**CACIE Tool #NN** – **Surface Rate Interpolator(surf\_rate\_interp\_win\_intel\_64.exe)**

**Version** **1.0**

**QA**: **QA**

# Description and Purpose

The Surface Rate Interpolator (SRI) takes STOMP output or other time series data with similar format and extrapolates the time series into a uniform yearly format. It also has the capability to convert the mass of the time series between various units.

# Functional Requirements

The following are the functional requirements (FR) of the SRI.

FR-1: Read space delimited files

FR-2: Read comma delimited files

FR-3: Read tab delimited files.

FR-4: Allow the user to label what each column in the file represents. If the column does not have a label then, skip that column.

FR-5: “single file” option will generate an output file with the same file name as the input file but with “\_yearly\_steps.csv” added to it. If this option is not used it will output each column in a separate file named the definition + “yearly\_steps.csv”

FR-6: If multiple columns have the same definition then it will sum the mass of those columns together to create a single timeseries for that data.

FR-7: If the input dataset does not include a column for cumulative mass for the timeseries, calculate the cumulative mass based on the rate data included in the input dataset.

FR-8: It will have the capability of applying conversion factors to the data. Built-in conversion factors convert from the base units of grams (g) to micrograms (µg) and Curies (Ci) to picoCuries (pCi), as well as a custom conversion factor, which is user-defined. Default conversion value is 1.

Converted Mass = Mass × conversion factor

FR-9: It will Interpolate the cumulative mass time series for each column into integer years i.e. 2018, 2019, 2020 etc. The original data is interpolated into a series of integer single year steps using the formula below.

Where:

| Cumulative Interpolation Calculation Variable Definitions |
| --- |
| cum = Interpolated cumulative mass value being calculated for a given year |
| year = Given year that the interpolated cumulative mass value is being calculated (i.e., full year timestep) |
| yearp = Year prior to the given year (i.e. first full year timestep prior to given year) |
| yearn = Timestep after the given year (i.e., not necessarily a full year timestep) |
| cumn = Cumulative mass value after the given year (corresponding to yearn) |
| cump = Cumulative mass value prior to the given year (corresponding to yearp) |

FR-10: Calculate the rate for each integer year using the interpolated cumulative mass time series.

Where:

| Rate Interpolation Calculation Variable Definitions |
| --- |
| rate = Rate being calculated for a given year |
| cum = Cumulative mass value for a given year |
| cump = Cumulative mass value prior to the given year |

FR-11: Ability to select and process multiple files from a single directory. Each file selected must have identical headers.

FR-12: Option to create stepwise outputs. Insert intermediary steps between the integer years using the same rate as the previous rate. The inserted step will be the previous step + 0.9999999. For example:

* + 2019 = 12,
  + 2019.9999999 = 12,
  + 2020 = 15,
  + 2020.9999999 = 15
  + etc.

FR-13: Ability to use the application from a command line, using a XML config file that will configure the application options, input file(s) or whole directory, and output location.

# Software Requirements Specifications

Programming Language and required modules/libraries:

* C#
* Microsoft Visual Studio 2015
* Microsoft Office Interop Excel v15.0.4785.1
* WindowsAPICodePack-Core v1.1.2
* WindowsAPICodePack-Shell V1.1.1

# Software Design Description

The SRI uses a graphical user interface (GUI) to load files and define input parameters.

Input Files:

Input files contain time series data that need to be extrapolated into a uniform yearly format (years will all be integer). The format of the input file needs to be in either comma, tab, or space delimited with the first column being “Time”. All mass related columns after that will use that column as its time reference for its timeseries. Any comments should have a ‘#’ as the first character of the line.

Command Line Input:

If the application is run from a command line with an argument, the application will assume the argument is a XML configuration file. The XML configuration file will tell the application what files to process and what options to use. It can specify single or multiple files with separate options or one set of options for an entire directory.

Example 1 configuration file. Specifies 2 files that are in the same directory. The first file allows the application to determine the header names, the second file explicitly tells the application which columns to use and what to name them. If an option is left out the application will assume a default value for it.

<?xml version="1.0" encoding="utf-8"?>

<root>

<dir name="C:\tools\test\SRI\test4\vz\_data">

<file name="rsp-h-3-bot\_header.csv">

<units>pCi/Year</units>

<conv\_factor>1000000000000</conv\_factor>

<first\_header>8</first\_header>

<last\_header>10</last\_header>

<delim>,</delim>

<use\_cumulative>true</use\_cumulative>

<consolidate\_file>true</consolidate\_file>

<path\_out>C:\tools\test\SRI\test4\output</path\_out>

<step\_wise>true</step\_wise>

</file>

<file name="rsp-h-3-bot.csv">

<units>pCi/Year</units>

<conv\_factor>1000000000000</conv\_factor>

<first\_header>8</first\_header>

<last\_header>10</last\_header>

<delim>,</delim>

<use\_cumulative>true</use\_cumulative>

<consolidate\_file>true</consolidate\_file>

<path\_out>C:\tools\test\SRI\test4\output</path\_out>

<step\_wise>true</step\_wise>

<cols>

<col index="0">time</col>

<col index="1">101-38</col>

<col index="11">101-43</col>

<col index="51">100-41</col>

<col index="71">100-51</col>

<col index="79">100-55</col>

<col index="83">100-57</col>

<col index="87">100-59</col>

</cols>

</file>

</dir>

</root>

Example 2 configuration file. This example shows how to process an entire directory. It gives the file name of ‘all’ which tells the application to grab all files from the directory. It will process all of the files with the same settings, and in this example the columns have been specified so it will assume all files have the same headers.

<?xml version="1.0" encoding="utf-8"?>

<root>

<dir name="C:\tools\test\SRI\test4\vz\_data2">

<file name="all">

<units>pCi/Year</units>

<conv\_factor>1000000000000</conv\_factor>

<first\_header>8</first\_header>

<last\_header>10</last\_header>

<delim>,</delim>

<use\_cumulative>true</use\_cumulative>

<consolidate\_file>true</consolidate\_file>

<path\_out>C:\tools\test\SRI\test4\output</path\_out>

<cols>

<col index="0">time</col>

<col index="1">101-38</col>

<col index="11">101-43</col>

<col index="51">100-41</col>

<col index="71">100-51</col>

<col index="79">100-55</col>

<col index="83">100-57</col>

<col index="87">100-59</col>

</cols>

</file>

</dir>

</root>

Output Files:

The output file will be named using the original file name plus “\_yearly\_steps.csv”. the first line will be location of the original data, second line will be the header with column names, second line will be header with column units. Each line after that will be data.

The cumulative output file contains the cumulative data used to calculate the rates for each year in the yearly steps output. Cumulative data is used as typically it has a higher precision than rate data when coming from STOMP.

Tool Runner:

The following is the shell script configuration that will be passed as an argument to the Tool Runner for qualified runs:

{directory path to repository}\tools\surf\_rate\_interpolation\win64\ surf\_rate\_interp\_win\_intel\_64.exe

Code Review:

Sara Lindberg performed a code review on May 15, 2020. No impacts to other repository tools or library dependencies were identified for the SRI.

