



## HL7 Generator Tool Overview (CSV File Input)

### **Version 20210105**

| <b>Version number</b> | <b>Changes made</b>                                                                                                                                                                                                                                                                                                    |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 20200921              | <i>Added capability to customize the file name (Step 5 to Step 5A and 5B)<br/>Updated notes around replacement value handling</i>                                                                                                                                                                                      |
| 20201016              | <i>Updated instructions to explain how testing lab / reporting facility information is used.<br/>Updated instructions to clarify which element in the csv file is used as the look up in the Local Code column on the DropDownValues tab<br/>Updated instructions to indicate how to deal with assigning authority</i> |
| 20201125              | <i>Added note about use of only the first row per specimen for comments<br/>Added Mapping table for content in the COVID-19 LIVD file to specific csv file columns</i>                                                                                                                                                 |
| 20210105              | <i>Added instructions what to do, when you need help</i>                                                                                                                                                                                                                                                               |



This tool is built into Microsoft Excel and has various tabs, some of which are for data input and some of which are for configuration data.

Note: When you have to update to a new version of the tool it is recommended to copy over the entire tabs EXCEPT for the Admin tab - copy only your settings (values in Column B) over to it.

### Description of Tabs in the HL7 Generator Tool

**Instructions Tab:** Contains overall instructions and buttons to execute the generation

**Gap\_Analysis\_7-8 Tab:** Contains the overall data guidance/constraints provided by CDC and HHS on 7/8/2020

**Flatfile\_Result\_Use Tab:** Data entry tab which allows the user to manually enter data into the required fields to generate an HL7 v.2.5.1 compliant message. This provides the file layout and column headers that the imported file must contain – the tab itself is not used when using csv file input option. Column header order is not important when creating the csv input file; the column header names are not case sensitive.

In order to help with population of some of the content use the following table to extract related information for the specific test you are performing using the COVID-19 LIVD file accessible here: <https://www.cdc.gov/csels/dls/sars-cov-2-livd-codes.html>

| Column Header in Flatfile HL7 Generator | LIVD Column Name           | LIVD Column ID | Comment                                                                                                                                                                                                     |
|-----------------------------------------|----------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ordered_test_code                       | LOINC Order Code           | H              | This is the preferred value to use in the Ordered_test_code column in the csv file and also populate column C in the DropDownValues tab, so that the lookup can properly work to include the version number |
| Ordered_test_description                | LOINC Order Code Long Name | I              |                                                                                                                                                                                                             |



| Column Header in Flatfile HL7 Generator | LIVD Column Name                                                                                      | LIVD Column ID | Comment                                                                                                                                                                                                      |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ordered_test_code_system                | Not explicitly in the LIVD file, but can be assumed by the column header name - should be set to "LN" |                |                                                                                                                                                                                                              |
| Specimen_type_code                      | Vendor Specimen Description<br>the first element in the () - a numeric value in most cases.           | D              | This is the preferred value to use in the Specimen_type_code column in the csv file and also populate column C in the DropDownValues tab, so that the lookup can properly work to include the version number |
| Specimen_type_description               | Vendor Specimen Description<br>the second element in the () - text                                    | D              |                                                                                                                                                                                                              |
| Specimen_type_code_system               | Vendor Specimen Description<br>the third element in the () - "SCT" in most cases                      | D              |                                                                                                                                                                                                              |
| Test_kit_EUA_ID                         | Testkit Name ID, when Testkit Name ID Type = "EUA"                                                    | M and N        | Use the content of this column and append _<Testkit Name ID Type>, so in this case _EUA                                                                                                                      |
| Test_kit_model_ID                       | Testkit Name ID, when Testkit Name ID Type = "DIT"                                                    | M and N        | Use the content of this column and append _<Testkit Name ID Type>, so in this case _DIT                                                                                                                      |
| Test_kit_model_name                     | Testkit Name ID, when Testkit Name ID Type = "MNT" or "MNM"                                           | M and N        | Use the content of this column and append _<Testkit Name ID Type>, so in this case _MNT                                                                                                                      |
| Instrument_model_ID                     | Equipment UID, when Equipment UID Type = "DII"                                                        | O and P        | Use the content of this column and append _<Testkit Name ID Type>, so in this case _DII                                                                                                                      |



| Column Header in Flatfile HL7 Generator | LIVD Column Name                                                                                      | LIVD Column ID | Comment                                                                                                                                                                                                       |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Instrument_model_name                   | Equipment UID, when Equipment UID Type = "MNI"                                                        | O and P        | Use the content of this column and append _<Testkit Name ID Type>, so in this case _MNI                                                                                                                       |
| Test_performed_code                     | LOINC Code                                                                                            | F              | This is the preferred value to use in the Test_performed_code column in the csv file and also populate column C in the DropDownValues tab, so that the lookup can properly work to include the version number |
| Test_performed_description              | LOINC Long Name                                                                                       | G              |                                                                                                                                                                                                               |
| Test_performed_code_system              | Not explicitly in the LIVD file, but can be assumed by the column header name - should be set to "LN" |                |                                                                                                                                                                                                               |
| Test_result_coded                       | Vendor Result Description<br>the first element in the () - a numeric value in most cases.             | E              | This is the preferred value to use in the Test_result_coded column in the csv file and also populate column C in the DropDownValues tab, so that the lookup can properly work to include the version number   |
| Test_result_description                 | Vendor Result Description<br>the second element in the () - text                                      | E              |                                                                                                                                                                                                               |
| Test_result_code_system                 | Vendor Result Description<br>the third element in the () - "SCT" in most cases                        | E              |                                                                                                                                                                                                               |

**Configuration Tab:** Contains two parts that determine data mapping for each message generated by the tool.

1. Static values to be included in specific data fields for all messages generated



- a. If Column E – “Corresponding input column name (to replace if empty)” is populated, the tool will only populate this entry if the corresponding input column is empty. (e.g. for reporting\_facility\_id – if the csv file has values the tool will use those, if those cells are blank, the tool will use the value from the configuration tab in cell B11. This means: If you are reporting only for one facility you can use the configuration tab values and don’t need ot populate the cells in the csv file, but if you are reporting for many different testing sites, you should only use the csv cell values and leave the configuration cells blank, so that you get an error, when csv file data is missing).
2. References that map valid values from the dropdownvalues tab to the HL7 replacement value for each column configured. The dropdowns are manually configured to the data input fields on the Flatfile\_Result\_Use tab using data validation.

**dropDownValues Tab:** Defines specific value sets that are valid for certain HL7 elements and fields. Referenced by Configuration Tab and Flatfile\_Result\_Use Tab and allows for mapping local codes used in the csv file coded columns (e.g. test\_performed\_code) that is being imported to the standard codes to be included in the HL7 messages. If the lookup of the local value fails, it will then check to see if the input is in column D (Standard code). If it matches the value in Column D, it will map the replacement value to the HL7 message for that field, if it does not match, the file will error.

**Admin Tab:** Defines overall flat file configuration (input/output directories for processing, flatfile naming parameters) as well as validations and lookups to be used for various fields

For a video of this section see (The video uses the previous version of the tool, so if some screens look different don’t despair – the screenshots in this document show the updated views): <https://youtu.be/3SdD0D4vPwQ>



## Summary of Steps to Generate HL7 Output Files from CSV Input File

### Setting up the tool

**Step 1:** Set up folder structures for files

**Step 2:** Open the HL7 Generator Tool

**Step 3:** In *Admin tab*, specify file directory paths

**Step 4:** In *Admin tab*, specify 'Test' or 'Prod'

**Step 5A:** For AIMS Routing Service: In *Admin tab*, select "InterPartner" in Cell B13 and specify the *Interpartner "From"* Value in Cell B16, which will be the ID assigned to your organization by the AIMS team.

**Step 5B:** For direct connections with jurisdictions: In *Admin tab*, select the desired file naming schema in Cell B13 and enter the specific requirements for the jurisdiction you are working with in Cell B14.

**Step 6:** In *Admin tab*, specify the .csv file name for the tool to look for in the "Input" file directory path

**Step 7:** In *Admin tab*, specify the delimiter character to note multiple values (repeats) in a single segment.

**Step 8:** Take test file (named to input filename specified in Step 6) and put in "Input" file directory

**Step 9:** In *Instructions tab*, click "Process CSV and Generate HL7" button to generate test output

**Step 10:** In *Configuration tab*, populate static meta-data values.

**Step 11:** In *dropDownValues tab*, map local lab values to standard values for use in HL7; this includes demographic data, test related data and assigning authority identification

**Step 12:** In *Configuration tab*, ensure that all standard HL7 values from *dropDownValues tab* are represented in the bottom half of the tab

For videos of the above steps see here (The video uses the previous version of the tool, so if some screens look different don't despair – the screenshots in this document show the updated views):

<https://youtu.be/5ZEK1JXRN5c>



[https://youtu.be/6\\_6v4cCv7y0](https://youtu.be/6_6v4cCv7y0)

### **Creating the CSV file**

**Step 13:** In *Gap Analysis* tab, view minimum required fields and indicate fields that your lab supports; if your lab is missing required fields, those will either need to be added or default values will need to be defined.

**Step 14:** Create CSV file for input

**Step 15:** Validate the csv file using the flat file validator tool: <https://validator.aimsplatform.org/> (select the Flatfile Validator),

**Step 16:** Take CSV file (named to input filename specified in Step 6) and put in “Input” file directory

**Step 17:** In *Instructions* tab, click “Process CSV and Generate HL7” button to generate output

**Step 18:** Automation of the csv file conversion process

For a video of the above steps see here (The video uses the previous version of the tool, so if some screens look different don’t despair – the screenshots in this document show the updated views): <https://youtu.be/Ryp2z1MZIKg>

### **Instructions when you need help**

If you encounter issues, send an email to [informatics.support@aphl.org](mailto:informatics.support@aphl.org)

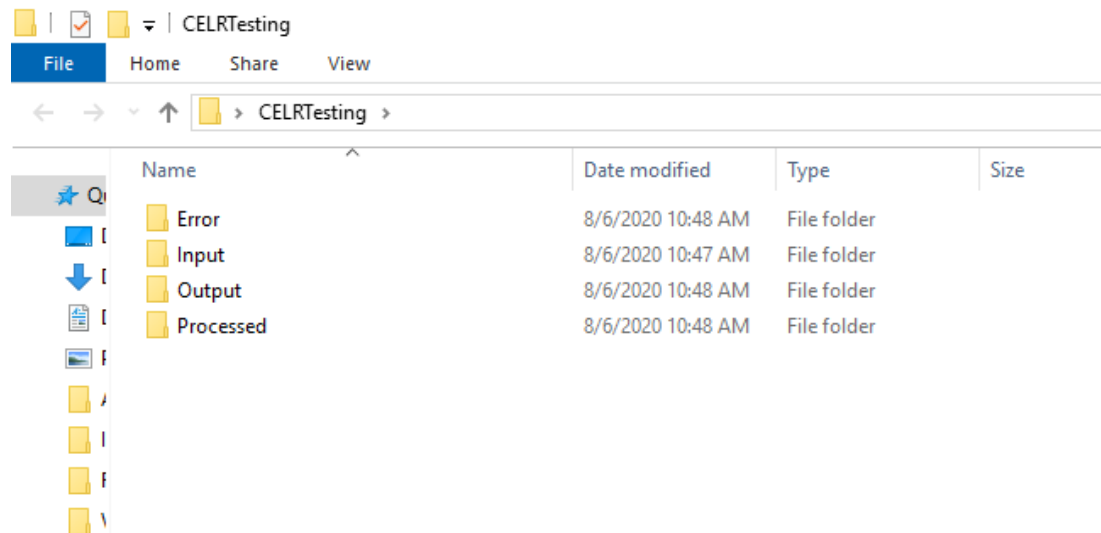
In the subject line include the name of your jurisdiction (if you are a PHA) or organization and “HL7 Generator Help”. Describe your problem in detail and be sure to also attach your version of the HL7 generator file – as well as the csv file you are working with – make sure you are only sending TEST DATA (no PHI).



