**CACIE Tool #NN** – ***HSSM Builder (build\_hssm.py)***

**Version** **1.0**

**QA**: **QA**

1. **Description and Purpose**

The main purpose of the HSSM Builder tool is to build a Hydrocarbon Spill Screening Model (HSSM) package for MT3D modeling purposes. It processes a single mass flux time series data file or multiple mass flux time series data files by first combining them into a single package. The HSSM Builder tool then shifts mass out of cells that no longer have a saturated layer in the MT3D model to adjacent cells that have a saturated layer and reduces the number of time steps associated with each MT3D model cell. The shifting of mass is consistent with the aqueous flow direction as defined by the MT3D model.

1. **Functional Requirements**

The following are the functional requirements of the HSSM Builder tool.

FR-1: read and process the following MT3D files and save processed files as \*.pkl files for use during subsequent processing of additional data files:

* MT3D Head file (\*.hds),
* Model top definition (\*.ref),
* Layer bottom definitions (\*.ref)
* Layer initial condition files (\*.ref).

FR-2: Identify the top layer where the percent saturation is greater than or equal to user-identified saturation threshold for each time period from MT3D HDS and layer files.

FR-3: Ability to reuse saturated data processed as part of FR-2 in future runs of the application without having to reprocess the MT3D data to rebuild it.

FR-4: User-definable start and end years for the output data (note: HSSM Builder tool converts years to days (365.25 days per year) starting from 0 for generated output files)

FR-5: User-definable flux floor (noise) threshold value

FR-6: User-definable maximum acceptable total mass error

FR-7: Read in and process a single file or multiple data files containing mass flux time series data (multiple files must be the same COPC but can represent different STOMP model domains). Note that the time steps must be the same in each file or it can throw off mass shift and cell summing calculations.

FR-8: Assign a value of “0” (zero) to mass flux values that are less than the user-specified flux floor (noise) threshold (FR-5) for each cell.

FR-9: When processing multiple mass flux time series data files, sum the mass flux of overlapping cells together to form a single time series for each cell. The overlapping cells must have the same time steps in order to be summed together.

FR-10: If a cell is dry or inactive (i.e. all cell layers drop below specified saturation), move remaining time series out of cell following the modeled aqueous flow from the cell to adjacent cell(s).

FR-11: Split a cell’s time series between cell layers depending on at which timesteps a layer meets or exceeds the minimum percent saturation threshold, using the highest layer that meets or exceeds the saturation threshold.

FR-12: Reduce the number of timesteps associated with each cell timeseries to within a target range of greater than 50 and less than 200. It is noted that the processing logic prioritizes meeting the acceptable error tolerance between the reduced and original datasets. As a result, the number of datapoints can be less than or greater than the target range of reduced timesteps.

FR-13: Build HSSM package input for MT3D

FR-14 If cell is dry or inactive in year 0 then check if there is atleast 10% saturation in any layer. If there is 10% saturation then use it as the saturated layer for year 0, then mass shift in year 1. If saturation never gets above 10% then mass shift starting in year 0.

1. **Software Requirements Specifications**

Programming Language and required modules/libraries:

* Python 3.6
* Numpy 1.16
* Pandas 0.24.2 (incompatible with other versions)
* Scipy 1.4.1
* Flopy 3.3
* Matplotlib 3.1.2

1. **Software Design Description**

Required inputs/generated outputs:

* Inputs:
  + MT3D files:
    - Data file (\*.hds) containing water levels for each cell
    - Data file (top1.ref) containing elevation of the top of the model for each cell
    - Data files (bot\*.ref) containing elevation of the bottom of each layer for each cell
    - Data files (sh\*.ref) containing the initial conditions for the model layers per cell.
  + Pickle files:
    - Data files (\*.pkl) containing preprocessed MT3D data (generated using data from MT3D files listed above).
      * Saturation levels at the final timestep for each cell ([MT3D\_model\_version]\_sat.pkl)
      * Directional mass flow between cells ([MT3D\_model\_version]\_flow.pkl)
      * Layer saturation levels by year for each cell over entire time period ([MT3D\_model\_version]\_yearly\_sat.pkl)

Once generated, these files can be reused instead of having to reprocess the MT3D files between different HSSM builder executions that use the same MT3D model.

* + Mass Flux Time series data
    - Typically STOMP data files (\*.csv) for an individual COPC by model domain
  + Config file
    - JSON-formatted file containing the following user-defined input parameters:
      * isPickled (Boolean): true: \*.pkl files exist; false: \*.pkl files need to be processed.
      * pickleDir (string): directory location of the \*.pkl files
      * satFile (string): name of the \*.pkl file containing the saturation levels at the final timestep for each cell
      * flowFile (string): name of \*.pkl file containing the directional mass flow between cells
      * yearlySatFile (string): name of \*.pkl file containing the layer saturation levels by year for each cell
      * hds (string): path/name of MT3D hds file
      * top\_ref (string): path/name of the file containing elevation of the top of the model for each cell
      * bot\_ref (string): array of file path/names containing elevation of the bottom of each layer of the model for each cell
      * hds\_init\_conditions (string): array of file path/names containing MT3D initial conditions
      * input (string): directory location for COPC mass time series files (all files need to be in the same time steps or any overlapping cells will not sum properly, and mass shifting out of cells will not merge with the new cell location properly)
      * output (string): directory to build HSSM package and verification files in; defaults to “/output” if not provided.
      * find\_sat\_layer\_by\_year (Boolean): true: split cells between layers as saturated layer changes; false: use the layer that is saturated for the entire model.
      * sat\_lvl (float): the minimum percent saturation value (percentage in decimal format, i.e., enter 0.75 to represent 75% saturation) for a layer to be considered saturated (i.e. not dry); defaults to 0.75 if not provided
      * max\_i (integer): maximum rows in the MT3D model grid
      * max\_j (integer): maximum columns in MT3D model grid
      * max\_k (integer): maximum layers in MT3D model grid
      * start\_year (integer): first year to start pulling data from inputs
      * end\_year (integer): last year to pull data from inputs
      * tolerance (float): maximum acceptable relative total mass error (percentage, i.e., enter 0.1 to represent 0.1% total mass error); defaults to 1E-02 if not provided
      * mass\_shift (Boolean): true: shift mass out of cells that go dry (no layers >= sat\_lvl) into other cells; false: leave mass in dry cells; defaults to false if not provided
      * data\_reduction (Boolean): true: reduce number of time steps in data; false: retain all times steps in data; defaults to true if not provided
      * flux\_floor (float): threshold value below which flux or mass values are considered to be equal to zero (i.e., below noise threshold); defaults to 1E-15 if not provided. Anything below this may be dropped out of model
      * max\_tm\_error (float): maximum acceptable total mass error after data reduction; defaults to 2.25E+15
      * HSSpath (string): extended path for file names in hss config file (mt3d.hss); defaults to “/hss” if not provided,
      * copc: name of COPC being processed
      * graph\_name (string): prefix for file names of generated graphs; e.g. “tc-99\_graphs” will equate to “tc-99\_graphs\_x-y(kz).png where x, y and z resolve to the i, j and cell layer address in the MT3D grid.
      * units (string): units applicable to data being processed; choice of pCi (radionuclides) or µg (chemicals); default is pCi if not provided
* Outputs:
  + Log files (\*.log) documenting different stages of building the HSSM package
  + \*.dat files for each cell, and for some cases, multiple layers of a cell (i{xx}j{yy}k{z}.dat)
  + Mt3d.hss file, config file for mt3d data.
  + PNG files with plots of the original and reduced datasets (flux and cumulative mass) versus time
  + CSV files, used for verification and recording data processing steps:
    - 01\_all\_cells\_after\_cell\_merge.csv
      * Snapshot of data after all inputs have been loaded and overlapping cells have been merged (i.e., mass flux summed)
    - 02\_all\_cell\_by\_day.csv
      * Snapshot of data after the mass flux has been converted from yearly to daily rates
    - 03\_all\_cell\_by\_day\_dry\_cell\_shifted.csv
      * Snapshot of data after mass has been shifted out of all dry cells
    - cell\_error.csv
      * Total error by cell after reduction
    - cell\_error\_by\_layer.csv
      * total error by cell layer after reduction
    - cell\_map.csv
      * what input files contributed to each cell
    - cumulative\_data\_set\_by\_year.csv
      * cumulative data for debugging
    - dry\_cells.csv
      * list of the cells that went dry and the cells that received the shifted mass from the dry cells
    - dry\_cell\_flux\_shift\_itteration\_{step number}.csv
      * data after it has been shifted to a new cell but before it has been merged with the existing data (there may be multiple iterations for the same grid address). There will be one file for each iteration, as it will iterate through until all mass has been shifted out of dry cells.
    - flux\_mass\_shift\_mapping.csv
      * shows how much mass moved from one cell to another
    - full\_data\_set.csv
      * all \*.dat files combined into a single csv
    - interpolated\_results\_cell.csv
      * each cell interpolated back into full data for comparison against the original full data set
    - interpolated\_results\_cell\_by\_layer.csv
      * each cell layer interpolated back into full data for comparison against the original full data set
    - rate\_error\_check.csv
      * shows where the absolute relative percent error of the reduced flux versus the original flux is greater than 0.1% for same time step
    - saturation.csv
      * Final saturated layer for each active cell
    - yearly\_saturation.csv
      * Saturated layers of each active cell through time

