**CACIE Tool #09**– ***Steady-State Output Card Generator Tool  
OC\_SS\_gen.f***

**Version** **1.0**

**QA**: **QA**

1. **Description and Purpose**

The Steady State Output Card Generator Tool reads input.sij, input.nij and input.top files generated by the CAST tool and generates an Output Control card for the steady-state simulation. The Steady State Output Card Generator Tool determines the reference nodes for a defined model domain. The reference nodes correspond to the center of the model domain and the center of each domain quadrant. If the model and/or quadrant centers are not located exactly at node centers, then the closest node center is chosen. The closest node center is determined by first evaluating i values, then j values. If a center location is equidistant (in i or j) from two node centers, then:

1. the lower index value is selected for the model center
2. the lower i-index value is selected for the western quadrants
3. the higher i-index value is selected for the eastern quadrants
4. the lower j-index value is selected for the southern quadrants
5. the higher j-index value is selected for the northern quadrants.

The reference nodes are assigned vertically to the bottom of the domain, layer 20 and at successive layers at intervals of 20. The final layer interval corresponds to the elevation of the uppermost active layer at a reference node location (e.g., 1, 20, 40, …, 200, 208).

Reference node output includes: Rock/Soil Type, Integrated Water Mass, Aqueous Saturation, Aqueous Moisture Content, Aqueous Pressure, Aqueous Hydraulic Head, Diffusive Porosity, XNC Aqueous Volumetric Flux (Node Centered), YNC Aqueous Volumetric Flux (Node Centered), ZNC Aqueous Volumetric Flux (Node Centered).

A single plot file output time of 10,000 years is specified. Plot file output includes: rock/soil type, aqueous saturation, aqueous moisture content, aqueous pressure, aqueous hydraulic head, diffusive porosity, xnc aqueous volumetric flux (node centered), ync aqueous volumetric flux (node centered), znc aqueous volumetric flux (node centered), final restart.

1. **Functional Requirements**

The following are the functional requirements of the Steady State Output Card Generator Tool:

FR-1: Read model name as command line input.

FR-2: Open “SS\_Output\_Control.dat” as outfile1 file.

FR-3: Open “input.sij” as infile1 file

FR-4: Read infile1, determine grid and quadrant center coordinates.

FR-5: Open “input.nij” as infile2 file

FR-6: Read infile2, determine grid and quadrant center i/j index values. i left/center/right and j bottom/center/top.

FR-7: Open “input.top” as infile3 file

FR-8: Read infile3, find top active layer for grid and quadrant centers.

FR-9: Write Output Control Card.

1. **Software Requirements Specifications**

FORTRAN

1. **Software Design Description**

*Arguments:*

ModelName – Name of the model being processed (used only in an informational comment).

*Input Files:*

*(Need to be placed in the work directory – ss subdirectory of each test case).*

input.sij

input.nij

input.top

*Output files:*

SS\_Output\_Control.dat

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

*(Need to be executed from the work directory – ss subdirectory of each test case).*

# Command line variable 1 is model name. Used in comments only.

[repository path]/tools/ca-ssoccard/linux/OC\_SS\_gen\_linux-intel-64.exe' '$1'

[variable $1 is model name]

Sara Lindberg performed a code review on 02/02/2020. No impacts to other repository tools or shared library dependencies were identified for the Steady-State Output Card Generator Tool.

1. **Requirements Traceability Matrix**

The requirements traceability matrix for the Steady-State Output Card Generator tool is presented in Table 1.