## Detailed Steps to Generate HL7 Output Files from CSV Input File

### Setting up the tool

**Step 1:** Create a folder structure (suggested on Desktop of your Computer) with four folders: Input, Output, Processed, Error. Write down the full paths of each of the folders.



**Step 2:** Open the HL7 Generator tool Excel file (*NatELRFlatFile\_GapAnalysis\_HL7Generator.xlsm*). Enable all content and macros. Click on “Save As” and add your own unique filename to save your specific configurations separate from the base tool file (i.e. *NatELRFlatFile\_GapAnalysis\_HL7Generator\_Testing.xlsm*).

**Step 3.** Go to the *Admin* tab of the tool. Note that Config items highlighted in orange on the *Admin* tab are the fields that need to be configured. Enter the full directory paths for the Input, Output, Processed and Error Directories from Step 1.

**Please note that the tool can process files automatically that are placed in a network drive. Please contact [informatics.support@aphl.org](mailto:informatics.support@aphl.org) to discuss configuration and other necessary considerations for optimal processing performance.**



| File Home Insert Page Layout Formulas Data Review View ACROBAT Tell me what you want to do...                                                        |                                            |                                                                                   |             |                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------|-------------|------------------|
| PROTECTED VIEW Be careful—files from the Internet can contain viruses. Unless you need to edit, it's safer to stay in Protected View. Enable Editing |                                            |                                                                                   |             |                  |
| G34 X ✓ fx REQUIRED_COMBO_4                                                                                                                          |                                            |                                                                                   |             |                  |
|                                                                                                                                                      | A                                          | B                                                                                 | C           |                  |
| 1                                                                                                                                                    | Config Item                                | Value                                                                             | Description | FlatFile_Co      |
| 2                                                                                                                                                    | Input Directory                            | C:\runMacro\test1\Input                                                           |             | Abnormal flag    |
| 3                                                                                                                                                    | Output Directory                           | C:\runMacro\test1\Output                                                          |             | Comments         |
| 4                                                                                                                                                    | Processed Directory                        | C:\runMacro\test1\Processed                                                       |             | Date_result_rel  |
| 5                                                                                                                                                    | Error Directory                            | C:\runMacro\test1>Error                                                           |             | Disease_symp     |
| 6                                                                                                                                                    | FlatFile_order_use column to count rows    | A                                                                                 |             | Employed in h    |
| 7                                                                                                                                                    | FlatFile_Result_Use final column           | DP                                                                                |             | Employed in h    |
| 8                                                                                                                                                    |                                            |                                                                                   |             | First test       |
| 9                                                                                                                                                    | Timer on                                   | FALSE                                                                             |             | flatfile version |
| 10                                                                                                                                                   | Number of Errors before exit               | 0                                                                                 |             | Hospitalized     |
| 11                                                                                                                                                   | Include Batch header and footer            | TRUE                                                                              |             | ICU              |
| 12                                                                                                                                                   |                                            |                                                                                   |             | Illness_onset_d  |
| 13                                                                                                                                                   | File Naming option                         | ManualAndTimeStamp                                                                |             | Instrument ins   |
| 14                                                                                                                                                   | Manual file Name                           | ELR~                                                                              |             | Instrument mc    |
| 15                                                                                                                                                   | Current Usage (and MSH-11 mapping)         | Prod                                                                              |             | Instrument mc    |
| 16                                                                                                                                                   | InterPartner "From" value                  | eTrueNorth                                                                        |             | Link test to ps  |
| 17                                                                                                                                                   | InterPartner "To" value                    | AIMSPlatform                                                                      |             | Link test to ps  |
| 18                                                                                                                                                   | Test result exclude from normal processing | Test_kit_EUA_ID,Test_kit_model_ID,Test_kit_model_name,Test_result_code_system,Tes |             | Order result s   |
| 19                                                                                                                                                   | Multiple value separator                   | ;                                                                                 |             | Order test dat   |
| 20                                                                                                                                                   | Input file name                            | csvToConvert.csv                                                                  |             | Ordered test c   |
| 21                                                                                                                                                   | Debug mode                                 | FALSE                                                                             |             | Ordered test c   |
| 22                                                                                                                                                   | Time zone                                  | ET                                                                                |             | Ordered test c   |
| 23                                                                                                                                                   |                                            |                                                                                   |             | Ordering facilit |

**Step 4:** On the *Admin* tab, select the appropriate value (Test or Prod) from the drop down for the field *Current Usage (and MSH-11 mapping)*.



| File Home Insert Page Layout Formulas Data Review View ACROBAT Tell me what you want to do...                                                        |                                                                                   |             |                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------|------------------|
| PROTECTED VIEW Be careful—files from the Internet can contain viruses. Unless you need to edit, it's safer to stay in Protected View. Enable Editing |                                                                                   |             |                  |
| G34 X ✓ fx REQUIRED_COMBO_4                                                                                                                          |                                                                                   |             |                  |
| Config Item                                                                                                                                          | Value                                                                             | Description | FlatFile_Co      |
| Input Directory                                                                                                                                      | C:\runMacro\test1\Input                                                           |             | Abnormal_flag    |
| Output Directory                                                                                                                                     | C:\runMacro\test1\Output                                                          |             | Comments         |
| Processed Directory                                                                                                                                  | C:\runMacro\test1\Processed                                                       |             | Date_result_rel  |
| Error Directory                                                                                                                                      | C:\runMacro\test1>Error                                                           |             | Disease_symp     |
| FlatFile_order_use column to count rows                                                                                                              | A                                                                                 |             | Employed_in_h    |
| FlatFile_Result_Use final column                                                                                                                     | DP                                                                                |             | Employed_in_h    |
|                                                                                                                                                      |                                                                                   |             | First_test       |
| Timer on                                                                                                                                             | FALSE                                                                             |             | flatfile_version |
| Number of Errors before exit                                                                                                                         |                                                                                   | 0           | Hospitalized     |
| Include Batch header and footer                                                                                                                      | TRUE                                                                              |             | ICU              |
|                                                                                                                                                      |                                                                                   |             | Illness_onset_d  |
| File Naming option                                                                                                                                   | ManualAndTimeStamp                                                                |             | Instrument_ins   |
| Manual file Name                                                                                                                                     | ELR~                                                                              |             | Instrument_mc    |
| Current Usage (and MSH-11 mapping)                                                                                                                   | Prod                                                                              |             | Instrument_mc    |
| InterPartner "From" value                                                                                                                            | eTrueNorth                                                                        |             | Link_test_to_pa  |
| InterPartner "To" value                                                                                                                              | AIMSPlatform                                                                      |             | Link_test_to_pa  |
| Test result exclude from normal processing                                                                                                           | Test_kit_EUA_ID,Test_kit_model_ID,Test_kit_model_name,Test_result_code_system,Tes |             | Order_result_s   |
| Multiple value separator                                                                                                                             | ;                                                                                 |             | Order_test_dat   |
| Input file name                                                                                                                                      | csvToConvert.csv                                                                  |             | Ordered_test_c   |
| Debug mode                                                                                                                                           | FALSE                                                                             |             | Ordered_test_c   |
| Time zone                                                                                                                                            | ET                                                                                |             | Ordered_test_c   |
|                                                                                                                                                      |                                                                                   |             | Ordering_facili  |

**Step 5A: Setting up for Use of InterPartner file naming convention:** On the *Admin* tab, in Cell B13 select InterPartner.



File Home Insert Page Layout Formulas Data Review View ACROBAT Tell me what you want to do...

PROTECTED VIEW Be careful—files from the Internet can contain viruses. Unless you need to edit, it's safer to stay in Protected View. Enable Editing

B13 ManualAndTimeStamp

|    | A                                          | B                                  | C           | D                   |
|----|--------------------------------------------|------------------------------------|-------------|---------------------|
| 1  | Config Item                                | Value                              | Description | FlatFile_Column     |
| 2  | Input Directory                            | C:\runMacro\test1\input            |             | Abnormal_flag       |
| 3  | Output Directory                           | C:\runMacro\test1\Output           |             | Comments            |
| 4  | Processed Directory                        | C:\runMacro\test1\Processed        |             | Date_result_relea   |
| 5  | Error Directory                            | C:\runMacro\test1\Error            |             | Disease_symptom     |
| 6  | FlatFile_order_use column to count rows    | A                                  |             | Employed_in hea     |
| 7  | FlatFile_Result_Use final column           | DP                                 |             | Employed_in high    |
| 8  |                                            |                                    |             | First test          |
| 9  | Timer on                                   | FALSE                              |             | flatfile_version_ne |
| 10 | Number of Errors before exit               | 0                                  |             | Hospitalized        |
| 11 | Include Batch header and footer            | TRUE                               |             | ICU                 |
| 12 |                                            |                                    |             | Illness onset date  |
| 13 | File Naming option                         | ManualAndTimeStamp                 |             | Instrument instar   |
| 14 | Manual file Name                           | InterPartner                       |             | Instrument_mode     |
| 15 | Current Usage (and MSH-11 mapping)         | InputFileNameOnly                  |             | Instrument_mode     |
| 16 | InterPartner "From" value                  | Manual                             |             | Link test to pare   |
| 17 | InterPartner "To" value                    | ManualAndTimeStamp                 |             | Link test to pare   |
| 18 | Test result exclude from normal processing | ManualAndInputFileName             |             | Order_result_stat   |
| 19 | Multiple value separator                   | ManualAndInputFileNameAndTimeStamp |             | Order_result_stat   |
| 20 | Input file name                            | ;                                  |             | Order test date     |
| 21 | Debug mode                                 | FALSE                              |             | Ordered test cod    |
| 22 | Time zone                                  | ET                                 |             | Ordered test des    |
| 23 |                                            |                                    |             | Ordering facility   |