Tool Runner:

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

pylib/hssmbuilder/build\_hssm.py {config.json}

Code Review:

Code walkthrough was performed by Sara Lindberg on 05/26/2020. The code relies on standard python libraries as noted in Section 3 and additional code modules that are specific to the HSSM Builder tool only. No impacts to other repository tools or shared library dependencies were identified for the HSSM Builder tool.

1. **Requirements Traceability Matrix**

The requirements traceability matrix for the HSSM Builder tool is presented in Table 1.

| **Table 1. HSSM Builder Tool Requirements Traceability Matrix** | | |
| --- | --- | --- |
| **Functional Requirement ID** | **Acceptance Test ID** | **Test Case** |
| QA Level | CACIE- build\_hssm.py-AT-1 | Installation Test |
| FR-1 | CACIE- build\_hssm.py-AT-1 | Verify the MT3D head file, the model top definition file, the layer bottom definitions files, and the layer initial conditions files are read and processed and pkl files generated |
| FR-2 | CACIE- build\_hssm.py-AT-1 | Generate saturation and yearly saturation pkl files |
| FR-3 | CACIE- build\_hssm.py-AT-2 | Use existing saturation and yearly pkl files (already generated as part of AT-1) |
| FR-4 | CACIE- build\_hssm.py-AT-1 | Verify that the initial and final timesteps for the output data files correspond to the user-defined start year and end year in the JSON-formatted config file |
| FR-5 | CACIE- build\_hssm.py-AT-2 | Verify the flux floor threshold value is equal to the user-defined flux floor threshold in the JSON-formatted config file |
| FR-6 | CACIE- build\_hssm.py-AT-1 CACIE- build\_hssm.py-AT-2 | Verify that the maximum acceptable relative and total mass error of the reduced dataset is less than or equal to the maximum acceptable mass error value (FR-12) in the JSON-formatted config file |
| FR-7 | CACIE- build\_hssm.py-AT-1 | Read in and process multiple mass flux time series data files |
| FR-7 | CACIE-build\_hssm.py-AT-2 | Read in and process a single mass flux time series data file |
| FR-8 | CACIE-build\_hssm.py- AT-2 | Verify that mass flux is set to “0” (zero) when the original mass flux values is less than the flux floor threshold (FR-5) |
| FR-9 | CACIE-build\_hssm.py- AT-1 | Verify that the mass flux is summed for each cell that is included in more than one input file when processing multiple mass flux time series data input files |
| FR-10 | CACIE-build\_hssm.py-AT-1 | Verify that when a cell is dry, the mass associated with the cell is transferred to adjacent cell(s) |
| FR-11 | CACIE-build\_hssm.py-AT-1 | Split the time series for a cell between layers according to the timesteps when a layer meets or exceed the saturation threshold |
| FR-12 | CACIE-build\_hssm.py-AT-1  CACIE-build\_hssm.py-AT-2 | Verify the number of timesteps in the reduced time series datasets are within the target range of 50 to 200. If the reduced dataset is not within the target range, verify that the difference between the reduced and original datasets is within the acceptable error tolerance. |
| FR-13 | CACIE-build\_hssm.py-AT-1 | Verify that the HSSM package input file is generated |

1. **Test Plan and Cases**

The installation test plan for the HSSM Builder tool is presented in Table 2. The acceptance test cases are presented in Table 3 and Table 4.

| Table 2  **HSSM Builder Installation Test Plan** | | | |
| --- | --- | --- | --- |
| **HSSM Builder Installation Testing**  **CACIE-hssm\_build.py– 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\_hssm\_builder.sh* | | |
| 2 | Verify Tool Runner is invoked and executed. | Tool runner log generated |  |
| 3 | Verify HSSM Builder tool is invoked | Verify the following is output in command window:  flopy is installed in <python environment>  Invalid inputs: File not found, exiting script. |  |

