

**Department of Forensic Science**

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**FORENSIC BIOLOGY  
PROCEDURES MANUAL  
OF  
ANALYSIS OF CE RESULTS  
USING GENEMAPPER® ID**

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## 1 ANALYSIS OF CE RESULTS USING GENEMAPPER® ID

Refer to the GeneMapper® ID User Manuals (Applied Biosystems™) for the initial set up of the GeneMapper® ID software specific to each kit chemistry that will be analyzed.

The raw data obtained with the Applied Biosystems 3130xl Genetic Analyzer can be analyzed using GeneMapper® ID software.

When loaded on the same plate, all evidence samples pertaining to a case must be assessed prior to opening any reference sample electropherograms pertaining to the same case.

For PowerPlex® 16 data:

- The analysis method used is PowerPlex16advanced
- The Internal Lane Standard used is ILS600
- The Panel used is PowerPlex\_16\_Panels\_ID3.2.0

For AmpFℓSTR® Yfiler™ data:

- The analysis method used is CODISYfiler
- The Internal Lane Standard used is GS LIZ 600
- The Panel used in GMID-X is CODISYfiler\_v2

### 1.1 Logging On

1.1.1 Open the GeneMapper® ID software by double-clicking on the software icon.



1.1.2 Select the appropriate user name and type the password.


1.1.3 Click OK or press Enter.

### 1.2 Project Window

1.2.1 Upon opening the GeneMapper® ID software, the user is taken to the Project Window.

1.2.2 To begin the data analysis, samples must be added to the project to be analyzed.

**NOTE:** All samples to be analyzed from a single run should be added at once. If not done in this manner, the GeneMapper® ID software may not associate the correct allelic ladder(s) with the given samples.


1.2.2.1 Choose “File” and “Add samples to Project” or, click the  icon.

1.2.2.2 Browse to the data files to analyze. You may select the entire folder or pick the files within the folder to analyze.

1.2.2.3 Click “Add to List” then “Add and Analyze”.

1.2.2.4 Name the project when prompted.

1.2.3 Upon addition of the samples to the project, the “Samples” tab will become populated. The population of some of the information is based on that entered in the Plate Map/file in the ABI 3130xl Data Collection Software. If changes need to be made to the panel, sample type, size standard or analysis method, select the necessary cells and choose the appropriate settings from the drop-down menus. Verify that the information is correct and analyze the project or re-analyze the affected sample(s).


- 1.2.4 Check the size standard results by examining the flags in the SQ (sizing quality) column. A green square indicates that a sample has passed the sizing criteria. For any samples that do not pass the sizing criteria, indicated by a yellow triangle or red octagon, assess the size standard by highlighting the sample(s) and click on the icon:  or select Tools>Size Match Editor. Check that all expected size standard peaks are detected and labeled correctly. Spikes or other artifacts may be mislabeled by the software resulting in poor sizing.

**NOTES:** If the majority of the size standards fail, look for a global problem with the run, such as a poorly-chosen sizing range in the Analysis Method Editor (see 1.2.6).

If the sizing quality column indicates failure (a red octagon), the sample will not be genotyped by the software until the size standard has been adjusted or, if necessary, the sample is re-run.

- 1.2.5 Upon entering the Size Match Editor window, the recognizable pattern of the size standard peaks specific to the amplification kit in use should appear.

1.2.5.1 If a required size standard peak is not shown or the size standard peaks are mis-labeled, the Analysis Start and/or Stop point(s) in the associated Analysis Method or the LOD value for the associated dye color may need to be adjusted (see 1.2.6). Alternatively, the size standard peaks may be manually defined if they appear to be mis-labeled (see 1.2.7).

- 1.2.6 To adjust the Analysis Start and/or Stop point(s) or the LOD value for the size standard dye in the associated Analysis Method, exit from the Size Match Editor window, be sure that any one sample in the project is highlighted and click on the icon:  or select Analysis>Analysis Method Editor.


1.2.6.1 All of the settings should remain the same with the exception of the Start and/or Stop points or the size standard LOD.

1.2.6.2 Click on the “Peak Detector” tab, if necessary.



1.2.6.3 The Analysis range Start and/or Stop points may be redefined to increase/decrease the window of raw data analyzed such that all required size standard peaks are included while avoiding, if possible, the inclusion of the initial primer peaks and/or excess noise. If necessary, the size standard LOD may be redefined to allow for all required peaks to be detected.

1.2.6.3.1 The raw data for the sample files in the project may be viewed to assist in choosing an appropriate Analysis Start and/or Stop point, if desired.

1.2.6.3.1.1 To view raw data for a sample file, exit the Analysis Method Editor. Select View>Raw Data. The cursor can be used to hover over the area just after the primer peaks are observed and just before the first required size standard peak is observed to assist in selecting an appropriate Analysis Start Point. Likewise, the cursor can be used to hover over the area just after the last required size standard peak is observed to assist in selecting an appropriate Analysis Stop Point.

- 1.2.7 To manually define the size standard peaks for a sample, highlight the affected sample and click on the icon:  or select Analysis>Size Match Editor.