On the *Admin* tab, in Cell B16 *Interpartner "From" Value*, input the appropriate value for your organization (example below shows "eTrueNorth"), which will be the ID assigned to your organization by the AIMS team. For more information about setting up the Interpartner filename follow instructions in ["AIMS - CentralizedELR InterPartner Messaging Guide"](#) This step is important when using AIMS routing services.



| File Home Insert Page Layout Formulas Data Review View ACROBAT Tell me what you want to do...                                                        |                                            |                                                                                   |                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------|------------------|
| PROTECTED VIEW Be careful—files from the Internet can contain viruses. Unless you need to edit, it's safer to stay in Protected View. Enable Editing |                                            |                                                                                   |                  |
| G34 X ✓ fx REQUIRED_COMBO_4                                                                                                                          |                                            |                                                                                   |                  |
|                                                                                                                                                      | A                                          | B                                                                                 | C                |
| 1                                                                                                                                                    | Config Item                                | Value                                                                             | Description      |
| 2                                                                                                                                                    | Input Directory                            | C:\runMacro\test1\Input                                                           | FlatFile_Co      |
| 3                                                                                                                                                    | Output Directory                           | C:\runMacro\test1\Output                                                          | Abnormal flag    |
| 4                                                                                                                                                    | Processed Directory                        | C:\runMacro\test1\Processed                                                       | Comments         |
|                                                                                                                                                      |                                            |                                                                                   | Date_result_re   |
| 5                                                                                                                                                    | Error Directory                            | C:\runMacro\test1\Error                                                           | Disease_symp     |
| 6                                                                                                                                                    | FlatFile_order_use column to count rows    | A                                                                                 | Employed in h    |
| 7                                                                                                                                                    | FlatFile_Result_Use final column           | DP                                                                                | Employed in h    |
| 8                                                                                                                                                    |                                            |                                                                                   | First test       |
| 9                                                                                                                                                    | Timer on                                   | FALSE                                                                             | flatfile_version |
| 10                                                                                                                                                   | Number of Errors before exit               | 0                                                                                 | Hospitalized     |
| 11                                                                                                                                                   | Include Batch header and footer            | TRUE                                                                              | ICU              |
| 12                                                                                                                                                   |                                            |                                                                                   | Illness_onset_d  |
| 13                                                                                                                                                   | File Naming option                         | ManualAndTimeStamp                                                                | Instrument ins   |
| 14                                                                                                                                                   | Manual file Name                           | ELR~                                                                              | Instrument mc    |
| 15                                                                                                                                                   | Current Usage (and MSH-11 mapping)         | Prod                                                                              | Instrument mc    |
| 16                                                                                                                                                   | InterPartner "From" value                  | eTrueNorth                                                                        | Link test to pa  |
| 17                                                                                                                                                   | InterPartner "To" value                    | AIMSPlatform                                                                      | Link test to pa  |
| 18                                                                                                                                                   | Test result exclude from normal processing | Test_kit_EUA_ID,Test_kit_model_ID,Test_kit_model_name,Test_result_code_system,Tes | Order_result s   |
| 19                                                                                                                                                   | Multiple value separator                   | ;                                                                                 | Order test dat   |
| 20                                                                                                                                                   | Input file name                            | csvToConvert.csv                                                                  | Ordered test c   |
| 21                                                                                                                                                   | Debug mode                                 | FALSE                                                                             | Ordered test c   |
| 22                                                                                                                                                   | Time zone                                  | ET                                                                                | Ordered test c   |
| 23                                                                                                                                                   |                                            |                                                                                   | Ordering facili  |

**Step 5B: Setting up for Use of other file naming conventions:** *When working directly with a jurisdiction they may have other requirements for file naming conventions, which can be configured using cell B14 in the Admin tab.*



| File Home Insert Page Layout Formulas Data Review View ACROBAT Tell me what you want to do...                                                        |                                            |                                                                                   |                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------|------------------|
| PROTECTED VIEW Be careful—files from the Internet can contain viruses. Unless you need to edit, it's safer to stay in Protected View. Enable Editing |                                            |                                                                                   |                  |
| G34 X ✓ fx REQUIRED_COMBO_4                                                                                                                          |                                            |                                                                                   |                  |
|                                                                                                                                                      | A                                          | B                                                                                 | C                |
| 1                                                                                                                                                    | Config Item                                | Value                                                                             | Description      |
| 2                                                                                                                                                    | Input Directory                            | C:\runMacro\test1\Input                                                           | FlatFile_Col     |
| 3                                                                                                                                                    | Output Directory                           | C:\runMacro\test1\Output                                                          | Abnormal_flag    |
| 4                                                                                                                                                    | Processed Directory                        | C:\runMacro\test1\Processed                                                       | Comments         |
| 5                                                                                                                                                    | Error Directory                            | C:\runMacro\test1>Error                                                           | Date_result_rel  |
| 6                                                                                                                                                    | FlatFile_order_use column to count rows    | A                                                                                 | Disease_sympt    |
| 7                                                                                                                                                    | FlatFile_Result_Use final column           | DP                                                                                | Employed_in_h    |
| 8                                                                                                                                                    |                                            |                                                                                   | Employed_in_h    |
| 9                                                                                                                                                    | Timer on                                   | FALSE                                                                             | First test       |
| 10                                                                                                                                                   | Number of Errors before exit               | 0                                                                                 | flatfile_version |
| 11                                                                                                                                                   | Include Batch header and footer            | TRUE                                                                              | Hospitalized     |
| 12                                                                                                                                                   |                                            |                                                                                   | ICU              |
| 13                                                                                                                                                   | File Naming option                         | ManualAndTimeStamp                                                                | Illness_onset_d  |
| 14                                                                                                                                                   | Manual file Name                           | ELR~                                                                              | Instrument_ins   |
| 15                                                                                                                                                   | Current Usage (and MSH-11 mapping)         | Prod                                                                              | Instrument_ma    |
| 16                                                                                                                                                   | InterPartner "From" value                  | eTrueNorth                                                                        | Instrument_ma    |
| 17                                                                                                                                                   | InterPartner "To" value                    | AIMSPlatform                                                                      | Link_test_to_pe  |
| 18                                                                                                                                                   | Test result exclude from normal processing | Test_kit_EUA_ID,Test_kit_model_ID,Test_kit_model_name,Test_result_code_system,Tes | Link_test_to_pe  |
| 19                                                                                                                                                   | Multiple value separator                   | ,                                                                                 | Order_result_st  |
| 20                                                                                                                                                   | Input file name                            | csvToConvert.csv                                                                  | Order_test_dat   |
| 21                                                                                                                                                   | Debug mode                                 | FALSE                                                                             | Ordered_test_c   |
| 22                                                                                                                                                   | Time zone                                  | ET                                                                                | Ordered_test_c   |
| 23                                                                                                                                                   |                                            |                                                                                   | Ordered_test_c   |

Cell B13 in the *Admin* tab allows selection of one of 4 basic file naming schemes:

- Manual – where the filename is defined in the *Admin* tab in cell B14
- Manual with timestamp – uses the value from cell B14 in *Admin* tab and appends with the file creation date and time
- Manual with the name of the input file – uses the value from cell B14 in *Admin* tab and appends with the file name defined in cell B20
- Manual with the name of the input file and timestamp– uses the value from cell B14 in *Admin* tab and appends with the file name defined in cell B20 and the file creation date and time



NatELRFlatFile\_GapAnalysis\_HL7Generator\_20200921 [Protected View] - Excel

PROTECTED VIEW Be careful—files from the Internet can contain viruses. Unless you need to edit, it's safer to stay in Protected View. [Enable Editing](#)

B13 ManualAndTimeStamp

| Config Item                                | Value                              | Description                       | FlatFile_Column     |
|--------------------------------------------|------------------------------------|-----------------------------------|---------------------|
| Input Directory                            | C:\runMacro\test1\Input            |                                   | Abnormal flag       |
| Output Directory                           | C:\runMacro\test1\Output           |                                   | Comments            |
| Processed Directory                        | C:\runMacro\test1\Processed        |                                   | Date result relea   |
| Error Directory                            | C:\runMacro\test1\Error            |                                   | Disease symptom     |
| FlatFile_order_use column to count rows    | A                                  |                                   | Employed in hea     |
| FlatFile_Result_Use final column           | DP                                 |                                   | Employed in high    |
| Timer on                                   | FALSE                              |                                   | First test          |
| Number of Errors before exit               | 0                                  |                                   | flatfile_version_nc |
| Include Batch header and footer            | TRUE                               |                                   | Hospitalized        |
|                                            |                                    |                                   | ICU                 |
|                                            |                                    |                                   | Illness_onset date  |
| File Naming option                         | ManualAndTimeStamp                 |                                   | Instrument instar   |
| Manual file Name                           | InterPartner                       |                                   | Instrument_mode     |
| Current Usage (and MSH-11 mapping)         | InputFileNameOnly                  |                                   | Instrument_mode     |
| InterPartner "From" value                  | InputFileNameAndTimeStamp          |                                   | Link_test_to_pare   |
| InterPartner "To" value                    | Manual                             |                                   | Link_test_to_pare   |
| Test result exclude from normal processing | ManualAndTimeStamp                 |                                   | Link_test_to_pare   |
| Multiple value separator                   | ManualAndInputFileName             |                                   | Order result statu  |
| Input file name                            | ManualAndInputFileNameAndTimeStamp | _name,Test_result_code_system,Tes | Order result statu  |
| Debug mode                                 | FALSE                              |                                   | Order test date     |
| Time zone                                  | ET                                 |                                   | Ordered_test_cod    |
|                                            |                                    |                                   | Ordered_test_cod    |
|                                            |                                    |                                   | Ordered_test des    |
|                                            |                                    |                                   | Ordering facility   |

On the *Admin* tab, note that Columns D-K contains the logic by which the different data fields are read, transformed and output to the flat file. Please do not change these columns or the tool macros may break.

On the Admin tab, the fields “Timer on” , “Number of Errors before exit” and “Debug mode” should be used by developers or those trained with the macro to perform integration testing. This is documented in “Developer Instructions”. By default “Timer on” and “Debug Mode” should be set to “FALSE” and “Number of Errors before exit” should be set to 0.

If you notice any issues please contact AIMS Technical Assistance at [informatics.support@aphl.org](mailto:informatics.support@aphl.org).

