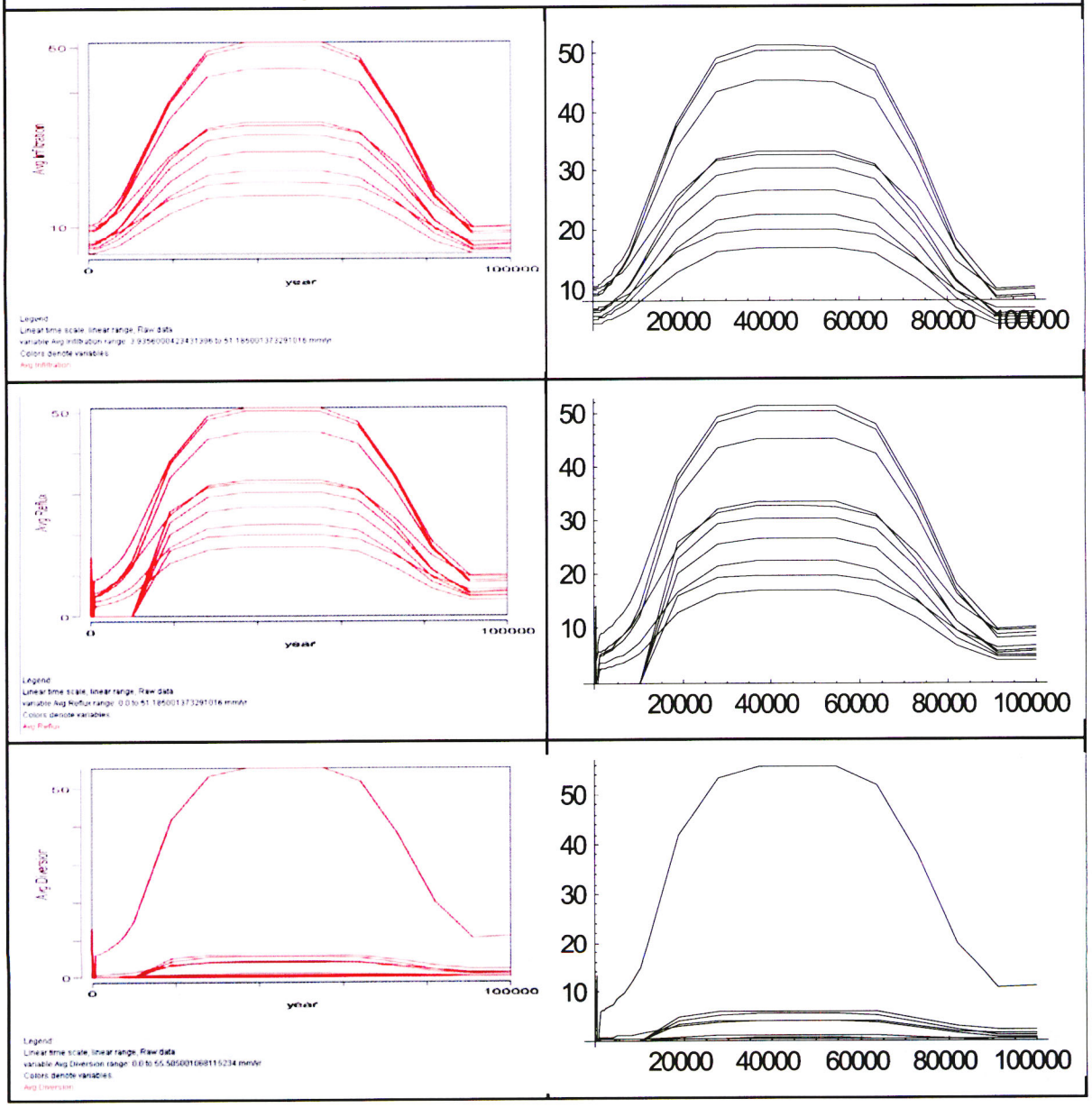
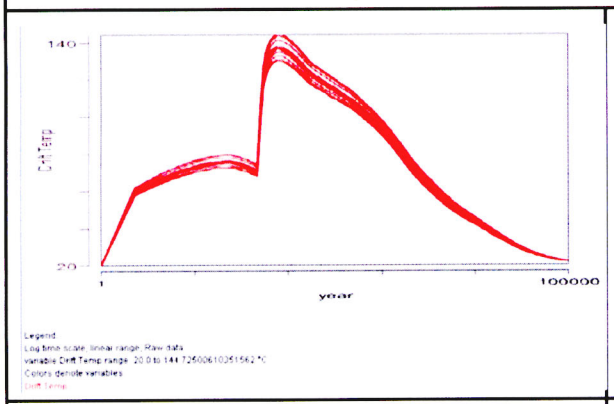
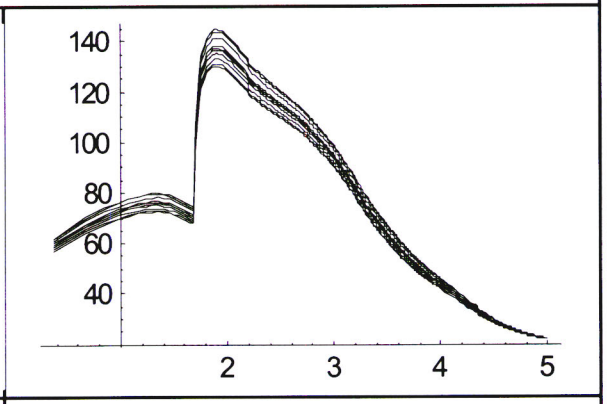
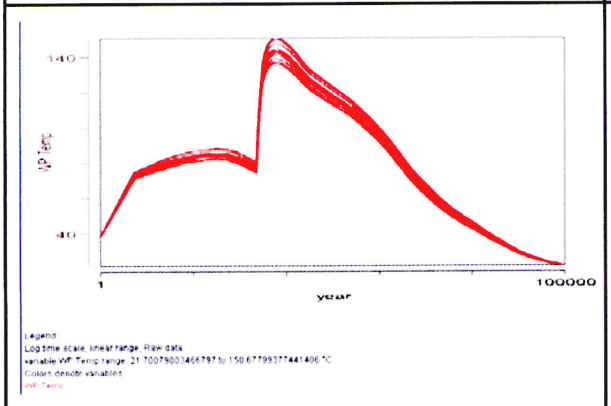
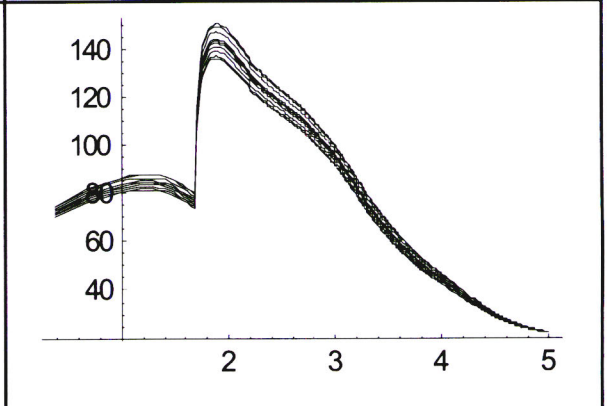


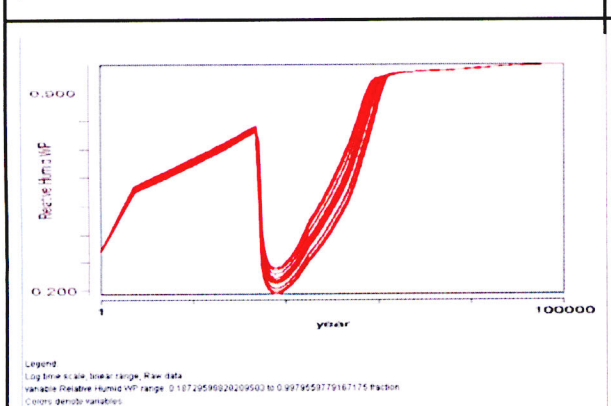
Table 6.4. Comparison of Horse Tail Display for Data in File nfenv.rlt











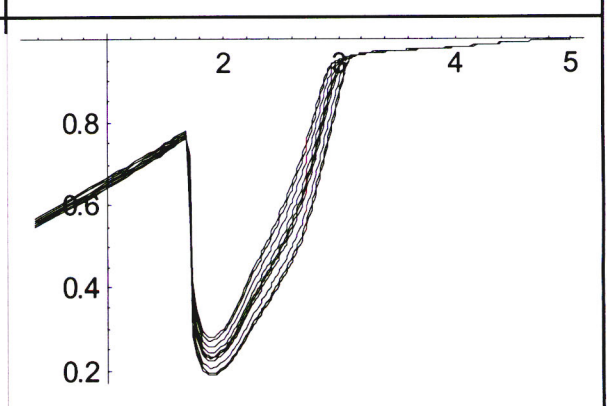
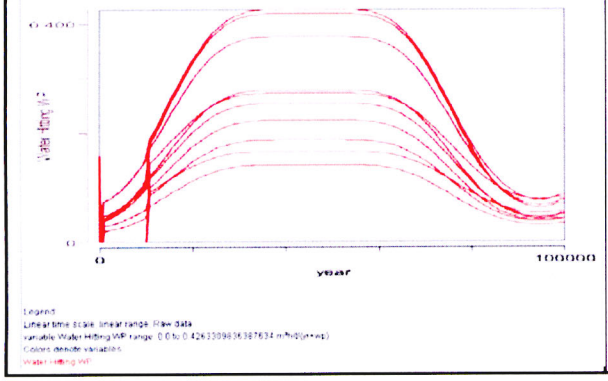


Table 6.4. Comparison of Horse Tail Display for Data in File nfenv.rlt (continued)



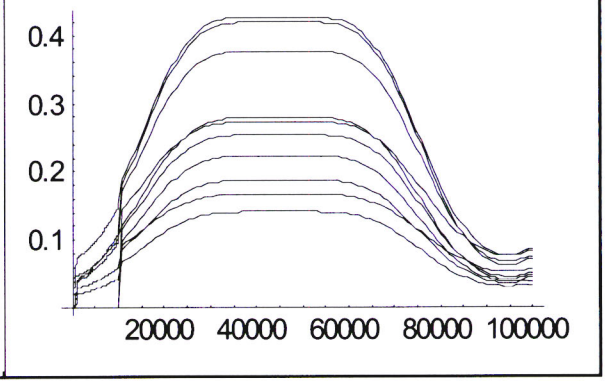
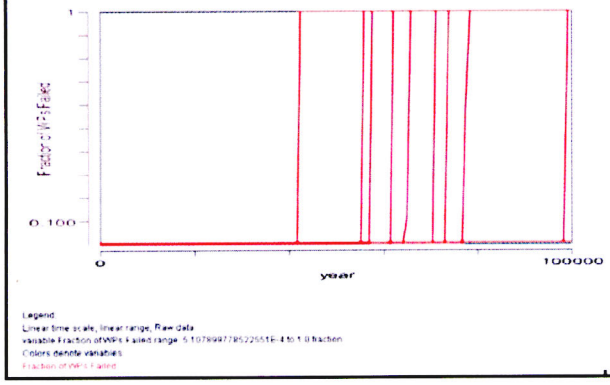


Table 6.5. Comparison of Horse Tail Display for Data in File ebsfail.rlt.



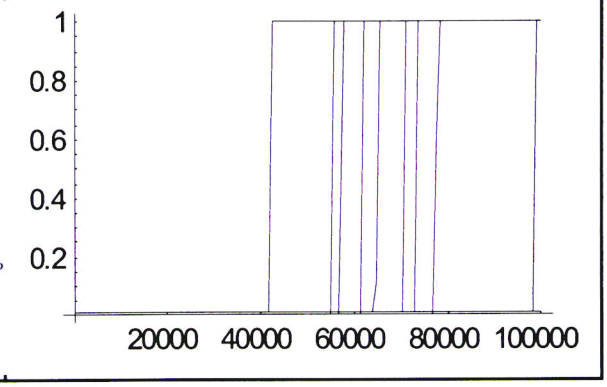
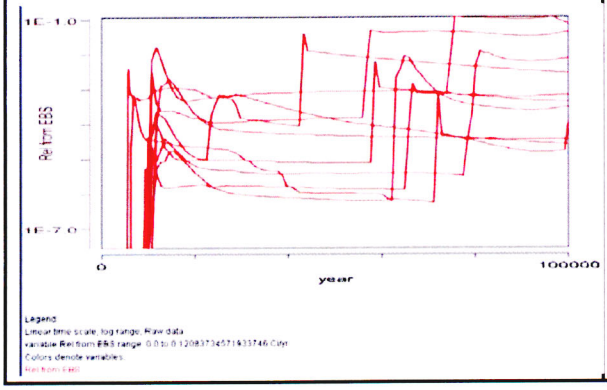


Table 6.6. Comparison of Horse Tail Display for Data in Files ebsrel.rlt, uzft.rlt, and szft.rlt

Average Release per Subarea	Total Release



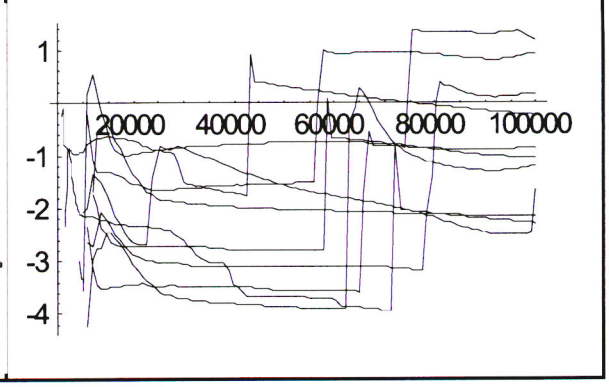
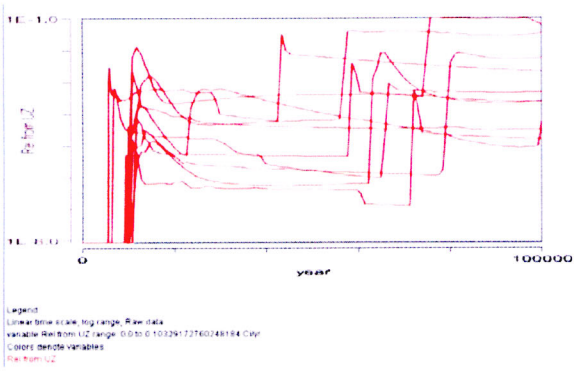
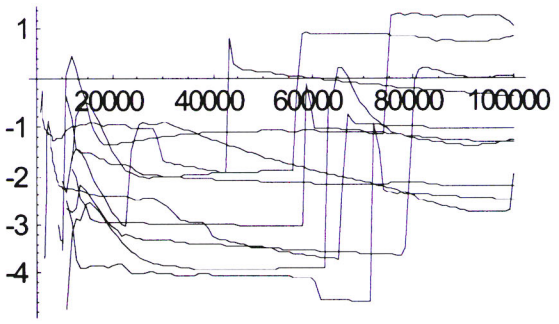
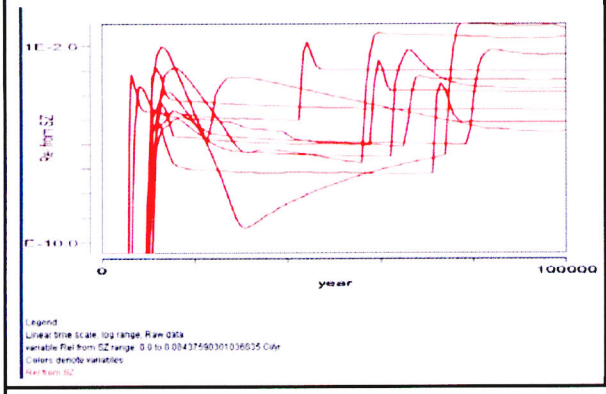
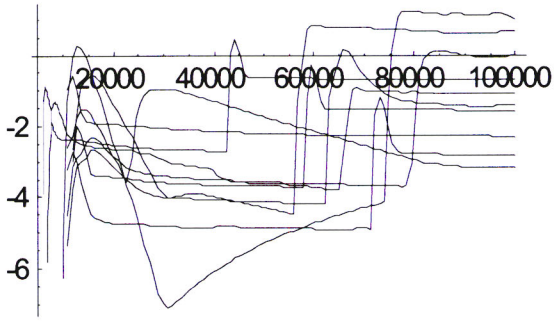


