

**Test Plan and Baseline Testing Results for the  
FRAMES EXF and BBF Viewers**

**Addendum to**

**Demonstration of the Wildlife Ecological  
Assessment Program (WEAP)**

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# Contents

1.0 Background and Scope .....	Page -1-
2.0 Requirements .....	Page -1-
3.0 Test Cases and Baseline Testing Results .....	Page -2-
3.1 VIEWER01 .....	Page -2-
3.2 VIEWER02 .....	Page -3-
3.3 VIEWER03 .....	Page -4-
3.4 VIEWER04 .....	Page -4-
3.5 VIEWER05 .....	Page -5-
3.6 VIEWER06 .....	Page -5-
4.0 References .....	Page -6-

## 1.0 Background and Scope

This paper presents a test plan and the baseline testing results for the EXF and BBF viewers of the Framework for Risk Analysis in Multimedia Environmental Systems (FRAMES). The purpose of these viewers is to allow FRAMES users to view, as text and graphical output, the default set of input and output files produced by the applicable modules in the FRAMES software. The viewers are specifically designed as objects for inclusion into the FRAMES software, which is a platform that allows for the linking of various multimedia modules into complete transport/exposure assessment systems (Whelan et al. 1997).

The viewers are being baseline tested for FRAMES Version 1.3. The test cases developed for this testing, and presented in this paper, will also be used for assessing the effects of future code modifications. Each time a modification is made to the program code, these test cases are rerun, and their results are compared to the previous run (regression testing). Changes in the results are evaluated to determine if they were expected as a result of the modification and are an acceptable change, or if they are an unintended side effect. In the latter case, the program code can be changed and the testing performed again.

There are two viewer types associated with this test plan:

1. Ecological Dose File (EXF)— probability of exceedence versus contaminant concentration, time varying acute and chronic exposures
2. Body Burden File (BBF)— ecological hazard quotients over variant times; probability of exceedence for ecological hazard quotients and dose or body burden

Each of these files is produced when its respective modules have been run (e.g., ecological dose files after the water module). Both files can be viewed graphically or textually. All text views and most of the graphical viewers require only the existence of a valid file of the appropriate type.

The following sections list the requirements of the viewers, explain how these requirements relate to the specific test cases in this plan, and then present the test cases themselves.

## 2.0 Requirements

Requirements for the viewers are described in the paper entitled, *Requirements for the FRAMES Specification Files Viewer Modules*. These requirements have been reworded into the following list (Table 1) of concise, fundamental requirements suitable for testing.

**Table 1.** Requirements Suitable for Testing

Requirement Number	Requirement
1	Allow the user to textually or graphically view the information from the connected module.

Requirement Number	Requirement
2	For text viewers, allow the user to scroll through pages of text.
3	For text viewers, allow the user to print the output.
4	Include text viewer output matches that are depicted in the graphical viewer
5	For graphical viewers, use external existing graphing tools such as Excel or GNU plot.
6	For graphical viewers, label all axes consistently with units included in labels.
7	For graphical viewers, display a legend of the curve provided.
8	For graphical viewers, produce all same-type plots consistently (i.e., two-dimensional, time-varying plots).
9	For graphical viewers, correctly reflect the data in the textual file.

Table 2 shows the relationship between these requirements and the test cases described in Section 3. Although some requirements are applicable to all test cases, this table mainly shows which requirements are intended to be tested by each case.

**Table 2.** Relationship Between Requirements and Test Cases

		Test Case Number					
		01	02	03	04	05	06
Requirements	1	x	x	x	x	x	x
	2	x		x		x	
	3	x		x		x	
	4	x		x		x	
	5		x		x		x
	6		x		x		x
	7		x		x		x
	8		x		x		x
	9		x		x		x

### 3.0 Test Cases and Baseline Testing Results

This section describes the specific test cases used for baseline testing of the new viewers to FRAMES 1.3. For a complete listing of FRAMES viewers, refer to the requirements for the FRAMES Specification File Viewer Modules. Because this testing program evaluates the viewers, and not the modules themselves, no calculations are performed. Instead, the tester checks that results displayed in textual format are consistent between result files viewed internally and externally to the system and also checks that text-file results are consistent with those displayed in graphical format. Appendix A describes the general procedure for conducting a test.