**Step 6:** In *Admin* tab, specify the .csv file name for the tool to look for in the “Input” file directory path. Note that the input CSV file that you use MUST be named this or the tool will not process it. Note that Config items highlighted in orange on the *Admin* tab are the fields that need to be configured.



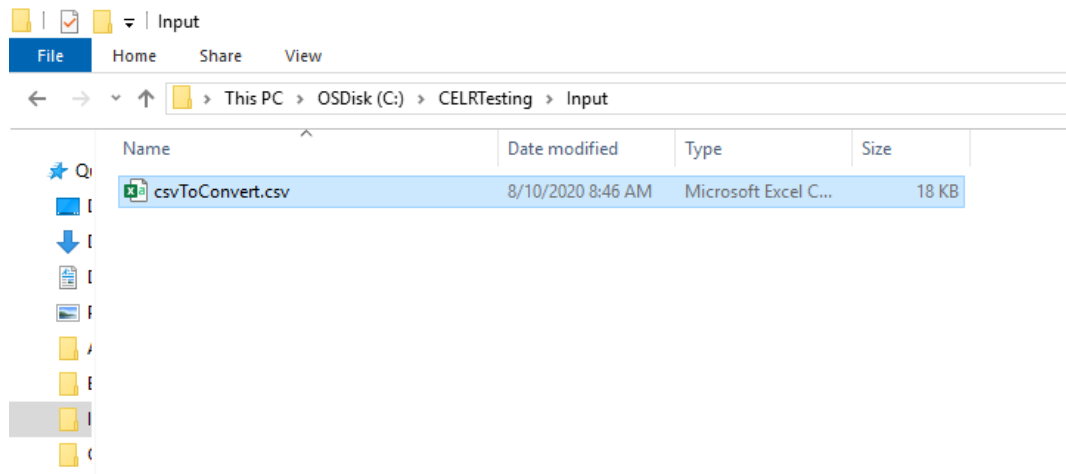
| File Home Insert Page Layout Formulas Data Review View ACROBAT Tell me what you want to do...                                                        |                                            |                                                                                   |                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------|------------------|
| PROTECTED VIEW Be careful—files from the Internet can contain viruses. Unless you need to edit, it's safer to stay in Protected View. Enable Editing |                                            |                                                                                   |                  |
| G34                                                                                                                                                  |                                            |                                                                                   | REQUIRED_COMBO_4 |
|                                                                                                                                                      | A                                          | B                                                                                 | C                |
| 1                                                                                                                                                    | Config Item                                | Value                                                                             | Description      |
| 2                                                                                                                                                    | Input Directory                            | C:\runMacro\test1\Input                                                           | Abnormal_flag    |
| 3                                                                                                                                                    | Output Directory                           | C:\runMacro\test1\Output                                                          | Comments         |
| 4                                                                                                                                                    | Processed Directory                        | C:\runMacro\test1\Processed                                                       | Date_result_rel  |
| 5                                                                                                                                                    | Error Directory                            | C:\runMacro\test1\Error                                                           | Disease_sympt    |
| 6                                                                                                                                                    | FlatFile_order_use column to count rows    | A                                                                                 | Employed_in_h    |
| 7                                                                                                                                                    | FlatFile_Result_Use final column           | DP                                                                                | Employed_in_h    |
| 8                                                                                                                                                    |                                            |                                                                                   | First_test       |
| 9                                                                                                                                                    | Timer on                                   | FALSE                                                                             | flatfile_version |
| 10                                                                                                                                                   | Number of Errors before exit               | 0                                                                                 | Hospitalized     |
| 11                                                                                                                                                   | Include Batch header and footer            | TRUE                                                                              | ICU              |
| 12                                                                                                                                                   |                                            |                                                                                   | Illness_onset_d  |
| 13                                                                                                                                                   | File Naming option                         | ManualAndTimeStamp                                                                | Instrument_ins   |
| 14                                                                                                                                                   | Manual file Name                           | ELR~                                                                              | Instrument_mo    |
| 15                                                                                                                                                   | Current Usage (and MSH-11 mapping)         | Prod                                                                              | Instrument_mo    |
| 16                                                                                                                                                   | InterPartner "From" value                  | eTrueNorth                                                                        | Link_test_to_pa  |
| 17                                                                                                                                                   | InterPartner "To" value                    | AIMSPlatform                                                                      | Link_test_to_pa  |
| 18                                                                                                                                                   | Test result exclude from normal processing | Test_kit_EUA_ID,Test_kit_model_ID,Test_kit_model_name,Test_result_code_system,Tes | Order_result_st  |
| 19                                                                                                                                                   | Multiple value separator                   | ;                                                                                 | Order_test_dat   |
| 20                                                                                                                                                   | Input file name                            | csvToConvert.csv                                                                  | Ordered_test_c   |
| 21                                                                                                                                                   | Debug mode                                 | FALSE                                                                             | Ordered_test_c   |
| 22                                                                                                                                                   | Time zone                                  | ET                                                                                | Ordered_test_d   |
| 23                                                                                                                                                   |                                            |                                                                                   | Ordering_facilit |

**Step 7:** In *Admin* tab, specify the delimiter character to note multiple values (repeats) in a single field. Note that the default character used is a semicolon (;). Use this delimiter to list multiple values in the Disease\_symptoms column. In the output, each value will be mapped to a separate OBX segment.



| File Home Insert Page Layout Formulas Data Review View ACROBAT Tell me what you want to do...                                                        |                                            |                                                                                   |                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------|------------------|
| PROTECTED VIEW Be careful—files from the Internet can contain viruses. Unless you need to edit, it's safer to stay in Protected View. Enable Editing |                                            |                                                                                   |                  |
| G34 REQUIRED_COMBO_4                                                                                                                                 |                                            |                                                                                   |                  |
|                                                                                                                                                      | A                                          | B                                                                                 | C                |
| 1                                                                                                                                                    | Config Item                                | Value                                                                             | Description      |
| 2                                                                                                                                                    | Input Directory                            | C:\runMacro\test1\Input                                                           | Abnormal_flag    |
| 3                                                                                                                                                    | Output Directory                           | C:\runMacro\test1\Output                                                          | Comments         |
| 4                                                                                                                                                    | Processed Directory                        | C:\runMacro\test1\Processed                                                       | Date_result_rel  |
| 5                                                                                                                                                    | Error Directory                            | C:\runMacro\test1\Error                                                           | Disease_symp     |
| 6                                                                                                                                                    | FlatFile_order_use column to count rows    | A                                                                                 | Employed_in_h    |
| 7                                                                                                                                                    | FlatFile_Result_Use final column           | DP                                                                                | Employed_in_h    |
| 8                                                                                                                                                    |                                            |                                                                                   | First test       |
| 9                                                                                                                                                    | Timer on                                   | FALSE                                                                             | flatfile_version |
| 10                                                                                                                                                   | Number of Errors before exit               | 0                                                                                 | Hospitalized     |
| 11                                                                                                                                                   | Include Batch header and footer            | TRUE                                                                              | ICU              |
| 12                                                                                                                                                   |                                            |                                                                                   | Illness_onset_d  |
| 13                                                                                                                                                   | File Naming option                         | ManualAndTimeStamp                                                                | Instrument_ins   |
| 14                                                                                                                                                   | Manual file Name                           | ELR~                                                                              | Instrument_mc    |
| 15                                                                                                                                                   | Current Usage (and MSH-11 mapping)         | Prod                                                                              | Instrument_mc    |
| 16                                                                                                                                                   | InterPartner "From" value                  | eTrueNorth                                                                        | Link_test_to_pa  |
| 17                                                                                                                                                   | InterPartner "To" value                    | AIMSPlatform                                                                      | Link_test_to_pa  |
| 18                                                                                                                                                   | Test result exclude from normal processing | Test_kit_EUA_ID,Test_kit_model_ID,Test_kit_model_name,Test_result_code_system,Tes | Order_result_s   |
| 19                                                                                                                                                   | Multiple value separator                   | ;                                                                                 | Order_test_dat   |
| 20                                                                                                                                                   | Input file name                            | csvToConvert.csv                                                                  | Ordered_test_c   |
| 21                                                                                                                                                   | Debug mode                                 | FALSE                                                                             | Ordered_test_c   |
| 22                                                                                                                                                   | Time zone                                  | ET                                                                                | Ordered_test_c   |
| 23                                                                                                                                                   |                                            |                                                                                   | Ordering_familie |

**Step 8:** Take the CSV file you intend to use (or a test validation CSV file provided by AIMS) and place it in the “Input” file directory that you specified in Step 3. Rename the file to the input CSV filename you specified in the *Admin* tab in Step 6 (make sure the filename matches exactly or the tool will not process it)



**Step 9:** Under the *Instructions* tab, click the “Process CSV and generate HL7” button to generate a test output. If a runtime error pops up, go through Steps 1 to 8 (especially Step 3 and Step 6) to ensure that all setup steps are correct. If no runtime error is generated or no message appears, the tool should take you to the *Admin* tab to the Input File Name field. Go to the Output directory set up in Step 3 to find an output file generated from the input CSV. The output is generated as an HL7 batch file. If there are errors in processing, such as missing required fields, improper data, wrong format, or lookup failure, it will not output an HL7 file and output the error file in the “Error” directory.



**Gap Analysis document to support COVID-19 ELR flat file development efforts**

**Tabs included in this file:**

- Instructions
- Gap Analysis7-8
- Flatfile\_Result\_Use
- Configuration
- dropDownValues
- Admin

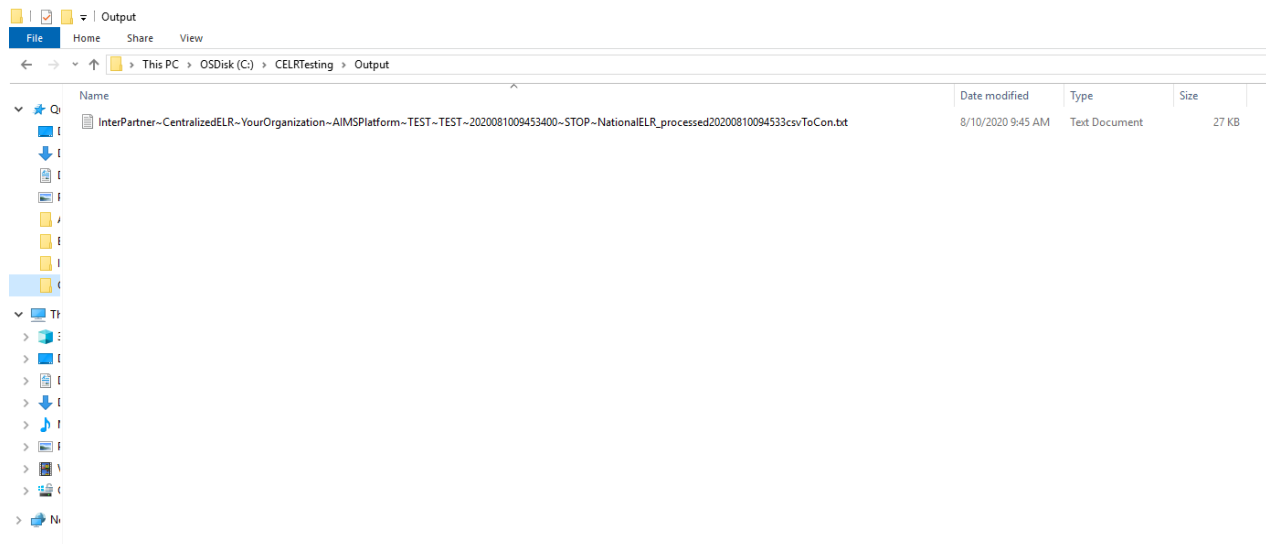
Generate HL7 from Manual Entry

Process CSV and generate HL7

**Instructions tab**  
Provides background and explanation of how this file is laid out, its usage and the purpose of each tab.