| Table 3  **HSSM Builder Acceptance Test Plan Case 1** | | | |
| --- | --- | --- | --- |
| **HSSM Builder Acceptance Testing**  **CACIE-build\_hssm.py – AT-1** | | **Date:** | |
| **Tool Runner Log File Location for this test:**  **OLIVE//CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/AT-1** | | **Test Performed By:** | |
| **Testing Directory: OLIVE//CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/AT-1** | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | **Test Result  (Pass/Fail)** |
| Navigate to the Testing Directory | | | |
| 1 | Start application *runner\_run\_AT-1.sh* | | |
| 2 | Wait for the tool to finish running. Note: depending on system, network lag, etc this can take anywhere from a couple of hours to a full day to run. it takes a significant amount of time to process all the cells in the P2R Grid through time. | | |
| 3 | Verify the MT3D head file, the model top definition file, the layer bottom definitions files, and the layer initial conditions files are read and processed and saved as \*.pkl files per FR-1 | The following files were generated:  P2Rv8.3\_flow.pkl P2Rv8.3\_sat.pkl |  |
| 4 | Verify that the uppermost layer where the percent saturation is greater than or equal to user-identified saturation threshold for each time period from MT3D HDS and layer files per FR-2 | The following file was generated:  P2Rv8.3\_yearly\_sat.pkl |  |
| 5 | Verify multiple mass flux timeseries data files are read and processed per FR-7 | Check log/build\_mass\_data\_log\_YYYYMMDD.log and verify both input files were processed, and output files correspond to the cells in the input files |  |
| 6 | Verify flux columns for cell 66-101 from both data\_set1\_1 and data\_set1\_2 were summed together in the generated file “misc/01\_all\_cells\_after\_cell\_merge.csv” per FR-9 | Column 66-101 values (01\_all\_cells\_after\_cell\_merge.csv) = Column 66-101 values (data/data\_set1\_1.csv) + Column 66-101 values (data/data\_set1\_2.csv) |  |
| 7 | Verify mass shifted from column 39-95 per FR-10 | Should have been spread between 39-93,39-94,40-94,40-95,41-95 starting on day 10592 (year 2046). (use output/misc/flux\_mass\_shift\_mapping.csv and output/misc/03\_all\_cell\_by\_day\_dry\_cell\_shifted.csv to verify) |  |
| 8 | Verify 60-46 was split between layers 2 and 3 per FR-11 | Check below files exist:  Output/i60j46k2\_hss.dat  Output/i60j46k3\_hss.dat  verification of data:  Output/log/AT-1\_60-46(k2).png  Output/log/AT-1\_60-46(k3).png  Output/log/AT-1\_60-46\_all\_layers.png |  |
| 9 | Verify 66-101 was split between layers 2,3, and 4 per FR-11 | Check below files exist:  Output/i66j101k2\_hss.dat  Output/i66j101k3\_hss.dat  Output/i66j101k4\_hss.dat  verification of data:  Output/log/AT-1\_66-101(k2).png  Output/log/AT-1\_66-101(k3).png  Output/log/AT-1\_66-101(k4).png  Output/log/AT-1\_66-101\_all\_layers.png |  |
| 10 | Verify the initial and final timesteps of the reduced dataset in generated output files correspond to the start and end year in the JSON-formatted config file per FR-4 | Use output/misc/ 02\_all\_cell\_by\_day.csv. This file contains the data after all files have been loaded into a dataframe. Only the pertinent data to be used will be in it (IE data from start date to end date)  AT-1/config\_AT-1\_olive.json:  "start\_year": 2018,  "end\_year": 2617, |  |
| 11 | Verify reduced data plot corresponds to the original dataset plot (Figures (\*.png files) are located in AT-1/log/);  Reduced number of points within target range of 50 to 200 and/or difference is within acceptable error tolerance (error and reduced dataset set summary is located in misc/cell\_error.csv) per FR-6 (error) and FR-12 | Figures (\*.png files) are located in AT-1/output/log/  abs(Total Mass Error) < Total Mass Error Threshold  AT-1/config\_AT-1\_olive.json:  "max\_tm\_error": 2.25e7, (pCi)  abs(% error) < maximum acceptable tolerance  AT-1/config\_AT-1\_olive.json: "tolerance": 0.1, (IE .1%) |  |
| 12 | Verify the Verify that the HSSM package input file is generated per FR-13 | Check to see that the following file was generated:  Output/mt3d.hss |  |

| Table 4  **HSSM Builder Acceptance Test Plan Case 2** | | | |
| --- | --- | --- | --- |
| **HSSM Builder Acceptance Testing**  **CACIE-build\_hssm.py – AT-2** | | **Date:** | |
| **Tool Runner Log File Location for this test:**  **OLIVE//CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/AT-2** | | **Test Performed By:** | |
| **Testing Directory: OLIVE//CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/AT-2** | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | **Test Result  (Pass/Fail)** |
| Navigate to the Testing Directory | | | |
| 1 | Start application *runner\_run\_AT-2.sh* | | |
| 2 | Wait until tool finishes processing the data files.  Note: The P2R model files were processed as part of the AT-1 test case. The AT-2 test case uses the post-processed \*.pkl files already generated in AT-1 which should speed up the process. Processing for this test case should take between 5 – 30 minutes to run. | | |
| 3 | Verify existing pkl files were used per FR-3. | Open: Log/ build\_sat\_data\_log\_20200520.log  Should have entries for reading: -reading saturation pkl file  -reading Flow pkl file  -reading yearly saturation pkl |  |
| 4 | Verify single mass flux timeseries data file is read and processed per FR-7 | Check log/build\_mass\_data\_log\_YYYYMMDD.log and verify the input file was processed  Verify files in output directory correspond to the cells in the input file |  |
| 5 | Verify reduced data plot corresponds to the original dataset plot (Figures (\*.png files) are located in A2-1/log/);  Reduced number of points within target range of 50 to 200 and/or difference is within acceptable error tolerance (error and reduced dataset set summary is located in misc/cell\_error.csv) per FR-6 (error) and FR-12 | Figures (\*.png files) are located in AT-2/output/log/  abs(Total Mass Error) < Total Mass Error Threshold  AT-2/config\_AT-2\_olive.json: "max\_tm\_error": 2.25e7, (pCi)  abs(% error) < maximum acceptable relative tolerance  AT-2/config\_AT-2\_olive.json:  "tolerance": 0.1, (IE .1%) |  |
| 6 | Using misc/cell\_error\_by\_layer.csv verify: | | |
| 7 | Cell/layers that have flux less than the flux floor threshold value of 2.7378507871321015e-06 pCi/day (i.e., 0.001 pCi/year/365.25 days/year) for the entire time series is skipped per FR-5 and FR-8 | These cells have notes in cell\_error\_by\_layer.csv stating: “This cell was skipped as the flux never rises above minimum flux (2.7378507871321015e-06)” |  |
| 8 | Verify percent error is less than 0.1% (or -0.1%) per FR-12 | Use Column “%error”  Notes:  \* only summed\_layers will contain a value as that adds the layers together then compares it to the original data. |  |

1. **Acceptance Test Report**

Results of the acceptance testing are in Appendix A. The two test cases are described as follows:

* Acceptance Test 1 is in Table A-1 of Appendix A. The test executed the HSSM Builder Tool and the outputs were evaluated to validate the functional requirements as specified in Requirements Traceability Matrix in Table 1.
* Acceptance Test 2 is in Table A-2 of Appendix A. The test executed the HSSM Builder Tool and the outputs evaluated to validate the functional requirements as specified in Requirements Traceability Matrix in Table 1.

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

1. **User Guide**

To run this tool, you will need to pass 1 argument into it.

1. Config file: Refer to Section 4 of this software management plan for a full description

It is recommended that a shell script is used to execute the tool. The recommended structure of this shell script is shown below.

TOOL=<path/to/build\_hssm.py>

INPUTFILE=<path/to/config/file>

python $TOOL $ INPUTFILE

1. **Tool Versions**

This section details changes incorporated into each version of the HSSM Builder tool.

* 1.0 – Tool was developed.
* 1.1 = Bug: Cells going inactive or starting inactive at year 0 not being processed correctly.

# 

# Appendix A

**Completed Acceptance Test Cases**

**Tool Runner Log**

###Executing AT-1 ###

###Executing Fingerprint Tool /srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/AT-1/config\_AT-1\_olive.json ###

INFO--05/28/2020 02:37:02 PM--Starting CA-CIE Tool Runner. Logging to "./AT-1\_AT-1.log"

INFO--05/28/2020 02:37:02 PM--Code Version: 6d9ed4f88ad818f19f3a8519e7b3f50860c5dd33 v3.1: /opt/tools/pylib/runner/runner.py<--1bcfd6779e9cbdb82673405873a8e5e81514ae27

INFO--05/28/2020 02:37:02 PM--Code Version: 6d9ed4f88ad818f19f3a8519e7b3f50860c5dd33 v3.1: /opt/tools/pylib/fingerprint/fingerprint.py<--e9692a4faec2ee264fe50417b6b6a516ba82b2f6

INFO--05/28/2020 02:37:02 PM--QA Status: QUALIFIED : /opt/tools/pylib/runner/runner.py

INFO--05/28/2020 02:37:02 PM--QA Status: QUALIFIED : /opt/tools/pylib/fingerprint/fingerprint.py

INFO--05/28/2020 02:37:02 PM--Invoking Command:"python3.6" with Arguments:"/opt/tools/pylib/fingerprint/fingerprint.py /srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/AT-1/config\_AT-1\_olive.json --output ./AT-1\_AT-1.log --outputmode a"

INFO--05/28/2020 02:37:02 PM--Username:stomusiak Computer:olive Platform:Linux 4.4.0-38-generic #57~14.04.1-Ubuntu SMP Tue Sep 6 17:20:43 UTC 2016