# Requirements Traceability Matrix

The requirements traceability matrix for the SRI is presented in Table 1.

| Table  Requirements Traceability Matrix | | |
| --- | --- | --- |
| **Functional Requirement ID** | **Acceptance Test ID** | **Test Case** |
| QA Level | CACIE-surf\_rate\_interp\_win\_intel\_64.exe -IT-1 | Installation Test |
| FR-1 | CACIE- surf\_rate\_interp\_win\_intel\_64.exe -AT-1 | Open Space-delimited File |
| FR-2 | CACIE- surf\_rate\_interp\_win\_intel\_64.exe -AT-2 | Open Comma-delimited File |
| FR-3 | CACIE- surf\_rate\_interp\_win\_intel\_64.exe -AT-3 | Open Tab-delimited file |
| FR-4 FR-5 | CACIE- surf\_rate\_interp\_win\_intel\_64.exe -AT-4 | User-defined Column Headers  Generate Single Output File |
| FR-5 FR-7 FR-9  FR-10 | CACIE- surf\_rate\_interp\_win\_intel\_64.exe -AT-5 | Calculate cumulative data and generate separate output files for each column with a unique user-defined “definition.”  Calculate cumulative values for integer year timesteps if these timesteps are not included in original dataset.  Generate output files with rate and cumulative data for yearly (integer) timesteps. |
| FR-6 | CACIE- surf\_rate\_interp\_win\_intel\_64.exe -AT-6 | Sum multiple columns with same user-defined “definition” |
| FR-8 | CACIE- surf\_rate\_interp\_win\_intel\_64.exe -AT-7 | Apply user-selected conversion factors |
| FR-11 | CACIE- surf\_rate\_interp\_win\_intel\_64.exe -AT-8 | Process multiple files |

# Installation Test Plan and Acceptance Test Plan Cases

The installation test plan for the SRI is presented in Table 2 and the acceptance test plan cases for the SRI is presented in Table 3 through Table 10.

| Table  **Surface Rate Interpolator Installation Test Plan** | | | |
| --- | --- | --- | --- |
| **Surface Rate Interpolator Installation Testing**  **CACIE- surf\_rate\_interp\_win\_intel\_64.exe – IT-1** | | **Date:** | |
| **Tool Runner Log File Location for this test:**  **[PUT LINK TO THE DIRECTORY HERE]** | | **Test Performed By: [FIRST & LAST NAME]** | |
| **Testing Directory: [PROVIDE LINK TO TESTING DIRECTORY]** | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | **Test Result  (Pass/Fail)** |
| Tools Code Repository Directory: | | | |
| Navigate to the testing directory | | | |
| 1 | Invoke Tool runner and test installation of the tool by entering the following command as follows:  *./runner\_run\_IT-1\_SRI.bat* | | |
| 2 | Verify Tool Runner is invoked and executed. | Tool runner log generated |  |
| 3 | Verify graphic user interface window for the Surf Conversion tool opens | Graphic user interface window opens |  |

| Table  **Surface Rate Interpolator Acceptance Test Plan Case 1** | | | |
| --- | --- | --- | --- |
| **Surface Rate Interpolator Acceptance Testing**  **CACIE-** **surf\_rate\_interp\_win\_intel\_64.exe – AT-1** | | **Date:** | |
| **Tool Runner Log File Location for this test:**  **[PUT LINK TO THE DIRECTORY HERE]** | | **Test Performed By:** | |
| **Testing Directory: OLIVE\\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\ AT-1** | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | **Test Result  (Pass/Fail)** |
| Navigate to the Testing Directory | | | |
| 1 | [If not already open] Start application (double-click on *runner\_run\_SRI.bat*)  [If already opened] Clear header1 row and header2 row text boxes  Unselect Select ‘Single Output’, ‘Use Cumulative’, and any ‘Conv. Factor’ options | | |
| 2 | Select “space” delimiter radio button | | |
| 3 | Click “Browse” | | |
| 4 | Select [test\_directory]\AT-1\space\_i-129\_test\_data\_1\_multi\_times\_subset.srf | | |
| 5 | Click “Open” | | |
| 6 | Verify the “title” fields listed in the application GUI window are consistent with the selected input file | “title” text = header row1 + header row2 (input file) |  |

| Table  **Surface Rate Interpolator Acceptance Test Plan Case 2** | | | | | |
| --- | --- | --- | --- | --- | --- |
| **Surface Rate Interpolator Acceptance Testing**  **CACIE-** **surf\_rate\_interp\_win\_intel\_64.exe – AT-2** | | **Date:** | | | |
| **Tool Runner Log File Location for this test:**  **[PUT LINK TO THE DIRECTORY HERE]** | | **Test Performed By:** | | | |
| **Testing Directory: OLIVE\\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\ AT-2** | | | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | | **Test Result  (Pass/Fail)** | |
| Navigate to the Testing Directory | | | | | |
| 1 | [If not already open] Start application (double-click on *runner\_run\_SRI.bat*)  [If already opened] Clear header1 row and header2 row text boxes  Unselect Select ‘Single Output’, ‘Use Cumulative’, and any ‘Conv. Factor’ options | | | | |
| 2 | Select “comma” delimiter radio button | | | | |
| 3 | Click “Browse” button next to ‘file(s):’ | | | | |
| 4 | Select [test\_directory]\AT-2\comma\_i-129\_test\_data\_2\_multi\_times\_subset.csv | | | | |
| 5 | Click “Open” | | | | |
| 6 | Verify the “title” fields listed in the application GUI window are consistent with the selected input file | | “title” text = header row1 + header row2 (input file)  Note: definition column may not populate as SRI currently only recognizes prefix “modflow\_” as being a grid coordinate. | |  |

| Table 5  **Surface Rate Interpolator Acceptance Test Plan Case 3** | | | |
| --- | --- | --- | --- |
| **Surface Rate Interpolator Acceptance Testing**  **CACIE- surf\_rate\_interp\_win\_intel\_64.exe- AT-3** | | **Date:** | |
| **Tool Runner Log File Location for this test:**  **[PUT LINK TO THE DIRECTORY HERE]** | | **Test Performed By:** | |
| **Testing Directory: OLIVE\\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\ AT-3** | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | **Test Result  (Pass/Fail)** |
| Navigate to the Testing Directory | | | |
| 1 | [If not already open] Start application (double-click on *runner\_run\_SRI.bat*)  [If already opened] Clear header1 row and header2 row text boxes  Unselect Select ‘Single Output’, ‘Use Cumulative’, and any ‘Conv. Factor’ options | | |
| 2 | Select “tab” delimiter radio button | | |
| 3 | Click “Browse” | | |
| 4 | Select [test\_directory]\AT-3\tab\_i-129\_test\_data\_3\_subset.dat | | |
| 5 | Click “Open” | | |
| 6 | Verify the “title” fields listed in the application window are consistent with the selected input file | “title” text = header row1 + header row2 (input file) |  |

| Table 6  **Surface Rate Interpolator Acceptance Test Plan Case 4** | | | |
| --- | --- | --- | --- |
| **Surface Rate Interpolator Acceptance Testing**  **CACIE-** **surf\_rate\_interp\_win\_intel\_64.exe – AT-4** | | **Date:** | |
| **Tool Runner Log File Location for this test:**  **[PUT LINK TO THE DIRECTORY HERE]** | | **Test Performed By:** | |
| **Testing Directory: OLIVE\\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\ AT-4** | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | **Test Result  (Pass/Fail)** |
| Navigate to the Testing Directory | | | |
| 1 | [If not already open] Start application (double-click on *runner\_run\_SRI.bat*)  [If already opened] Clear header1 row and header2 row text boxes  Unselect Select ‘Single Output’, ‘Use Cumulative’, and any ‘Conv. Factor’ options | | |
| 2 | Select “tab” delimiter radio button | | |
| 3 | Click “Browse” | | |
| 4 | Select [test\_directory]\AT-4\tab\_i-129\_test\_data\_4\_subset.dat | | |
| 5 | Click “Open” | | |
| 6 | Edit the Column 2, 4, 6, and 8 “definition” fields by adding the following suffix to the default text:  \_AT-4 | | |
| 7 | Check the “Single Output” check box | | |
| 8 | Click “Browse” next to “out dir:” | | |
| 9 | Browse to [test\_directory]\AT-4\output | | |
| 10 | Click on “Select Folder” button | | |
| 11 | Click “execute” | | |
| 12 | Verify the two output files were generated. The yearly steps named consistent with FR-5, and the cumulative file which is an intermediate file to be used for double checking. | Output file names = {input\_file\_name}\_yearly\_steps.csv,  {input\_file\_name}\_cumulative.csv |  |
| 13 | Verify the column headers in the generated output files and the file names are consistent with the text displayed in the “definition” fields per FR-4 | Output file column headers = definition fields |  |