**Gap Analysis7-8 tab**  
This tab includes all the data elements that are desired (R, C, RE and O) for the flat file and how they will be mapped to HL7v2.5.1 ELR R1 message instance default view.  
Only elements that have an entry in the Flatfileheader column are included in the FlatFile\_Result\_Use tab with example data tab, and are needed in the

Output folder showing generated file:



**Step 10:** Go to the *Configuration* tab. The top part of the tab specifies static values that will be sent with every HL7 message generated (i.e. your lab address and CLIA number) and which fields they are mapped to in the HL7 message. If a field is left empty on the “Flatfile\_Result\_Use” tab, the field will be automatically populated with the appropriate value from the “Configuration” tab if column E “Corresponding input column name (to replace if empty)” is configured. Populate all fields in Column B, *Answer (local value)* that are highlighted in yellow. The tool will reference these values to populate the appropriate field when generating the HL7 message. You will need to create 1 tool file for each submitting laboratory, if you are a data aggregator. Be sure to get the right values for MSH-5 (Cells B32 and B33) and MSH-6 (Cells B34 and B35) from the jurisdiction you are working with – if you are using the AIMS routing service make sure these fields are left blank.



| HL7 Generator Instructions, CSV Input, 20200102, BNA/1, 1/1/2020                                                                                                                 |                                                                                                                                                                                    |                                         |                                                                               |                |                                                       |                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-------------------------------------------------------------------------------|----------------|-------------------------------------------------------|--------------------------------------------------------------------------------|
| Hnat23747476, GapAnalysis, HL7Generator, updatedInstructions.docx - Excel                                                                                                        |                                                                                                                                                                                    |                                         |                                                                               |                |                                                       |                                                                                |
| Cheng, Benson                                                                                                                                                                    |                                                                                                                                                                                    |                                         |                                                                               |                |                                                       |                                                                                |
| Cheng, Benson                                                                                                                                                                    |                                                                                                                                                                                    |                                         |                                                                               |                |                                                       |                                                                                |
| Share Comments                                                                                                                                                                   |                                                                                                                                                                                    |                                         |                                                                               |                |                                                       |                                                                                |
| File Home Insert Draw Page Layout Formulas Data Review View Deloitte Tools Help Acrobat Search                                                                                   |                                                                                                                                                                                    |                                         |                                                                               |                |                                                       |                                                                                |
| Normal Page Break Preview Page Custom Views Sub Formula Bar Zoom 100% Zoom to Selection New Window All Pages Hide Split View Side by Side Synchronize Scrolling Switch Windows + |                                                                                                                                                                                    |                                         |                                                                               |                |                                                       |                                                                                |
| Workbook Views Show Gridlines Headings Zoom Window                                                                                                                               |                                                                                                                                                                                    |                                         |                                                                               |                |                                                       |                                                                                |
| 1 Static Values Do not move these columns. The macro code references specific cells.                                                                                             |                                                                                                                                                                                    |                                         |                                                                               |                |                                                       |                                                                                |
| 2                                                                                                                                                                                | Data on this tab is assumed to be the same for each site, where testing is performed, so could be pre-populated for manual user entry or populated automatically if entry is blank |                                         |                                                                               |                |                                                       |                                                                                |
| 3                                                                                                                                                                                | Question                                                                                                                                                                           | Answer (local value)                    | More information about the question                                           | Mapping to HL7 | Corresponding input column name (to replace if empty) | Additional mapping instructions                                                |
| 4                                                                                                                                                                                | Testing Laboratory Street                                                                                                                                                          | 202 South Monroe-FromStatic             |                                                                               | OBX-24.1       | Testing_lab_street                                    |                                                                                |
| 5                                                                                                                                                                                | Testing Laboratory Street 2                                                                                                                                                        | 842 11-FromStatic                       |                                                                               | OBX-24.2       | Testing_lab_street2                                   |                                                                                |
| 6                                                                                                                                                                                | Testing Laboratory City                                                                                                                                                            | Little Rock-From static                 |                                                                               | OBX-24.3       | Testing_lab_city                                      |                                                                                |
| 7                                                                                                                                                                                | Testing Laboratory State                                                                                                                                                           | NM                                      |                                                                               | OBX-24.4       | Testing_lab_state                                     |                                                                                |
| 8                                                                                                                                                                                | Testing Laboratory County                                                                                                                                                          | 55519                                   |                                                                               | OBX-24.9       | Testing_lab_county                                    |                                                                                |
| 9                                                                                                                                                                                | Testing Laboratory Zip                                                                                                                                                             | 71205                                   |                                                                               | OBX-24.5       | Testing_lab_zip_code                                  |                                                                                |
| 10                                                                                                                                                                               | Name of the reporting facility                                                                                                                                                     | Public Health Laboratory, AB-FromStatic |                                                                               | MSH-4.1        | Reporting_facility_name                               | MSH-4.3                                                                        |
| 11                                                                                                                                                                               | Identifier of the reporting facility                                                                                                                                               | AR-101aRock-SPH-FromStatic              | This can be a CLIA number or an OID                                           | MSH-4.2        | Reporting_facility_id                                 | OID                                                                            |
| 12                                                                                                                                                                               | Name of the reporting system                                                                                                                                                       | AR-101aRock-SPH-FromStatic2             |                                                                               | MSH-3.1        | Report_facility_data_source_app                       | MSH-3.3                                                                        |
| 13                                                                                                                                                                               | OID for the reporting system (if known)                                                                                                                                            | dummyMSH2OID                            |                                                                               | MSH-3.2        |                                                       |                                                                                |
| 14                                                                                                                                                                               | Testing Lab ID assigner                                                                                                                                                            | testingLabIDAssignerRequired            | System id assigner for ORC-5, OBX-5, and SPM2.2                               |                |                                                       |                                                                                |
| 15                                                                                                                                                                               | Testing Lab ID assigner OID                                                                                                                                                        | testingLabIDAssignerOIDRequired         |                                                                               |                |                                                       |                                                                                |
| 16                                                                                                                                                                               | Name of the testing laboratory                                                                                                                                                     | UAMC-FromStatic                         |                                                                               | OBX-23.1       | Testing_lab_name                                      |                                                                                |
| 17                                                                                                                                                                               | CLIA number of the testing laboratory                                                                                                                                              | 0401044189-FromStatic                   |                                                                               | OBX-23.10      | Testing_lab_id                                        |                                                                                |
| 18                                                                                                                                                                               | Name of the organization that assigns the Patient identifier                                                                                                                       | dummyOID                                | Patient_ID_assigner                                                           | PID-3.4.1-1    |                                                       |                                                                                |
| 19                                                                                                                                                                               | OID of organization that assigns the Patient identifier                                                                                                                            | Public Health Laboratory, AB-FromStatic | Patient ID assigning OID                                                      | PID-3.4.2-1    |                                                       |                                                                                |
| 20                                                                                                                                                                               | Name of the organization that assigns the Patient identifier                                                                                                                       | Public Health Laboratory, AB-FromStatic | Patient_ID_assigner 2                                                         | PID-3.4.1-1    |                                                       |                                                                                |
| 21                                                                                                                                                                               | OID of organization that assigns the second Patient identifier                                                                                                                     | dummyOID2                               | Patient ID assigning OID                                                      | PID-3.4.2-1    |                                                       |                                                                                |
| 22                                                                                                                                                                               | Test instrument or kit                                                                                                                                                             |                                         | If more than one test is performed, copy this row as often as needed          | OBX-17.1       |                                                       | populate if OBX-17.1 empty                                                     |
| 23                                                                                                                                                                               | Test instrument or kit                                                                                                                                                             |                                         | If more than one test is performed, copy this row as often as needed          | OBX-17.1       |                                                       | populate if OBX-17.1 empty                                                     |
| 24                                                                                                                                                                               | Test instrument or kit                                                                                                                                                             |                                         | If more than one test is performed, copy this row as often as needed          | OBX-17.1       |                                                       | populate if OBX-17.1 empty                                                     |
| 25                                                                                                                                                                               | Default specimen type description                                                                                                                                                  | Specimen of unknown material            | Default value if Specimen_type_description is not populated, enter this value | SPM-4.2        | Specimen_type_description                             |                                                                                |
| 26                                                                                                                                                                               | Default specimen type code                                                                                                                                                         | 118924002                               | Default value if not populated                                                | SPM-4.1        | Specimen_type_code                                    |                                                                                |
| 27                                                                                                                                                                               | Software vendor                                                                                                                                                                    | software vendor                         |                                                                               |                |                                                       |                                                                                |
| 28                                                                                                                                                                               | Software version or release number                                                                                                                                                 | v1.2                                    |                                                                               |                |                                                       |                                                                                |
| 29                                                                                                                                                                               | Software Name                                                                                                                                                                      | software name                           |                                                                               |                |                                                       |                                                                                |
| 30                                                                                                                                                                               | Binary ID                                                                                                                                                                          | Binary ID unknown                       |                                                                               |                |                                                       |                                                                                |
| 31                                                                                                                                                                               | Install date                                                                                                                                                                       | 20181008                                | Date in HL7 format YYYYMMDD                                                   |                |                                                       |                                                                                |
| 32                                                                                                                                                                               | Receiving Application Name                                                                                                                                                         | US-WHO Collab LabSys                    |                                                                               | MSH-5.1        |                                                       |                                                                                |
| 33                                                                                                                                                                               | Receiving Application OID                                                                                                                                                          | 2.16.840.1.114322.4.3.3.7               |                                                                               | MSH-5.2        |                                                       |                                                                                |
| 34                                                                                                                                                                               | Receiving Facility Name                                                                                                                                                            | CDC-EPH Surv Branch                     | This field can be left blank, if using the AIMS routing service               | MSH-6.1        |                                                       |                                                                                |
| 35                                                                                                                                                                               | Name of the health department receiving the data                                                                                                                                   | 2.16.840.1.114322.4.1.10418             |                                                                               | MSH-6.2        |                                                       | Based on the name, look up the OID for use in MSH-6.2 and also the information |
| 36                                                                                                                                                                               |                                                                                                                                                                                    |                                         |                                                                               |                |                                                       |                                                                                |
| 37                                                                                                                                                                               |                                                                                                                                                                                    |                                         |                                                                               |                |                                                       |                                                                                |
| 38                                                                                                                                                                               |                                                                                                                                                                                    |                                         |                                                                               |                |                                                       |                                                                                |
| 39                                                                                                                                                                               |                                                                                                                                                                                    |                                         |                                                                               |                |                                                       |                                                                                |
| 40                                                                                                                                                                               |                                                                                                                                                                                    |                                         |                                                                               |                |                                                       |                                                                                |
| 41                                                                                                                                                                               |                                                                                                                                                                                    |                                         |                                                                               |                |                                                       |                                                                                |
| 42                                                                                                                                                                               |                                                                                                                                                                                    |                                         |                                                                               |                |                                                       |                                                                                |
| 43                                                                                                                                                                               |                                                                                                                                                                                    |                                         |                                                                               |                |                                                       |                                                                                |