Fingerprint generated at 2020-05-28 14:37:02.627671

/srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/AT-1/config\_AT-1\_olive.json 9ec287ce4074ee8b7a4425b69491a2dc51b7c9128458a05d129317cc37922af2

###Finished Process###

###Executing Fingerprint Tool###

INFO--05/28/2020 02:37:02 PM--Starting CA-CIE Tool Runner. Logging to "./AT-1\_AT-1.log"

INFO--05/28/2020 02:37:02 PM--Code Version: 6d9ed4f88ad818f19f3a8519e7b3f50860c5dd33 v3.1: /opt/tools/pylib/runner/runner.py<--1bcfd6779e9cbdb82673405873a8e5e81514ae27

INFO--05/28/2020 02:37:02 PM--Code Version: 6d9ed4f88ad818f19f3a8519e7b3f50860c5dd33 v3.1: /opt/tools/pylib/fingerprint/fingerprint.py<--e9692a4faec2ee264fe50417b6b6a516ba82b2f6

INFO--05/28/2020 02:37:02 PM--QA Status: QUALIFIED : /opt/tools/pylib/runner/runner.py

INFO--05/28/2020 02:37:02 PM--QA Status: QUALIFIED : /opt/tools/pylib/fingerprint/fingerprint.py

INFO--05/28/2020 02:37:02 PM--Invoking Command:"python3.6" with Arguments:"/opt/tools/pylib/fingerprint/fingerprint.py /srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/hds/ --output ./AT-1\_AT-1.log --outputmode a"

INFO--05/28/2020 02:37:02 PM--Username:stomusiak Computer:olive Platform:Linux 4.4.0-38-generic #57~14.04.1-Ubuntu SMP Tue Sep 6 17:20:43 UTC 2016

Fingerprint generated at 2020-05-28 14:37:05.355676

Total for 8 files 3cd79b8f68f6442fa580584b8441b3fb998b1020ce5fc4a6f0a9941f0c222048

/srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/hds/P2Rv8.3.hds 00dbf19088e4d50e51de5ff2d9bea721c3a1338b91b424639b67b42769629f10

/srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/hds/sh1.ref 5c72f484a1bf746838b6106570077f22bbb2573cb072b2efb7541bd683ec04da

/srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/hds/sh2.ref a4d84d3972550fa0f333ff70a0f8711f31b39333a008dfd80f5259adf1b410f4

/srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/hds/sh3.ref 994019a7e8c1f3b7b5689888f864d3edeaeb1f6fcd55cdeab4d3d00617c0e6e9

/srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/hds/sh4.ref fad807fe4f3652d4c1d011524c39db8f0ad2d34a9fcf259a513efce23db65240

/srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/hds/sh5.ref 308a7ab800bb4a4e29ab5a4d431fec6d5a1e9b30d98194f8c8160f42309dcf84

/srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/hds/sh6.ref 649a286518ee1815ae8710d3d616fc8c164736820ed6521aa92b3543d524cfe7

/srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/hds/sh7.ref efbaa30f9008ff17a3cf7cf975dee125dc56bf7bb9ac4223a9e96b9778e2378a

###Finished Process###

###Executing Fingerprint Tool###

INFO--05/28/2020 02:37:05 PM--Starting CA-CIE Tool Runner. Logging to "./AT-1\_AT-1.log"

INFO--05/28/2020 02:37:05 PM--Code Version: 6d9ed4f88ad818f19f3a8519e7b3f50860c5dd33 v3.1: /opt/tools/pylib/runner/runner.py<--1bcfd6779e9cbdb82673405873a8e5e81514ae27

INFO--05/28/2020 02:37:05 PM--Code Version: 6d9ed4f88ad818f19f3a8519e7b3f50860c5dd33 v3.1: /opt/tools/pylib/fingerprint/fingerprint.py<--e9692a4faec2ee264fe50417b6b6a516ba82b2f6

INFO--05/28/2020 02:37:05 PM--QA Status: QUALIFIED : /opt/tools/pylib/runner/runner.py

INFO--05/28/2020 02:37:05 PM--QA Status: QUALIFIED : /opt/tools/pylib/fingerprint/fingerprint.py

INFO--05/28/2020 02:37:05 PM--Invoking Command:"python3.6" with Arguments:"/opt/tools/pylib/fingerprint/fingerprint.py /opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/ --output ./AT-1\_AT-1.log --outputmode a"

INFO--05/28/2020 02:37:05 PM--Username:stomusiak Computer:olive Platform:Linux 4.4.0-38-generic #57~14.04.1-Ubuntu SMP Tue Sep 6 17:20:43 UTC 2016

Fingerprint generated at 2020-05-28 14:37:06.444722

Total for 62 files 99dbbf7846fe07de7cea67d502b95b576883b229920817d273c74523150f1bc3

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.bas a9174ff63286daf8e3bfe1f4568af38280638642029fd70dabbb1edd51abe9f9

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.chd 0bc580df8c2bb8d585f6671b457b43acdecf24c9e1b010b24f78b4e3ddbe8f0d

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.dis 780fec30f05c6a51e722f31b80e7de46a1a5f19bdd9152d37276742ea9b368e6

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.hfb 16a3d1236ef9847c5eba812e01a3bd3b94020a607fbe646593abe7fc21b6214b

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.lpf 88baae862bb8464b982e8e12d7365564b4540bf98253b2b2f8c0d443c12db467

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.lst 76e355022e68faf20e0c1cc939f0bfa20ef796d526c5a0e1eff7850ab214b778

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.mnw2 1bcc1201d84bcf340315ce7df32c0182faf904730565f89647b71dabc855aa19

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.mst 816aab56b0c10e796fed5a8b5eda5cf4a5db5483e50300c2349c618d0bb538bc

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.nam 5ffde9b0290773c7c88377b090ba5984101fee9a230dc87c6448e9753e19a886

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.oc 2e644464bd8f0a2055f663d179f1020f7263709e0d5c96d8c43e8ed3bc4e4234

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.ort a2aca5af418855bf9b71383b932f5dd63ad190a5046de99b8e23771e7bcdeb80

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.rch e771cb232a43835cf8c714f7b3a651afc6ccf3140c78ea40b58359f3ec95bdca

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.riv 428e66a3fc0a4c63fe8bc54888ba5640a0bcf6ee8bc836170c2c1ec42c4a91f4

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.spc 661044af6959176fa821729154529af057b534afcdf4821f078118826bd526ff

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3\_ato.oc 4c60398686aaca975d34cfbe3c6f319d4286e79c90ec3406ceef0b7bc70ce413

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3\_sh1.ref 1d5069249b81a13d8b98460eadf8e0863233cdb9a0f19ae20f20e8249740d1a5

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3\_sh2.ref 9c51be975dfcf3a57c1c237e0cc8969fa0d17591b583dd472351ae0026879571

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3\_sh3.ref ba4bbefa1528ed6e7d1132d99c433f4e29691f38240f09af62b86ab1f07c0a6f

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3\_sh4.ref 700900640a1fe89fb9e1c965fd0ae5b4471cd919e3a46ed61bac8ddb476bb59f

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3\_sh5.ref 3e78a611ed3d19e55e29060ddb859895c6930aa61ca20503f2a89629d498ca14

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3\_sh6.ref bba2ea051194ca0c38aa6f4a923e5e1ae3f7ed67ede8bc2ea201e79b167723ef

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3\_sh7.ref 93226a9674cefa9eaba64ab438dc0ce3b47b80049b16f8f539b743c384b056a1

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/bot1.ref f162da5bef18b495eea5f5819be30e1cb616d0790f708dff7bb3428129a7046c

