**CACIE Tool # NN** – ***splitKingdomLayer Tool (splitKingdomLayer.pl)***

**Version** **1.0**

**QA**: **QA**

1. **Description and Purpose**

The splitKingdomLayer tool is used to split one geology surface layer file into two sub-unit surface layer files based on the information specified in the polygon file. The output files generated after executing the tool contain points for the two geology sub-units.

This tool reads the user-supplied geology surface layer file (X, Y, and Z (elevation) coordinates) and a file with a defined polygon (X and Y) delineating one of the sub unit surface layers and writes each point (X, Y and Z (elevation) coordinates) into one of the two output files, depending on whether the point is inside or outside of the polygon. The resulting two output files are:

* 1. ‘Inside’ file: All points inside or at the boundaries of the polygon (first geology sub unit surface layer)
  2. ‘Outside’ file: All points outside of the polygon (second geology sub unit surface layer)

1. **Functional Requirements**

The following are the functional requirements of the splitKingdomLayer Tool:

FR-1: Open the polygon file

FR-2: Read the polygon vertices (X and Y)

FR-3: Open the geology surface layer file

FR-4: Read the geology surface layer file; X, Y and Z coordinates for each line; no header lines

FR-5: Determine whether each point is inside (or on the boundary) or outside of the polygon

FR-6: Write each point either to the ‘inside’ file if it is inside or at the boundary of the polygon, or to the ‘outside’ file if it is outside of the polygon.

1. **Software Requirements Specifications**

PERL

1. **Software Design Description**

Command Line Arguments:

1. Input Kingdom geology surface layer file name
2. Input polygon file name
3. Output 1st sub-unit geology surface layer file name for points inside or at the boundaries of the user specified polygon
4. Output 2nd sub-unit geology surface layer file name for points outside of the user supplied polygon

Input Files:

1. Original geology surface layer file (Command Line Argument 1)
2. Polygon file (Command Line Argument 2)

Output Files:

1. Inside sub unit surface layer file (Command Line Argument 3)
2. Outside sub unit surface layer file (Command Line Argument 4)

Execution:

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)*

perl ca-splitKindomLayer/splitKingdomLayer.pl {geo surface layer file} {polygon file} {output inside boundaries} {output outside boundaries}

Code Review:

Code review was conducted on Feb 6, 2020 by Denis Fryar. No issues were found.

1. **Requirements Traceability Matrix**

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

| **Table 1. splitKingdomLayer Tool Requirements Traceability Matrix** | | |
| --- | --- | --- |
| **Functional Requirement ID** | **Acceptance Test ID** | **Test Case** |
| QA Level | CACIE- splitKingdomLayer.pl -IT-1 | Installation Test |
| FR-1-6 | CACIE-  splitKingdomLayer.pl  -TC-1 | Confirm that the output files “CPVZ\_200East\_Rev1\_split\_CCUsand\_edit.dat (inside of the polygon) and CPVZ\_200East\_Rev1\_split\_CCUsilt\_edit.dat (outside of the polygon)” are generated |
| FR-3  FR-4  FR-6 | CACIE- splitKingdomLayer.pl -TC-1 | Using independent method (Excel suggested or user choice)   1. Import the two output files (CPVZ\_200East\_Rev1\_split\_CCUsand\_edit.dat & CPVZ\_200East\_Rev1\_split\_CCUsilt\_edit.dat ) into Excel 2. Add a column to tag them as sand or silt 3. Merge the two files 4. Sort by X and Y 5. Import the original geology surface layer file (CPVZ\_200East\_Rev1\_CCU\_03262019.dat) file 6. Sort by X and Y 7. Compare the original geology surface layer file point by point to the merged files; there should be a one to one correspondence |
| FR-2  FR-3  FR-4  FR-5  FR-6 | CACIE- splitKingdomLayer.pl -TC-1 | Generate the plots (Excel suggested) to compare the output files (CPVZ\_200East\_Rev1\_split\_CCUsand\_edit.dat & CPVZ\_200East\_Rev1\_split\_CCUsilt\_edit.dat) to the CCUs\_200East.dat polygon file. |

1. **Test Plan and Cases**

The installation and the test plan for the splitlingdomlayer.pl is presented in Table 2.