The bottom part of the *Configuration* tab refers to cells on the *dropDownValues* tab and indicates which range of dropdown values are mapped to particular HL7 fields. See next step for more details on the *dropDownValues* tab.



| Static Values | Local Code                    | Local Code values Range (in dropDownValues Tab) | HL7 range is hard coded to replace "C" with "G" do not remove columns | Must have more than one in range | HL7 element / Field Name | Local Code |
|---------------|-------------------------------|-------------------------------------------------|-----------------------------------------------------------------------|----------------------------------|--------------------------|------------|
| 47            | Patient_ID_type               | C2 C7                                           |                                                                       |                                  |                          |            |
| 48            | Patient_gender                | C29 C33                                         |                                                                       |                                  |                          |            |
| 49            | YAU                           | C273 C275                                       |                                                                       |                                  |                          |            |
| 50            | Patient_race                  | C15 C20                                         |                                                                       |                                  |                          |            |
| 51            | Patient_ethnicity             | C23 C25                                         |                                                                       |                                  |                          |            |
| 52            | Patient_state                 | C28 C87                                         |                                                                       |                                  |                          |            |
| 53            | Ordering_facility_state       | C28 C87                                         |                                                                       |                                  |                          |            |
| 54            | Ordering_provider_state       | C28 C87                                         |                                                                       |                                  |                          |            |
| 55            | Testing_lab_state             | C28 C87                                         |                                                                       |                                  |                          |            |
| 56            | Ordered_test_code_system      | C89 C91                                         |                                                                       |                                  |                          |            |
| 57            | Test_result_code_system       | C93 C95                                         |                                                                       |                                  |                          |            |
| 58            | Result_status_code            | C97 C100                                        |                                                                       |                                  |                          |            |
| 59            | Specimen_type_code_system     | C102 C105                                       |                                                                       |                                  |                          |            |
| 60            | Specimen_source_site_code_sys | C107 C109                                       |                                                                       |                                  |                          |            |
| 61            | Patient_died                  | C111 C112                                       |                                                                       |                                  |                          |            |
| 62            | Patient_location              | C114 C121                                       |                                                                       |                                  |                          |            |
| 63            | Symptomatic_for_disease       | C273 C275                                       |                                                                       |                                  |                          |            |
| 64            | Disease_symptoms              | C351 C351                                       |                                                                       |                                  |                          |            |
| 65            | Patient_age_units             | C134 C137                                       |                                                                       |                                  |                          |            |
| 66            | Pregnant                      | C139 C142                                       |                                                                       |                                  |                          |            |
| 67            | Abnormal_flag                 | C144 C161                                       |                                                                       |                                  |                          |            |
| 68            | Ordered_test_code             | C167 C169                                       |                                                                       |                                  |                          |            |
| 69            | Test_performed_description    | C176 C203                                       |                                                                       |                                  |                          |            |
| 70            | Test_result_code              | C206 C219                                       |                                                                       |                                  |                          |            |
| 71            | Test_result_description       | C206 C219                                       |                                                                       |                                  |                          |            |
| 72            | Test_result_free_text         | C206 C219                                       |                                                                       |                                  |                          |            |
| 73            | Specimen_type                 | C238 C238                                       |                                                                       |                                  |                          |            |
| 74            | Specimen_type_free_text       | C238 C238                                       |                                                                       |                                  |                          |            |
| 75            | Specimen_source_site_code     | C260 C262                                       |                                                                       |                                  |                          |            |
| 76            | Specimen_source_site_descrip  | C260 C262                                       |                                                                       |                                  |                          |            |
| 77            | Order_result_status           | C97 C100                                        |                                                                       |                                  |                          |            |
| 78            | Test_result_units             | C224 C236                                       |                                                                       |                                  |                          |            |
| 79            | First_test                    | C273 C275                                       |                                                                       |                                  |                          |            |
| 80            | Employed_in_high_risk_setting | C277 C292                                       |                                                                       |                                  |                          |            |
| 81            | Patient_occupation            | C294 C313                                       |                                                                       |                                  |                          |            |
| 82            | Patient_residency_type        | C318 C317                                       |                                                                       |                                  |                          |            |
| 83            | Result_units                  | C300 C307                                       |                                                                       |                                  |                          |            |
| 84            | Patient_ID_assigner           | C354 C358                                       |                                                                       |                                  |                          |            |
| 85            | Patient_ID_2_assigner         | C354 C358                                       |                                                                       |                                  |                          |            |
| 86            | Patient_county                | C1100 C4245                                     |                                                                       |                                  |                          |            |
| 87            | Ordering_facility_county      | C1100 C4245                                     |                                                                       |                                  |                          |            |
| 88            | Ordering_provider_county      | C1100 C4245                                     |                                                                       |                                  |                          |            |
| 89            | Testing_lab_county            | C1100 C4245                                     |                                                                       |                                  |                          |            |

**Step 11:** The *dropDownValues* tab maps input values from your lab for certain fields that may be plaintext or locally coded to standard values to be included in the HL7 output. Note that any input values in the Column C of the *dropDownValues* tab will be replaced with corresponding values in Column G of the same row.

- On the *dropDownValues* tab, enter any transformation values for particular data fields as new rows at the bottom of the tab, if additional values are needed, else update to your local values in column C.
- Ensure that Column A, *HL7 element / Field Name* matches the name of the data column in Row 1 of the *Flatfile\_Result\_Use* tab.
- Also ensure that each row in Column C, *Local Code* represents all the local values that could be received from your system.
  - Notes:
    - For all coded entries the following hierarchy applies:
      - If the input value for the code (i.e. *Ordered\_test\_code* or *Test+performed\_code*, or *Test\_result\_coded* or *Specimen\_type\_code* or *Specimen\_source\_site\_code*) matches a value in the Local Code (Column C) or the



Standard Code(Column D) then the entire replacement value will be used and entries in the respective \*\_code\_system fields will be ignored; if the input value does not match the values from the respective fields in the input file will be used.

- If you need to map different local codes to the same standard codes (for example Detected and D both need to be mapped to detected, then you need to create a second version of the standard code entry in column D, or the tool will not process properly (the tool uses the replacement value from Column G, so that will not affect the HL7 file output values.
- For identification of assigning authorities (so that identifiers across organizations will be unique):
  - Ensure you have local values that will be in the csv file represented in column C for these elements:
    - Patient\_ID\_assigner
    - If used: Submitter\_sample\_ID\_assigner
  - Seek help in creating the replacement value in column G as an OID will be required as well as the suffix of '&ISO'
- Transformation for county values starts on row 1100 (scroll way down!) – because many counties have the same name in different states, it is recommended that you include the state in the same field (we may update the tool in the future to use a combined search, but for now) to get the right county mapped.
- Column G *Replacement Value* is the standard value that will populate and replace your local code in the output file. Verify that that this replacement value is correct. In most instances you will want to use the standard code found in Column D. For example, in the screen below, a Local Code value of “Medical Record Number” in cell C2 (yellow) will be replaced with the value of “MR” as specified in cell G2, which is the standard code populated in cell D2 (orange).



NatELRFlatFile\_GapAnalysis\_HL7Generator - Excel

File Home Insert Page Layout Formulas Data Review View ACROBAT Tell me what you want to do... Riki Merrick