| Table 7  **Surface Rate Interpolator Acceptance Test Plan Case 5** | | | | |
| --- | --- | --- | --- | --- |
| **Surface Rate Interpolator Acceptance Testing**  **CACIE-** **surf\_rate\_interp\_win\_intel\_64.exe – AT-5** | | **Date:** | | |
| **Tool Runner Log File Location for this test:**  **[PUT LINK TO THE DIRECTORY HERE]** | | **Test Performed By:** | | |
| **Testing Directory: OLIVE\\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\ AT-5** | | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | | **Test Result  (Pass/Fail)** |
| Navigate to the Testing Directory | | | | |
| 1 | [If not already open] Start application (double-click on *runner\_run\_SRI.bat*)  [If already opened] Clear header1 row and header2 row text boxes  Unselect Select ‘Single Output’, ‘Use Cumulative’, and any ‘Conv. Factor’ options | | | |
| 2 | Select “tab” delimiter radio button | | | |
| 3 | Click “Browse” | | | |
| 4 | Select [test\_directory]\AT-5\tab\_i-129\_test\_data\_2\_column\_subset.dat | | | |
| 5 | Click “Open” | | | |
| 6 | Edit the Column 2 “definition” field by entering the following text:  cum\_AT-5\_66-101 | | | |
| 7 | Edit the Column 4 “definition” field by entering the following text:  cum\_AT-5\_66-102 | | | |
| 8 | Click “Browse” next to “out dir:” | | | |
| 9 | Browse to [test\_directory]\AT-5\output | | | |
| 10 | Click on “Select Folder” button | | | |
| 11 | Click “execute” | | | |
| 12 | Verify separate output files were generated for the user-defined column “definitions” per FR-5 | Separate output files were generated for each column  Output file names = as follows for each “definition”  {definition field}\_yearly\_steps.csv,  {definition field}\_cumulative.csv |  | |
| 13 | *Open* [test\_directory]\ AT-5\utility\tab\_i-129\_test\_data\_2\_column\_subset\_cum\_AT-5\_66-101\_comparison.xlsx | | | |
| 14 | Open [test\_directory]\AT-5\output\tab\_i-129\_test\_data\_2\_column\_subset\_cum\_AT-5\_66-101\_cumulative.csv | | | |
| 15 | Copy columns A and B from “tab\_i-129\_test\_data\_2\_column\_subset\_cum\_AT-5\_66-101\_cumulative.csv” and paste them into tab “66-101 Cumulative” of “tab\_i-129\_test\_data\_2\_column\_subset\_cum\_AT-5\_66-101\_comparison.xlsx” | | | |
| 16 | Verify the cumulative values for the noninteger year timesteps are calculated correctly by using formula documented in FR-7 and the rate data in “tab\_i-129\_test\_data\_2\_column\_subset.dat” file | Cumulative values in “tab\_i-129\_test\_data\_2\_column\_subset\_cum\_AT-5\_66-101\_cumulative.csv” file = independently calculated cumulative values for noninteger year timesteps  Note: provided excel document with hand calculated values. You can add the cumulative from SRI to the cumulative tab (using columns A and B) to populate the cumulative graph comparison of the original data, hand calculation and the SRI data |  | |
| 17 | Verify the cumulative values for the integer year timesteps are calculated correctly by using the formula documented in FR-9 | Cumulative values in “tab\_i-129\_test\_data\_2\_column\_subset\_cum\_AT-5\_66-101\_cumulative.csv” file = calculated cumulative values for integer year timesteps  Note: provided excel document with hand calculated values. You can add the cumulative from SRI to the cumulative tab (using columns A and B) to populate the cumulative graph comparison of the original data, hand calculation and the SRI data |  | |
| 18 | Open the “tab\_i-129\_test\_data\_2\_column\_subset\_cum\_AT-5\_66-101\_yearly\_steps.csv” file | | | |
| 19 | Copy columns A and B from “tab\_i-129\_test\_data\_2\_column\_subset\_cum\_AT-5\_66-101\_yearly\_steps.csv” and past them into tab “66-101 Rate” of “tab\_i-129\_test\_data\_2\_column\_subset\_cum\_AT-5\_66-101\_comparison.xlsx” | | | |
| 20 | Verify the yearly timesteps and rate values for the integer year timesteps are in the generated output file “tab\_i-129\_test\_data\_2\_column\_subset\_yearly\_steps.csv” consistent with FR-10 | Years are all integer values |  | |
| Rate values = hand calculated rates for integer years. |  | |

| Table 8  **Surface Rate Interpolator Acceptance Test Plan Case 6** | | | |
| --- | --- | --- | --- |
| **Surface Rate Interpolator Acceptance Testing**  **CACIE-** **surf\_rate\_interp\_win\_intel\_64.exe – AT-6** | | **Date:** | |
| **Tool Runner Log File Location for this test:**  **[PUT LINK TO THE DIRECTORY HERE]** | | **Test Performed By:** | |
| **Testing Directory: OLIVE\\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\ AT-6** | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | **Test Result  (Pass/Fail)** |
| Navigate to the Testing Directory | | | |
| 1 | [If not already open] Start application (double-click on *runner\_run\_SRI.bat*)  [If already opened] Clear header1 row and header2 row text boxes  Unselect Select ‘Single Output’, ‘Use Cumulative’, and any ‘Conv. Factor’ options | | |
| 2 | Select “tab” delimiter radio button | | |
| 3 | Check the “Single Output” check box | | |
| 4 | Check “Use Cumulative” | | |
| 5 | Click “Browse” | | |
| 6 | Select [test\_directory]\AT-6\tab\_i-129\_test\_data\_2\_column\_subset.dat | | |
| 7 | Click “Open” | | |
| 8 | Edit the Column 2 “definition” field by entering the following text:  sum\_mass\_FR-6 | | |
| 9 | Edit the Column 4 “definition” field by entering the following text:  sum\_mass\_FR-6 | | |
| 10 | Click “Browse” next to “out dir:” | | |
| 11 | Browse to [test\_directory]\AT-6\output | | |
| 12 | Click on “Select Folder” button | | |
| 13 | Click “execute” | | |
| 14 | Verify that the cumulative mass of columns 2 and 4 are summed together to create a single timeseries consistent with FR-7 | “sum\_mass\_FR-6” values for noninteger year timesteps (output file) = 66-101 [g] + 66-102 [g] for corresponding noninteger timesteps (input file)  Note:  Excel file is available to assist checking located in the AT-6/utility directory. |  |