Table 6.6. Comparison of Horse Tail Display for Data in Files ebsrel.rlt, uzft.rlt, and szft.rlt (continued)

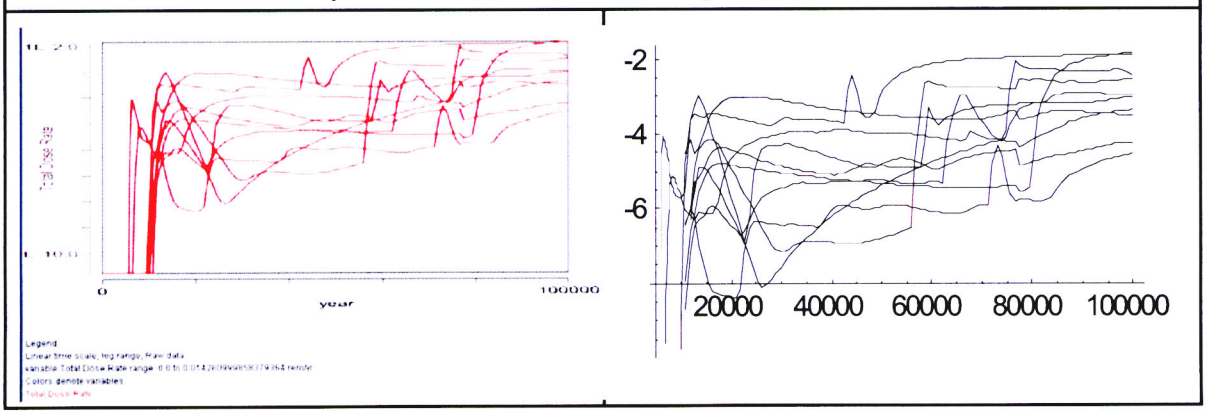
Average Release per Subarea	Total Release
	
	

Comment: In this case a divergence by a factor of 10 is noted. The reason for the difference is that the GPP Version 1.0.1 computes an average by adding the releases and dividing by the number of subareas. Therefore, the total release in the Mathematica plots can be obtained from the GPP plots by multiplying the average releases by the number of subareas.
It is recommended to change the labels in the Plot Control Window to the following

Rel from EBS per SA (currently reads Rel from EBS)
Rel from UZ per SA (currently reads Rel from UZ)
Rel from SZ per SA (currently reads Rel from SZ)

Also, it is recommended to add a general note to the User's manual about the GPP approach to compute subarea averages when subarea values are available.

Table 6.7. Comparison of Horse Tail Display for Data in File totdose.res



For the test, TPA Version 4.1j code utput files of a run of the basecase with 20 realizations were used.

6.2.2 Test Procedure

- Follow instructions described in the user's manual for the display of box and whisker (dose conversion factors and cumulative releases) and scatter plots (peak dose) by GPP Version 1.0.1. Select a logarithmic scale for box and whisker plots.
- Save plots as JPG or TIFF files.
- Use independent FORTRAN 77 procedures to remove text labels from TPA Version 4.0 code output files containing source data and use Mathematica functions to read the data and reproduce scatter plots and box and whisker plots.

6.2.3 Test Results

The comparison of GPP plots and Mathematica plots are displayed in Tables 6.8–6.11; GPP plots are located on the left columns, and Mathematica plots on the right columns in the tables. The TPA Version 4.0 code output file containing the source data is indicated in each table. In order to enhance differences between realizations logarithmic scales were selected when needed. Note that, because of software limitations, the tick marks of Mathematica plots correspond to $\log_{10}(x)$ or $\log_{10}(y)$ where appropriate. Complete correspondence was obtained. Very small differences are noted, due to the different algorithms to compute percentile values. Such small differences are of no concern and we conclude that the GPP properly displays scatter data and box and whisker plots.

6.3 Correct Display of Influence Diagrams, Influence of Parameters on Variables

The objective of this test is to verify that influence diagrams (influence of parameters on variables) displayed by the GPP are in agreement with the description in the user's manual.

Table 6.8. Comparison of Box and Whisker Plot Display for Data in File cumrel.res (Cumulative Release from EBS, UZ, and SZ [Ci])

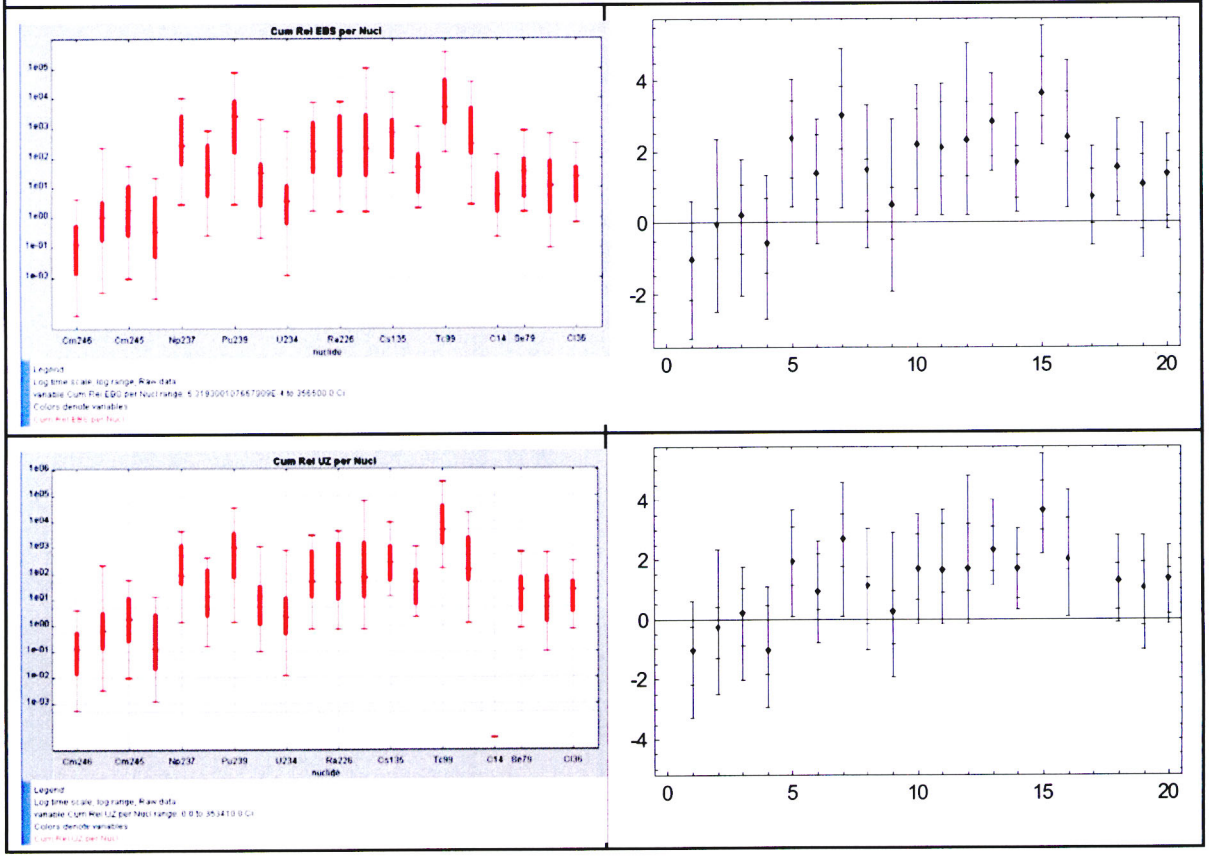
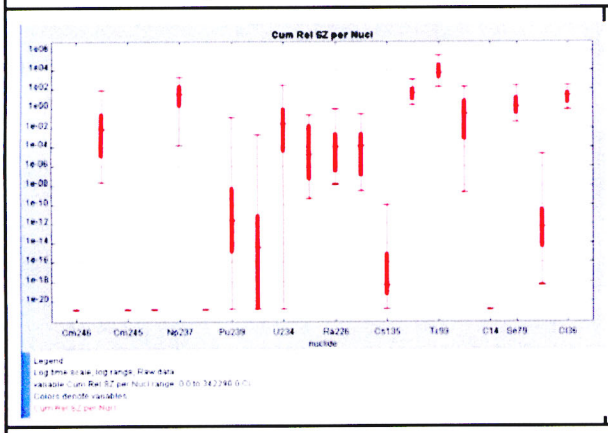
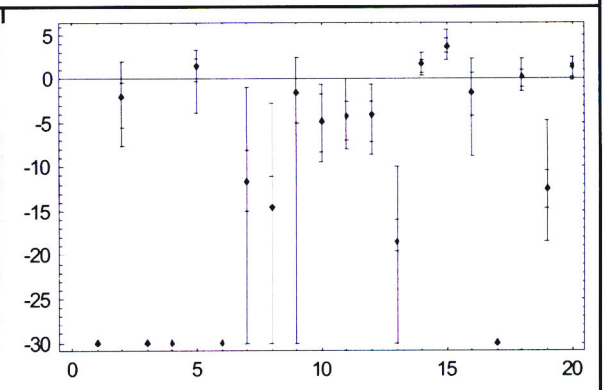


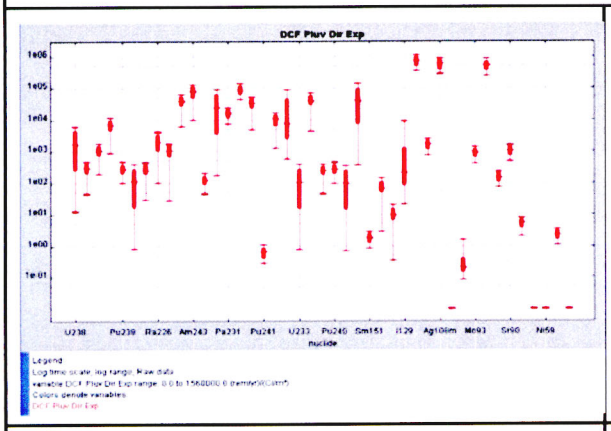
Table 6.8. Comparison of Box and Whisker Plot Display for Data in File cumrel.res (Cumulative Release from EBS, UZ, and SZ [Ci]) (continued)

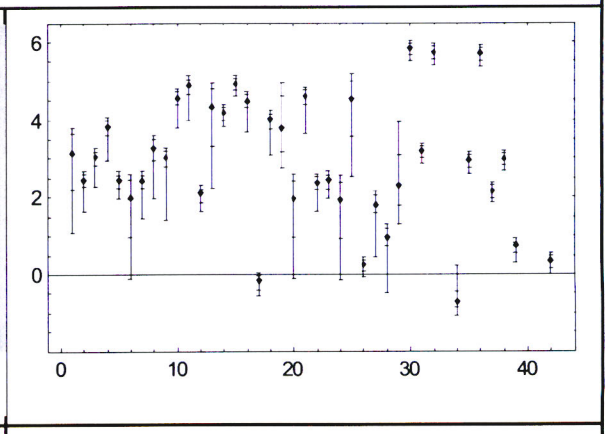


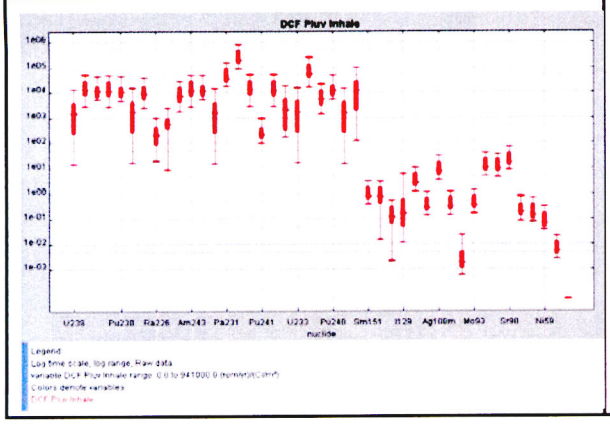


Note: Small differences are noted in the locations of the percentile values. These differences are of no concern and due to the different algorithms used to estimate percentile values. The percentile values are only estimators to the true percentiles, and the Mathematica and GPP values are both reasonable. Mathematica plots are in agreement with GPP plots.

Table 6.9. Comparison of Box and Whisker Plot Display for Data in File dcf.cum (Dose Conversion Factors for Pluvial Period)







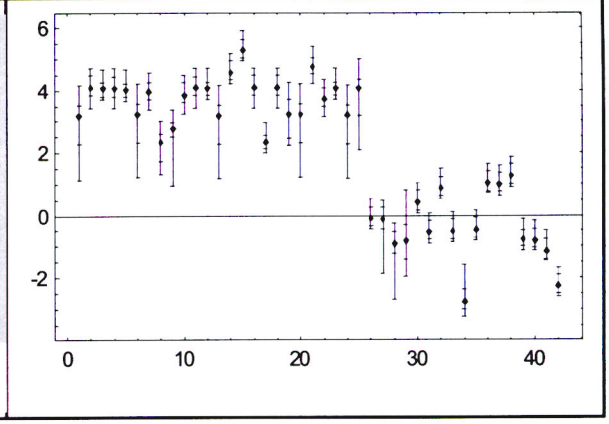


Table 6.9. Comparison of Box and Whisker Plot Display for Data in File dcf.cum (Dose Conversion Factors for Pluvial Period) (continued)