| **Table 2.**  **splitKingdomLayer Tool Installation Test Plan** | | | |
| --- | --- | --- | --- |
| **splitKingdomLayer.pl Installation Testing**  **CACIE-splitKingdomLayer.pl-IT-1** | | **Date:** | |
| **Tool Runner File Location for this test:**  [\\olive](file:///\\olive)\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2\_splitKingdomLayer\_Testing | | **Test Performed By:** | |
| **Testing Directory:** [\\olive](file:///\\olive)\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2\_splitKingdomLayer\_Testing | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | **Test Result  (Pass/Fail)** |
| Tools Code Repository Directory: [\\olive](file:///\\olive)\backups\CAVE\CA-CIE-Tools-TestEnv\CA-CIE-Tools-Testing\tools\ca-splitKingdomLayer | | | |
| Navigate to the testing directory: [\\olive](file:///\\olive)\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2\_splitKingdomLayer\_Testing | | | |
| 1 | Invoke Tool runner and test the tool using *runner\_splitccus.sh* as follows:  *sh runner\_splitccus.sh* | | |
| 2 | Verify Tool Runner is invoked and executed. |  |  |

| **Table 3.**  **splitKingdomLayer Tool Acceptance Test Plan** | | | |
| --- | --- | --- | --- |
| **splitKingdomLayer.pl Acceptance Testing**  **CACIE-splitKingdomLayer.pl-AT-1** | | **Date:** | |
| **Tool Runner File Location for this test:**  [\\olive](file:///\\olive)\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2\_splitKingdomLayer\_Testing | | **Test Performed By:** | |
| **Testing Directory:** [\\olive](file:///\\olive)\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2\_splitKingdomLayer\_Testing | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | **Test Result  (Pass/Fail)** |
| **CACIE-splitKingdomLayer.pl – TC-1** | | | |
| Navigate to the Testing Directory: v4-2\_splitKingdomLayer\_Testing | | | |
| 1 | Copy the following files to the testing directory  CCUs\_200East.dat (polygon file)  CPVZ\_200East\_Rev1\_CCU\_03262019.dat (geology surface layer)  These files are needed for the execution of the splitKingdomLayer.pl tool | The files are present in the specified directories. |  |
| 2 | Verify Tool Runner is invoked and executed. | Verify that the Tool Runner log is generated. |  |
| 3 | Confirm that the output files “CPVZ\_200East\_Rev1\_split\_CCUsand\_edit.dat (inside of the polygon) and CPVZ\_200East\_Rev1\_split\_CCUsilt\_edit.dat (outside of the polygon)” are generated by the tool in the  v4-2\_splitKingdomLayer\_Testing directory | The output files are generated |  |
| 4 | Confirm that each point from the original geology layer file gets assigned to one of the output files but not both, using independent method (Excel suggested or user choice)   1. Import the two output files (CPVZ\_200East\_Rev1\_split\_CCUsand\_edit.dat & CPVZ\_200East\_Rev1\_split\_CCUsilt\_edit.dat ) into Excel 2. Add a column to tag them as sand or silt 3. Merge the two files 4. Sort by X and Y 5. Import the original geology surface layer file: CPVZ\_200East\_Rev1\_CCU\_03262019.dat 6. Sort by X and Y 7. Compare the original geology surface layer file and the two merged output files point by point - there should be a one to one correspondence | The points specified in the original geology surface layer file match exactly the points in the file created by merging two output files. |  |
| 5 | Confirm that points from the original geology surface layer file are placed correctly in the right output files based on the information provided in the polygon file. To do so, generate the plots (Excel suggested) to compare the output files (CPVZ\_200East\_Rev1\_split\_CCUsand\_edit.dat and CPVZ\_200East\_Rev1\_split\_CCUsilt\_edit.dat) to the CCUs\_200East.dat polygon file. | The plots confirm that the ‘inside’ points all fall within the polygon boundaries and the ‘outside’ points are all placed outside the boundaries of the polygon. |  |

1. **Acceptance Test Report**

To complete the Acceptance Testing use Appendix A. The test case is described as follows:

* Acceptance Test 1 is in Table A-1. Two files CPVZ\_200East\_Rev1\_CCU\_03262019.dat and CCUs\_200East.dat are used to test the splitKingdomLayer.pl that generates CPVZ\_200East\_Rev1\_split\_CCUsand\_edit.dat and CPVZ\_200East\_Rev1\_split\_CCUsilt\_edit.dat.

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

1. **User Guide**

To run this tool:

1. Need access to the input files described in Section 4: Software Design description under input files.
2. Execute the tool as described in Section 4: Software Design description under Execution.