| Table 9  **Surface Rate Interpolator Acceptance Test Plan Case 7** | | | |
| --- | --- | --- | --- |
| **Surface Rate Interpolator Acceptance Testing**  **CACIE- surf\_rate\_interp\_win\_intel\_64.exe – AT-7** | | **Date:** | |
| **Tool Runner Log File Location for this test:**  **[PUT LINK TO THE DIRECTORY HERE]** | | **Test Performed By:** | |
| **Testing Directory: OLIVE\\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\ AT-7** | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | **Test Result  (Pass/Fail)** |
| Navigate to the Testing Directory | | | |
| 1 | [If not already open] Start application (double-click on *runner\_run\_SRI.bat*)  [If already opened] Clear header1 row and header2 row text boxes  Unselect Select ‘Single Output’, ‘Use Cumulative’, and any ‘Conv. Factor’ options | | |
| 2 | Select “tab” delimiter radio button | | |
| 3 | Select checkbox for ci-> pCi in “Conv. Factor:” (unselect other checkboxes if applicable) | | |
| 5 | Click “Browse” | | |
| 6 | Select [test\_directory]\AT-7\tab\_i-129\_test\_data\_2\_column\_subset.dat | | |
| 7 | Click “Open” | | |
| 8 | Type “66-101” in column 2 “definition” | | |
| 9 | Type “66-102” in column 4 “definition” | | |
| 10 | Click “Browse” next to “out dir:” | | |
| 11 | Browse to [test\_directory]\AT-7\output\_pCi | | |
| 12 | Click on “Select Folder” button | | |
| 13 | Click “execute” | | |
| 14 | Verify that the cumulative mass of columns 2 and 4 in input files have been multiplied by selected conversion factor in generated output file per FR-6 | Values in generated output file = Values in input file × 1 × 1012 |  |
| 15 | Clear header1 row and header2 row text boxes | | |
| 16 | Select checkbox for g-> ug in “Conv. Factor:” (unselect other checkboxes if applicable) | | |
| 17 | Click “Browse” | | |
| 18 | Select [test\_directory]\AT-7\tab\_i-129\_test\_data\_2\_column\_subset.dat | | |
| 19 | Click “Open” | | |
| 20 | Type “66-101” in column 2 “definition” | | |
| 21 | Type “66-102” in column 4 “definition” | | |
| 22 | Click “Browse” next to “out dir:” | | |
| 23 | Browse to [test\_directory]\AT-7\output\_ug | | |
| 24 | Click on “Select Folder” button | | |
| 25 | Click “execute” | | |
| 26 | Verify that the cumulative mass of columns 2 and 4 in input files have been multiplied by selected conversion factor in generated output file per FR-6 | Values in generated output file = Values in input file × 1 × 106 |  |
| 27 | Clear header1 row and header2 row text boxes | | |
| 28 | Select checkbox for custom in “Conv. Factor:” and enter 2 in “custom:” text box and “User” in “Unit:” text box (unselect other checkboxes if applicable) | | |
| 29 | Click “Browse” | | |
| 30 | Select [test\_directory]\AT-7\tab\_i-129\_test\_data\_2\_column\_subset.dat | | |
| 31 | Click “Open” | | |
| 32 | Type “66-101” in column 2 “definition” | | |
| 33 | Type “66-102” in column 4 “definition” | | |
| 34 | Click “Browse” next to “out dir:” | | |
| 35 | Browse to [test\_directory]\AT-7\output\_user | | |
| 36 | Click on “Select Folder” button | | |
| 37 | Click “execute” | | |
| 38 | Verify that the cumulative mass of columns 2 and 4 in input files have been multiplied by selected conversion factor in generated output file per FR-6 | Values in generated output file = Values in input file × 2 |  |

| Table 10  **Surface Rate Interpolator Acceptance Test Plan Case 8** | | | |
| --- | --- | --- | --- |
| **Surface Rate Interpolator Acceptance Testing**  **CACIE- surf\_rate\_interp\_win\_intel\_64.exe – AT-8** | | **Date:** | |
| **Tool Runner Log File Location for this test:**  **[PUT LINK TO THE DIRECTORY HERE]** | | **Test Performed By:** | |
| **Testing Directory: OLIVE\\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\ AT-8** | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | **Test Result  (Pass/Fail)** |
| Navigate to the Testing Directory | | | |
| 1 | [If not already open] Start application (double-click on *runner\_run\_SRI.bat*)  [If already opened] Clear header1 row and header2 row text boxes | | |
| 2 | Select “tab” delimiter radio button | | |
| 3 | Check the “Single Output” check box | | |
| 4 | Click “Browse” | | |
| 5 | Multi-select the following files:   [test\_directory]\AT-8\tab\_i-129\_test\_data\_2.1\_column\_subset.dat  [test\_directory]\AT-8\tab\_i-129\_test\_data\_2.2\_column\_subset.dat [test\_directory]\AT-8\tab\_i-129\_test\_data\_2.3\_column\_subset.dat | | |
| 6 | Click “Open” | | |
| 7 | Type “66-101” in column 2 “definition” | | |
| 8 | Type “66-102” in column 4 “definition” | | |
| 9 | Click “Browse” next to “out dir:” | | |
| 10 | Browse to [test\_directory]\AT-8\output | | |
| 11 | Click on “Select Folder” button | | |
| 12 | Click “execute” | | |
| 13 | Verify that the three files were processed | Should be 6 files, 1 yearly steps, and one cumulative for each file processed. |  |

# Acceptance Test Report

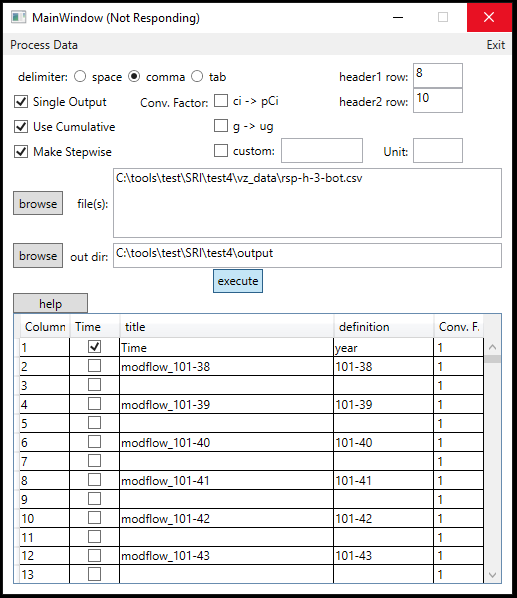
To complete the Acceptance Testing use Appendix A. The two test cases are described as follows:

* Acceptance Test 1 is in Table A-1. It is successful and qualified to use
* Acceptance Test 2 is in Table A-2. It is successful and qualified to use
* Acceptance Test 3 is in Table A-3. It is successful and qualified to use
* Acceptance Test 4 is in Table A-4. It is successful and qualified to use
  + Output files (Z:\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\AT-4\output) are generated and checked with no errors as per the steps laid out for the AT-4 case.
* Acceptance Test 5 is in Table A-5. It is successful and qualified to use
  + Output files (Z:\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\AT-5\output) are generated as per the steps laid out for the AT-5 case.
  + Excel program is used to verify the steps listed in Table A-5. The excel files (preset files) tab\_i-129\_test\_data\_2\_column\_subset\_cum\_AT-5\_66-101\_comparison\_pa.xlsx and tab\_i-129\_test\_data\_2\_column\_subset\_cum\_AT-5\_66-102\_comparison\_pa.xlsx located in the testing directory \\olive\backups\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\AT-5\utility
* Acceptance Test 6 is in Table A-6. It is successful and qualified to use
  + Output files (Z:\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\AT-6\output) are generated as per the steps laid out for the AT-6 case.
  + Excel program is used to verify the steps listed in Table A-5. The excel file (preset file) tab\_i-129\_test\_data\_2\_column\_subset\_cum\_AT-6\_summing\_comparison\_pa.xlsx located in the testing directory \\olive\backups\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\AT-5\utility
* Acceptance Test 7 is in Table A-7. It is successful and qualified to use
  + Three sets of output files (output\_pCi, output\_ug & output\_user) are generated and checked with no errors as per the steps laid out for the AT-7 case. They are located
    - Z:\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\AT-7\output\_pCi
    - Z:\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\AT-7\output\_ug
    - Z:\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\AT-7\output\_user
* Acceptance Test 8 is in Table A-8. It is successful and qualified to use
  + Output files (Z:\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\AT-8\output) are generated and checked with no errors as per the steps laid out for the AT-8 case.