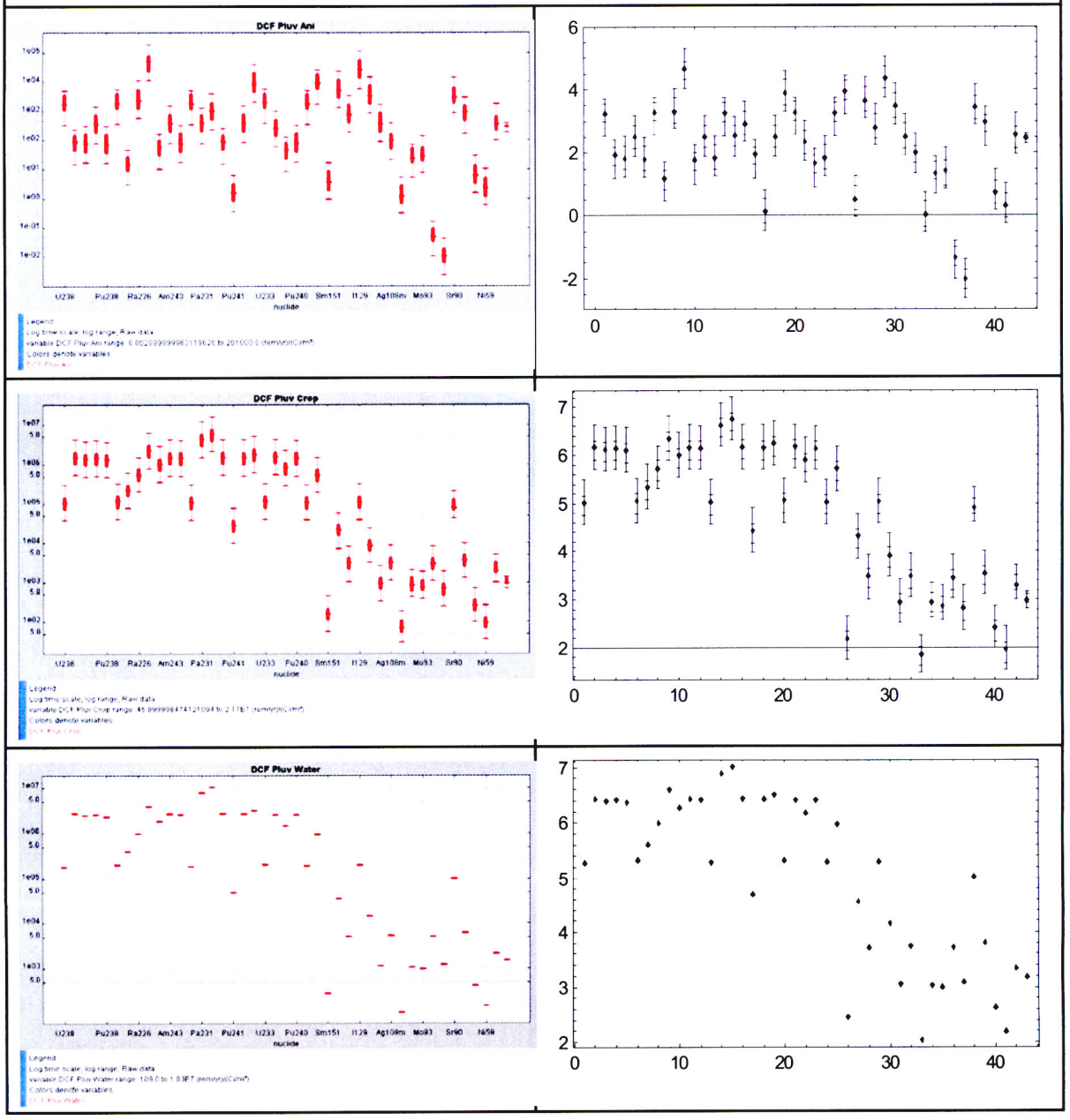


Table 6.9. Comparison of Box and Whisker Plot Display for Data in File dcf.cum (Dose Conversion Factors for Pluvial Period) (continued)

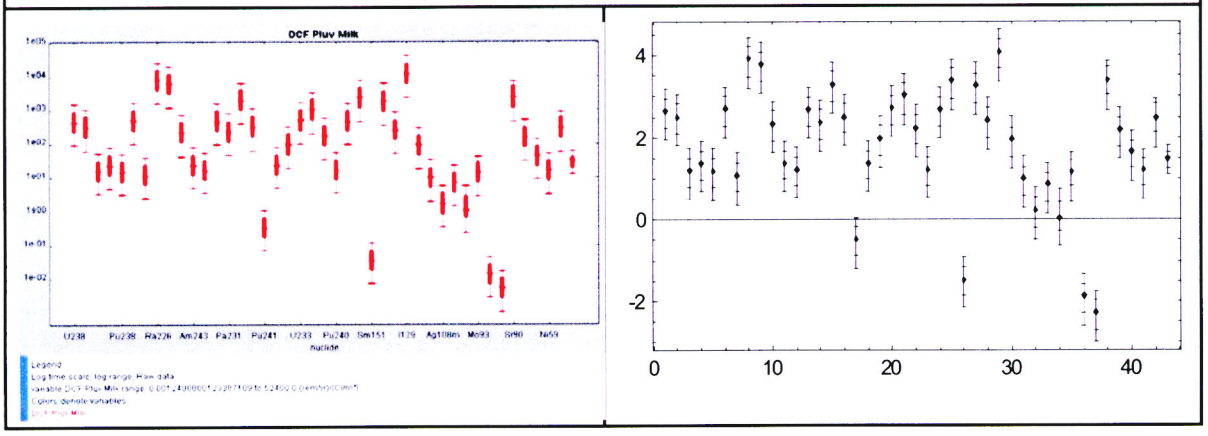


Table 6.10. Comparison of Box and Whisker Plot Display for Data in File dcf.cum (Dose Conversion Factors for Non-Pluvial Period)

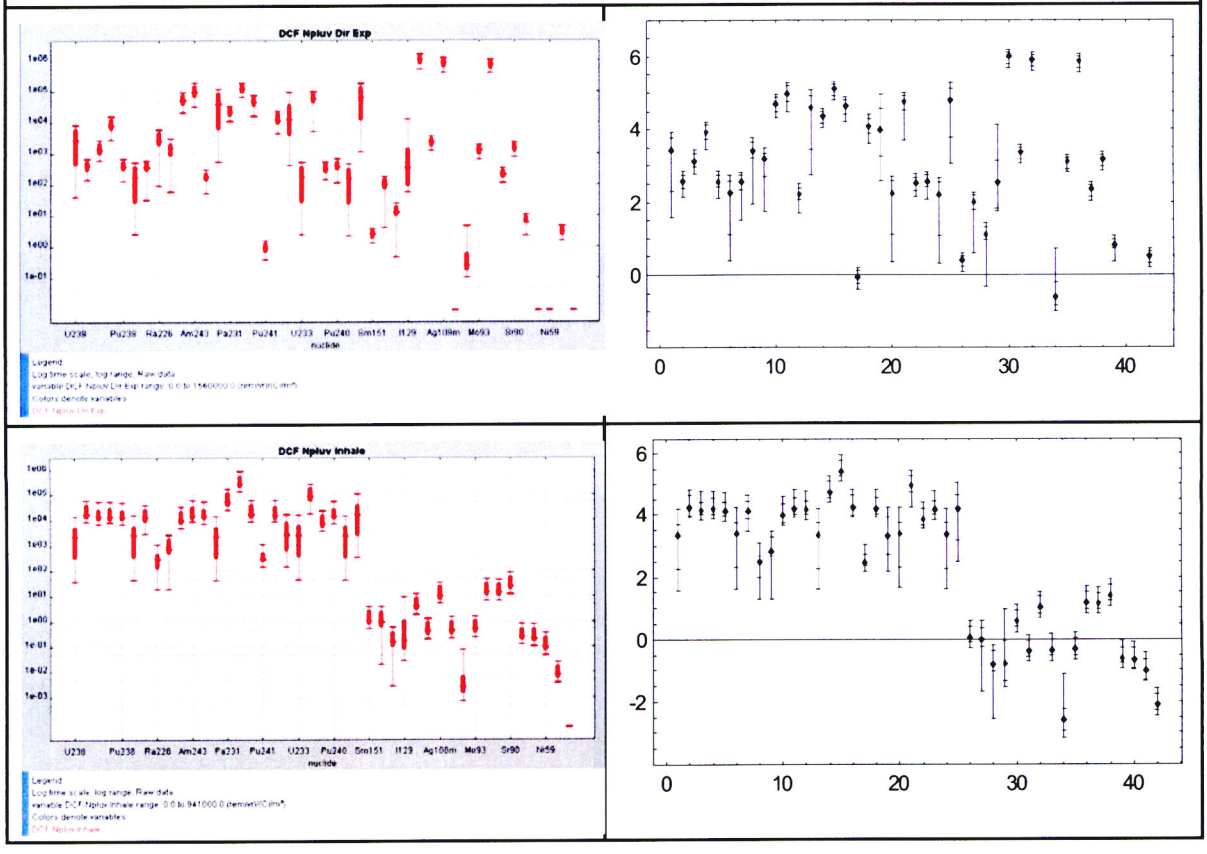


Table 6.10. Comparison of Box and Whisker Plot Display for Data in File dcf.cum (Dose Conversion Factors for Non-Pluvial Period) (continued)

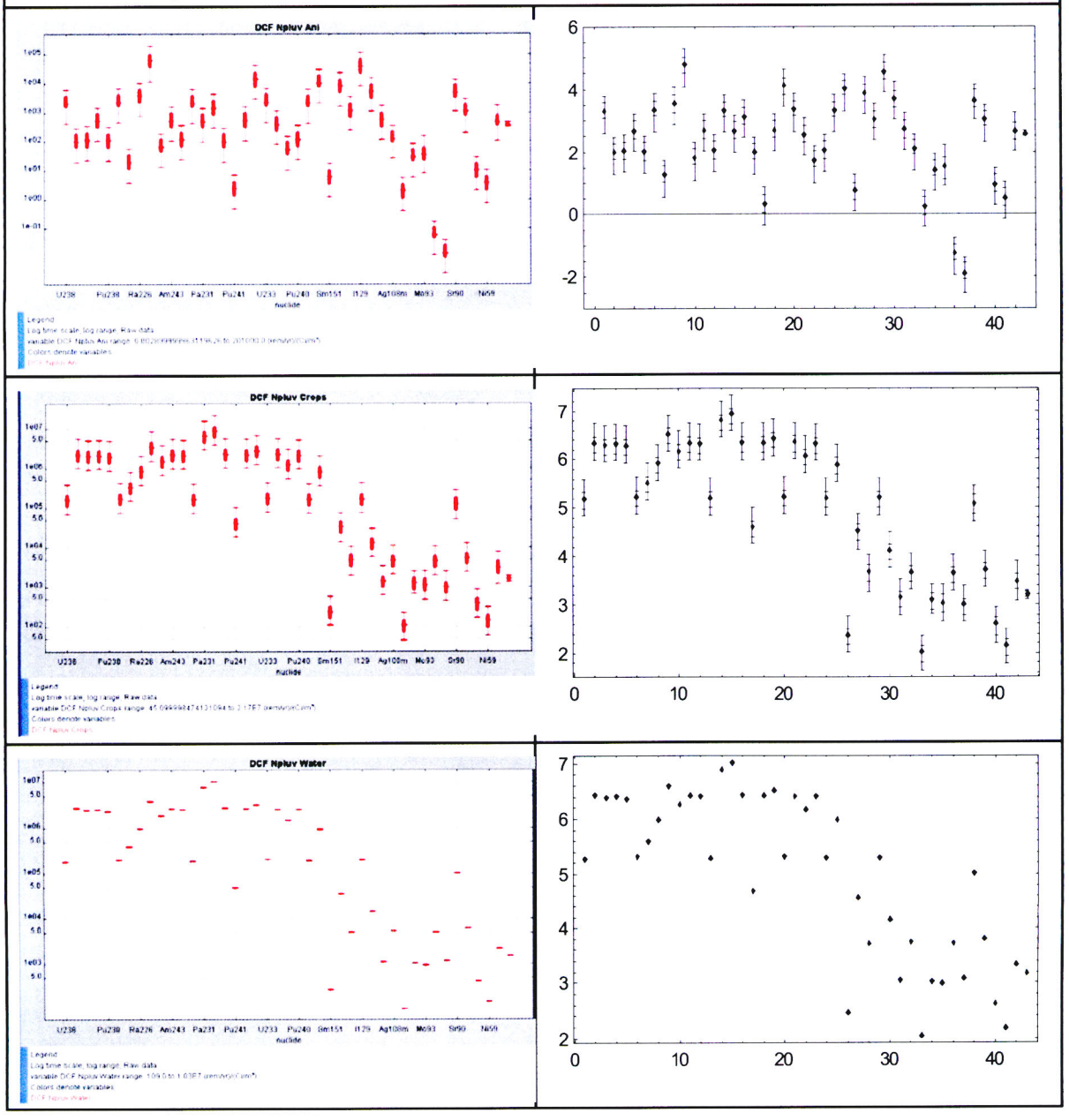
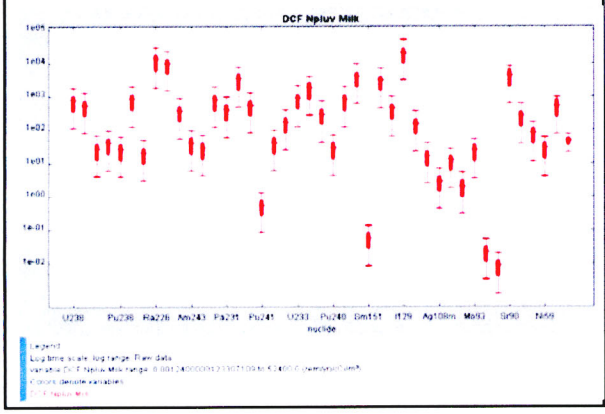


Table 6.10. Comparison of Box and Whisker Plot Display for Data in File dcf.cum (Dose Conversion Factors for Non-Pluvial Period) (continued)



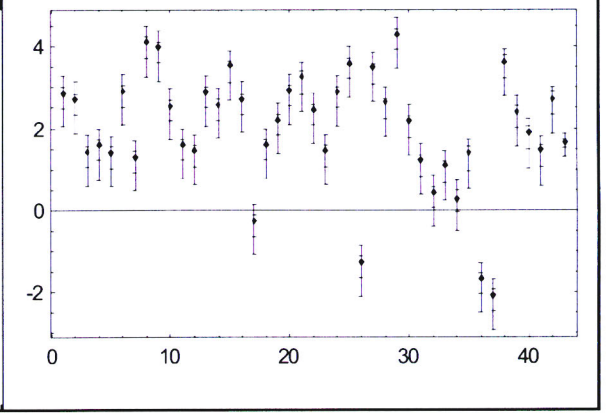
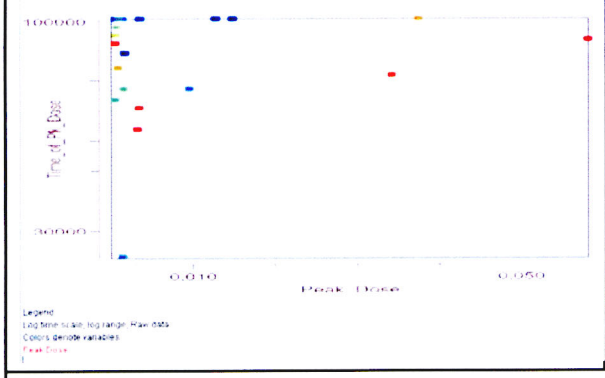
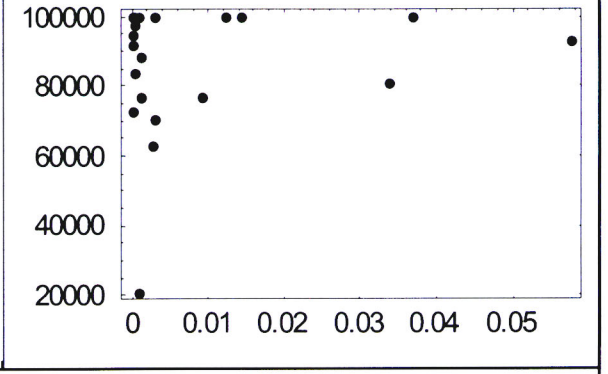


Table 6.11. Comparison of Scatter Plot Display for Data in File gwpkdos.res (Maximum Dose for Each Realization [rem/yr])





Comment: The GPP does not allow to change scale in this display.

The reader is referred to the user's manual for a thorough description of influence diagrams. A secondary objective is to verify that percentile curves are correctly displayed.

