

Hydrologic Deterministic Verification Test Plan

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Table of Contents

| | | |
|------------|--|----------|
| 1.0 | <i>Overview</i> | 3 |
| 2.0 | <i>Prerequisites</i> | 3 |
| 3.0 | <i>General Test Steps</i> | 3 |
| 3.1 | <i>Vfyrinfo Test Details</i> | 3 |
| 3.2 | <i>IVP Test Details</i> | 4 |
| 3.3 | <i>IVP Batch Program Test Details</i> | 6 |
| 3.4 | <i>IVP Batch Builder Test Details</i> | 7 |
| 3.5 | <i>Other Details</i> | 7 |
| 4.0 | <i>Conclusion</i> | 7 |

1.0 Overview

The Interactive Verification Program (IVP) and IVP Batch Program are being changed for OB8.2 in order to satisfy requirements as stated in the *Concept of Operations and Requirements Specification Document* for the Complete Deterministic Verification HOSIP project. Described herein is a plan for independently testing the new IVP against the requirements stated in Appendix B of the document above. The requirements will be referred to by number within this document, so it is recommended any reader have a copy of the requirements on hand.

2.0 Prerequisites

The primary prerequisite before testing the software is the presence of an RFC archive database populated with test data. The test performed will require a consistent canned set of data to work with, so that the correct results can be identified and compared against captured screenshots and baseline output files. In order to run the test, the tester will be responsible for the following:

- Installation of the test archive database, and what settings for environment variables and apps-defaults tokens are needed to access the database.
- Installation of the test data package and knowledge of the directory where the package is located.
- Having a copy of the test procedure.

3.0 General Test Steps

The following programs must be tested:

- Vfyruninfo Editor: The editor must be tested to determine if a location can be added and removed from the table. A location is defined by the lid, pe, dur, extremum, and forecast type source, and has associated with it an active flag (yes for active, no for not active), a national flag, a list of sensor preferences (observed type sources), and a response time. Each field must be editable for all rows in the GUI.
- IVP: The GUI must be tested to be sure that it allows for the user to select locations to verify, define parameters of verification, create an initial scatter plot and time series plot of the pairs used in verification, select parameters of a graphic to create, and create the graphic.
- IVP Batch Program: The batch program must be tested to be sure it can load any pairs from the vfpairs table, calculate statistics specified in the requirements, and generate any graphics that can be generated within the GUI.
- IVP Batch Builder: The batch builder must be tested to be sure it allows for editing all commands or actions within the batch language, run the batch file using the IVP Batch Program, and view any output files.

The test procedures will provide the step-by-step instructions associated with each of the following sections.

3.1 Vfyruninfo Test Details

The vfyruninfo table defines what verification locations are available for verification within the IVP software. As such, the test of the Vfyruninfo Editor tests the following requirements:

1.1.2, 1.1.6.1, 1.2.1.1-1.2.1.4, 1.2.1.6, 1.2.1.9, 1.2.1.11

The following tests should be performed using the Vfyruninfo Editor:

1. Make sure Vfyruninfo Editor starts correctly.
2. In the first GUI, the IVP Vfyruninfo Table Editor main window, test that the contents of the two displayed tables correspond correctly to the contents of the ingestfilter and vfyruninfo archive database tables.
3. Verify that new rows can be added to the table with each having a unique combination of location id, physical element, duration, extremum, and forecast type source. Each will also specify a sensor preference list, a response time, an active flag, and a national flag. Rows can be added to the vfyruninfo table either based on the ingest filter table or manually.
4. Verify that existing rows can be changed in the table.
5. Verify that the contents can be saved to and loaded from the vfyruninfo table.
6. Make sure the Vfyruninfo Editor exits correctly.

3.2 IVP Test Details

The following tests should be performed using the IVP software. Any step that tests a listed requirement will have the number of that requirement provided in italics at the end of that step's description.