| **Table 1. Steady-State Output Card GeneratorTool Requirements Traceability Matrix** | | |
| --- | --- | --- |
| **Functional Requirement ID** | **Acceptance Test ID** | **Test Case** |
| QA Level | CACIE-OC\_SS\_gen.f-IT-1 | Installation Test |
| FR-1  FR-2 | CACIE-OC\_SS\_gen.f-TC-1  CACIE-OC\_SS\_gen.f-TC-2 | Check that output file “*SS\_Output\_Control.dat*” was generated and that the model name is included in the first comment in the “*SS\_Output\_Control.dat*” output file. |
| FR-3  FR-4  FR-5  FR-6 | CACIE-OC\_SS\_gen.f-TC-1  CACIE-OC\_SS\_gen.f-TC-2 | Check that reference nodes for model and quadrant centers are at the center coordinates, or as close as possible, considering that model and quadrant centers may not fall exactly on a node center. |
| FR-7  FR-8 | CACIE-OC\_SS\_gen.f-TC-1  CACIE-OC\_SS\_gen.f-TC-2 | Check that the uppermost reference node at each i,j location is the top active node for that i,j location. |
| FR-9 | CACIE-OC\_SS\_gen.f-TC-1  CACIE-OC\_SS\_gen.f-TC-2 | Check that Node 1,1,1 is included as a reference node. |
| Check that the “Number of Reference Nodes” matches the number defined. |
| Check that the “Number of Reference Node Variables” matches the number defined. |
| Check that reference nodes are included for the model and quadrant centers for layer 1, the topmost active layer, and every layer number that is a multiple of 20 and less than the topmost active layer. |
| Check that the reference node variables are the expected parameters (See list in Section 1 Description and Purpose). |
| Check that there is a single plot file year at 10,000 years. |
| Check that the “Number of Plot File Variables” matches the number defined. |
| Check that the plot file variables are the expected parameters (See list in Section 1 Description and Purpose). |

1. **Test Plan and Cases**

The installation test plan for the Steady-State Output Card Generator tool is presented in Table 2 and the acceptance test plan test cases are in Table 3.

| **Table 2.** **Steady-State Output Card GeneratorTool**  **Installation Test Plan** | | | |
| --- | --- | --- | --- |
| **Steady-State Output Card Generator Tool Installation Testing**  **CACIE- OC\_SS\_gen.f – IT-1** | | **Date:** | |
| **Tool Runner File Location for this test:** | | **Test Performed By:** | |
| **Testing Directory:** | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | **Test Result  (Pass/Fail)** |
| Tools Code Repository Directory: 1 | Invoke Tool runner and test the tool using *runner\_runSS\_OC.sh* as follows:  *runner\_runSS\_OC.sh* | | |
| 2 | Verify Tool Runner is invoked and executed. |  |  |
| 3 | Verify tool is invoked and executed. |  |  |