6.3.1 Test Input

For the test, TPA Version 4.1j code output files of a run of the basecase with 20 realizations were used.

Contents of gpp.properties:

Test 1: #which_subarea=1
num_realizations=20
param_percentiles=33,66,100
nuclide_of_interest=none

Test 2: #which_subarea=1
num_realizations=20
param_percentiles=25,100
nuclide_of_interest=none

Note that in the Version 1.0.1 of the GPP, it is necessary to close the application and open the application in order for changes to the file, gpp.properties, to be recognized.

The line param_percentiles is used to define the percentile ranges to classify the parameter values in the influence diagrams. For example, param_percentiles=25,100 causes the GPP to classify parameter values into two ranges, from the minimum (0 percentile) to the 25th percentile and from 25th percentile to the maximum value (100th percentile). Two different gpp.properties files were used to verify that the GPP is appropriately reading the gpp.properties file and that the class ranges are well computed.

6.3.2 Test Procedure

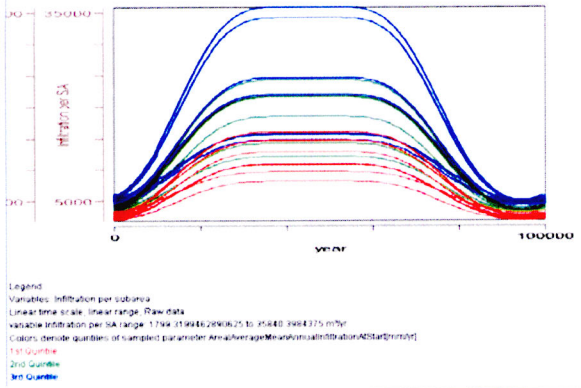
- Follow instructions described in the user's manual for the display of influence diagrams (influence of parameters on variables) by GPP Version 1.0.1. Select a scale (logarithmic or linear) enhancing the differences between realizations.
- Save plots as JPG or TIFF files.
- Use independent FORTRAN 77 procedures to remove text labels from TPA Version 4.0 code output files containing source data and use Mathematica to read the realization data.
- Use Mathematica functions to perform the actions described in the user's manual for the display of influence diagrams.
- Compare GPP influence diagrams to those created with Mathematica.
- Use the Test 2 version of the file gpp.properties to develop additional test cases.

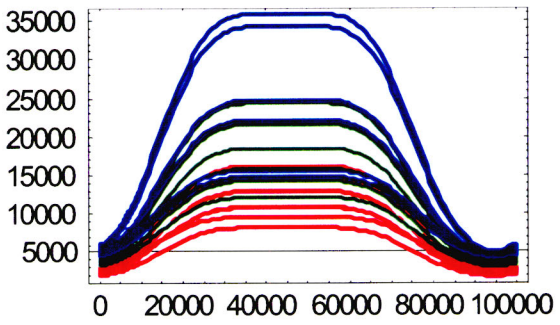
6.3.3 Test Results

The comparison of GPP plots and Mathematica plots are displayed in Tables 6.12–6.14; GPP plots are located on the left columns, and Mathematica plots on the right columns. The TPA Version 4.0 code output file containing the source data is indicated in each table. In order to enhance differences between realizations logarithmic scales were selected when needed. Note that, because of software limitations, the tick marks of Mathematica plots correspond to $\log_{10}(x)$ or $\log_{10}(y)$ where appropriate. Complete agreement was found between GPP influence diagrams and those created with Mathematica. Two aspects required validation: 1) whether the classification of realizations according to percentile ranges of a given parameter is well accomplished, and 2) whether the display of percentile curves is correct. We concluded that both aspects are correct and consistent with the description in the user's manual. Mathematica computations following instructions outlined in the user's manual, produced identical influence diagrams to those generated by the GPP. Given that the same algorithms are used by the GPP, independently of the variable or parameter under analysis, comparison of few influence diagrams is enough to conclude that GPP influence diagrams are correct and consistent with the description in the user's manual.

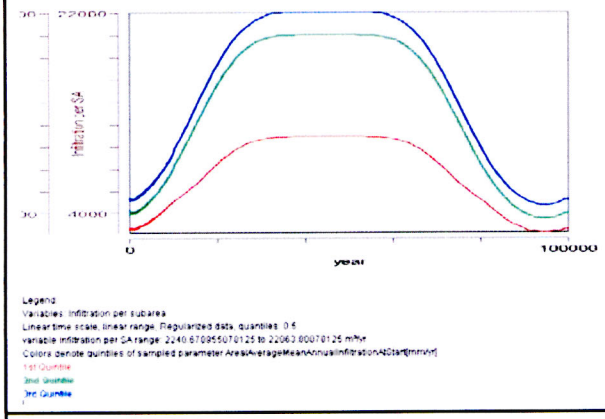
Table 6.12. Comparison of influence diagrams. Parameter: ArealAverageMeanAnnualInfiltrationAtStart[mm/yr]. Variable Data from File uzflow.rlt (Average Infiltration Rate per Subarea). Percentile Ranges: [0, 33), [33, 66), [66,100].

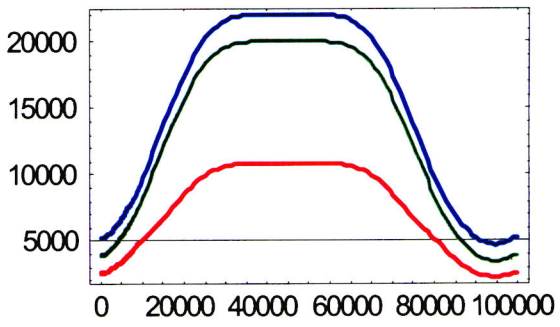
Horse Tail Display



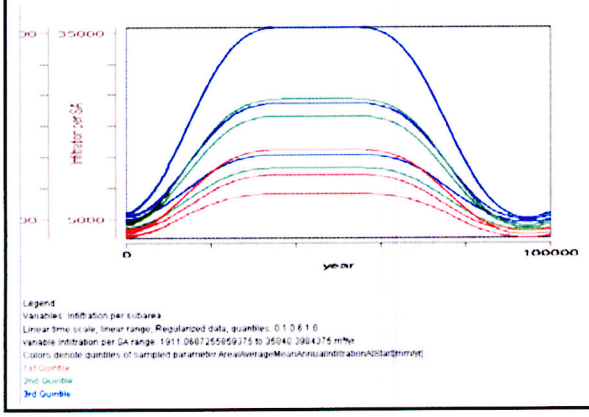


50th Percentile Curves





10th Percentile, 60th Percentile, and Maximum Curves



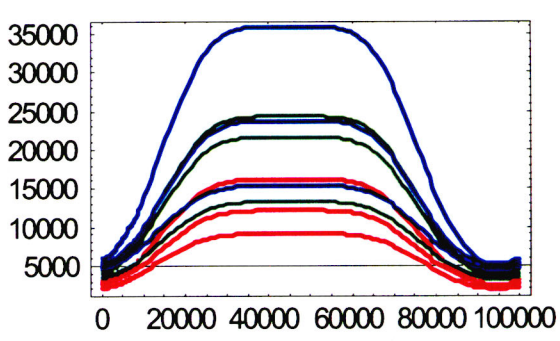
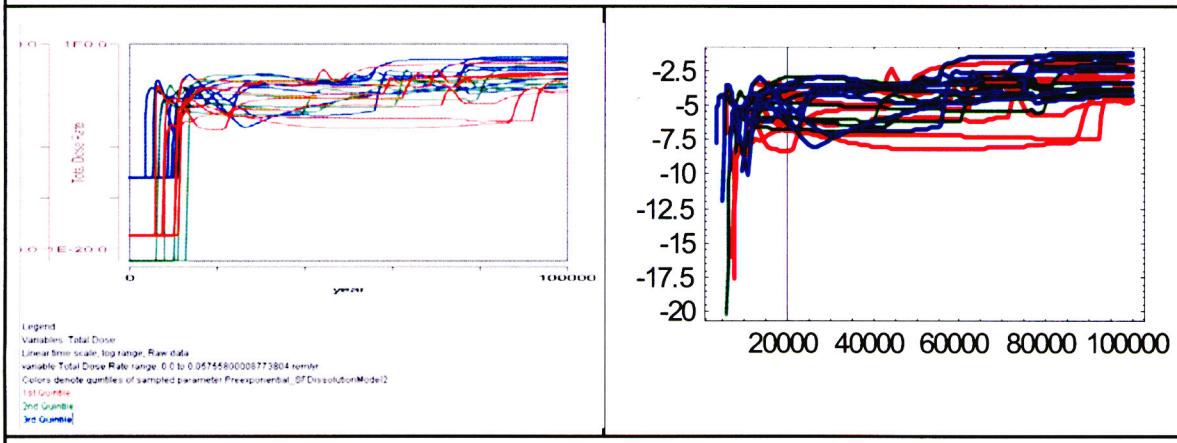
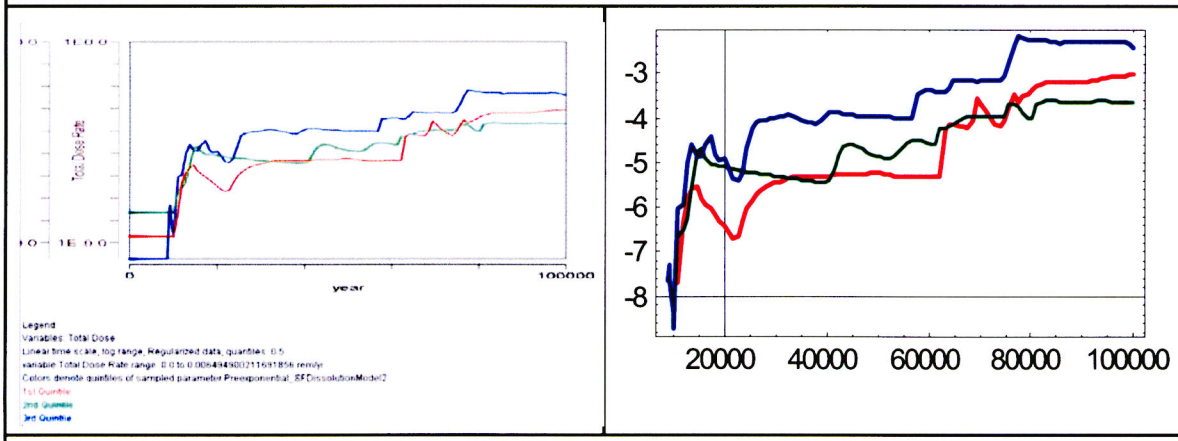


Table 6.13. Comparison of influence diagrams. Parameter: Preexponential_SFDissolutionModel2. Variable data from file totdose.res (Total Dose Rate). Percentile ranges: [0, 33), [33, 66), [66,100].

Horse Tail Display



50th Percentile Curves



20th, 40th, 90th Percentile Curves

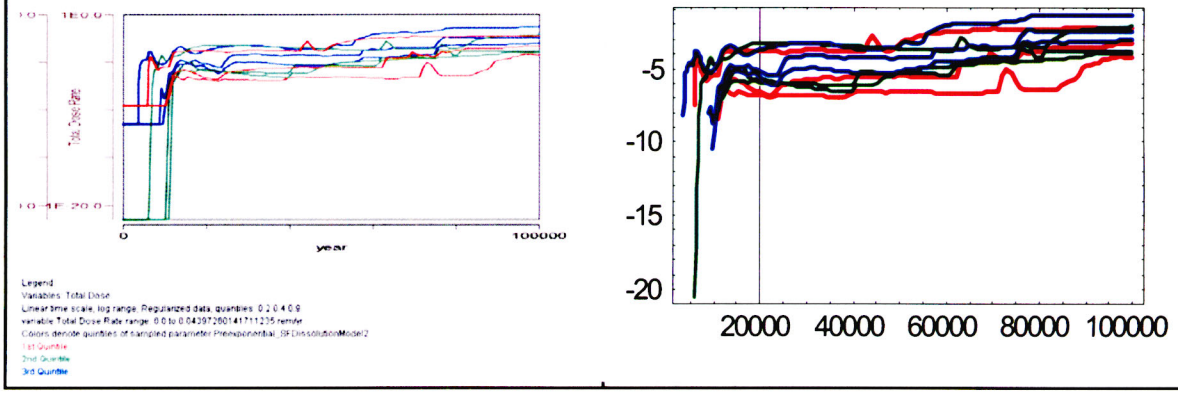
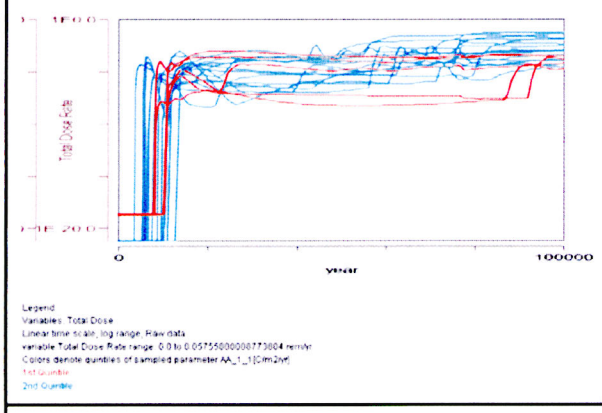
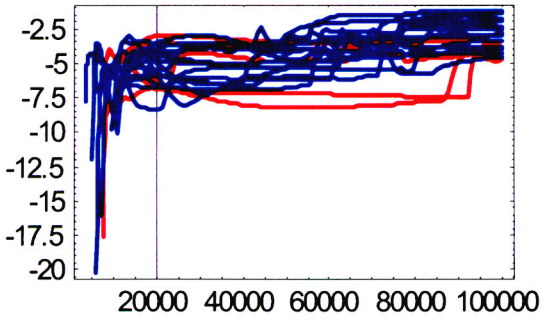


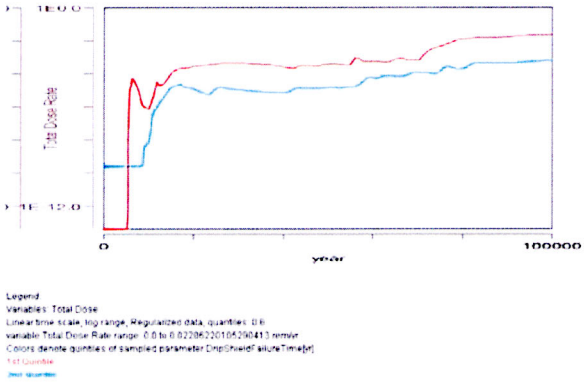
Table 6.14. Comparison of Influence Diagrams. Variable Data from File totdose.res (Total Dose Rate). Percentile Ranges: [0, 25), [25,100].

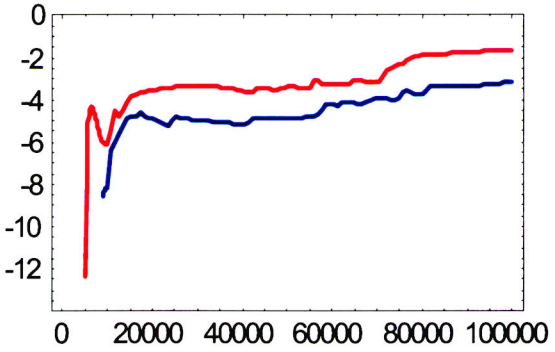
Parameter: AA_1_1[C/m2/yr]. Horse Tail Display.