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/bot2.ref cb6e88901e24bd42026290efa0825c632c35adfbf290ba67c2cd94ef1ffed979

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/bot3.ref 0a219383be39b8528e4382f3a64dc1ea97b8fc023c7f50aacc5ed6bbf840b18b

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/bot4.ref 5439116ed0ea25d90648886055c4dc8fde2bcc8b812d4683b55143906edeebc1

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/bot5.ref 351c551e214c092b56bea573ac9457d044b684e1908917476d149d0d7b5d2bfa

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/bot5\_FY79\_03\_116d.ref 2a172eeb8ff31341e617eb4e95991c1479dde58d50ed2c035a73bbbcebddbd0b

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/bot6.ref 29962c4a13c33bc74998a047cf05deb4ddad7307a480e2400f3f9cc987b98e80

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/bot6\_FY79\_03\_116d.ref 49800f659d8446cb84e937a79607fc0fd22c7c1e94cd742e956828f54a298f66

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/bot7.ref 9156963f7859b90b36fdea4274c983fbaa67e0fd6007e92900d22f5b14d31191

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/bot7\_FY79\_03\_116d.ref 316f81fa5a29158045d2a0b4f9d0e9927bb2cae2ae69bd14c4e69c32a87b6c97

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/ibnd1.inf 8bea383f48516051a085896a35408e62e14f1ac5c6fac731d12a15fb3b56c452

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/ibnd2.inf f62e57f7c4d948721f023f8e42bc83b68e04f1fcfa35de9352d08d546f0a3b70

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/ibnd3.inf f62e57f7c4d948721f023f8e42bc83b68e04f1fcfa35de9352d08d546f0a3b70

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/ibnd4.inf 0b7fe94916d03e8965c2143b1ac39fa6af7b31c57e53f08813dc4a9b31428c65

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/ibnd5.inf 0b7fe94916d03e8965c2143b1ac39fa6af7b31c57e53f08813dc4a9b31428c65

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/ibnd6.inf e383faab171e5a0aa8a59a138a35020e3349340a54afe6c918931bfb9d1a0a4c

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/ibnd7.inf af13fa6e714c3101a253c8c516ffb531bbf0cba1d2e7572090ed2d483a626431

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/kh1.ref 38935fca1501a322869f39071e39f4900d783611edeb061415f45e379cef8ef6

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/kh2.ref 8364c45b799b9789e6bcd2859871ad44b94cbfcd57abad6bdff1e535d2cd19a2

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/kh3.ref 455986c23a7f2267f122e546e347349632537a07753ae5174d28c0dc3d1da28f

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/kh4.ref f6ea87b4ef8fd6b6c4e70b782d19dc816cc5f812f2f02d8d9957864f730b8018

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/kh5.ref da1f5a3e58ead268a59ab8f76cd47c9ea1cd86a00e038f8f7c13a990706bc879

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/kh6.ref 179517891481efdd1ba19740e80dadaec15376f4e02b44ec742a29675fa41a21

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/kh7.ref 9813f6d8d3c3ca10569e52946c7802813aad3f94da15bbb7148803fd2170601d

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sh1.ref 923bce4ca1631623c4c3cd82a1fd79a429782f48e608f1746d4c28d8fa57d249

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sh2.ref 5de6f8ca92d59e2514a3a64e9172ba19faf62257e580cff5cbb19578043d33f0

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sh3.ref bf8ca866804af500eea50f406cafebaed97300c4fa8cea2af01e6aeef230d90b

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sh4.ref cdd06e674d5b2a0f8889f385d8c3e6bc5b75d3204672e64b3083fdf7c9cdff61

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sh5.ref 97698ac92d39640c98458cc50a3453030474d83e1c62e50ae6d20014bd0be641

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sh6.ref 2e67911ba081e00cf62ed97d85667961ecda3320396573938d0fd8ed05cdefb8

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sh7.ref ee6cb31d4b5642a34124c6662ecdd47d4fdcc235d8726293b6644ff7d7ff0580

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/ss.ref 6cebcdeac730badaff8157da430c6e2b51f1e488ee5cef208eee12dd8c895637

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sy1.ref 634a18fae735c8177da45d73683ee14f3c1624903a2582ac1da93afc6b078b21

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sy2.ref 168c49d5cca20e49fad36d5c9680b09eb72a8d66b486a9765dc6072e0267b2d7

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sy3.ref fbd483a7bb88f0d83554dbb75dc43fb29459bab2377976afafb34a81ec92ca85

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sy4.ref c1bb39eca31ff85b369f6ad8aee707f12424ebda83dfd016bca5b974720ade32

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sy5.ref 1d2a3e1e84550498709e715434f76dcd04251f366a626b6ddddd36442f887f12

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sy6.ref bc132ae70ffa92f4af41e3a231f7d5594b66c6f36489b75ef7fb66653a129ba2

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sy7.ref 4841d8eff2f0c125ae4b66771515e7f8a4ebb37add869f1892ce92665b830779

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/top1.ref 30ccfc72c31497e1d421cd0b8ad4850cdea4fdf1ea438bace3208bc9bcd1e266

###Finished Process###

###Executing HSSM Builder###

INFO--05/28/2020 02:37:06 PM--Starting CA-CIE Tool Runner. Logging to "./AT-1\_AT-1.log"

INFO--05/28/2020 02:37:06 PM--Code Version: 6d9ed4f88ad818f19f3a8519e7b3f50860c5dd33 v3.1: /opt/tools/pylib/runner/runner.py<--1bcfd6779e9cbdb82673405873a8e5e81514ae27

INFO--05/28/2020 02:37:06 PM--Code Version: 1a98dfe2ff0d09974422adeea69627c442a83f0e Local repo SHA-1 has does not correspond to a remote repo release version: ../../../CA-CIE-Tools-TestRepos/sz\_hssm\_builder/CA-CIE-Tools/pylib/hssmbuilder/build\_hssm.py<--4a0cdfbf7b4fe78c70715894a7bea64c9c0194bd

INFO--05/28/2020 02:37:06 PM--QA Status: QUALIFIED : /opt/tools/pylib/runner/runner.py

INFO--05/28/2020 02:37:06 PM--QA Status: TEST : ../../../CA-CIE-Tools-TestRepos/sz\_hssm\_builder/CA-CIE-Tools/pylib/hssmbuilder/build\_hssm.py

INFO--05/28/2020 02:37:06 PM--Invoking Command:"python3.6" with Arguments:"../../../CA-CIE-Tools-TestRepos/sz\_hssm\_builder/CA-CIE-Tools/pylib/hssmbuilder/build\_hssm.py /srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/AT-1/config\_AT-1\_olive.json"

INFO--05/28/2020 02:37:06 PM--Username:stomusiak Computer:olive Platform:Linux 4.4.0-38-generic #57~14.04.1-Ubuntu SMP Tue Sep 6 17:20:43 UTC 2016