Clipboard Font Alignment Number Styles Cells Editing

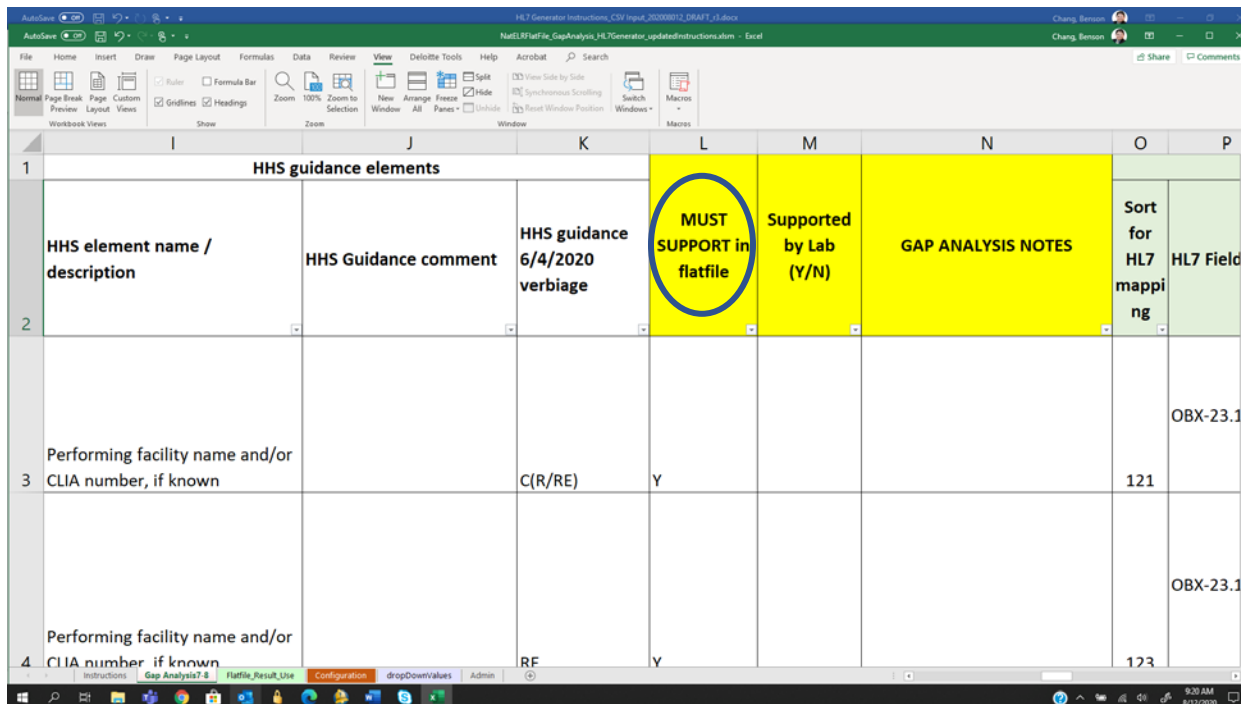
G379

| HL7 element / Field name | Local Description | Local Code                                | Standard Code | Standard Code Description     | Standard Code System | Replacement Value                                        | Comment |
|--------------------------|-------------------|-------------------------------------------|---------------|-------------------------------|----------------------|----------------------------------------------------------|---------|
| Patient_ID_Type          |                   | Medical Record Number                     | MR            | Medical Record Number         |                      | MR                                                       |         |
| Patient_ID_Type          |                   | Specimen Identifier                       | SID           | Specimen Identifier           |                      | SID                                                      |         |
| Patient_ID_Type          |                   | Patient Internal ID                       | PI            | Patient Internal ID           |                      | PI                                                       |         |
| Patient_ID_Type          |                   | Social Security Number                    | SS            | Social Security Number        |                      | SS                                                       |         |
| Patient_ID_Type          |                   | Patient External ID                       | PT            | Patient External ID           |                      | PT                                                       |         |
| Patient_ID_Type          |                   | Public Health Case ID                     | PHC           | Public Health Case ID         |                      | PHC                                                      |         |
| Patient_gender           |                   | Male                                      | M             | M                             |                      | M                                                        |         |
| Patient_gender           |                   | Female                                    | F             | F                             |                      | F                                                        |         |
| Patient_gender           |                   | Other                                     | O             | O                             |                      | O                                                        |         |
| Patient_gender           |                   | Unknown                                   | U             | U                             |                      | U                                                        |         |
| Patient_gender           |                   | Ambiguous                                 | A             | A                             |                      | A                                                        |         |
| Patient_race             |                   | American Indian or Alaska Native          | 1002-5        | American Indian or Alaska Nat | HL70005              | 1002-5^American Indian or Alaska Native^HL70005          |         |
| Patient_race             |                   | Asian                                     | 2028-9        | Asian                         | HL70005              | 2028-9^Asian^HL70005                                     |         |
| Patient_race             |                   | Black or African American                 | 2054-5        | Black or African American     | HL70005              | 2054-5^Black or African American^HL70005                 |         |
| Patient_race             |                   | Native Hawaiian or Other Pacific Islander | 2076-8        | Native Hawaiian or Other Paci | HL70005              | 2076-8^Native Hawaiian or Other Pacific Islander^HL70005 |         |
| Patient_race             |                   | White                                     | 2106-3        | White                         | HL70005              | 2106-3^White^HL70005                                     |         |
| Patient_race             |                   | Other Race                                | 2131-1        | Other Race                    | HL70005              | 2131-1^Other Race^HL70005                                |         |
| Patient_race             |                   | Asked but no answer / unknown             | ASKU          | Asked but unknown             | NULLFL               | ASKU^Asked but unknown^NULLFL                            |         |
| Patient_ethnicity        |                   | Hispanic or Latino                        | H             | Hispanic or Latino            | HL70189              | H^Hispanic or Latino^HL70189                             |         |
| Patient_ethnicity        |                   | Not-Hispanic or latino                    | N             | Not-Hispanic or latino        | HL70189              | N^Not-Hispanic or latino^HL70189                         |         |
| Patient_ethnicity        |                   | Unknown                                   | U             | Unknown                       | HL70189              | U^Unknown^HL70189                                        |         |
| Patient_ethnicity        |                   | Asked but no answer / unknown             | ASKU          | Asked but unknown             | NULLFL               | ASKU^Asked but unknown^NULLFL                            |         |

**Step 12:** Once you are done entering transformation values in the *dropDownValues* tab, go back to the *Configuration* tab and ensure that all values from the *dropDownValues* tab match those listed in the bottom half of the tab. For example, it specifies that rows C15 through C20 will be input values for the field Patient\_Race.

## Creating the CSV file

**Step 13:** Go to the *Gap Analysis7-8* tab. Filter on Column L, *MUST SUPPORT in flatfile* = Y. This displays the minimum data fields that must be populated in the input and output file.



Make sure ALL comments are entered in the FIRST ROW for each specimen – the tool currently ONLY uses the data from that first row!

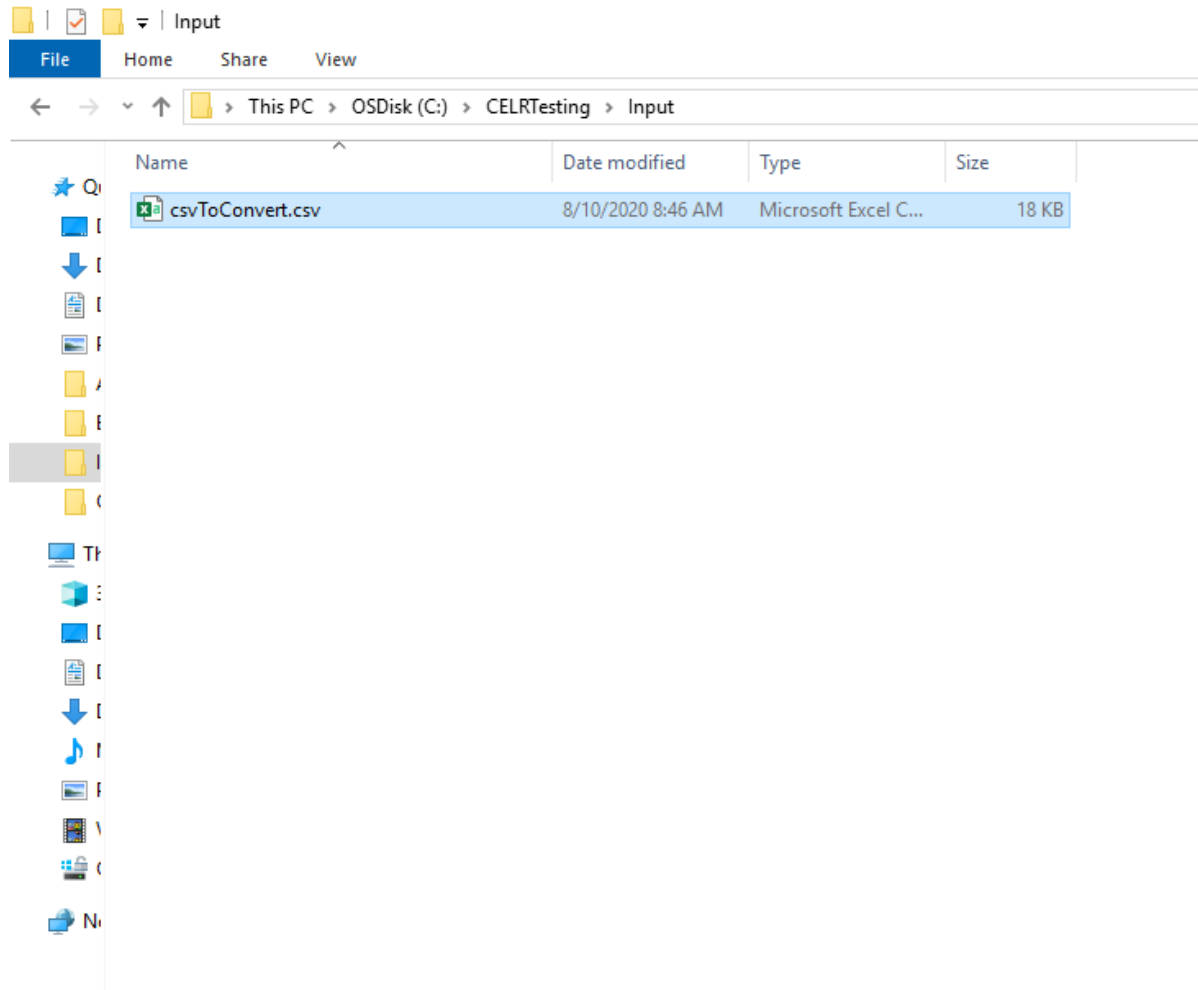
Version 20210105



Note that every column header listed on the *Gap Analysis* 7-8 tab MUST be included in the CSV file, even if your lab does not send all of the data. Column headers are not case sensitive and can be sent in any order.

**Step 15:** Validate the csv file using the flat file validator tool: <https://validator.aimsplatform.org/> to ensure it has all column headers, data in all required elements and that the entries are formatted correctly; if you are using standard codes the tool will also validate those values (they are under warnings). See the document *Flatfile Validator Use Instructions* for more details.

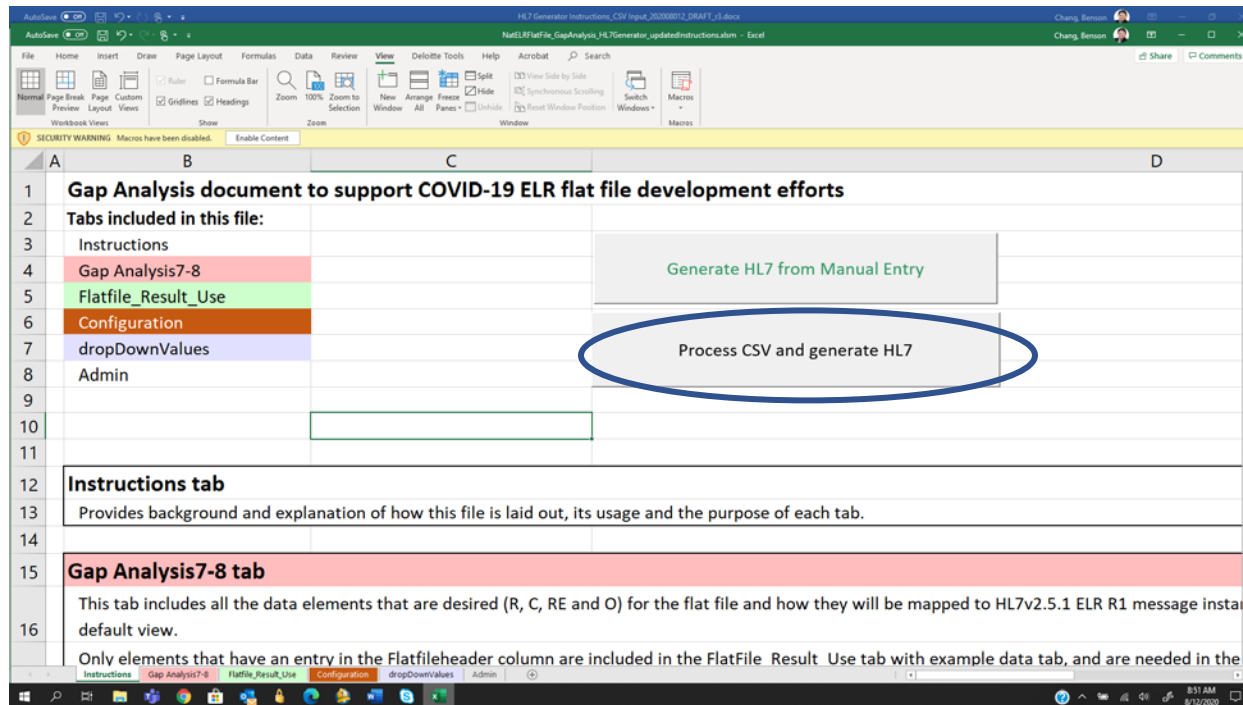
**Step 16:** Take the CSV file and place it in the “Input” file directory that you specified in Step 3. Rename the file to the input CSV filename you specified in the *Admin* tab in Step 6 (make sure the filename matches exactly or the tool will not process it)