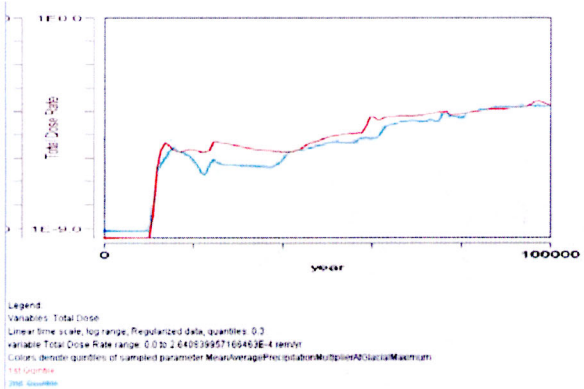


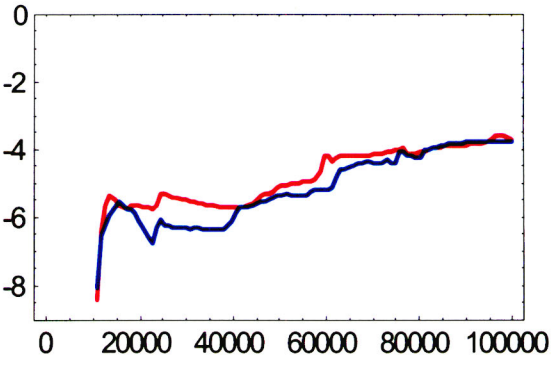
Parameter: DripShieldFailureTime[yr]. 60th Percentile Curves.





Parameter: MeanAveragePrecipitationMultiplierAtGlacialMaximum. 30th Percentile Curves.





6.4 Correct Display of Influence Diagrams, Influence of Variables on Variables

The objective of this test is to verify that influence diagrams (influence of variables on variables) displayed by the GPP correspond to the description in the user's manual. The reader is referred to the user's manual for a thorough description of influence diagrams.

6.4.1 Test Input

Contents of gpp.properties:

```
#which_subarea=1
num_realizations=20
param_percentiles=33,66,100
nuclide_of_interest=none
```

For the test, TPA Version 4.1j code output files of a run of the basecase with 20 realizations were used.

6.4.2 Test Procedure

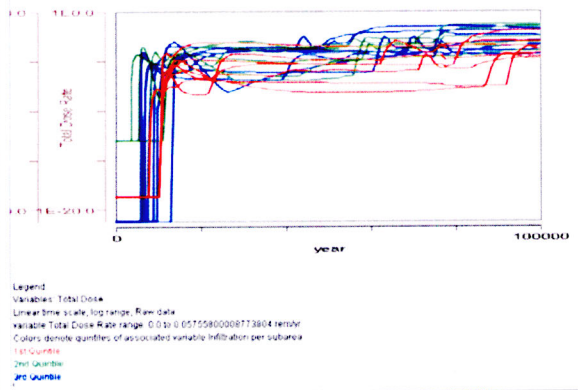
- Follow instructions described in the user's manual for the display of influence diagrams (influence of variables on variables) by GPP Version 1.0.1. Select a scale (logarithmic or linear) enhancing the differences between realizations.
- Save plots as JPG or TIFF files.
- Use independent FORTRAN 77 procedures to remove text labels from TPA Version 4.0 code output files containing source data and use Mathematica to read realization data.
- Use Mathematica functions to perform the actions described in the user's manual for the display of influence diagrams.
- Perform a limited comparison of influence diagrams. Given that the GPP algorithms are independent of the variable of parameter under analysis, only few comparisons are sufficient to test the adequate performance of the GPP application.

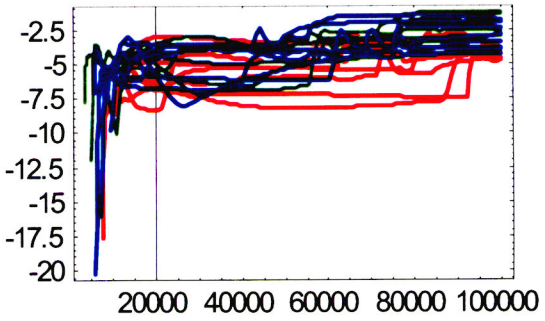
6.4.3 Test Results

The comparison of GPP plots and Mathematica plots are displayed in Tables 6.15–6.16. GPP plots are located on the left columns, and Mathematica plots on the right columns. The TPA Version 4.0 code output file containing the source data is indicated in each table. In order to enhance differences between realizations, logarithmic scales were selected when needed. Note that, because of software limitations, the tick marks of Mathematica plots correspond to $\log_{10}(x)$ or $\log_{10}(y)$ where appropriate. Complete agreement was found between GPP influence diagrams and those created with Mathematica. Independent computations in Mathematica, following instructions outlined in the user's manual, produced identical influence diagrams to

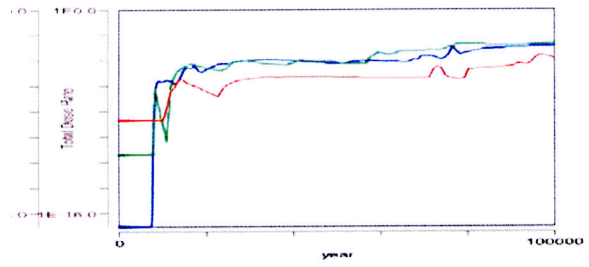
Table 6.15. Comparison of influence diagrams. Variable Data from File totdose.res (total dose rate). Influencing Variable Data from File uzflow.rlt (Average Infiltration per Subarea). Percentile Ranges: [0, 33), [33, 66), [66,100].

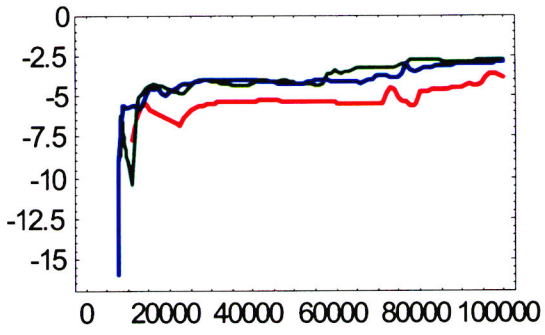
Horse Tail Display



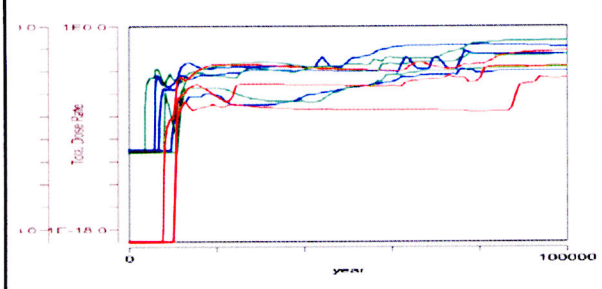


50th Percentile Curves





10th, 40th, and 90th Percentile Curves



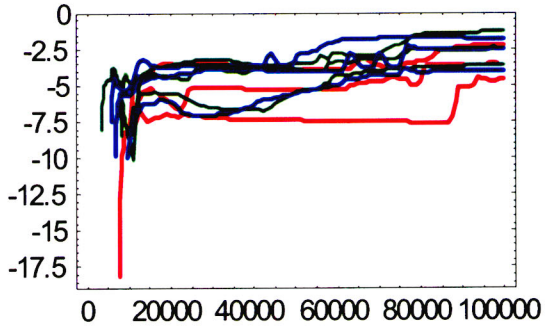
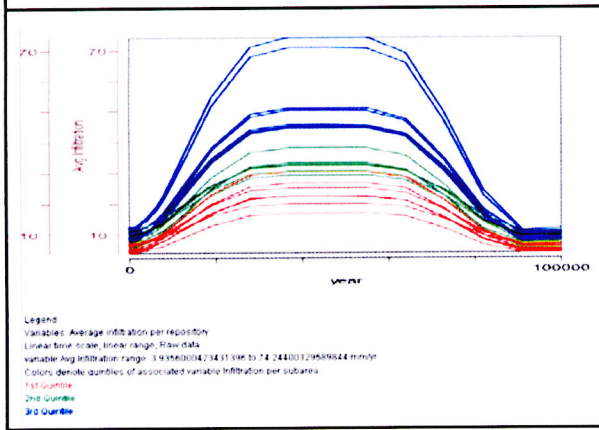
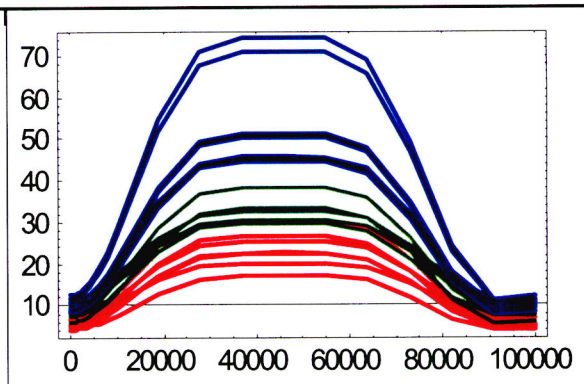


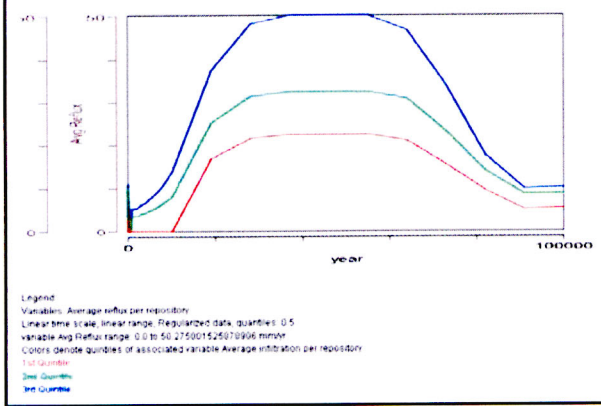
Table 6.16. Comparison of Influence Diagrams. Variable Data from File infilper.res (Infiltration, Reflux, and Diversion). Influencing Variable Data from Files uzflow.rlt (Average Infiltration per Subarea) and infilper.res. Percentile Ranges: 0, 33), [33, 66), [66,100].

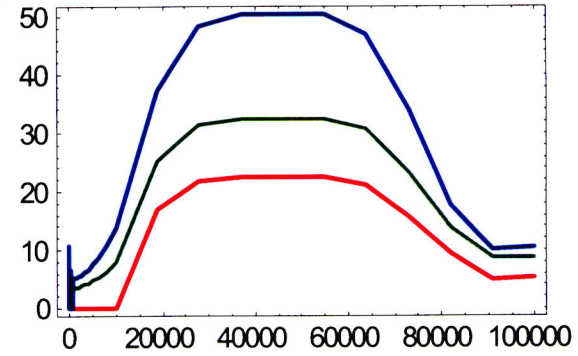
Influence of linfiltration per Subarea on the Average Infiltration. Horse Tail Display.



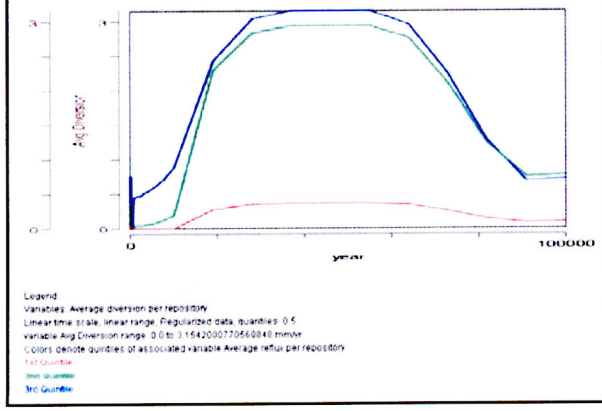


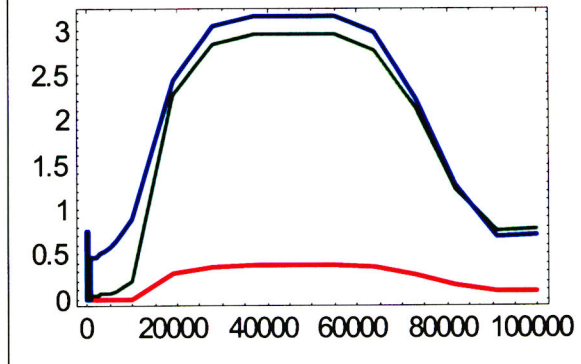
Influence of Average Infiltration on Average Reflux. 50th Percentile Curves.





Influence of Average Reflux on Average Diversion. 50th Percentile Curves.





those generated by the GPP. Given that the GPP algorithms are independent of the variables under analysis, few comparisons suffice to validate the GPP display of influence diagrams. This test provides additional examples, in addition to those in Section 6.3, showing that the display of percentile curves is correct.

6.5 Correct Display of Subarea or Radionuclide Information

The objective of this test is to verify the GPP displays correctly subarea information, for those variables for which subarea information is available, and radionuclide information for radionuclide release variables. The subarea and radionuclide of interest are defined by the lines which_subarea and nuclide_of_interest in the file gpp.properties. The following TPA Version 4.0 code output files contain information on a per subarea basis: uzflow.rlt, nfenv.rlt, ebsfail.rlt, ebsrel.rlt, uzft.rlt, szft.rlt. The release files, ebsrel.rlt, uzft.rlt, szft.rlt, include information on a per nuclide basis.

6.5.1 Test Input

For the test, TPA Version 4.1j code output files of a run of the basecase with 20 realizations were used.

Contents of gpp.properties:

Test 1: which_subarea=1
num_realizations=5
param_percentiles=33,66,100
nuclide_of_interest=Np237

Test 2: which_subarea=5
num_realizations=5
param_percentiles=33,66,100
nuclide_of_interest=Tc99

6.5.2 Test Procedure

- Follow instructions described in the user's manual for the display of variables (raw data displays) by GPP Version 1.0.1. Select a scale (logarithmic or linear) enhancing the differences between realizations.
- Save plots as JPG or TIFF files.
- Use independent FORTRAN 77 procedures to remove text labels from TPA Version 4.0 code output files containing source data and use Mathematica to read realization data.
- Use Mathematica functions to display subarea-specific data and compare to GPP plots.
- Perform a second test, using the Test 2 gpp.properties file, and plot radionuclide releases to provide additional tests that radionuclide and subarea information is appropriately read.

6.5.3 Test Results

The comparison of GPP plots and Mathematica plots are displayed in Tables 6.17–6.22. GPP plots are located on the left columns, and Mathematica plots on the right columns. The TPA Version 4.0 code output file containing the source data is indicated in each table. In order to enhance differences between realizations, logarithmic scales were selected when needed. Note that, because of software limitations, the tick marks of Mathematica plots correspond to $\log_{10}(x)$ or $\log_{10}(y)$ where appropriate. Complete agreement was obtained between the GPP and the Mathematica plots, with a minor apparent exception due to the different treatment of log(0) in the logarithmic-scale plots. Such difference is of no importance. We conclude that the GPP correctly reads subarea data and radionuclide data when available.

6.6 Correct Creation of Comma Separated Value Files

The objective of this test is to verify the GPP correctly creates comma separated value (CSV) files of the displays.

6.6.1 Test Input

For the test, TPA Version 4.1j code output files of a run of the basecase with 20 realizations were used.