**Appendix A**

**Acceptance Testing Logs**

| **Table A-1.**  **splitKingdomLayer.pl Acceptance Test Case 1** | | | |
| --- | --- | --- | --- |
| **splitKingdomLayer.pl Acceptance Testing**  **CACIE- splitKingdomLayer.pl – AT-1** | | **Date: 02/04/2020** | |
| **Tool Runner File Location for this test:**  \\olive\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2\_splitKingdomLayer\_Testing | | **Test Performed By:** Guzel Tartakovsky | |
| **Testing Directory:** [\\olive\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2\_splitKingdomLayer\_Testing](file:///\\olive\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2_splitKingdomLayer_Testing) | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | **Test Result  (Pass/Fail)** |
| Navigate to the Testing Directory | | | |
| 1 | Copy the following files to the testing directory  CCUs\_200East.dat (polygon file)  CPVZ\_200East\_Rev1\_CCU\_03262019.dat (geology surface layer)  These files are needed for the execution of the splitKingdomLayer.pl tool | The files are present in the specified directories. | **Pass** |
| 2 | Verify Tool Runner is invoked and executed. | Verify that the Tool Runner log is generated. | **Pass** |
|  | | | |
| 3 | Confirm that the output files “CPVZ\_200East\_Rev1\_split\_CCUsand\_edit.dat (inside of the polygon) and CPVZ\_200East\_Rev1\_split\_CCUsilt\_edit.dat (outside of the polygon)” are generated by the tool in the  v4-2\_splitKingdomLayer\_Testing directory | The output files are generated | **Pass** |
| 4 | Confirm that each point from the original geology layer file gets assigned to one of the output files but not both, using independent method (Excel suggested or user choice)   1. Import the two output files (CPVZ\_200East\_Rev1\_split\_CCUsand\_edit.dat & CPVZ\_200East\_Rev1\_split\_CCUsilt\_edit.dat ) into Excel 2. Add a column to tag them as sand or silt 3. Merge the two files 4. Sort by X and Y 5. Import the original geology surface layer file: CPVZ\_200East\_Rev1\_CCU\_03262019.dat into Excel 6. Sort by X and Y 7. Compare the original geology surface layer file and the two merged output files point by point - there should be a one to one correspondence | The points specified in the original geology surface layer file match exactly the points in the file created by merging the two output files.  The results of this testing step are recorded in the *splitKingdomLayer\_testing.xlsx* file, tab ‘*Sorted\_All\_Compare’,* located in the Testing directory. | **Pass** |
| 5 | Confirm that points from the original geology surface layer file are placed correctly in the right output files based on the information provided in the polygon file. To do so, generate the plots (Excel suggested) to compare the output files (CPVZ\_200East\_Rev1\_split\_CCUsand\_edit.dat and CPVZ\_200East\_Rev1\_split\_CCUsilt\_edit.dat) to the CCUs\_200East.dat polygon file. | The plots of the polygon boundaries, both output files and the original geology file are in the *splitKingdomLayer\_testing.*xlsx file, tab *“In\_Out\_plots”* located in the Testing directory.The plots confirm that the ‘inside’ points all fall within the polygon boundaries and the ‘outside’ points are all placed outside the boundaries of the polygon. | **Pass** |

**Appendix B**

**Installation TestLogs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Table B2.**  **Split Kingdom**  **Installation Test Plan** | | | |
| **splitKingdomLayer.pl Installation Testing**  **CACIE-splitKingdomLayer.pl– IT-1** | | **Date:** | |
| **Tool Runner File Location for this test:**  [\\olive](file:///\\olive)\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2\_splitKingdomLayer\_Testing | | **Test Performed By:** | |
| **Testing Directory:** [\\olive](file:///\\olive)\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2\_splitKingdomLayer\_Testing | | | |
| **Test Step** | **Test Instruction** | **Expected Result** | **Test Result**  **(Pass/Fail)** |
| Tools Code Repository Directory: [\\olive](file:///\\olive)\backups\CAVE\CA-CIE-Tools-TestEnv\CA-CIE-Tools-Testing\tools\ca-splitKingdomLayer | | | |
| Navigate to the testing directory: [\\olive](file:///\\olive)\backups\CAVE\CA-CIE-Tools-TestEnv\v4-2\_splitKingdomLayer\_Testing | | | |
| 1 | Invoke Tool runner and test the tool using *runner\_splitccus.sh* as follows:  *sh runner\_splitccus.sh* | | |
| 2 | Verify Tool Runner is invoked and executed. |  |  |