###Finished Process###

###Finished AT-1 ###

| Table A-1  **HSSM Builder Acceptance Test Plan Case 1** | | | | |
| --- | --- | --- | --- | --- |
| **HSSM Builder Acceptance Testing**  **CACIE-build\_hssm.py – AT-1** | | | **Date: 05/28/2020** | |
| **Tool Runner Log File Location for this test:**  **OLIVE//CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/AT-1** | | | **Test Performed By: S. Tomusiak** | |
| **Testing Directory: OLIVE//CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/AT-1** | | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | | **Test Result  (Pass/Fail)** |
| Navigate to the Testing Directory | | | | |
| 1 | Start application *runner\_run\_AT-1.sh* | | | |
| 2 | Wait for the tool to finish running. Note: depending on system, network lag, etc this can take anywhere from a couple of hours to a full day to run. it takes a significant amount of time to process all the cells in the P2R Grid through time. | | | |
| 3 | Verify the MT3D head file, the model top definition file, the layer bottom definitions files, and the layer initial conditions files are read and processed and saved as \*.pkl files per FR-1 | The following files were generated:  P2Rv8.3\_flow.pkl P2Rv8.3\_sat.pkl | | Pass |
| 4 | Verify that the uppermost layer where the percent saturation is greater than or equal to user-identified saturation threshold for each time period from MT3D HDS and layer files per FR-2 | The following file was generated:  P2Rv8.3\_yearly\_sat.pkl | | Pass |
| 5 | Verify multiple mass flux timeseries data files are read and processed per FR-7 | Check log/build\_mass\_data\_log\_YYMMDD.log and verify both input files were processed, and output files correspond to the cells in the input files | | Pass |
| 6 | Verify flux columns for cell 66-101 from both data\_set1\_1 and data\_set1\_2 were summed together in the generated file “misc/01\_all\_cells\_after\_cell\_merge.csv” per FR-9 | Column 66-101 values (01\_all\_cells\_after\_cell\_merge.csv) = Column 66-101 values (data/data\_set1\_1.csv) + Column 66-101 values (data/data\_set1\_2.csv) | | Pass |
| 7 | Verify mass shifted from column 39-95 per FR-10 | Should have been spread between 39-93,39-94,40-94,40-95,41-95 starting on day 10592 (year 2046). (use output/misc/flux\_mass\_shift\_mapping.csv and output/misc/03\_all\_cell\_by\_day\_dry\_cell\_shifted.csv to verify) | | Pass |
| 8 | Verify 60-46 was split between layers 2 and 3 per FR-11 | Check below files exist:  Output/i60j46k2\_hss.dat  Output/i60j46k3\_hss.dat  verification of data:  Output/log/AT-1\_60-46(k2).png  Output/log/AT-1\_60-46(k3).png  Output/log/AT-1\_60-46\_all\_layers.png | | Pass |
| 9 | Verify 66-101 was split between layers 2,3, and 4 per FR-11 | Check below files exist:  Output/i66j101k2\_hss.dat  Output/i66j101k3\_hss.dat  Output/i66j101k4\_hss.dat  verification of data:  Output/log/AT-1\_66-101(k2).png  Output/log/AT-1\_66-101(k3).png  Output/log/AT-1\_66-101(k4).png  Output/log/AT-1\_66-101\_all\_layers.png | | Pass |
| 10 | Verify the initial and final timesteps of the reduced dataset in generated output files correspond to the start and end year in the JSON-formatted config file per FR-4 (AT-1/config\_AT-1\_olive.json) | Use output/misc/ 02\_all\_cell\_by\_day.csv. This file contains the data after all files have been loaded into a dataframe. Only the pertinent data to be used will be in it (IE data from start date to end date)  AT-1/config\_AT-1\_olive.json:  "start\_year": 2018,  "end\_year": 2617, | | Pass |
| 11 | Verify reduced data plot corresponds to the original dataset plot (Figures (\*.png files) are located in AT-1/log/);  Reduced number of points within target range of 50 to 200 and/or difference is within acceptable error tolerance (error and reduced dataset set summary is located in misc/cell\_error.csv) per FR-6 (error) and FR-12 | Figures (\*.png files) are located in AT-1/output/log/  abs(Total Mass Error) < Total Mass Error Threshold  AT-1/config\_AT-1\_olive.json:  "max\_tm\_error": 2.25e7, (pCi)  abs(% error) < maximum acceptable tolerance  AT-1/config\_AT-1\_olive.json: "tolerance": 0.1, (IE .1%) | | Pass |
| 12 | Verify the Verify that the HSSM package input file is generated per FR-13 | Check to see that the following file was generated:  Output/mt3d.hss | | Pass |

**Tool Runner Log**

###Executing AT-2 ###

###Executing Fingerprint Tool /srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/AT-2/config\_AT-2\_olive.json ###

INFO--06/03/2020 04:47:04 PM--Starting CA-CIE Tool Runner. Logging to "./AT-2\_AT-2.log"

INFO--06/03/2020 04:47:04 PM--Code Version: 6d9ed4f88ad818f19f3a8519e7b3f50860c5dd33 v3.1: /opt/tools/pylib/runner/runner.py<--1bcfd6779e9cbdb82673405873a8e5e81514ae27

INFO--06/03/2020 04:47:04 PM--Code Version: 6d9ed4f88ad818f19f3a8519e7b3f50860c5dd33 v3.1: /opt/tools/pylib/fingerprint/fingerprint.py<--e9692a4faec2ee264fe50417b6b6a516ba82b2f6

INFO--06/03/2020 04:47:04 PM--QA Status: QUALIFIED : /opt/tools/pylib/runner/runner.py

INFO--06/03/2020 04:47:04 PM--QA Status: QUALIFIED : /opt/tools/pylib/fingerprint/fingerprint.py

INFO--06/03/2020 04:47:04 PM--Invoking Command:"python3.6" with Arguments:"/opt/tools/pylib/fingerprint/fingerprint.py /srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/AT-2/config\_AT-2\_olive.json --output ./AT-2\_AT-2.log --outputmode a"

INFO--06/03/2020 04:47:04 PM--Username:stomusiak Computer:olive Platform:Linux 4.4.0-38-generic #57~14.04.1-Ubuntu SMP Tue Sep 6 17:20:43 UTC 2016

Fingerprint generated at 2020-06-03 16:47:04.379521

/srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/AT-2/config\_AT-2\_olive.json 95b44357d0bc2aea9f30143a8d3821250b2d0752d86d705d80c82cda1d298802

###Finished Process###

###Executing Fingerprint Tool###

INFO--06/03/2020 04:47:04 PM--Starting CA-CIE Tool Runner. Logging to "./AT-2\_AT-2.log"

INFO--06/03/2020 04:47:04 PM--Code Version: 6d9ed4f88ad818f19f3a8519e7b3f50860c5dd33 v3.1: /opt/tools/pylib/runner/runner.py<--1bcfd6779e9cbdb82673405873a8e5e81514ae27

INFO--06/03/2020 04:47:04 PM--Code Version: 6d9ed4f88ad818f19f3a8519e7b3f50860c5dd33 v3.1: /opt/tools/pylib/fingerprint/fingerprint.py<--e9692a4faec2ee264fe50417b6b6a516ba82b2f6

INFO--06/03/2020 04:47:04 PM--QA Status: QUALIFIED : /opt/tools/pylib/runner/runner.py

INFO--06/03/2020 04:47:04 PM--QA Status: QUALIFIED : /opt/tools/pylib/fingerprint/fingerprint.py

INFO--06/03/2020 04:47:04 PM--Invoking Command:"python3.6" with Arguments:"/opt/tools/pylib/fingerprint/fingerprint.py /srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/hds/ --output ./AT-2\_AT-2.log --outputmode a"

INFO--06/03/2020 04:47:04 PM--Username:stomusiak Computer:olive Platform:Linux 4.4.0-38-generic #57~14.04.1-Ubuntu SMP Tue Sep 6 17:20:43 UTC 2016

Fingerprint generated at 2020-06-03 16:47:07.338944

Total for 8 files 3cd79b8f68f6442fa580584b8441b3fb998b1020ce5fc4a6f0a9941f0c222048

/srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/hds/P2Rv8.3.hds 00dbf19088e4d50e51de5ff2d9bea721c3a1338b91b424639b67b42769629f10

/srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/hds/sh1.ref 5c72f484a1bf746838b6106570077f22bbb2573cb072b2efb7541bd683ec04da

/srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/hds/sh2.ref a4d84d3972550fa0f333ff70a0f8711f31b39333a008dfd80f5259adf1b410f4

/srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/hds/sh3.ref 994019a7e8c1f3b7b5689888f864d3edeaeb1f6fcd55cdeab4d3d00617c0e6e9

/srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/hds/sh4.ref fad807fe4f3652d4c1d011524c39db8f0ad2d34a9fcf259a513efce23db65240

/srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/hds/sh5.ref 308a7ab800bb4a4e29ab5a4d431fec6d5a1e9b30d98194f8c8160f42309dcf84

/srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/hds/sh6.ref 649a286518ee1815ae8710d3d616fc8c164736820ed6521aa92b3543d524cfe7

/srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/hds/sh7.ref efbaa30f9008ff17a3cf7cf975dee125dc56bf7bb9ac4223a9e96b9778e2378a

###Finished Process###

###Executing Fingerprint Tool###

INFO--06/03/2020 04:47:07 PM--Starting CA-CIE Tool Runner. Logging to "./AT-2\_AT-2.log"

INFO--06/03/2020 04:47:07 PM--Code Version: 6d9ed4f88ad818f19f3a8519e7b3f50860c5dd33 v3.1: /opt/tools/pylib/runner/runner.py<--1bcfd6779e9cbdb82673405873a8e5e81514ae27

INFO--06/03/2020 04:47:07 PM--Code Version: 6d9ed4f88ad818f19f3a8519e7b3f50860c5dd33 v3.1: /opt/tools/pylib/fingerprint/fingerprint.py<--e9692a4faec2ee264fe50417b6b6a516ba82b2f6

INFO--06/03/2020 04:47:07 PM--QA Status: QUALIFIED : /opt/tools/pylib/runner/runner.py

INFO--06/03/2020 04:47:07 PM--QA Status: QUALIFIED : /opt/tools/pylib/fingerprint/fingerprint.py

INFO--06/03/2020 04:47:07 PM--Invoking Command:"python3.6" with Arguments:"/opt/tools/pylib/fingerprint/fingerprint.py /opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/ --output ./AT-2\_AT-2.log --outputmode a"

INFO--06/03/2020 04:47:07 PM--Username:stomusiak Computer:olive Platform:Linux 4.4.0-38-generic #57~14.04.1-Ubuntu SMP Tue Sep 6 17:20:43 UTC 2016

Fingerprint generated at 2020-06-03 16:47:08.511842

Total for 62 files 99dbbf7846fe07de7cea67d502b95b576883b229920817d273c74523150f1bc3

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.bas a9174ff63286daf8e3bfe1f4568af38280638642029fd70dabbb1edd51abe9f9

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.chd 0bc580df8c2bb8d585f6671b457b43acdecf24c9e1b010b24f78b4e3ddbe8f0d

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.dis 780fec30f05c6a51e722f31b80e7de46a1a5f19bdd9152d37276742ea9b368e6

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.hfb 16a3d1236ef9847c5eba812e01a3bd3b94020a607fbe646593abe7fc21b6214b

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.lpf 88baae862bb8464b982e8e12d7365564b4540bf98253b2b2f8c0d443c12db467

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.lst 76e355022e68faf20e0c1cc939f0bfa20ef796d526c5a0e1eff7850ab214b778

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.mnw2 1bcc1201d84bcf340315ce7df32c0182faf904730565f89647b71dabc855aa19

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.mst 816aab56b0c10e796fed5a8b5eda5cf4a5db5483e50300c2349c618d0bb538bc

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.nam 5ffde9b0290773c7c88377b090ba5984101fee9a230dc87c6448e9753e19a886

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.oc 2e644464bd8f0a2055f663d179f1020f7263709e0d5c96d8c43e8ed3bc4e4234

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.ort a2aca5af418855bf9b71383b932f5dd63ad190a5046de99b8e23771e7bcdeb80

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.rch e771cb232a43835cf8c714f7b3a651afc6ccf3140c78ea40b58359f3ec95bdca

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.riv 428e66a3fc0a4c63fe8bc54888ba5640a0bcf6ee8bc836170c2c1ec42c4a91f4

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3.spc 661044af6959176fa821729154529af057b534afcdf4821f078118826bd526ff

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3\_ato.oc 4c60398686aaca975d34cfbe3c6f319d4286e79c90ec3406ceef0b7bc70ce413

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3\_sh1.ref 1d5069249b81a13d8b98460eadf8e0863233cdb9a0f19ae20f20e8249740d1a5

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3\_sh2.ref 9c51be975dfcf3a57c1c237e0cc8969fa0d17591b583dd472351ae0026879571

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3\_sh3.ref ba4bbefa1528ed6e7d1132d99c433f4e29691f38240f09af62b86ab1f07c0a6f

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3\_sh4.ref 700900640a1fe89fb9e1c965fd0ae5b4471cd919e3a46ed61bac8ddb476bb59f

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3\_sh5.ref 3e78a611ed3d19e55e29060ddb859895c6930aa61ca20503f2a89629d498ca14

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3\_sh6.ref bba2ea051194ca0c38aa6f4a923e5e1ae3f7ed67ede8bc2ea201e79b167723ef

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/P2Rv8.3\_sh7.ref 93226a9674cefa9eaba64ab438dc0ce3b47b80049b16f8f539b743c384b056a1

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/bot1.ref f162da5bef18b495eea5f5819be30e1cb616d0790f708dff7bb3428129a7046c

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/bot2.ref cb6e88901e24bd42026290efa0825c632c35adfbf290ba67c2cd94ef1ffed979

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/bot3.ref 0a219383be39b8528e4382f3a64dc1ea97b8fc023c7f50aacc5ed6bbf840b18b

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/bot4.ref 5439116ed0ea25d90648886055c4dc8fde2bcc8b812d4683b55143906edeebc1

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/bot5.ref 351c551e214c092b56bea573ac9457d044b684e1908917476d149d0d7b5d2bfa

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/bot5\_FY79\_03\_116d.ref 2a172eeb8ff31341e617eb4e95991c1479dde58d50ed2c035a73bbbcebddbd0b

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/bot6.ref 29962c4a13c33bc74998a047cf05deb4ddad7307a480e2400f3f9cc987b98e80

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/bot6\_FY79\_03\_116d.ref 49800f659d8446cb84e937a79607fc0fd22c7c1e94cd742e956828f54a298f66

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/bot7.ref 9156963f7859b90b36fdea4274c983fbaa67e0fd6007e92900d22f5b14d31191

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/bot7\_FY79\_03\_116d.ref 316f81fa5a29158045d2a0b4f9d0e9927bb2cae2ae69bd14c4e69c32a87b6c97

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/ibnd1.inf 8bea383f48516051a085896a35408e62e14f1ac5c6fac731d12a15fb3b56c452

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/ibnd2.inf f62e57f7c4d948721f023f8e42bc83b68e04f1fcfa35de9352d08d546f0a3b70

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/ibnd3.inf f62e57f7c4d948721f023f8e42bc83b68e04f1fcfa35de9352d08d546f0a3b70

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/ibnd4.inf 0b7fe94916d03e8965c2143b1ac39fa6af7b31c57e53f08813dc4a9b31428c65

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/ibnd5.inf 0b7fe94916d03e8965c2143b1ac39fa6af7b31c57e53f08813dc4a9b31428c65

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/ibnd6.inf e383faab171e5a0aa8a59a138a35020e3349340a54afe6c918931bfb9d1a0a4c

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/ibnd7.inf af13fa6e714c3101a253c8c516ffb531bbf0cba1d2e7572090ed2d483a626431