| **Table 3. Steady-State Output Card GeneratorTool**  **Acceptance Test Plan** | | | |
| --- | --- | --- | --- |
| **Steady-State Output Card Generator Tool Acceptance Testing**  **CACIE- OC\_SS\_gen.f –TC-1  CACIE- OC\_SS\_gen.f –TC-2** | | **Date:** | |
| **Tool Runner File Location for this test:**   * \\olive\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2\_OC\_SS\_gen\_Testing\mpond\_test * \\olive\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2\_OC\_SS\_gen\_Testing\bplant\_test | | **Test Performed By:** | |
| **Testing Directory:** \\olive\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2\_OC\_SS\_gen\_Testing | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | **Test Result  (Pass/Fail)** |
| **CACIE- *OC\_SS\_gen.f* – TC-1** | | | |
| Tools Code Repository Directory: \\olive\backups\CAVE\CA-CIE-Tools-TestEnv\CA-CIE-Tools-Testing\tools\ca-ssoccard | | | |
| Navigate to the *[Testing Directory]/mpond\_test/ss:* | | | |
| 1 | Copy the following files for the *mpond* model:  *input.sij, input.nij, input.top.* These files are neededfor the execution of the *OC\_SS\_gen.f* tool. | The files are present in the  *[Testing Directory]/mpond\_test/ss* directory. |  |
| 2 | Execute *runner\_runSS\_OC.sh* in the Testing Directory. | The executable runs. |  |
| 3 | Confirm that output file “*SS\_Output\_Control.dat*” was generated by the *OC\_SS\_gen.f* tool and that the model name is included in the first comment in the “*SS\_Output\_Control.dat*” output file | The output file “*SS\_Output\_Control.dat*” is generated and the model name is included in the first comment in the “*SS\_Output\_Control.dat*” output file |  |
| 4 | Confirm that reference nodes for model and quadrant centers are at the center coordinates, or as close as possible, considering that model and quadrant centers may not fall exactly on a node center.  To confirm that, calculations for determining the model’s and each of the four quadrants’ centers were performed in Excel following the algorithm stated in the Description and Purpose section. These calculations are recorded in the *runSS\_OC\_calcs\_QA.xlsx* file located in the  *\\olive\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2\_OC\_SS\_gen\_Testing* directory. | The results reported in the “*SS\_Output\_Control.dat*” are in a good agreement with the ones calculated using Excel. |  |
| 5 | Confirm that Node 1,1,1 is included as a reference node. | Node 1,1,1 is included as a reference node. |  |
| 6 | Confirm that the “Number of Reference Nodes” matches the number defined. The lines that follow (and are not commented out with the # sign) and have the following format:  XX, XX, XX, (where XX is the I-, J-, and K- node indices) are the Reference Nodes. | The “Number of Reference Nodes” matches the number defined. |  |
| 7 | Confirm that the “Number of Reference Node Variables” matches the number defined. The number of Reference Node Variables is specified on line preceding the first line with the text “Rock/Soil Type” in the SS\_Output\_Control.dat and the lines that follow are the Reference Node Variables. | The “Number of Reference Node Variables” matches the number defined |  |
| 8 | Confirm that reference nodes are included for the model and quadrant centers for layer 1, the topmost active layer, and every layer number that is a multiple of 20 and less than the topmost active layer. | The reference nodes are included for the model and quadrant centers for layer 1, the topmost active layer, and every layer number that is a multiple of 20 and less than the topmost active layer. |  |
| 9 | Confirm that the reference node variables are the expected parameters (See list in Section 1 Description and Purpose). | The reference node variables are as defined in Section 1 Description and Purpose. |  |
| 10 | Confirm that there is a single plot file year at 10,000 years. | A single plot file year, 10,000 years, is specified in the “*SS\_Output\_Control.dat*” |  |
| 11 | Confirm that the “Number of Plot File Variables” matches the number defined. | The “Number of Plot File Variables” matches the number defined. |  |
| 12 | Confirm that the plot file variables are the expected parameters (See list in the Description and Purpose section). | The plot file variables are as defined in the Description and Purpose section. |  |
| 13 | To confirm that the uppermost reference node at each i,j location is the top active node for that i,j location | | |
| 13.1 | * Copy input file for the M Pond model into the testing directory (/ss); * Copy the shell script estomp-run.sh into the testing directory (/ss); * Copy the /ret folder for the M Pond model to the testing directory; | The files and folders are copied into the right directories |  |
| 13.2 | Make the following changes in the *input* file:   * Change the number of time steps in the *Solution Control Card* to 1 (line 32 in the *input* file); * In the *Output Control Card*, add additional reference nodes above the topmost active nodes for the model center and each of the quadrant’s centers with the Rock/Soil Type variable for an output.:   Delete lines 426 -441 and add 30,25,314, in line #426;  Delete lines 444 -459 and add 46,38,314, in line #444;  Delete lines 462 -477 and add 15,38,313, in line #462;  Delete lines 480 -495 and add 15,13,316, in line #480;  Delete lines 498 -513 and add 46,13,318, in line #480.   * Change 10 to 1 in line 515 * Delete lines 517 – 525 (all variables but the Rock/Soil Type). | The changes in the input file are implemented |  |
| 13.3 | Run STOMP simulation for 1 timestep by executing *estomp-run.sh* from the testing directory *(/ss)* | STOMP simulation is executed. |  |