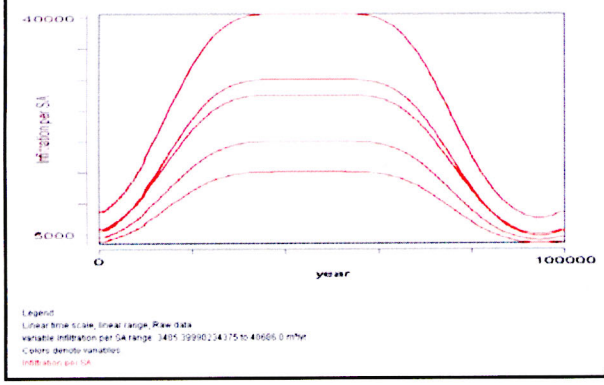
Contents of gpp.properties:

```
which_subarea=4
num_realizations=10
param_percentiles=33,66,100
nuclide_of_interest=Np237
```

6.6.2 Test Procedure

- Follow instructions described in the GPP user's manual to create various graphic displays (e.g., raw data displays, influence diagrams), and displaying multiple variables in a single plot, selecting diverse combinations of percentile curves and scales.
- Save output plots as JPG or TIFF files.
- Follow instructions described in the GPP user's manual to create CSV files containing the data used in the graphic displays.
- Open the CSV files with a text editor and replace commas by spaces, to facilitate Mathematica to read the data.
- Use Mathematica functions to directly read the data from the CSV files and create a graphic display of the data.
- Compare the Mathematica plots to the GPP plots.

Table 6.17. Comparison of Subarea 1 information. Variable Data from File uzflow.rlt (Infiltration per Subarea).



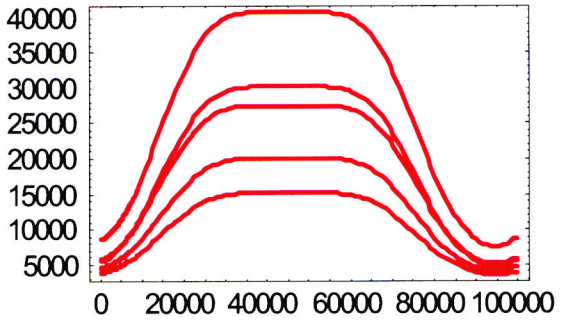
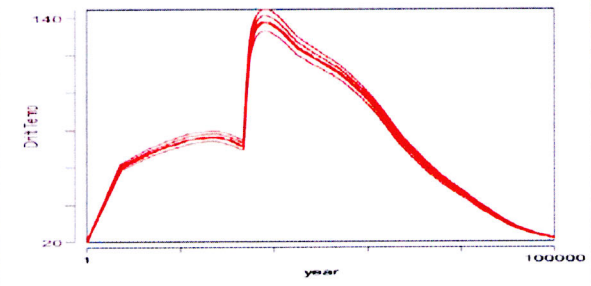
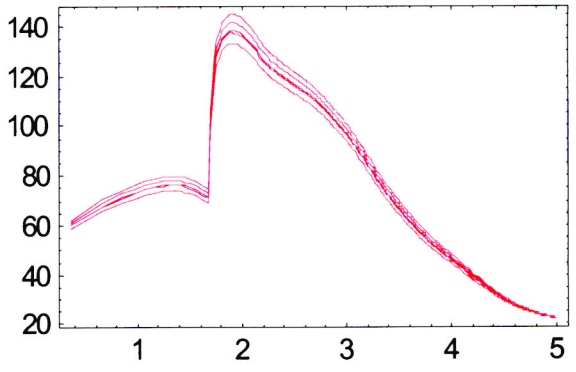
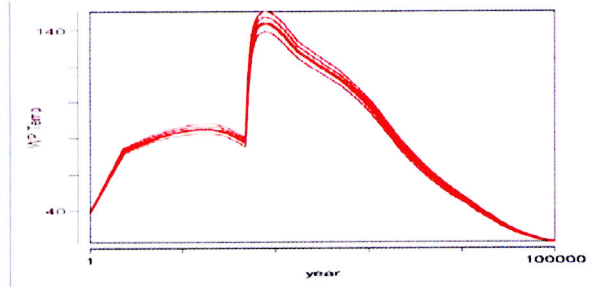


Table 6-18. Comparison of Subarea 1 Information. Variable Data from File nfenv.rlt (Drift Temperature, Waste Package Temperature, Relative Humidity, and Amount of Water Hitting Each Waste Package).







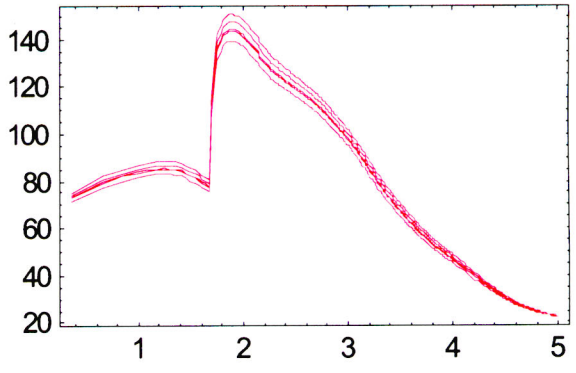


Table 6-18. Comparison of Subarea 1 Information. Variable Data from File nfenv.rlt (Drift Temperature, Waste Package Temperature, Relative Humidity, and Amount of Water Hitting Each Waste Package).

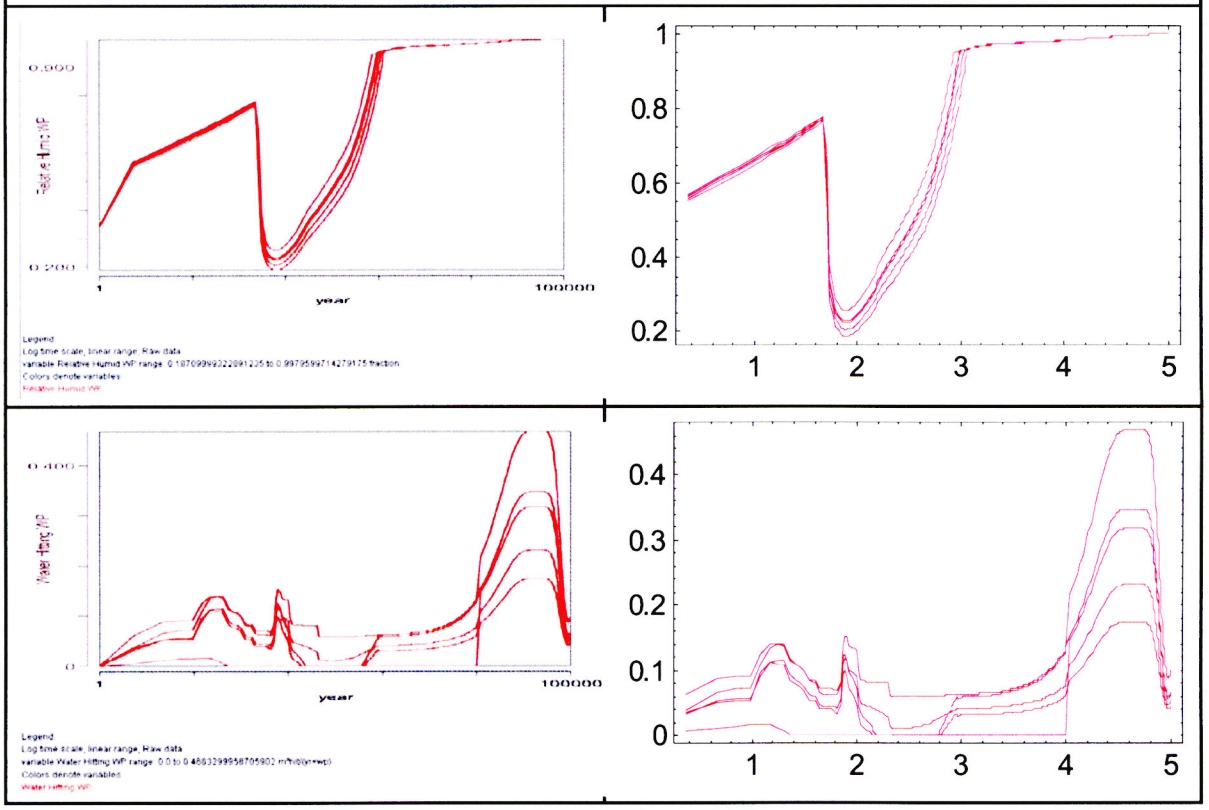


Table 6.19. Comparison of Subarea 1 Information. Variable Data from File ebsfail.rlt (Fraction of Waste Packages Failed).

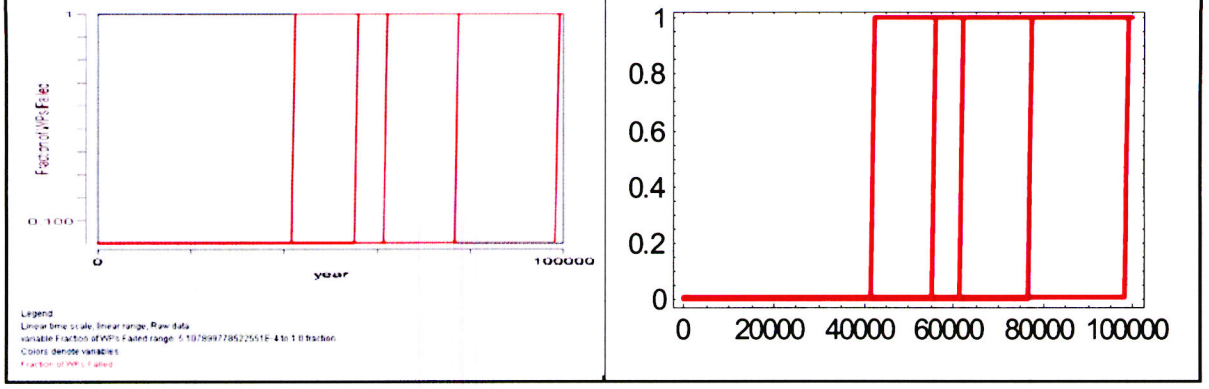
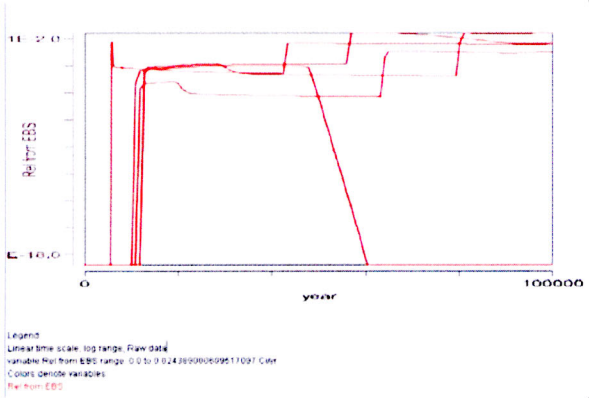
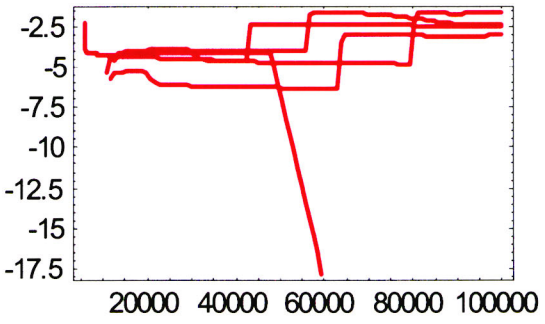


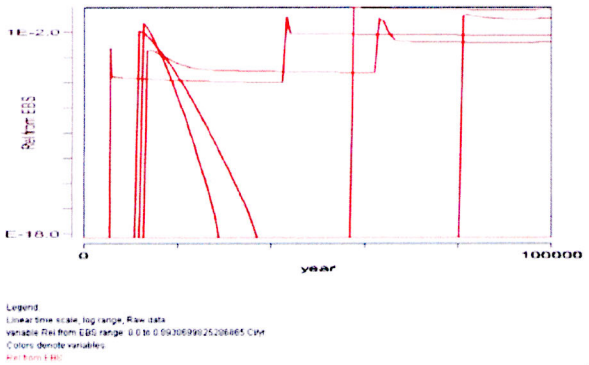
Table 6.20. Comparison of Subarea and Radionuclide Information. Variable Data from File ebsrel.rlt.

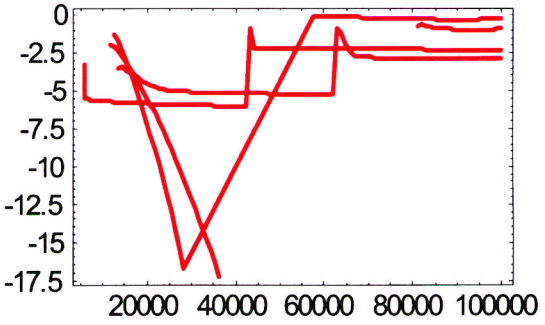
Subarea 1. Release of Np237 from EBS



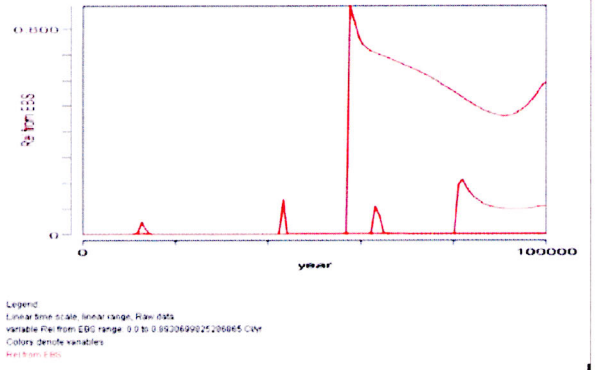


Subarea 5. Release of Tc99 from EBS





Comment: There seems to exist some disagreement, but it is just apparent. The small differences in the plots are caused by the different treatment of Log(0). Mathematica skips all the Log(0) points, and joins all of the other points with lines. On the other hand, the GPP replaces Log(0) by Log(minimum). See that in the next linear-scale plot there are no differences.



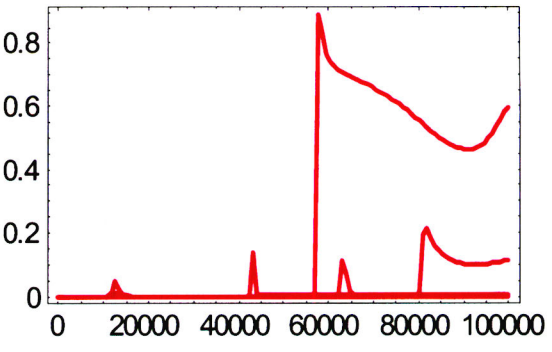
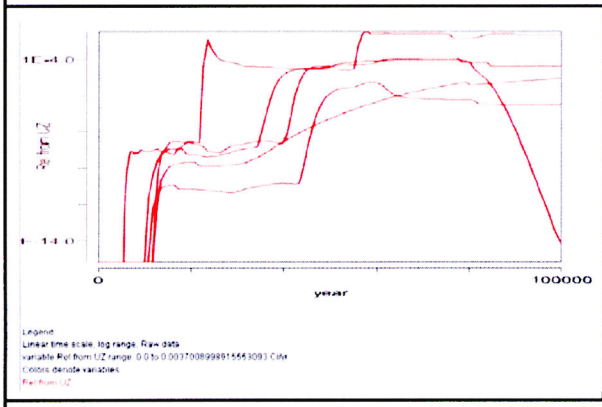
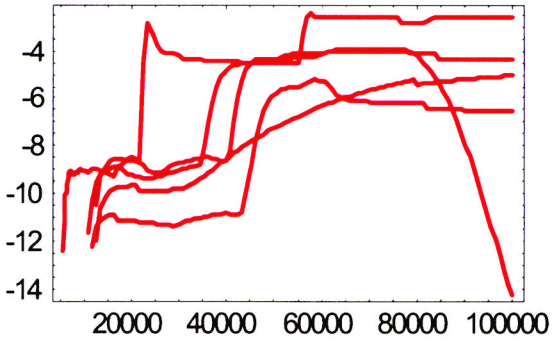


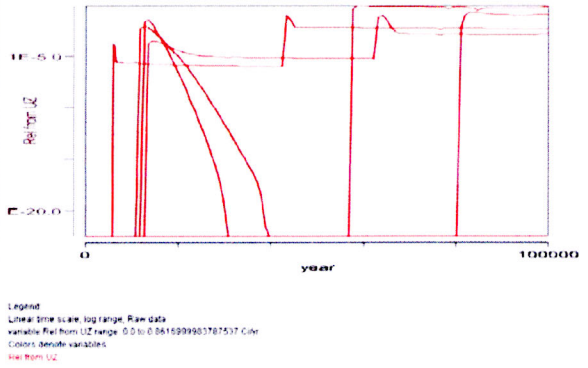
Table 6.21. Comparison of Subarea and Radionuclide Information. Variable Data from File uzft.rlt.