## **3.1 VIEWER01**

### **3.1.1 Description and Rationale**

The EXF viewer must be capable of displaying the results of a source module either textually or graphically, depending on user needs. This test case evaluates the capability of the EXF viewer to display results in textual format. Specific actions that will be evaluated include the following:

- Does the EXF textual viewer allow the user to scroll through pages of text for the entire file?
- Do the results shown in the EXF textual viewer match the results shown when the EXF is opened using Notepad?
- Do the results shown in the EXF textual viewer match the results shown in the graphical viewer (Test Case WEAP02)?

### **3.1.2 Input Data**

This test case runs the viewer named EXF in the GID file WEAP02.gid.

### **3.1.3 Expected Results**

It is expected that the textual viewer will allow scrolling and that the results shown match what is in the Notepad file as well as the results shown in the graphical viewer.

### **3.1.4 Baseline Testing Results**

The EXF text viewer performed as expected. The results from the EXF textual viewer matched the results from the EXF opened in Notepad. When printed, the EXF contained four pages of text. The viewer allowed scrolling the full length of the file. Horizontal scrolling was not needed to read all text lines. Therefore, the viewer passed this test.

## **3.2 VIEWER02**

### **3.2.1 Description and Rationale**

This test case evaluates the capability of the EXF viewer to display results in graphical format. Specific actions that will be evaluated include the following:

- Does the SCF graphical viewer use external existing graphic tools?
- Are all axes labeled, including units?
- Is there a legend of the curve provided?
- Are the plots consistent in format with similar types of plots produced under other test cases (e.g., VIEWER04, VIEWER06, etc.)?

- Do the plots correctly depict the actual data in the EXF?
- Does the plot reflect a time-varying concentration curve and display usage location, medium, and contaminants on the screen?

### **3.2.2 Input Data**

This test case runs the viewer named EXF graphical viewer in the GID file WEAP02.gid.

### **3.2.3 Expected Results**

It is expected that the EXF graphical viewer will generate plots in Excel, one for each of the six contaminant concentrations. These plots will be consistent in format with each other and with similar plots produced under other test cases (e.g., VIEWER04, VIEWER06, etc.). Each plot will have axes labeled with units and will have a legend.

### **3.2.4 Baseline Testing Results**

The EXF graphical viewer uses Excel to plot results. All axes were labeled, including units. Note that units were not consistent between this graphical viewer and others. However, as units are partially dependent on what was provided in the module GID file; the viewer software alone cannot standardize it. The curve has a legend, and the plots correctly depict the data in the EXF, based on output from the text viewer. Therefore, this viewer passed its test case.

## **3.3 VIEWER03**

### **3.3.1 Description and Rationale**

The BBF viewer must display the results of a source module either textually or graphically, depending on user needs. This test case evaluates the capability of the BBF viewer to display results in textual format. Specific actions that will be evaluated are similar to those evaluated in Test Case VIEWER01.

### **3.3.2 Input Data**

This test case runs the viewer named BBF text view in the GID file WEAP02.gid.

### **3.3.3 Expected Results**

The expected results are similar to those outlined for Test Case VIEW01.

### **3.3.4 Baseline Testing Results**

The BBF text viewer also performed as expected. The results matched those from the BBF opened in Notepad. Therefore, the viewer passed this test.

## **3.4 VIEWER04**

### **3.4.1 Description and Rationale**

This test case evaluates the capability of the BBF viewer to display results in graphical format. Specific actions that will be evaluated are similar to those evaluated for Test Case VIEW02.

### **3.4.2 Input Data**

This test case runs the viewer named BBF graphical viewer in the GID file WEAP02.gid.

### **3.4.3 Expected Results**

The expected results are similar to those outlined for Test Case VIEWER02.

### **3.4.4 Baseline Testing Results**

The BBF graphical viewer uses Excel to plot results. All axes were labeled and included units. Note that units were not consistent between this graphical viewers and others. However, as units are partially dependent on what was provided in the module GID file, the viewer software alone cannot standardize it. The plots correctly depict the data in the BBF, based on output from the text viewer. The curve displayed body burden versus time for the different species.