| 13.4 | Confirm that the Rock Soil Type outputs for the reference nodes specified above the topmost active nodes generated by the *OC\_SS\_gen.f* script are inactive. | The Rock Soil Type outputs for the reference nodes specified above the topmost active nodes generated by the *OC\_SS\_gen.f* script show as zeros in the *output* file generated after STOMP simulation. Specifically, starting from line 1177 in the Output file, the numbers in column 6 (RSZN) should be alternating between 1.00 and 0.00. |  |
| **CACIE- *OC\_SS\_gen.f* – TC-2** | | | |
| Navigate to the *[Testing Directory]/bplant\_test/ss:* | | | |
| 1 | Copy the following files for the *B Plant* model:  *input.sij, input.nij, input.top.* These files are neededfor the execution of the *OC\_SS\_gen.f* tool. | The files are present in the  *[Testing Directory]/bplant\_test/ss* directory. |  |
| 2 | Execute *runner\_runSS\_OC.sh* in the Testing Directory. | The executable runs. |  |
| 3 | Confirm that output file “*SS\_Output\_Control.dat*” was generated by the *OC\_SS\_gen.f* tool and that the model name is included in the first comment in the “*SS\_Output\_Control.dat*” output file | The output file “*SS\_Output\_Control.dat*” is generated and the model name is included in the first comment in the “*SS\_Output\_Control.dat*” output file |  |
| 4 | Confirm that reference nodes for model and quadrant centers are at the center coordinates, or as close as possible, considering that model and quadrant centers may not fall exactly on a node center.  To confirm that, calculations for determining the model’s and each of the four quadrants’ centers were performed in Excel following the algorithm stated in the Description and Purpose section. These calculations are recorded in the *runSS\_OC\_calcs\_QA.xlsx* file located in the  *\\olive\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2\_OC\_SS\_gen\_Testing* directory. | The results reported in the “*SS\_Output\_Control.dat*” are in a good agreement with the ones calculated using Excel. |  |
| 5 | Confirm that Node 1,1,1 is included as a reference node. | Node 1,1,1 is included as a reference node. |  |
| 6 | Confirm that the “Number of Reference Nodes” matches the number defined. The lines that follow (and are not commented out with the # sign) and have the following format:  XX, XX, XX, (where XX is the I-, J-, and K- node indices) are the Reference Nodes. | The “Number of Reference Nodes” matches the number defined. |  |
| 7 | Confirm that the “Number of Reference Node Variables” matches the number defined. The number of Reference Node Variables is specified on line # 86 of the SS\_Output\_Control.dat and the lines that follow are the Reference Node Variables. | The “Number of Reference Node Variables” matches the number defined |  |
| 8 | Confirm that reference nodes are included for the model and quadrant centers for layer 1, the topmost active layer, and every layer number that is a multiple of 20 and less than the topmost active layer. | The reference nodes are included for the model and quadrant centers for layer 1, the topmost active layer, and every layer number that is a multiple of 20 and less than the topmost active layer. |  |
| 9 | Confirm that the reference node variables are the expected parameters (See list in the Description and Purpose section). | The reference node variables are as defined in the Description and Purpose section. |  |
| 10 | Confirm that there is a single plot file year at 10,000 years. | A single plot file year, 10,000 years, is specified in the “*SS\_Output\_Control.dat*” |  |
| 11 | Confirm that the “Number of Plot File Variables” matches the number defined. | The “Number of Plot File Variables” matches the number defined. |  |
| 12 | Confirm that the plot file variables are the expected parameters (See list in the Description and Purpose section). | The plot file variables are as defined in the Description and Purpose section. |  |
| 13 | To confirm that the uppermost reference node at each i,j location is the top active node for that i,j location | | |
| 13.1 | * Copy *input* file for the *B Plant* model into the testing directory (/ss); * Copy the shell script *estomp-run.sh* into the testing directory (/ss); * Copy the */ret* folder for the *B Plant* model to the testing directory; | The files and folders are copied into the right directories. |  |
| 13.2 | Make the following changes in the *input* file:   * Change the number of time steps in the *Solution Control Card* to 1 (line 32 in the *input* file); * In the *Output Control Card*, add additional reference nodes above the topmost active nodes for the model center and each of the quadrant’s centers with the Rock/Soil Type variable for an output.:   Delete lines 1901 -1912 and add 71,50,231, in line #1901;  Delete lines 1915 -1925 and add 111,105,218, in line #1915;  Delete lines 1928 -1939 and add 35,105,223, in line #1928;  Delete lines 1942 -1953 and add 35,15,239, in line #1942;  Delete lines 1956 -1967 and add 111,15,235, in line #1956.   * Change 10 to 1 in line 1969 * Delete lines 1971 – 1979 (all variables but the Rock/Soil Type). | The changes are implemented in the input file. |  |
| 13.3 | Run STOMP simulation for 1 timestep by executing *estomp-run.sh* from the testing directory *(/ss)* | STOMP simulation is executed. |  |
| 13.4 | Confirm that the Rock Soil Type outputs for the reference nodes specified above the topmost active nodes generated by the *OC\_SS\_gen.f* script are inactive. | The Rock Soil Type outputs for the reference nodes specified above the topmost active nodes generated by the *OC\_SS\_gen.f* script show as zeros in the *output* file generated after STOMP simulation. Specifically, starting from line 5649 in the Output file, the numbers in column 6 (RSZN) should be alternating between the non-zero value (1.00 or 2.0) and 0.00. |  |