Details of these tests, when they were conducted, by whom, and if they Passed or Failed are in each table of Appendix A.

# User Guide

The SRI tool is a compiled executable that utilizes a Graphical User Interface (GUI) for the user-defined input. As a result, it does not require user-defined arguments when invoked. When the SRI tool is executed, the GUI window is opened, with space-delimited files selected as the default selection (Figure 1).



**Figure 1**

The options for the data format (delimiter, rate and/or cumulative values), the conversion factor (if applicable), and the output format need to be set prior to browsing for and selecting the data files to be interpolated.

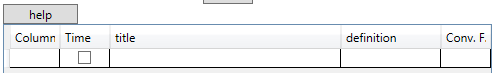
Set up these options as follows:

1. Select the delimiter (space, comma, or tab) consistent with the data file to be interpolated.
2. To save the interpolated data to a single file, select ‘Single Output’; otherwise the output of each column selected to be interpolated will be saved to a separate file.
3. If the data to be interpolated has both Rate and Cumulative data columns (note: Cumulative data must be in the column immediately following the Rate data), select ‘Use Cumulative’. Otherwise, application will calculate cumulative data using the Rate data columns in the input column.
4. If the output needs to be stepwise (i.e. 2018, 2018.9999999, 2019, 2019.9999999) then check the Make Stepwise option.
5. Select the appropriate conversions factor if applicable. Note: this will convert all data in the file to the new unit:
   1. ci -> pCi : converts data from Curies to picoCuries (1 × 1012 pCi/Ci)
   2. g -> µg: converts grams to micrograms (1 × 106 µg/g)
   3. Custom:
      1. User defined conversion factor
      2. Unit: new unit associated with the custom conversion
6. Define Header rows. Note: if these are not defined the application will attempt to find the correct rows. Autodetecting the header rows is not reliable, and it is suggested to manually set these consistent with the data file to be processed.
   1. Header row 1: First line of the header.
   2. Header row 2: Last line of the header.

Following configuration of the options above, select the file(s) to be process by clicking on the browse button next to ‘file(s):’. This opens a window to navigate to the file(s) to be opened. If multiple files are to be interpolated at the same time, all files need to have the same format and be located in the same directory. Multiple files are selected by shift-click (select a block of files) or control-click (select multiple files individually).

The location to save the generated output files defaults to the same directory location as the input data. To change this, click on the browse button next to ‘out dir:’ browse to and select the directory to save the output files to. If the ‘Single output’ option is selected, the output file will be named using the original file name, appending the suffix ‘\_yearly\_steps.csv’. Otherwise, multiple output files will be named using the definition column text, appending the suffix ‘\_yearly\_steps.csv’ (see the definition in the header grid). All output files will be in the comma delimited (\*.cvs) format.

The Header grid (see Figure 2) allows the user to define which columns to utilize. Descriptions of the columns displayed in the Header grid are provided below.



**Figure 2**

* Column: The order of the columns in the input file (read only).
* Time: Allows user to identify the input data column to be used for the time (such as year) is found.
  + Make sure Definition reflects the correct unit; currently only 'year' is supported.
* title: title of the input data column from the original file (note: the first header row and the last header row of the input file is noted in the 'header1 row' and 'header2 row' text boxes, respectively).
* definition: user-defined names for the output file headers.
  + If left empty/null: this column is not used
  + User-defined text: Denotes that the column is to be used during interpolation. If multiple columns have the same definition, the columns will be summed and entered in a single column in the output file. Multiple columns with unique definitions will result generate an output file for each unique definition (i.e., definition\_yearly\_steps.csv).
* Conv. F.: This is factor used to convert between units. If the original data is in g and you need it in Ci then you would put the multiplier here. For example, to convert Tc-99 from grams to Ci, the conversion factor of 0.017 is entered in the text box.
  + Special note: if column is marked as Time, then it will be assumed that the conv. F. is to be added to the year. This is normally used when the data does not have a starting year, i.e., it starts at 0 and increments from there, instead of starting at 1942 for example.

The Tool can also be run from the command line with a XML configuration file. All options in the interface are can be specified in the configuration file. For examples of the XML configuration file refer to section 4.

Notes:

* If processing multiple files, each file will need to have the same column structure.
* Output files will be named using the input file name with the unique definition name added to the end of the file.

# Tool Versions

This section details changes incorporated into each version of the SRI.

* 1.0 – Tool was developed.
* 1.1 – Added 2 functions:
  + Added command line function to read in XML config file that defines the input files, output location, and options used to process the files.
  + Added function to do stepwise outputs. This means it places intermediary steps between the integer years using the same rate as the previous rate. IE
    - 2019 = 12,
    - 2019.9999999 = 12,
    - 2020 = 15,
    - 2020.9999999 = 15
    - etc.

# 

# Appendix

**Completed Acceptance Test Cases**

**Testing Process Description**

This test only verified that SRI could open a tab delimited file correctly, which only required the tester to verify header information displayed in the GUI.

**Tool Runner Log**

INFO--05/18/2020 10:01:55 AM--Starting CA-CIE Tool Runner. Logging to "surf\_rate\_interp\_logfile.txt"

INFO--05/18/2020 10:01:57 AM--Code Version: 0831d9def5351ce22415dfcffd1f22b7d82fc324 v2.16: S:\PSC\!HANFORD\ICF\CA-CIE-Tools\CA-CIE-Tools\pylib\runner\runner.py<--1bcfd6779e9cbdb82673405873a8e5e81514ae27

INFO--05/18/2020 10:01:58 AM--Code Version: 6aca42571ca228bdc73af027acb1f558d6331aa7 Local repo SHA-1 has does not correspond to a remote repo release version: ..\..\..\CA-CIE-Tools-TestRepos\surf\_rate\_interpolation\CA-CIE-Tools\tools\surf\_rate\_interpolation\win64\surf\_rate\_interp\_win\_intel\_64.exe<--51076ce67ce7d4031fb1be7a4da0dba08a60cc38

INFO--05/18/2020 10:01:59 AM--QA Status: QUALIFIED : S:\PSC\!HANFORD\ICF\CA-CIE-Tools\CA-CIE-Tools\pylib\runner\runner.py

INFO--05/18/2020 10:02:00 AM--QA Status: TEST : ..\..\..\CA-CIE-Tools-TestRepos\surf\_rate\_interpolation\CA-CIE-Tools\tools\surf\_rate\_interpolation\win64\surf\_rate\_interp\_win\_intel\_64.exe

INFO--05/18/2020 10:02:00 AM--Invoking Command:"..\..\..\CA-CIE-Tools-TestRepos\surf\_rate\_interpolation\CA-CIE-Tools\tools\surf\_rate\_interpolation\win64\surf\_rate\_interp\_win\_intel\_64.exe" with Arguments:""