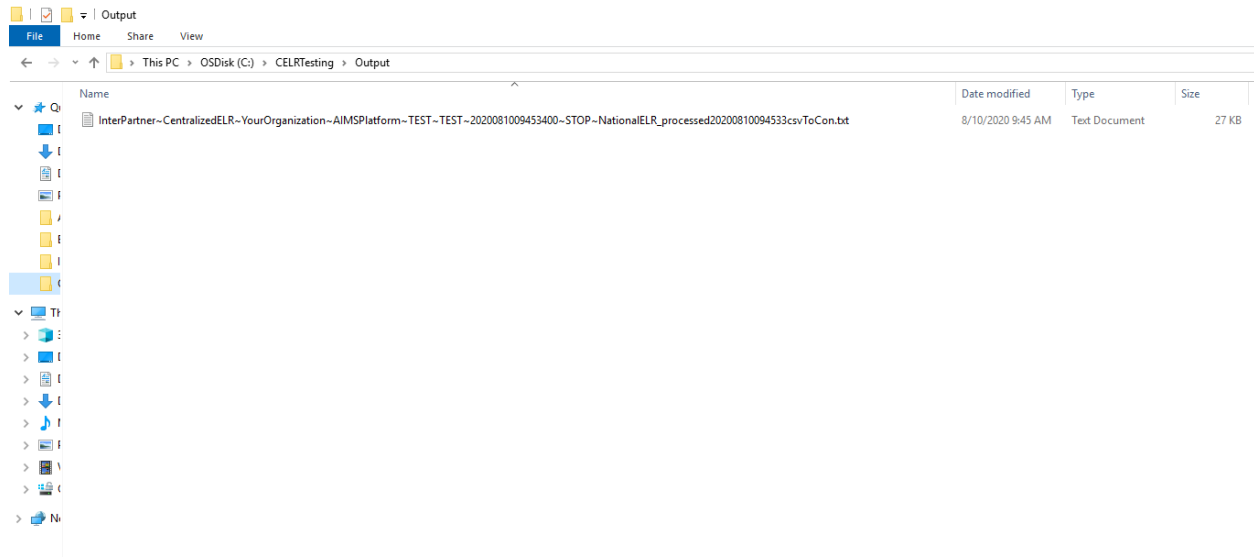
**Step 17:** Under the *Instructions* tab, click the “Process CSV and generate HL7” button to generate an output file. If a runtime error pops up, go through Steps 1 to 8 (especially Step 3 and Step 6) to ensure that all setup steps are correct. If no runtime error is generated or no message



appears, the tool should take you to the *Admin* tab to the Input File Name field. Go to the Output directory set up in Step 3, and you will find the output file generated from the input CSV.



Output folder showing generated file:



If the output file is not present, check the Error directory for the “NationalELRLog<timestamp>.txt” or “CSVLoadErrorLog<timestamp>.txt” for errors.

#### **Step 18:** Automation of the csv file conversion process

To automate the csv file conversion process:

1. Create a text file and change the extension of the file to “.bat”
2. The text of the batch file should be: “C:\Windows\System32\cscript.exe C:\runMacro\MacroLauncher.vbs //nologo”. The path of MacroLauncher.vbs is configurable.
3. Create a text file and change the extension to “.vbs” The name of the vb script should be “MacroLauncher.vbs” with the following text:

'Input Excel File's Full Path

ExcelFilePath = "C:\runMacro\NatELRFlatFile\_GapAnalysis\_HL7Generator.xlsm"

'Input Module/Macro name within the Excel File

MacroPath = "Module1.LoadCSV"



```
'Create an instance of Excel  
Set ExcelApp = CreateObject("Excel.Application")  
  
'Do you want this Excel instance to be visible?  
ExcelApp.Visible = False 'or "False"  
  
'Prevent any App Launch Alerts (ie Update External Links)  
ExcelApp.DisplayAlerts = False  
  
'Open Excel File  
Set wb = ExcelApp.Workbooks.Open(ExcelFilePath)  
  
'Execute Macro Code  
ExcelApp.Run MacroPath  
  
'Save Excel File (if applicable)  
wb.Save  
  
'Reset Display Alerts Before Closing  
ExcelApp.DisplayAlerts = False  
  
'Close Excel File  
wb.Close  
  
'End instance of Excel  
ExcelApp.Quit  
  
'Leaves an onscreen message!  
'MsgBox "Your Automated Task successfully ran at " & TimeValue(Now), vbInformation
```



'Note: change the Excel file path to the path of the excel macro enabled file on your local system

4. Open the Windows task scheduler as administrator and create a new scheduled task called HL7Generator and configure the following:
  - a. Under General click "Run whether use is logged on or not"

A screenshot of the 'HL7Generator Properties (Local Computer)' dialog box in Windows Task Scheduler. The 'General' tab is selected. The 'Name' field is 'HL7Generator'. The 'Location' field is empty. The 'Author' field is 'AzureAD\JohnPark'. The 'Description' field is empty. Under 'Security options', the 'When running the task, use the following user account:' section shows 'AzureAD\JohnPark' with a 'Change User or Group...' button. Below this, the radio button 'Run whether user is logged on or not' is selected. There are also checkboxes for 'Do not store password. The task will only have access to local computer resources.' and 'Run with highest privileges', both of which are unchecked. At the bottom, there is a 'Hidden' checkbox (unchecked) and a 'Configure for:' dropdown menu set to 'Windows Vista™, Windows Server™ 2008'. 'OK' and 'Cancel' buttons are at the bottom right.

HL7Generator Properties (Local Computer)

General Triggers Actions Conditions Settings History (disabled)

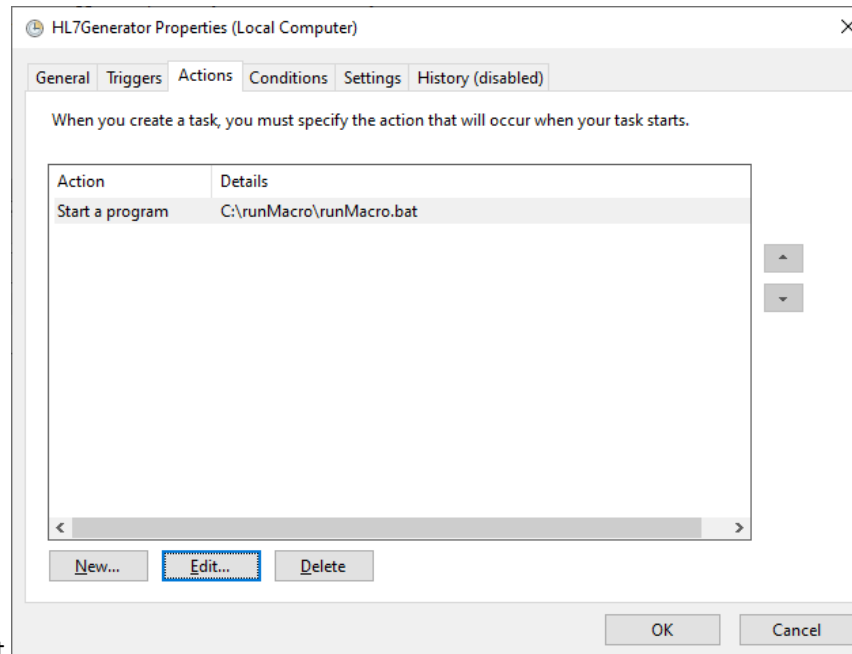
When you create a task, you can specify the conditions that will trigger the task.

| Trigger  | Details                  | Status  |
|----------|--------------------------|---------|
| One time | At 12:05 AM on 8/12/2020 | Enabled |

New... Edit... Delete

OK Cancel

b. Under Triggers, select the schedule desired



c. Under Actions, select runMacro.bat

The scheduled task can be tested by right clicking on “HL7Generator” and clicking “Run”

### [Trouble shooting other tool outputs etc.](#)

When the scheduled task runs the following happens:

1. The macro reads the CSV and loads all the information
2. If the load is successful it removes it from the “Input” directory and places it in the “Processed” directory renamed with “prc” and the timestamp pre-pended to the name.
3. It processes the CSV and outputs the HL7 batch to the output directory only if there are no errors (although there could be warnings in the NationalELRLog file). The HL7 file will generate if there are warnings.
4. If there are errors, it will output the error file (and warnings if any) to the error directory describing what happened. Possible outputs are:
  - a. A file named “NationalELRLog<timestamp>.txt with: “Not generating HL7 because of the following errors:” (with a list of the errors that prevented processing)



- i. Use the error entries to fix the data being input into CSV file
  - b. A file named "CSVLoadErrorLog<timestamp>.txt" with: "File not processed because it could not be found."
5. If there are no errors, it will output a file named "NationalELRLog<timestamp>.txt" with: "HL7 batched produced with no errors" and may have warnings in the file.

Note: the CSV to HL7 conversion was benchmarked to process 2000 records in about 2 minutes. Performance will vary based on data entry and number of rows per distinct HL7 record. Macros have a limitation where it cannot fully utilize the resources of multi core processor computers. If more than 2000 rows at a time need to be processed, please refer to the Developer's guide to implement parallel processing with the CSV file. Parallel processing separates the file into smaller files and processes them in parallel with multiple instances of the vb script that invokes the macro enabled excel document.