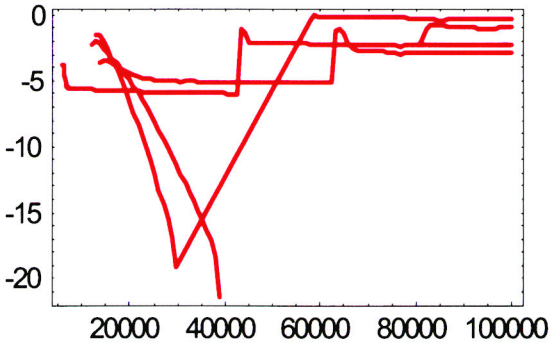
Subarea 1. Release of Np237 from UZ



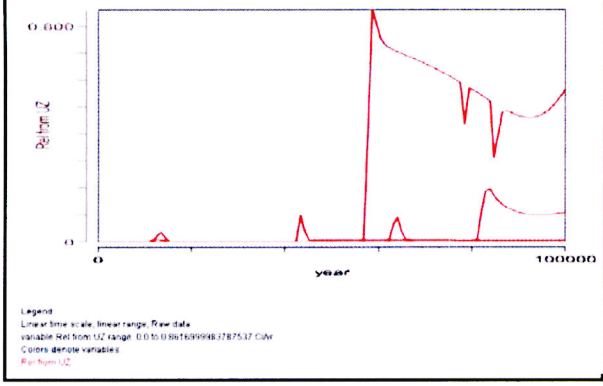


Subarea 5. Release of Tc99 from UZ





Comment: There seems to exist some disagreement, but it is just apparent. The small differences in the plots are caused by the different treatment of Log(0). Mathematica skips all the Log(0) points, and joins all of the other points with lines. On the other hand, the GPP replaces Log(0) by Log(minimum). See that in the next linear-scale plot there are no differences.



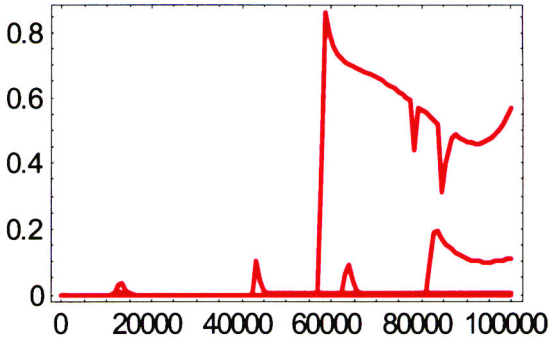
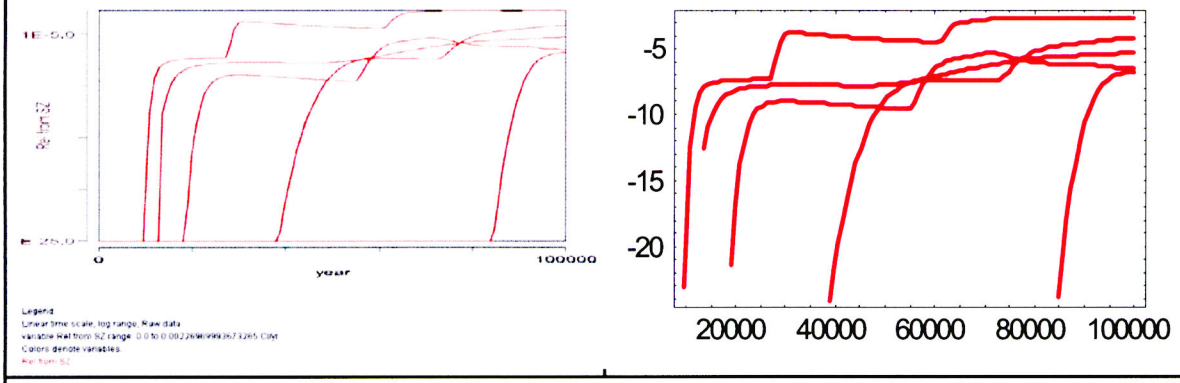
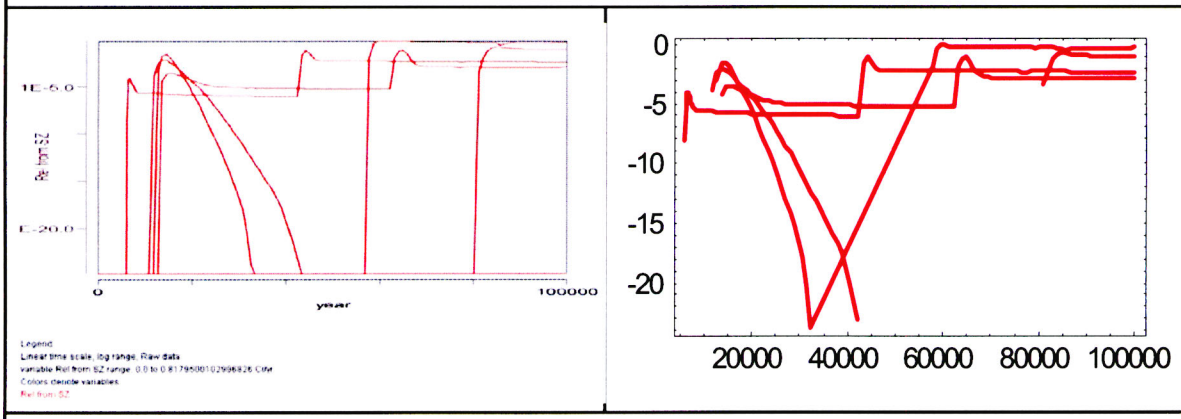


Table 6.22. Comparison of Subarea and Radionuclide Information. Variable Data from File szft.rlt.

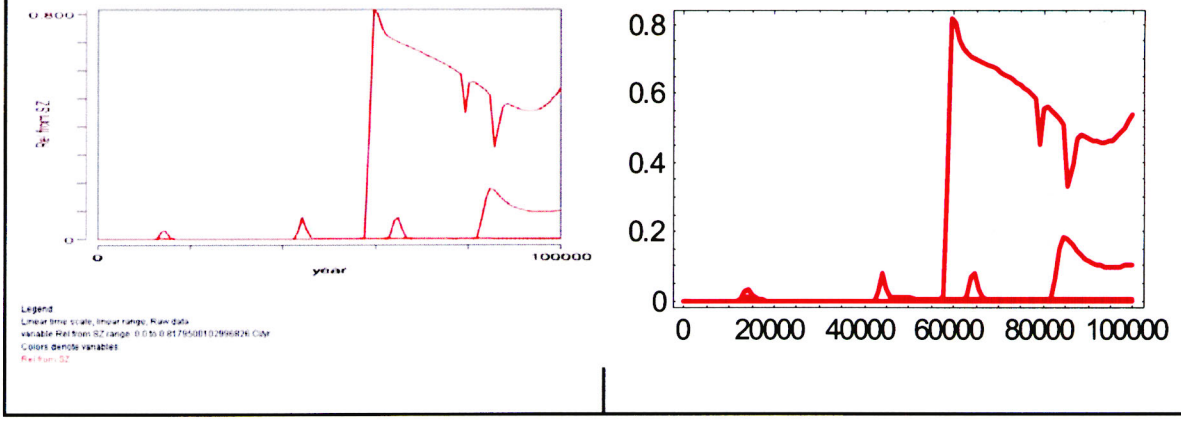
Subarea 1. Release of Np-237 from SZ



Subarea 5. Release of Tc-99 from SZ



Comment: There seems to exist some disagreement, but it is just apparent. The small differences in the plots are caused by the different treatment of Log(0). Mathematica skips all the Log(0) points, and joins all of the other points with lines. On the other hand, the GPP replaces Log(0) by Log(minimum). See that in the next linear-scale plot there are no differences.



6.6.3 Test Results

The comparison of GPP plots and Mathematica plots are displayed in Tables 6.23–6.27. GPP plots are located on the left columns, and Mathematica plots on the right columns. The name of the CSV file containing the data plotted is indicated in each table. Note that when logarithmic scale is selected, the values of the ordinates in the CSV files are the $\log_{10}$ values. The values of the time steps (abscissae) are always in a linear scale in the CSV files. Because of software limitations, when multiple variables were included in a GPP plot, those were compared to independent Mathematica plots. In all cases, complete agreement was found between the graphic display and the data in the CSV files, indicating that data in the CSV files are accurate.

7.0 CONCLUSIONS AND RECOMMENDATIONS

In all of the tests reasonable agreement with independent computations in Mathematica was obtained. We conclude that the actions of the GPP Version 1.01 are accurate and consider the GPP application validated.

There are a number of enhancements that are recommended to clarify and facilitate the use of the GPP application.

7.1 Recommendations

Recommendations in this section are not an indication of unsatisfactory performance by the GPP Version 1.0.1. Instead, the recommendations are made to facilitate the use of the GPP application, facilitate interpretation of the graphic displays, enhance the appearance of the application, and add software options. The recommendations are not listed by order of importance, but in arbitrary order (as they were conceived by the author of this validation report).

7.1.1 Hardwired Number of Subareas

The number of subareas is hardwired in the GPP and equal to 10. In other words, the GPP Version 1.0.1 cannot display those variables that are defined for each subarea, if the GPP is used on a run of the TPA Version 4.0 code with a number of subareas different than 10. The complete list of variables affected by this issue are listed, and in parenthesis are the TPA Version 4.0 code output files containing the source data.

- Infiltration_per_SA (uzflow.rlt)
- Drift_Temp (nfenv.rlt)
- WP_Temp (nfenv.rlt)
- Relative_Humid_WP (nfenv.rlt)
- Water_Hitting_WP (nfenv.rlt)
- Fraction_of_WPs_Failed (ebsfail.rlt)
- Rel_from_EBS (ebsrel.rlt)
- Rel_from_UZ (uzft.rlt)
- Rel_from_SZ (szft.rlt)

Table 6.23. Comparison of Graphic Display and Contents of CSV File Read with Mathematica. CSV file: C_01_01.csv.

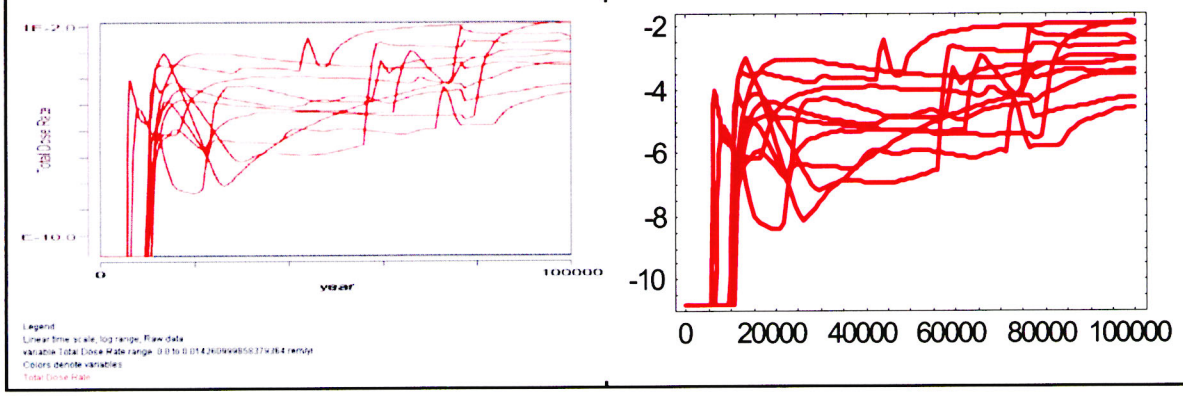


Table 6.24. Comparison of Graphic Display and Contents of CSV File Read with Mathematica. CSV file: C_01_02.csv.

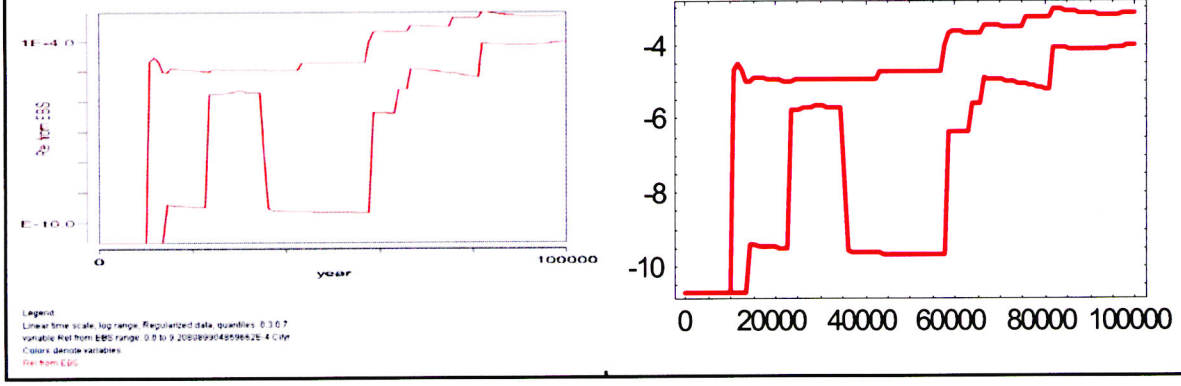


Table 6.25. Comparison of Graphic Display and Contents of CSV File Read with Mathematica. CSV File: C_01_02.csv.