1. Make sure IVP starts.
2. Verify that each field can be edited via the Verification Group Manager window using the tools provided.
 - a. Verify that parameters can be loaded from a batch file.
 - b. Verify that each parameter specified via the window can be edited.*Requirements: 1.2.1.5, 1.2.1.6, 1.2.1.7, 1.2.1.8, 1.2.1.9, 1.2.1.10, 1.2.1.11, 1.2.2.4, 1.2.2.5, 1.2.2.6*
3. Verify that the Verification Location Manager window can be opened from the Verification Group Manager window.
4. Verify that all features of the Verification Location Manager function properly:
 - a. Verify that all locations listed in the vfyruninfo table of the archive database are visible in the table within this window, and that the rivercrit information given in the as, fs, modfs, majfs, and rs columns are correct. This requires performing postgres queries and comparing the results to the GUI.
 - b. Verify that the categories listed and locations chosen match those specified in the batch file (loaded in step 2.a above).
 - c. Verify that one or more rows can be selected from the table.

- d. Verify that rows can be selected based on physical element, duration, extremum, forecast type source, and active/not active.
 - e. Verify that the forecast and observed categories can be specified from this window.
 - f. Verify that rows can be chosen to be displayed in the IVP Data Display window.
Requirements: 1.2.1.1, 1.2.1.2, 1.2.1.3, 1.2.1.4, 1.2.1.12, 1.2.2.1
5. Verify that the IVP Data Display can be opened from the Verification Group Manager window.
- a. Verify that if a parameter is improperly specified (such as if location data types do not have the same unit), then the IVP Data Display will not be created.
Requirements: 1.2.1.13, 1.2.1.14, 1.2.1.15
6. Verify that the IVP Data Display interacts correctly with the Verification Group Manager and Verification Location Manager.
- a. Change some setting in both the Verification Group Manager and Verification Location Manager, and verify that the IVP Data Display must be recreated due to parameter changes.
 - b. Verify that all locations chosen for display in the Verification Location Manager are present in the location list panel.
7. Verify that the menu options of the IVP Data Display work.
- a. Verify that the IVP Data Display can open the Verification Group Manager, Verification Location Manager, and Plot Definition Manager windows.
 - b. Verify that the chart displayed in the window can be saved to a PNG or JPEG file.
 - c. Verify that the chart allows for zooming.
 - d. Verify that the line $y=x$ can be plotted on the chart.
 - e. Verify that a Chart Property Manager window can be opened allowing for users to edit features of the chart.
Requirements: 5.1.5
8. Verify that the Verification Pairs Data Manager window can be opened up from the IVP Data Display.
- a. Verify that the data matches the data in the chart.
 - b. Verify that colors are used to distinguish rows visible in the chart from those not visible in the chart (due to zooming).
 - c. Verify that the data can be saved to a file.
 - d. Verify that pairs can be marked as good or bad, and that the plot reflects those marks.
Requirements: 5.1
9. Verify that the Plot Definition Manager window can be opened up from the IVP Data Display window.
10. Verify that the options in the Plot Definition Manager can be set correctly.
- a. Verify that statistics can be chosen for display against right or left-hand y-axes from IVP Statistic Chooser Manager windows.
 - b. Verify that special plots can be selected and that the window options become disabled as appropriate depending on the special plot.
 - c. Verify that the parameter displayed along the x-axis can be specified.
 - d. Verify that the parameter used as the comparison variable can be specified.
 - e. Verify that a category can be chosen, restricting data used in generating the graphic.
 - f. Verify that a graphics template file can be specified.
Requirements: 1.2.2.2, 1.2.2.3, 1.2.3, 1.3.1, 1.3.3, 1.3.4, 1.3.5, 1.3.6

11. Verify that the IVP Statistic Display window can be opened from the Verification Plot Definition manager, and that it displays an appropriate chart based on user settings.
12. Verify that the menu options in the IVP Statistic Display work.
 - a. Verify that the chart displayed in the window can be saved to a PNG or JPEG file.
 - b. Verify that a batch file can be created that recreates chart displayed in the window.
 - c. Verify that a Chart Property Manager window can be opened allowing for users to edit features of the chart.