## **3.5 VIEWER05**

### **3.5.1 Description and Rationale**

The EXF viewer must be able to display the results of a source module either textually or graphically, depending on user needs. This test case evaluates the capability of the EXF viewer to display results in textual format. Specific actions that will be evaluated include the following:

- Does the EXF textual viewer allow the user to scroll through pages of text for the entire file?
- Do the results shown in the EXF textual viewer match the results shown when the EXF is opened using Notepad?
- Do the results shown in the EXF textual viewer match the results shown in the graphical viewer (Test Case WEAP01)?

### **3.5.2 Input Data**

This test cases runs the viewer named EXF text viewer in the GID file WEAP01.gid.

### **3.5.3 Expected Results**

It is expected that the textual viewer will allow scrolling and that the results shown match what is in the Notepad file as well as the results shown in the graphical viewer.

### **3.5.4 Baseline Testing Results**

The EXF text viewer performed as expected. The results from the EXF textual viewer matched the results from the EXF opened in Notepad. When printed, the EXF contained one page of text. The viewer allowed scrolling the full length of the file. Horizontal scrolling was not needed to read all text lines. Therefore, the viewer passed this test.

## **3.6 VIEWER06**

### **3.6.1 Description and Rationale**

This test case evaluates the capability of the EXF viewer to display results in graphical format. Specific actions that will be evaluated are similar to those outlined in Test Case VIEWER02.

### **3.6.2 Input Data**

This test cases runs the viewer named EXF graphical viewer in the GID file WEAP01.gid.

### **3.6.3 Expected Results**

It is expected that the EXF graphical viewer will generate plots and/or charts in Excel. These plots will be consistent in format with each other and with similar plots produced under other test cases (e.g., VIEWER02, VIEWER04, etc.). Each plot will have axes labeled with units and will have a legend.

### **3.6.4 Baseline Testing Results**

The EXF graphical viewer uses Excel to plot results. All axes were labeled, including units. Note that units were not consistent between this graphical viewer and others. However, as units are partially dependent on what was provided in the module GID file, the viewer software alone cannot standardize it. The curve has a legend, and the plots correctly depict the data in the EXF, based on output from the text viewer. Therefore, this viewer passed its test case.

## **4.0 References**

Whelan G., K. J. Castleton, J. W. Buck, G. M. Gelston, B. L. Hoopes, M. A. Pelton, D. L. Strenge, and R. N. Kickert. 1997. *Concepts of a Framework for Risk Analysis in Multimedia Environmental Systems (FRAMES)*. PNNL-11748, Pacific Northwest National Laboratory, Richland, Washington.

## **Appendix A**

### **Additional Information on Viewer Testing**

**This document provides instruction for testing the FRAMES viewers, including the general procedure for conducting the tests in this plan.**

**After starting FRAMES, click on File, Open, and select one of the two test GID files (i.e., either Weap01.gid or Weap02.gid).**

**To test a text viewer, do the following**

1. Open test file Weap01.gid.
2. Make sure that the light for the module to which the text viewer is connected is green. If the light is not green, click on the module and follow instructions until the light turns green. All data are already selected in the modules; the module may only need to be run with the viewer connected to turn the light green.
3. Right click on the module you just ran and select View/Print Module Output followed by the EXF text view option. Print the data that appear when the viewer is opened and save this printout for comparison to the graphical viewer output. Close the viewer.
4. Open the Windows Explorer and locate the name of the viewer file in the test-bed directory. The file will be named for the GID file that corresponds to that test case (for example, for test cases that evaluate textual viewers, the GID file is Weap01.gid and the corresponding viewer files will be named Weap01.aff, Weap01.wcf, etc.). Open that file using Notepad.
5. Compare the results printed from the viewer file to the results shown in the Notepad.

**To test a graphical viewer, do the following:**

6. Open test file Weap01.gid.
7. Make sure that the light for the module to which the text viewer is connected is green. If the light is not green, click on the module and follow instructions until the light turns green. All data are already selected in the modules; the module may only need to be run with the viewer connected to turn the light green.
8. Right click on the module you just ran and select View/Print Module Output followed by the graphical view option (EXF, WCF, etc.). An Excel spreadsheet will self-populate. Print the data using the appropriate Excel commands. Close the graphics program.
9. Compare the results shown in the graphical viewer to those in the textual viewer.