1. **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. The *M Pond* model is used to test the Steady-State Output Card Generator Tool which generates the “*SS\_Output\_Control.dat*” file. This model has uniform lateral grid discretization.
* Acceptance Test 2 is in Table A-2. The *B Plant* model is used to test the Steady-State Output Card Generator Tool which generates the “*SS\_Output\_Control.dat*” file. This model has non-uniform lateral grid discretization.

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

Files used for checking during acceptance testing have been archived with this attachment.

1. **User Guide**

To run this code:

1. Copy the shell script *runner\_runSS\_OC.sh* from the *shell’s* directory to the *ss* subdirectory for the model being processed. The *ss* subdirectory must contain *input.top, input.sij and input.nij* files*.*
2. Run the script using *“runner\_runSS\_OC.sh”* command*.*
3. Check that the file “*SS\_Output\_Control.dat*” was created in the *ss* sub‑directory.

**Appendix A**

**Acceptance Testing Logs**

| **Table A-1**  **Steady-State Output Card Generator *T*ool**  **Acceptance Test Case 1** | | | | | |
| --- | --- | --- | --- | --- | --- |
| **Steady-State Output Card Generator Acceptance Testing**  **CACIE- OC\_SS\_gen.f – AT-1** | | | **Date:** 29 January, 2020 | | |
| **Tool Runner File Location for this test:**  [\\olive\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2\_OC\_SS\_gen\_Testing\mpond\_test\](file:///\\olive\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2_OC_SS_gen_Testing\mpond_test\)  **File Name:**  Runner\_OC\_SS\_gen\_test\_logfile.txt | | | **Test Performed By:**  Christopher Farrow | | |
| **Testing Directory:** \\olive\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2\_OC\_SS\_gen\_Testing\ mpond\_test\ss | | | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | | **Test Result  (Pass/Fail)** |
| Tools Code Repository Directory: \\olive\backups\CAVE\CA-CIE-Tools-TestEnv\CA-CIE-Tools-Testing\tools\ca-ssoccard | | | | | |
| Navigate to the testing directory:  \\olive\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2\_OC\_SS\_gen\_Testing\mpond\_test\ss | | | | | |
| 1 | Copy the following files for the *mpond* model:  *input.sij, input.nij, input.top.* These files are neededfor the execution of the *OC\_SS\_gen.f* tool. | The files are present in the  *[Testing Directory]/mpond\_test/ss* directory. | | **Pass** |
| 2 | Execute *runner\_runSS\_OC.sh* in the Testing Directory. | The executable runs. | | **Pass** |
| **Screenshot of the Tool Runner executed for this test.**  Text file present in the testing directory. | | | | | |
| 3 | Confirm that output file “*SS\_Output\_Control.dat*” was generated by the *OC\_SS\_gen.f* tool and that the model name is included in the first comment in the “*SS\_Output\_Control.dat*” output file | The output file “*SS\_Output\_Control.dat*” is generated and the model name is included in the first comment in the “*SS\_Output\_Control.dat*” output file | | **Pass** |
| 4 | Confirm that reference nodes for model and quadrant centers are at the center coordinates, or as close as possible, considering that model and quadrant centers may not fall exactly on a node center.  To confirm that, calculations for determining the model’s and each of the four quadrants’ centers were performed in Excel following the algorithm stated in the Description and Purpose section. These calculations are recorded in the *runSS\_OC\_calcs\_QA.xlsx* file located in the  *\\olive\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2\_OC\_SS\_gen\_Testing* directory. | The results reported in the “*SS\_Output\_Control.dat*” are in a good agreement with the ones calculated using Excel. | | **Pass** |
| 5 | Confirm that Node 1,1,1 is included as a reference node. | Node 1,1,1 is included as a reference node. | | **Pass** |