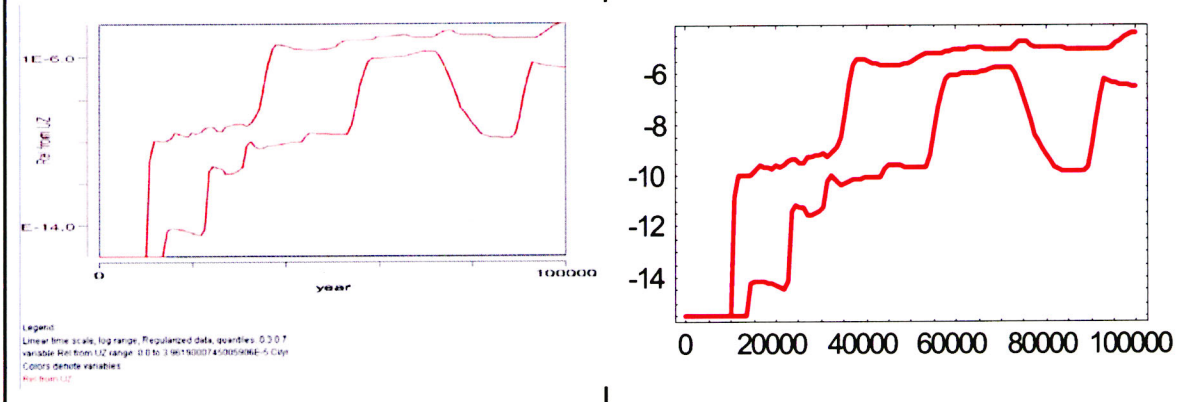
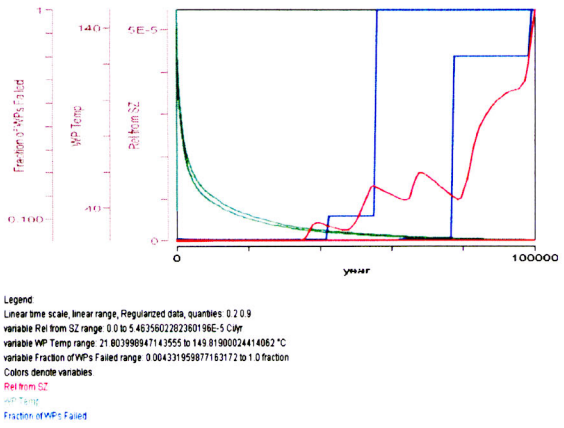
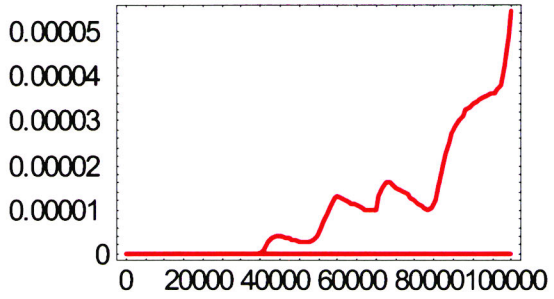
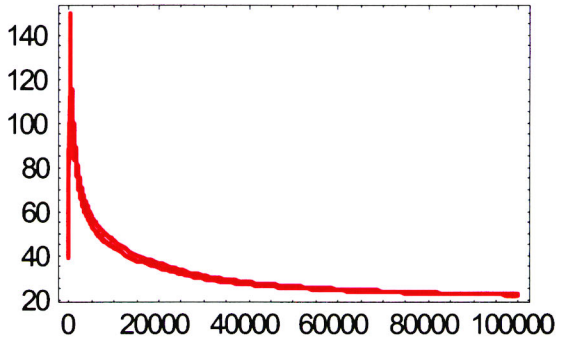


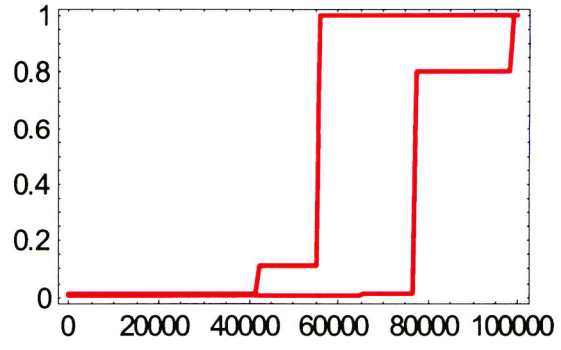
Table 6.26. Comparison of Graphic Display and Contents of CSV File Read with Mathematica. CSV file: C_02_01.csv



Legend:
Linear time scale, linear range, Regularized data, quantiles: 0.2 0.9
variable Rel from SZ range: 0.0 to 5.463560228236019 6E-5 C/yr
variable WP Temp range: 21.803998947143555 to 149.81900024414062 °C
variable Fraction of WPs Failed range: 0.004331959877163172 to 1.0 fraction
Colors denote variables:
Rel from SZ
WP Temp
Fraction of WPs Failed

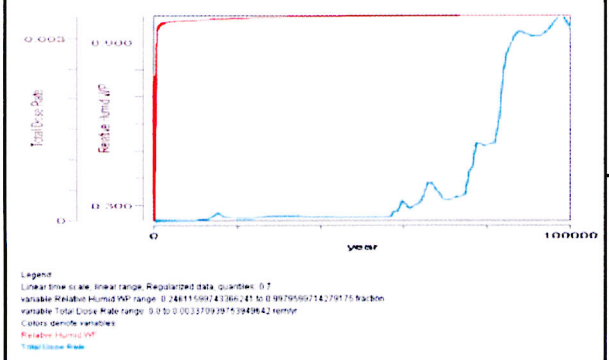


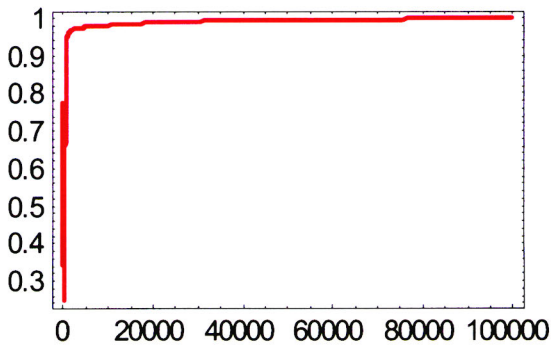


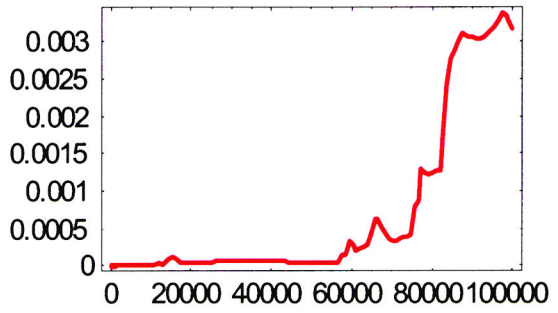


Comment: Because of software limitations, the three variables in the GPP plot are represented as three independent Mathematica plots.

Table 6.27. Comparison of Graphic Display and Contents of CSV File Read with Mathematica. CSV file: C_02_02.csv.







Comment: Because of software limitations, the two variables in the GPP plot are represented as two independent Mathematica plots.

7.1.2 Arithmetic Subarea Averages

In the file gpp.properties, if the line which_subarea is missing or commented out, the GPP computes subarea averages, for each realization, for those variables that are reported per subarea. Subarea specific data are available in the files uzflow.rlt, nfenv.rlt, ebsfail.rlt, ebsrel.rlt, uzft.rlt, szft.rlt. The average per realization is computed by the GPP Version 1.0.1 as an arithmetic average over the subareas; that is,

$$V_{\text{average}}(t) = \frac{1}{10}\sum_{i=1}^{10} V_i(t)$$

$V_i(t)$ is the value of a variable at a particular time-step, for a particular realization, and the index i is the subarea number. For visualization purposes such anapproach is economical and satisfactory. However, other averages may be more meaningful (although their implementation in the GPP is not necessary). For example the average for the variable

Fraction_of_WPs_Failed

could be computed as a weighted average by the subarea size (or by the number of waste packages in each subarea). In general, for extensive quantities (release rates [Ci/yr] and flow rates [m^3/yr]), weighted averages by subarea size are more meaningful than arithmetic averages. On the other hand, for intensive quantities (e.g., temperatures, fluxes [mm/yr], relative humidity) arithmetic averages are adequate.

No change is recommended to the GPP Version 1.0.1, but a comment in the user's manual may be appropriate. For the variable Fraction_of_WPs_Failed, the arithmetic subarea average and the subarea size weighted average yield identical results under TPA Version 4.0 code output files, because there is no variation in the fraction of waste packages failed from subarea to subarea. Future versions of the TPA Version 4.0 code may not differ significantly in this regard.

7.1.3 Variable Names

With regard to comment 7.1.2, it is recommended to revise the labels displayed in the Plot Control Window. For example, replace

Rel from EBS

by

Rel from EBS per SA

to highlight the fact that the GPP outputs an arithmetic subarea average. The complete list of recommended label changes are summarized in Table 7.1.

7.1.4 Additional Label to Plot Legend

It is recommended to include an extra label in the legend of the plot, highlighting that the visual output is a subarea average for subarea specific data. Possible labels could be "Arithmetic Subarea Average" or "Subarea 4" if, for example, which_subarea=4 in the file gpp.properties. Such label should only be displayed if the plot contains a variable with subarea specific information.

Table 7.1. Recommended Label Changes in the Plot Control Window, Variable Frame

Current Label	Recommended Label
Drift Temp	Drift Temp per SA
WP Temp	WP Temp per SA
Relative Humid WP	Relative Humid WP per SA
Water Hitting WP	Water Hitting WP per SA
Fraction of WPs Failed	Fraction of WPs Failed per SA
Rel from EBS	Rel from EBS per SA
Rel from UZ	Rel from UZ per SA
Rel from SZ	Rel from SZ per SA

It is also recommended, in the legend of the release plots, to add the particular radionuclide name (defined in the file gpp.properties by the line nuclide_of_interest) or the label "All Radionuclides" if total releases are displayed.

7.1.5 Word Quintile in Plot Legend

Influence diagrams use the word "quintile" for the ranges defined in the file gpp.properties in the line param_percentiles. It is recommended to change that "quintile" label as it is only justified for the case param_percentiles=20,40,60,80,100. An expression such as "Percentile Ranges" is generally valid.

7.1.6 Control of gpp.properties Inside Menu Window

It would be convenient to control the contents of the file gpp.properties from a menu window. Currently, changes to the file gpp.properties are not recognized until closing and re-launching the application. It would be convenient also to include a help note, possibly in the file gpp.properties, denoting the variables affected by the lines which_subarea and nuclide_of_interest. Although it is well explained in the user manual the meaning of the line param_percentiles, it would be convenient to include a short note clarifying that this line defines percentile ranges to be used in the influence diagrams.

7.1.7 Location and Name of CSV and JPG Files

It is recommended to allow the user to define the name of the CSV (Dump command) and JPG (Snap command) files and the save location in the hard drive. Currently, CSV and JPG files are named by default with a name including the saving date and time, as well as the Version of the GPP. CSV and JPG files are saved in the location of the GPP application. Although this approach was selected to satisfy quality assurance requirements, it is more useful to allow manual control on file naming.

7.1.8 Different Format for CSV Files

It is recommended to transpose CSV files, so that they can be directly opened with Microsoft® Excel. Realization data must be organized by columns. It is currently organized by rows, which causes Excel to truncate the number of time steps.

7.1.9 Manual Control of x and y Ranges

It is recommended to allow the user manual control of the range along ordinate and abscissa directions. Consider adding an input field inside the plot, or multiple fields in case multiple variables are included in the same plot, to allow the user to define ranges.

7.1.10 Mean Curves

It is very important to include display of mean curves.

7.1.11 Cleaner JPG Files

The Snap selection is highlighted in the menu in the output JPG file. The menu of the Repository Performance Visualization (RPV) window in the output JPG file should not be displayed.

7.1.12 CSV Files for Scatter and Box and Whisker Plots

It is recommended to include the capability to create CSV files for scatter plots and box and whisker plots. CSV files should include all relevant information such as radionuclide names.

7.1.13 Consolidation of Plot Control and View Control Windows

It is recommended to merge the Plot Control Window and the View Control Window into a single window. Currently, the View Control Window has very few fields. It is recommended considering to combine all of the GPP windows into a single window, with buttons or tree links, rather than the current pull-down menus that occupy much screen space.

7.1.14 Search Field for Parameter Names

It is recommended to include a search field in the Plot Control Window, in the Influences frame, to search for a specific parameter name. Currently, the more than 300 parameters are displayed in a pull-down menu, and locating a particular parameter is cumbersome.

7.1.15 Control of Scales for Scatter Plots, Enhancement of Display Style

It is recommended to allow user control of the scale (linear or logarithmic) of scatter plots. Currently only linear scale is allowed. It is desirable to improve the style of scatter plots. For example, each point is printed as a rectangle of a different color. Probably scatter plots with points represented as small circles of a single color may have a more professional appearance.

7.1.16 True-Type Fonts for Tick Marks and Axes Labels

It is recommended to enhance the display style of the plots to make them more professional looking to be directly used in reports and publications. For example, it is recommended the use of a printer true-type font such as Times New Roman or Arial for the tick marks and axes labels. It is desirable to allow user control of the font type and style.

7.1.17 Parameter Names Dependent on the TPA Version 4.0 Code Run

If data from a TPA run is opened, and then a second TPA run is opened, the list of parameter names in the Plot Control window, Influences frame, correspond to the sampled parameters of the first TPA run. The parameter names should correspond to the appropriate TPA run.

7.1.18 Influence Diagrams for Scatter Plots and Box and Whisker Plots

As a research problem, it is recommended to explore alternatives to produce influence diagrams for scatter plots (peak dose) and box and whisker plots (dose conversion factors and cumulative releases).

Software Change Reports

SOFTWARE CHANGE REPORT (SCR)

1. SCR No. (*Software Developer Assigns*): 401	2. Software Title and Version: Graphical Post-Processor Version 1.01 for the TPA Code (Version 4.0)	3. Project No:20.01402.762

4. Affected Software Module(s), Description of Problem(s):

[Bug 1]
Plotting the time axis in log scale will produce an error for the following variables:
Avg_Infiltration [mm/yr], Avg_Reflux [mm/yr], Avg_Diversion [mm/yr]

[Bug 2]
It is not possible to overlap two specific variables, under particular conditions.

Time scale : logarithmic
Variable 1: Water Hitting WP
Variable 2: Avg Diversion or Avg Infiltration or Avg Reflux

The plot for the "Water Hitting WP" is not correct.

A correct plot is displayed if the time scale is selected linear.

Unexpected results are displayed when Variable 1, any Variable 2, and any other variable are mixed in the same plot, and the time-scale is selected logarithmic. A correct plot is shown if the time-scale is linear.

[Bug 3]
Fraction of WPs failed ranges from 0 to 1 when log scale is selected. Lower vertical label should be given a label different than 0 when log scale is selected.

[Bug 4]
Avg Diversion, Avg Infiltration, Avg Reflux

The abscissae values for the above variables are shifted one time step downwards, leaving the last time step without abscissae value. Some garbage is assigned to the last time step, usually zero.

Additional explanation of the above bugs were documented in Scientific Notebook 376-2E, section maintained by Osvaldo Pensado.

5. Change Requested by: Osvaldo Pensado Date: 2/18/2002	6. Change Authorized by (*Software Developer*): Bayesian Systems, Inc. On behalf of Bayesian Systems Date: 2/18/2002

7. Description of Change(s) or Problem Resolution (*If changes not implemented, please justify*):

[Bug 1]
Bugs fixed in version transmitted to Osvaldo Pensado on Feb. 11, 2002 (Version 02-02-11)

[Bug 2], [Bug 3], [Bug 4]
Bugs fixed in version transmitted to Osvaldo Pensado on Feb. 28, 2002 (Version 02-02-28)

8. Implemented by: On behalf John Emmerling, Bayesian Systems, Inc.	**Date:** Feb. 28, 2002
9. Description of Acceptance Tests: The Graphical Post-Processor is a graphic display tool. It was verified that the data were correctly displayed by the application, and that the 4 bugs reported above were addressed. Details on the acceptance testing are reported in Scientific Notebook 376-2E (section maintained by Osvaldo Pensado), pages 72 - 73.	
10. Tested by: Osvaldo Pensado	**Date:** March 1, 2002

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