INFO--05/18/2020 10:02:00 AM--Username:PAllena Computer:PSC-VDI-50 Platform:Windows 10 10.0.18362

| Table A-1  **Surface Rate Interpolator Acceptance Test Plan Case 1** | | | |
| --- | --- | --- | --- |
| **Surface Rate Interpolator Acceptance Testing**  **CACIE-** **surf\_rate\_interp\_win\_intel\_64.exe – AT-1** | | **Date: 05-18-2020** | |
| **Tool Runner Log File Location for this test:**  **\\olive\backups\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\** | | **Test Performed By: Praveena Allena** | |
| **Testing Directory: OLIVE\\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\AT-1** | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | **Test Result  (Pass/Fail)** |
| Navigate to the Testing Directory | | | |
| 1 | [If not already open] Start application (double-click on *runner\_run\_SRI.bat*)  [If already opened] Clear header1 row and header2 row text boxes  Unselect Select ‘Single Output’, ‘Use Cumulative’, and any ‘Conv. Factor’ options | | |
| 2 | Select “space” delimiter radio button | | |
| 3 | Click “Browse” | | |
| 4 | Select [test\_directory]\AT-1\space\_i-129\_test\_data\_1\_multi\_times\_subset.srf | | |
| 5 | Click “Open” | | |
| 6 | Verify the “title” fields listed in the application GUI window are consistent with the selected input file | “title” text = header row1 + header row2 (input file) | Pass  (Row 8 + row 10 from input file) |

**Testing Process Description**

This test only verified that SRI could open a comma delimited file correctly, which only required the tester to verify header information displayed in the GUI.

**Tool Runner Log**

See Tool Runner Log in AT-1

| Table A-2  **Surface Rate Interpolator Acceptance Test Plan Case 2** | | | | | |
| --- | --- | --- | --- | --- | --- |
| **Surface Rate Interpolator Acceptance Testing**  **CACIE-** **surf\_rate\_interp\_win\_intel\_64.exe – AT-2** | | **Date:05-18-2020** | | | |
| **Tool Runner Log File Location for this test:**  **\\olive\backups\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\** | | **Test Performed By: Praveena Allena** | | | |
| **Testing Directory: OLIVE\\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\AT-2** | | | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | | **Test Result  (Pass/Fail)** | |
| Navigate to the Testing Directory | | | | | |
| 1 | [If not already open] Start application (double-click on *runner\_run\_SRI.bat*)  [If already opened] Clear header1 row and header2 row text boxes  Unselect Select ‘Single Output’, ‘Use Cumulative’, and any ‘Conv. Factor’ options | | | | |
| 2 | Select “comma” delimiter radio button | | | | |
| 3 | Click “Browse” button next to ‘file(s):’ | | | | |
| 4 | Select [test\_directory]\AT-2\comma\_i-129\_test\_data\_2\_multi\_times\_subset.csv | | | | |
| 5 | Click “Open” | | | | |
| 6 | Verify the “title” fields listed in the application GUI window are consistent with the selected input file | | “title” text = header row1 + header row2 (input file)  Note: definition column may not populate as SRI currently only recognizes prefix “modflow\_” as being a grid coordinate. | | Pass  (row3+row4 from input file)  Note: definition column not populated |

**Testing Process Description**

This test only verified that SRI could open a tab delimited file correctly, which only required the tester to verify header information displayed in the GUI.

**Tool Runner Log**

See Tool Runner Log in AT-1

| Table A-3  **Surface Rate Interpolator Acceptance Test Plan Case 3** | | | |
| --- | --- | --- | --- |
| **Surface Rate Interpolator Acceptance Testing**  **CACIE- surf\_rate\_interp\_win\_intel\_64.exe- AT-3** | | **Date:05-18-2020** | |
| **Tool Runner Log File Location for this test:**  **\\olive\backups\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\** | | **Test Performed By: Praveena Allena** | |
| **Testing Directory: OLIVE\\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\AT-3** | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | **Test Result  (Pass/Fail)** |
| Navigate to the Testing Directory | | | |
| 1 | [If not already open] Start application (double-click on *runner\_run\_SRI.bat*)  [If already opened] Clear header1 row and header2 row text boxes  Unselect Select ‘Single Output’, ‘Use Cumulative’, and any ‘Conv. Factor’ options | | |
| 2 | Select “tab” delimiter radio button | | |
| 3 | Click “Browse” | | |
| 4 | Select [test\_directory]\AT-3\tab\_i-129\_test\_data\_3\_subset.dat | | |
| 5 | Click “Open” | | |
| 6 | Verify the “title” fields listed in the application window are consistent with the selected input file | “title” text = header row1 + header row2 (input file) | Pass  (row 3+ row 5 from input file) |

**Testing Process Description**

The output data was manually checked to verify headers were named correctly.

**Tool Runner Log**

INFO--05/19/2020 09:54:15 AM--Starting CA-CIE Tool Runner. Logging to "surf\_rate\_interp\_logfile.txt"

INFO--05/19/2020 09:54:17 AM--Code Version: 0831d9def5351ce22415dfcffd1f22b7d82fc324 v2.16: S:\PSC\!HANFORD\ICF\CA-CIE-Tools\CA-CIE-Tools\pylib\runner\runner.py<--1bcfd6779e9cbdb82673405873a8e5e81514ae27

INFO--05/19/2020 09:54:18 AM--Code Version: 6aca42571ca228bdc73af027acb1f558d6331aa7 Local repo SHA-1 has does not correspond to a remote repo release version: ..\..\..\CA-CIE-Tools-TestRepos\surf\_rate\_interpolation\CA-CIE-Tools\tools\surf\_rate\_interpolation\win64\surf\_rate\_interp\_win\_intel\_64.exe<--51076ce67ce7d4031fb1be7a4da0dba08a60cc38

INFO--05/19/2020 09:54:20 AM--QA Status: QUALIFIED : S:\PSC\!HANFORD\ICF\CA-CIE-Tools\CA-CIE-Tools\pylib\runner\runner.py

INFO--05/19/2020 09:54:21 AM--QA Status: TEST : ..\..\..\CA-CIE-Tools-TestRepos\surf\_rate\_interpolation\CA-CIE-Tools\tools\surf\_rate\_interpolation\win64\surf\_rate\_interp\_win\_intel\_64.exe

INFO--05/19/2020 09:54:21 AM--Invoking Command:"..\..\..\CA-CIE-Tools-TestRepos\surf\_rate\_interpolation\CA-CIE-Tools\tools\surf\_rate\_interpolation\win64\surf\_rate\_interp\_win\_intel\_64.exe" with Arguments:""

INFO--05/19/2020 09:54:21 AM--Username:PAllena Computer:PSC-VDI-50 Platform:Windows 10 10.0.18362

| Table A-4  **Surface Rate Interpolator Acceptance Test Plan Case 4** | | | |
| --- | --- | --- | --- |
| **Surface Rate Interpolator Acceptance Testing**  **CACIE-** **surf\_rate\_interp\_win\_intel\_64.exe – AT-4** | | **Date: 05-19-2020** | |
| **Tool Runner Log File Location for this test:**  **\\olive\backups\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\** | | **Test Performed By: Praveena Allena** | |
| **Testing Directory: OLIVE\\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\AT-4** | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | **Test Result  (Pass/Fail)** |
| Navigate to the Testing Directory | | | |
| 1 | [If not already open] Start application (double-click on *runner\_run\_SRI.bat*)  [If already opened] Clear header1 row and header2 row text boxes  Unselect Select ‘Single Output’, ‘Use Cumulative’, and any ‘Conv. Factor’ options | | |
| 2 | Select “tab” delimiter radio button | | |
| 3 | Click “Browse” | | |
| 4 | Select [test\_directory]\AT-4\tab\_i-129\_test\_data\_4\_subset.dat | | |
| 5 | Click “Open” | | |
| 6 | Edit the Column 2, 4, 6, and 8 “definition” fields by adding the following suffix to the default text:  \_AT-4 | | |
| 7 | Check the “Single Output” check box | | |
| 8 | Click “Browse” next to “out dir:” | | |
| 9 | Browse to [test\_directory]\AT-4\output | | |
| 10 | Click on “Select Folder” button | | |
| 11 | Click “execute” | | |
| 12 | Verify the two output files were generated. The yearly steps named consistent with FR-5, and the cumulative file which is an intermediate file to be used for double checking. | Output file names = {input\_file\_name}\_yearly\_steps.csv,  {input\_file\_name}\_cumulative.csv | Pass |
| 13 | Verify the column headers in the generated output files and the file names are consistent with the text displayed in the “definition” fields per FR-4 | Output file column headers = definition fields | Pass |

**Testing Process Description**

Excel was used to create hand calculations which were then used to verify the SRI output for this test.