1.2.7.1 Right click on the peak to be added/deleted/changed and select the appropriate action. If applicable, double-click on the correct base pair size for this size standard peak in the drop down menu that appears. Continue to do this for each size standard peak until the peaks are labeled correctly. Click ‘Apply’ and then ‘OK’.

- 1.2.8 Re-Analyze the entire project by clicking the arrow icon:  or selecting Analysis>Analyze All. Alternatively, only the affected samples may be highlighted together and the user may select Analysis>Analyze Selected Samples.
- 1.2.9 Review the Allelic Ladder data.
- 1.2.9.1 Highlight the Allelic Ladder file(s) in the “Samples” tab of the project.
- 1.2.9.2 Display the plot(s) by clicking the display plots icon:  or selecting Analysis>Display Plots.
- 1.2.9.3 Verify that the Allelic Ladder peaks are called correctly for each locus for each ladder used for analysis in the project.
- 1.2.9.3.1 Only one ladder is required per project, but more may be imported and analyzed if desired.
- 1.2.10 Review the sample data.
- 1.2.10.1 View the raw data for reagent blanks and negative controls to verify that primer peaks are observed, indicating the sample was, in fact, loaded on the instrument.
- 1.2.10.1.1 Highlight the sample(s) in question and Select View>Raw Data.
- 1.2.10.2 Display the plot(s) as described in 1.2.9.2.
- 1.2.10.3 The negative control(s) should be checked to ensure that no amplification product (called alleles) is observed.
- 1.2.10.4 The positive control(s) should be checked to ensure that injection and electrophoresis performance was satisfactory and that the expected types have been called.
- 1.2.10.4.1 If the positive control was injected poorly, it can be re-injected/re-run. The original sample injections can be analyzed if the correct types for the positive control are documented upon the re-injection/re-run.
- 1.2.10.5 For samples with no typing results, the raw data may be viewed to verify the samples were, in fact, loaded onto the instrument, if indicated (if, for example, the quant values indicate results should have been obtained).
- 1.2.10.6 Artifacts such as pull-up, raised baseline, spikes, etc., may occasionally occur and can be documented as described in 1.2.11.
- 1.2.10.6.1 If pull-up peaks are due to poor color separation and not excessive peak height of peaks in other channels, then a new spectral may need to be performed.
- 1.2.11 Artifact peaks may be deleted and real alleles may be renamed, if necessary, as follows:
- 1.2.11.1 To delete an artifact, first highlight the peak by left clicking it. Then, right click on the artifact peak and select “Delete Allele(s)”. Enter the reason for the change when prompted (PU for Pull-up, ST for Stutter, etc.) and click OK. The label will now have a strike-through and the comment entered will appear at the bottom of the label.
- 1.2.11.2 To edit an existing peak label, first highlight the peak by left clicking it. Then, right click the peak and select “Rename Allele Label”>”Custom”. Type in the allele name (e.g., <7) and click OK. Enter the reason for the change (OL for off-ladder, MV for microvariant, etc.) and

click OK. The allele will now be re-named with the label showing both the new name and the reason for the change.

**NOTE:** If a peak is right-clicked prior to highlighting by left-clicking, the option “Delete All Labels for Sample” will appear. Click elsewhere on the plot to remove this option and continue as instructed in 1.2.11.1 and/or 1.2.11.2.

1.2.12 Print the appropriate electropherogram data by selecting File>Print in the Display Plots window.

1.2.12.1 The printing parameters for PowerPlex® 16 data are as follows:

- All printed samples (with the exception of ladders, if printed) will include allele call, peak height (RFU), bp size and any edit comments in the allele labels.
- All printed samples (regardless of type) will be printed with the x-axis set to 95 bp-500 bp.
- All positives (if printed) and samples should have the Y-axis “scaled individually” so that the highest peak per color is the approximate Y scale per color.
- All negatives and reagent blanks (if printed) and e-grams for samples with no DNA typing results will have the Y-axis scaled to 50 RFU for all colors.
- The ILS color (red) need not be printed.

1.2.12.2 The printing parameters for AmpF(STR® Yfiler™ data are as follows:

- All printed samples (with the exception of ladders, if printed) will include allele call, peak height (RFU), bp size and any edit comments in the allele labels.
- All printed samples (regardless of type) will be printed with the x-axis set to 90 bp-350 bp.
- All positives (if printed) and samples should have the Y-axis “scaled individually” so that the highest peak per color is the approximate Y scale per color.
- All negatives and reagent blanks (if printed) and e-grams for samples with no DNA typing results will have the Y-axis scaled to 50 RFU for all colors.
- The ILS color (orange) need not be printed.

**NOTE:** The plot settings for each amplification kit have been predefined in the software. Therefore, if using the plot settings saved for the amplification kit associated with the data, this x-axis plot region should default to the correct settings.

1.2.13 Should additional documentation be deemed necessary to support an allele designation, other views of the data (such as a zoomed-in view of a locus) may be printed and retained in the case file at the analyst’s discretion.