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/kh1.ref 38935fca1501a322869f39071e39f4900d783611edeb061415f45e379cef8ef6

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/kh2.ref 8364c45b799b9789e6bcd2859871ad44b94cbfcd57abad6bdff1e535d2cd19a2

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/kh3.ref 455986c23a7f2267f122e546e347349632537a07753ae5174d28c0dc3d1da28f

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/kh4.ref f6ea87b4ef8fd6b6c4e70b782d19dc816cc5f812f2f02d8d9957864f730b8018

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/kh5.ref da1f5a3e58ead268a59ab8f76cd47c9ea1cd86a00e038f8f7c13a990706bc879

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/kh6.ref 179517891481efdd1ba19740e80dadaec15376f4e02b44ec742a29675fa41a21

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/kh7.ref 9813f6d8d3c3ca10569e52946c7802813aad3f94da15bbb7148803fd2170601d

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sh1.ref 923bce4ca1631623c4c3cd82a1fd79a429782f48e608f1746d4c28d8fa57d249

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sh2.ref 5de6f8ca92d59e2514a3a64e9172ba19faf62257e580cff5cbb19578043d33f0

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sh3.ref bf8ca866804af500eea50f406cafebaed97300c4fa8cea2af01e6aeef230d90b

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sh4.ref cdd06e674d5b2a0f8889f385d8c3e6bc5b75d3204672e64b3083fdf7c9cdff61

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sh5.ref 97698ac92d39640c98458cc50a3453030474d83e1c62e50ae6d20014bd0be641

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sh6.ref 2e67911ba081e00cf62ed97d85667961ecda3320396573938d0fd8ed05cdefb8

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sh7.ref ee6cb31d4b5642a34124c6662ecdd47d4fdcc235d8726293b6644ff7d7ff0580

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/ss.ref 6cebcdeac730badaff8157da430c6e2b51f1e488ee5cef208eee12dd8c895637

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sy1.ref 634a18fae735c8177da45d73683ee14f3c1624903a2582ac1da93afc6b078b21

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sy2.ref 168c49d5cca20e49fad36d5c9680b09eb72a8d66b486a9765dc6072e0267b2d7

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sy3.ref fbd483a7bb88f0d83554dbb75dc43fb29459bab2377976afafb34a81ec92ca85

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sy4.ref c1bb39eca31ff85b369f6ad8aee707f12424ebda83dfd016bca5b974720ade32

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sy5.ref 1d2a3e1e84550498709e715434f76dcd04251f366a626b6ddddd36442f887f12

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sy6.ref bc132ae70ffa92f4af41e3a231f7d5594b66c6f36489b75ef7fb66653a129ba2

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/sy7.ref 4841d8eff2f0c125ae4b66771515e7f8a4ebb37add869f1892ce92665b830779

/opt/ICF/Prod/P2RCAL/v8.3/data/calib\_final/top1.ref 30ccfc72c31497e1d421cd0b8ad4850cdea4fdf1ea438bace3208bc9bcd1e266

###Finished Process###

###Executing HSSM Builder###

INFO--06/03/2020 04:47:08 PM--Starting CA-CIE Tool Runner. Logging to "./AT-2\_AT-2.log"

INFO--06/03/2020 04:47:08 PM--Code Version: 6d9ed4f88ad818f19f3a8519e7b3f50860c5dd33 v3.1: /opt/tools/pylib/runner/runner.py<--1bcfd6779e9cbdb82673405873a8e5e81514ae27

INFO--06/03/2020 04:47:08 PM--Code Version: 1a98dfe2ff0d09974422adeea69627c442a83f0e Local repo SHA-1 has does not correspond to a remote repo release version: ../../../CA-CIE-Tools-TestRepos/sz\_hssm\_builder/CA-CIE-Tools/pylib/hssmbuilder/build\_hssm.py<--4a0cdfbf7b4fe78c70715894a7bea64c9c0194bd

INFO--06/03/2020 04:47:08 PM--QA Status: QUALIFIED : /opt/tools/pylib/runner/runner.py

INFO--06/03/2020 04:47:08 PM--QA Status: TEST : ../../../CA-CIE-Tools-TestRepos/sz\_hssm\_builder/CA-CIE-Tools/pylib/hssmbuilder/build\_hssm.py

INFO--06/03/2020 04:47:08 PM--Invoking Command:"python3.6" with Arguments:"../../../CA-CIE-Tools-TestRepos/sz\_hssm\_builder/CA-CIE-Tools/pylib/hssmbuilder/build\_hssm.py /srv/samba/backups/CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/AT-2/config\_AT-2\_olive.json"

INFO--06/03/2020 04:47:08 PM--Username:stomusiak Computer:olive Platform:Linux 4.4.0-38-generic #57~14.04.1-Ubuntu SMP Tue Sep 6 17:20:43 UTC 2016

###Finished Process###

###Finished AT-2 ###

| Table A-2  **HSSM Builder Acceptance Test Plan Case 2** | | | |
| --- | --- | --- | --- |
| **HSSM Builder Acceptance Testing**  **CACIE-build\_hssm.py – AT-2** | | **Date: 06/03/2020** | |
| **Tool Runner Log File Location for this test:**  **OLIVE//CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/AT-2** | | **Test Performed By: S. Tomusiak** | |
| **Testing Directory: OLIVE//CAVE/CA-CIE-Tools-TestEnv/v4-2\_HSSM\_Package\_builder/AT-2** | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | **Test Result  (Pass/Fail)** |
| Navigate to the Testing Directory | | | |
| 1 | Start application *runner\_run\_AT-2.sh* | | |
| 2 | Wait until tool finishes processing the data files.  Note: The P2R model files were processed as part of the AT-1 test case. The AT-2 test case uses the post-processed \*.pkl files already generated in AT-1 which should speed up the process. Processing for this test case should take between 5 – 30 minutes to run. | | |
| 3 | Verify existing pkl files were used per FR-3. | Open: Log/ build\_sat\_data\_log\_20200520.log  Should have entries for reading: -reading saturation pkl file  -reading Flow pkl file  -reading yearly saturation pkl | Pass |
| 4 | Verify single mass flux timeseries data file is read and processed per FR-7 | Check log/build\_mass\_data\_log\_YYMMDD.log and verify the input file was processed  Verify files in output directory correspond to the cells in the input file | Pass |
| 5 | Verify reduced data plot corresponds to the original dataset plot (Figures (\*.png files) are located in A2-1/log/);  Reduced number of points within target range of 50 to 200 and/or difference is within acceptable error tolerance (error and reduced dataset set summary is located in misc/cell\_error.csv) per FR-6 (error) and FR-12 | Figures (\*.png files) are located in AT-2/output/log/  abs(Total Mass Error) < Total Mass Error Threshold  AT-2/config\_AT-2\_olive.json: "max\_tm\_error": 2.25e7, (pCi)  abs(% error) < maximum acceptable relative tolerance  AT-2/config\_AT-2\_olive.json:  "tolerance": 0.1, (IE .1%) | Pass |
| 6 | Using misc/cell\_error\_by\_layer.csv verify: | | |
| 7 | Cell/layers that have flux less than the flux floor threshold value of 2.7378507871321015e-06 pCi/day (i.e., 0.001 pCi/year/365.25 days/year) for the entire time series is skipped per FR-5 and FR-8 | These cells have notes in cell\_error\_by\_layer.csv stating: “This cell was skipped as the flux never rises above minimum flux (2.7378507871321015e-06)” | Pass |
| 8 | Verify percent error is less than 0.1% (or -0.1%) per FR-12 | Use Column “%error”  Notes:  \* only summed\_layers will contain a value as that adds the layers together then compares it to the original data. | Pass |