Requirements: 1.4.1, 1.4.2, 5.1.2, 5.1.4, 5.1.1, 5.1.4, 5.1.5, 5.1.6
13. Verify that the IVP Statistics Data Viewer can be opened up from the IVP Statistic Display.
 - a. Verify that the data matches the data in the chart.
 - b. Verify that the data can be saved to a file.

Requirements: 1.6, 5.1.3
14. Verify that the Chart Properties Manager window can be used to edit properties of the chart displayed in either the IVP Data Display or IVP Statistic Display.
 - a. Verify that each of the parameters required to be editable via the Chart Properties Manager can be edited.
 - b. Verify that chart properties can be saved to and loaded from a template file via the Actions menu of the IVP Statistics Display and the Options menu of the IVP Data Display.

Requirements: 1.3.2
15. Create many different graphics by changing the settings in the Plot Definition Manager and verify that they are created correctly.
16. Verify that the windows can close down.
 - a. Click on the “Close” menu item in the IVP Statistic Display.
 - b. Click on the “x” in the upper corner of every other open window, except for the IVP Data Display. This should close each window.
 - c. Click on the “Exit” menu item of the IVP Data Display. The program should shut down.

NOTE: The program should also shut down if you click on the “Close” button of the IVP Data Display while the Verification Group Manager is not open, or by closing the Verification Group Manager while the IVP Data Display is not open.

3.3 IVP Batch Program Test Details

The following test should be performed using the IVP Batch Program. Any step that tests a listed requirement will have the number of that requirement provided in italics at the end of that step’s description.

1. Verify that every required parameter can be set via the IVP Batch Program batch language.
 - a. Verify that all pairing parameters can be edited.
 - b. Verify that all location parameters can be edited.
 - c. Verify that all group parameters can be edited.
 - d. Verify that all graphics parameters can be edited.

Requirements: 1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.1.6, 1.2, 1.3.1, 1.3.3, 1.3.4, 1.3.5, 1.3.6

2. Verify that pairs can be built by the software, and that the pairs are correct.
 - a. Verify that the data paired is specified by the vfyruninfo table and parameters of the batch file.
 - b. Verify that output pairs are stored in the vfypairs table.
3. Verify that every required statistic can be calculated and output to an ascii file, and that the output statistics are correctly calculated.
 - a. Verify that output file can be generated and that statistics shown therein are correctly computed.
 - b. Verify that a pairs file can be generated and that it contains the correct pairs data.

Requirements: 1.1.7

Requirements: 5.1.1, 5.1.2, 5.1.3, 5.2, 5.3

4. Verify that any graphic that can be produced via the IVP GUI can also be produced via the IVP Batch Program.
 - a. Verify that a batch file saved from the IVP GUI can be executed via the IVP Batch Program to generate an identical graphic.
 - b. Verify that the template file can be specified using the batch tokens.
 - c. Verify that the graphics can be produced and output to a PNG or JPG file.
 - d. Verify that the data comprising a graphic can be output to an ASCII text file.

Requirements: 1.3.2, 1.4.3, 5.1.4, 5.1.5, 5.1.6

3.4 IVP Batch Builder Test Details

IVP Batch Builder is software designed to guide the user through building and running an IVP Batch Program batch file. The following test should be performed using the IVP Batch Builder:

1. Verify that any batch command or action of the IVP Batch Program can be edited via the IVP Batch Builder interface.
2. Verify that commands displayed in the command list can be saved to or loaded from a batch file.
3. Verify that the IVP Batch Builder can run the IVP Batch Program using the batch file displayed in the command list, and that any output file (both graphics files and ascii text files) generated from the execution can be viewed.

3.5 Other Details

The test above will use canned data, so that results will be predictable and easy to check. The canned data will be comprehensive and representative of data found in the field.

4.0 Conclusion

Upon completion of these tests, the software should be fully tested and all requirements are satisfied.