**Tool Runner Log**

See Tool Runner Log in AT-1

| Table A-5  **Surface Rate Interpolator Acceptance Test Plan Case 5** | | | | |
| --- | --- | --- | --- | --- |
| **Surface Rate Interpolator Acceptance Testing**  **CACIE-** **surf\_rate\_interp\_win\_intel\_64.exe – AT-5** | | **Date: 05-18-2020** | | |
| **Tool Runner Log File Location for this test:**  **\\olive\backups\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\** | | **Test Performed By: Praveena Allena** | | |
| **Testing Directory: OLIVE\\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\AT-5** | | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | | **Test Result  (Pass/Fail)** |
| Navigate to the Testing Directory | | | | |
| 1 | [If not already open] Start application (double-click on *runner\_run\_SRI.bat*)  [If already opened] Clear header1 row and header2 row text boxes  Unselect Select ‘Single Output’, ‘Use Cumulative’, and any ‘Conv. Factor’ options | | | |
| 2 | Select “tab” delimiter radio button | | | |
| 3 | Click “Browse” | | | |
| 4 | Select [test\_directory]\AT-5\tab\_i-129\_test\_data\_2\_column\_subset.dat | | | |
| 5 | Click “Open” | | | |
| 6 | Edit the Column 2 “definition” field by entering the following text:  cum\_AT-5\_66-101 | | | |
| 7 | Edit the Column 4 “definition” field by entering the following text:  cum\_AT-5\_66-102 | | | |
| 8 | Click “Browse” next to “out dir:” | | | |
| 9 | Browse to [test\_directory]\AT-5\output | | | |
| 10 | Click on “Select Folder” button | | | |
| 11 | Click “execute” | | | |
| 12 | Verify separate output files were generated for the user-defined column “definitions” per FR-5 | Separate output files were generated for each column  Output file names = as follows for each “definition”  {definition field}\_yearly\_steps.csv,  {definition field}\_cumulative.csv | *Pass* | |
| 13 | *Open* [test\_directory]\ AT-5\utility\tab\_i-129\_test\_data\_2\_column\_subset\_cum\_AT-5\_66-101\_comparison.xlsx | | | |
| 14 | Open [test\_directory]\AT-5\output\tab\_i-129\_test\_data\_2\_column\_subset\_cum\_AT-5\_66-101\_cumulative.csv | | | |
| 15 | Copy columns A and B from “tab\_i-129\_test\_data\_2\_column\_subset\_cum\_AT-5\_66-101\_cumulative.csv” and paste them into tab “66-101 Cumulative” of “tab\_i-129\_test\_data\_2\_column\_subset\_cum\_AT-5\_66-101\_comparison.xlsx” | | | |
| 16 | Verify the cumulative values for the noninteger year timesteps are calculated correctly by using formula documented in FR-7 and the rate data in “tab\_i-129\_test\_data\_2\_column\_subset.dat” file | Cumulative values in “tab\_i-129\_test\_data\_2\_column\_subset\_cum\_AT-5\_66-101\_cumulative.csv” file = independently calculated cumulative values for noninteger year timesteps  Note: provided excel document with hand calculated values. You can add the cumulative from SRI to the cumulative tab (using columns A and B) to populate the cumulative graph comparison of the original data, hand calculation and the SRI data | *Pass* | |
| 17 | Verify the cumulative values for the integer year timesteps are calculated correctly by using the formula documented in FR-9 | Cumulative values in “tab\_i-129\_test\_data\_2\_column\_subset\_cum\_AT-5\_66-101\_cumulative.csv” file = calculated cumulative values for integer year timesteps  Note: provided excel document with hand calculated values. You can add the cumulative from SRI to the cumulative tab (using columns A and B) to populate the cumulative graph comparison of the original data, hand calculation and the SRI data | Pass | |
| 18 | Open the “tab\_i-129\_test\_data\_2\_column\_subset\_cum\_AT-5\_66-101\_yearly\_steps.csv” file | | | |
| 19 | Copy columns A and B from “tab\_i-129\_test\_data\_2\_column\_subset\_cum\_AT-5\_66-101\_yearly\_steps.csv” and past them into tab “66-101 Rate” of “tab\_i-129\_test\_data\_2\_column\_subset\_cum\_AT-5\_66-101\_comparison.xlsx” | | | |
| 20 | Verify the yearly timesteps and rate values for the integer year timesteps are in the generated output file “tab\_i-129\_test\_data\_2\_column\_subset\_yearly\_steps.csv” consistent with FR-10 | Years are all integer values | Pass | |
| Rate values = hand calculated rates for integer years. | Pass | |

**Testing Process Description**

Excel was used to create hand calculations which were then used to verify the SRI output for this test.

**Tool Runner Log**

See Tool Runner Log in AT-1

| Table A-6  **Surface Rate Interpolator Acceptance Test Plan Case 6** | | | |
| --- | --- | --- | --- |
| **Surface Rate Interpolator Acceptance Testing**  **CACIE-** **surf\_rate\_interp\_win\_intel\_64.exe – AT-6** | | **Date:05-18-2020** | |
| **Tool Runner Log File Location for this test:**  **\\olive\backups\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\** | | **Test Performed By: Praveena Allena** | |
| **Testing Directory: OLIVE\\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\AT-6** | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | **Test Result  (Pass/Fail)** |
| Navigate to the Testing Directory | | | |
| 1 | [If not already open] Start application (double-click on *runner\_run\_SRI.bat*)  [If already opened] Clear header1 row and header2 row text boxes  Unselect Select ‘Single Output’, ‘Use Cumulative’, and any ‘Conv. Factor’ options | | |
| 2 | Select “tab” delimiter radio button | | |
| 3 | Check the “Single Output” check box | | |
| 4 | Check “Use Cumulative” | | |
| 5 | Click “Browse” | | |
| 6 | Select [test\_directory]\AT-6\tab\_i-129\_test\_data\_2\_column\_subset.dat | | |
| 7 | Click “Open” | | |
| 8 | Edit the Column 2 “definition” field by entering the following text:  sum\_mass\_FR-6 | | |
| 9 | Edit the Column 4 “definition” field by entering the following text:  sum\_mass\_FR-6 | | |
| 10 | Click “Browse” next to “out dir:” | | |
| 11 | Browse to [test\_directory]\AT-6\output | | |
| 12 | Click on “Select Folder” button | | |
| 13 | Click “execute” | | |
| 14 | Verify that the cumulative mass of columns 2 and 4 are summed together to create a single timeseries consistent with FR-7 | “sum\_mass\_FR-6” values for noninteger year timesteps (output file) = 66-101 [g] + 66-102 [g] for corresponding noninteger timesteps (input file)  Note:  Excel file is available to assist checking located in the AT-6/utility directory. | *Pass* |

**Testing Process Description**

This test requires manually checking that the data was converted to the correct unit.