| 6 | Confirm that the “Number of Reference Nodes” matches the number defined.  The number of Reference Nodes is specified in the first line of the Output Control Card. The lines that follow (and are not commented out with the # sign) and have the following format:  XX, XX, XX, (where XX is the I-, J-, and K- node indices) are the Reference Nodes. | The “Number of Reference Nodes” matches the number defined. | | **Pass** |
| 7 | Confirm that the “Number of Reference Node Variables” matches the number defined.  The number of Reference Node Variables is specified on line # 107 of the SS\_Output\_Control.dat and the lines that follow are the Reference Node Variables. | The “Number of Reference Node Variables” matches the number defined | | **Pass** |
| 8 | Confirm that reference nodes are included for the model and quadrant centers for layer 1, the topmost active layer, and every layer number that is a multiple of 20 and less than the topmost active layer. | The reference nodes are included for the model and quadrant centers for layer 1, the topmost active layer, and every layer number that is a multiple of 20 and less than the topmost active layer. | | **Pass** |
| 9 | Confirm that the reference node variables are the expected parameters (See list in the Description and Purpose section). | The reference node variables are as defined in the Description and Purpose section. | | **Pass** |
| 10 | Confirm that there is a single plot file year at 10,000 years. | A single plot file year, 10,000 years, is specified in the “*SS\_Output\_Control.dat*” | | **Pass** |
| 11 | Confirm that the “Number of Plot File Variables” matches the number defined. | The “Number of Plot File Variables” matches the number defined. | | **Pass** |
| 12 | Confirm that the plot file variables are the expected parameters (See list in the Description and Purpose section). | The plot file variables are as defined in the Description and Purpose section. | | **Pass** |
| 13 | To confirm that the uppermost reference node at each i,j location is the top active node for that i,j location | | | |
| 13.1 | * Copy input file for the M Pond model into the testing directory (/ss); * Copy the shell script estomp-run.sh into the testing directory (/ss); * Copy the /ret folder for the M Pond model to the testing directory; | The files and folders are copied into the right directories. | | **Pass** |
| 13.2 | Make the following changes in the *input* file:   * Change the number of time steps in the *Solution Control Card* to 1 (line 32 in the *input* file); * In the *Output Control Card*, add additional reference nodes above the topmost active nodes for the model center and each of the quadrant’s centers with the Rock/Soil Type variable for an output.:   Delete lines 426 -441 and add 30,25,314, in line #426;  Delete lines 444 -459 and add 46,38,314, in line #444;  Delete lines 462 -477 and add 15,38,313, in line #462;  Delete lines 480 -495 and add 15,13,316, in line #480;  Delete lines 498 -513 and add 46,13,318, in line #480.   * Change 10 to 1 in line 515 * Delete lines 517 – 525 (all variables but the Rock/Soil Type). | The changes are implemented in the input file. | | **Pass** |
| 13.3 | Run STOMP simulation for 1 timestep by executing *estomp-run.sh* from the testing directory *(/ss)* | STOMP simulation is executed. | | **Pass** |
| 13.4 | Confirm that the Rock Soil Type outputs for the reference nodes specified above the topmost active nodes generated by the *OC\_SS\_gen.f* script are inactive. | The Rock Soil Type outputs for the reference nodes specified above the topmost active nodes generated by the *OC\_SS\_gen.f* script show as zeros in the *output* file generated after STOMP simulation. Specifically, starting from line 1177 in the Output file, the numbers in column 6 (RSZN) should be alternating between 1.00 and 0.00. | | **Pass** |