**Tool Runner Log**

See Tool Runner Log in AT-1

| Table A-7  **Surface Rate Interpolator Acceptance Test Plan Case 7** | | | |
| --- | --- | --- | --- |
| **Surface Rate Interpolator Acceptance Testing**  **CACIE- surf\_rate\_interp\_win\_intel\_64.exe – AT-7** | | **Date:05-18-2020** | |
| **Tool Runner Log File Location for this test:**  **\\olive\backups\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\** | | **Test Performed By: Praveena Allena** | |
| **Testing Directory: OLIVE\\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\AT-7** | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | **Test Result  (Pass/Fail)** |
| Navigate to the Testing Directory | | | |
| 1 | [If not already open] Start application (double-click on *runner\_run\_SRI.bat*)  [If already opened] Clear header1 row and header2 row text boxes  Unselect Select ‘Single Output’, ‘Use Cumulative’, and any ‘Conv. Factor’ options | | |
| 2 | Select “tab” delimiter radio button | | |
| 3 | Select checkbox for ci-> pCi in “Conv. Factor:” (unselect other checkboxes if applicable) | | |
| 5 | Click “Browse” | | |
| 6 | Select [test\_directory]\AT-7\tab\_i-129\_test\_data\_2\_column\_subset.dat | | |
| 7 | Click “Open” | | |
| 8 | Type “66-101” in column 2 “definition” | | |
| 9 | Type “66-102” in column 4 “definition” | | |
| 10 | Click “Browse” next to “out dir:” | | |
| 11 | Browse to [test\_directory]\AT-7\output\_pCi | | |
| 12 | Click on “Select Folder” button | | |
| 13 | Click “execute” | | |
| 14 | Verify that the cumulative mass of columns 2 and 4 in input files have been multiplied by selected conversion factor in generated output file per FR-6 | Values in generated output file = Values in input file × 1 × 1012 | *Pass*  Note: Used AT-5/utility files to compare/check integer year numbers (yearly steps). |
| 15 | Clear header1 row and header2 row text boxes  Note: Select “tab” delimiter radio button | | |
| 16 | Select checkbox for g-> ug in “Conv. Factor:” (unselect other checkboxes if applicable) | | |
| 17 | Click “Browse” | | |
| 18 | Select [test\_directory]\AT-7\tab\_i-129\_test\_data\_2\_column\_subset.dat | | |
| 19 | Click “Open” | | |
| 20 | Type “66-101” in column 2 “definition” | | |
| 21 | Type “66-102” in column 4 “definition” | | |
| 22 | Click “Browse” next to “out dir:” | | |
| 23 | Browse to [test\_directory]\AT-7\output\_ug | | |
| 24 | Click on “Select Folder” button | | |
| 25 | Click “execute” | | |
| 26 | Verify that the cumulative mass of columns 2 and 4 in input files have been multiplied by selected conversion factor in generated output file per FR-6 | Values in generated output file = Values in input file × 1 × 106 | *Pass*  Note: Used AT-5/utility files to compare/check integer year numbers (yearly steps). |
| 27 | Clear header1 row and header2 row text boxes  Note: Select “tab” delimiter radio button | | |
| 28 | Select checkbox for custom in “Conv. Factor:” and enter 2 in “custom:” text box and “User” in “Unit:” text box (unselect other checkboxes if applicable) | | |
| 29 | Click “Browse” | | |
| 30 | Select [test\_directory]\AT-7\tab\_i-129\_test\_data\_2\_column\_subset.dat | | |
| 31 | Click “Open” | | |
| 32 | Type “66-101” in column 2 “definition” | | |
| 33 | Type “66-102” in column 4 “definition” | | |
| 34 | Click “Browse” next to “out dir:” | | |
| 35 | Browse to [test\_directory]\AT-7\output\_user | | |
| 36 | Click on “Select Folder” button | | |
| 37 | Click “execute” | | |
| 38 | Verify that the cumulative mass of columns 2 and 4 in input files have been multiplied by selected conversion factor in generated output file per FR-6 | Values in generated output file = Values in input file × 2 | *Pass*  Note: Used AT-5/utility files to compare/check integer year numbers (yearly steps). |

**Testing Process Description**

Output data was spot checked for accuracy, as the main intent of this test is to verify capability of processing multiple files at the same time.

**Tool Runner Log**

See Tool Runner Log in AT-1

| Table A-8  **Surface Rate Interpolator Acceptance Test Plan Case 8** | | | |
| --- | --- | --- | --- |
| **Surface Rate Interpolator Acceptance Testing**  **CACIE- surf\_rate\_interp\_win\_intel\_64.exe – AT-8** | | **Date:05-18-2020** | |
| **Tool Runner Log File Location for this test:**  **\\olive\backups\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\** | | **Test Performed By: Praveena Allena** | |
| **Testing Directory: OLIVE\\CAVE\CA-CIE-Tools-TestEnv\SZ\_surf\_conv\SRI Test\AT-8** | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | **Test Result  (Pass/Fail)** |
| Navigate to the Testing Directory | | | |
| 1 | [If not already open] Start application (double-click on *runner\_run\_SRI.bat*)  [If already opened] Clear header1 row and header2 row text boxes | | |
| 2 | Select “tab” delimiter radio button | | |
| 3 | Check the “Single Output” check box | | |
| 4 | Click “Browse” | | |
| 5 | Multi-select the following files:   [test\_directory]\AT-8\tab\_i-129\_test\_data\_2.1\_column\_subset.dat  [test\_directory]\AT-8\tab\_i-129\_test\_data\_2.2\_column\_subset.dat [test\_directory]\AT-8\tab\_i-129\_test\_data\_2.3\_column\_subset.dat | | |
| 6 | Click “Open” | | |
| 7 | Type “66-101” in column 2 “definition” | | |
| 8 | Type “66-102” in column 4 “definition” | | |
| 9 | Click “Browse” next to “out dir:” | | |
| 10 | Browse to [test\_directory]\AT-8\output | | |
| 11 | Click on “Select Folder” button | | |
| 12 | Click “execute” | | |
| 13 | Verify that the three files were processed | Should be 6 files, 1 yearly steps, and one cumulative for each file processed. | *Pass* |

# Appendix

**Completed Installation Test**

| Table B-1  **Surface Rate Interpolator Installation Test Plan** | | | |
| --- | --- | --- | --- |
| **Surface Rate Interpolator Installation Testing**  **CACIE- surf\_rate\_interp\_win\_intel\_64.exe – IT-1** | | **Date:** | |
| **Tool Runner Log File Location for this test:**  **[PUT LINK TO THE DIRECTORY HERE]** | | **Test Performed By: [FIRST & LAST NAME]** | |
| **Testing Directory: [PROVIDE LINK TO TESTING DIRECTORY]** | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | **Test Result  (Pass/Fail)** |
| Tools Code Repository Directory: | | | |
| Navigate to the testing directory | | | |
| 1 | Invoke Tool runner and test installation of the tool by entering the following command as follows:  *./runner\_run\_IT-1\_SRI.bat* | | |
| 2 | Verify Tool Runner is invoked and executed. | Tool runner log generated |  |
| 3 | Verify graphic user interface window for the Surf Conversion tool opens | Graphic user interface window opens |  |