| **Table A-2**  **Steady-State Output Card Generator Tool**  **Acceptance Test Case 2** | | | |
| --- | --- | --- | --- |
| **Steady-State Output Card Generator Acceptance Testing**  **CACIE- OC\_SS\_gen.f – AT-2** | | **Date:** 29 January, 2020 | |
| **Tool Runner File Location for this test:**  [\\olive\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2\_OC\_SS\_gen\_Testing\bplant\_test](file:///\\olive\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2_OC_SS_gen_Testing\bplant_test) | | **Test Performed By:**  Christopher Farrow | |
| **Testing Directory:** \\olive\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2\_OC\_SS\_gen\_Testing\ bplant\_test\ss | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | **Test Result  (Pass/Fail)** |
| Tools Code Repository Directory: \\olive\backups\CAVE\CA-CIE-Tools-TestEnv\CA-CIE-Tools-Testing\tools\ca-ssoccard | | | |
| Navigate to the testing directory:  \\olive\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2\_OC\_SS\_gen\_Testing\bplant\_test\ss | | | |
| 1 | Copy the following files for the *mpond* model:  *input.sij, input.nij, input.top.* These files are neededfor the execution of the *OC\_SS\_gen.f* tool. | The files are present in the  *[Testing Directory]/bplant\_test/ss* directory. | **Pass** |
| 2 | Execute *runner\_runSS\_OC.sh* in the Testing Directory. | The executable runs. | **Pass** |
| **Screenshot of the Toolrunner executed for this test.**  Text file present in the testing directory. | | | |
| 3 | Confirm that output file “*SS\_Output\_Control.dat*” was generated by the *OC\_SS\_gen.f* tool and that the model name is included in the first comment in the “*SS\_Output\_Control.dat*” output file | The output file “*SS\_Output\_Control.dat*” is generated and the model name is included in the first comment in the “*SS\_Output\_Control.dat*” output file | **Pass** |
| 4 | Confirm that reference nodes for model and quadrant centers are at the center coordinates, or as close as possible, considering that model and quadrant centers may not fall exactly on a node center.  To confirm that, calculations for determining the model’s and each of the four quadrants’ centers were performed in Excel following the algorithm stated in the Description and Purpose section. These calculations are recorded in the *runSS\_OC\_calcs\_QA.xlsx* file located in the  *\\olive\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2\_OC\_SS\_gen\_Testing* directory. | The results reported in the “*SS\_Output\_Control.dat*” are in a good agreement with the ones calculated using Excel. | **Pass** |
| 5 | Confirm that Node 1,1,1 is included as a reference node. | Node 1,1,1 is included as a reference node. | **Pass** |
| 6 | Confirm that the “Number of Reference Nodes” matches the number defined. The number of Reference Nodes is specified in the first line of the Output Control Card. The lines that follow (and are not commented out with the # sign) and have the following format:  XX, XX, XX, (where XX is the I-, J-, and K- node indices) are the Reference Nodes. | The “Number of Reference Nodes” matches the number defined. | **Pass** |
| 7 | Confirm that the “Number of Reference Node Variables” matches the number defined. The number of Reference Node Variables is specified on line # 86 of the SS\_Output\_Control.dat and the lines that follow are the Reference Node Variables. | The “Number of Reference Node Variables” matches the number defined | **Pass** |
| 8 | Confirm that reference nodes are included for the model and quadrant centers for layer 1, the topmost active layer, and every layer number that is a multiple of 20 and less than the topmost active layer. | The reference nodes are included for the model and quadrant centers for layer 1, the topmost active layer, and every layer number that is a multiple of 20 and less than the topmost active layer. | **Pass** |
| 9 | Confirm that the reference node variables are the expected parameters (See list in the Description and Purpose section). | The reference node variables are as defined in the Description and Purpose section. | **Pass** |
| 10 | Confirm that there is a single plot file year at 10,000 years. | A single plot file year, 10,000 years, is specified in the “*SS\_Output\_Control.dat*” | **Pass** |
| 11 | Confirm that the “Number of Plot File Variables” matches the number defined. | The “Number of Plot File Variables” matches the number defined. | **Pass** |
| 12 | Confirm that the plot file variables are the expected parameters (See list in the Description and Purpose section). | The plot file variables are as defined in the Description and Purpose section. | **Pass** |
| 13 | To confirm that the uppermost reference node at each i,j location is the top active node for that i,j location | | |
| 13.1 | * Copy *input* file for the *B Plant* model into the testing directory (/ss); * Copy the shell script *estomp-run.sh* into the testing directory (/ss); * Copy the */ret* folder for the *B Plant* model to the testing directory; | The files and folders are copied into the right directories. | **Pass** |
| 13.2 | Make the following changes in the *input* file:   * Change the number of time steps in the *Solution Control Card* to 1 (line 32 in the *input* file); * In the *Output Control Card*, add additional reference nodes above the topmost active nodes for the model center and each of the quadrant’s centers with the Rock/Soil Type variable for an output.:   Delete lines 1901 -1912 and add 71,50,231, in line #1901;  Delete lines 1915 -1925 and add 111,105,218, in line #1915;  Delete lines 1928 -1939 and add 35,105,223, in line #1928;  Delete lines 1942 -1953 and add 35,15,239, in line #1942;  Delete lines 1956 -1967 and add 111,15,235, in line #1956.   * Change 10 to 1 in line 1969 * Delete lines 1971 – 1979 (all variables but the Rock/Soil Type). | The changes are implemented in the input file. | **Pass** |
| 13.3 | Run STOMP simulation for 1 timestep by executing *estomp-run.sh* from the testing directory *(/ss)* | STOMP simulation is executed. | **Pass** |
| 13.4 | Confirm that the Rock Soil Type outputs for the reference nodes specified above the topmost active nodes generated by the *OC\_SS\_gen.f* script are inactive. | The Rock Soil Type outputs for the reference nodes specified above the topmost active nodes generated by the *OC\_SS\_gen.f* script show as zeros in the *output* file generated after STOMP simulation. Specifically, starting from line 5649 in the Output file, the numbers in column 6 (RSZN) should be alternating between the non-zero value (1.00 or 2.0) and 0.00. | **Pass** |

**Appendix B**

**Installation Testing Logs**

Installation test done as part of acceptance test case.

**Appendix C**

**QA Checklist**

