

Automated NGS Sample Prep with Integrated Data Management and Reporting Tools

Zach Smith, M.S.
John Snider, M.S.
David Horvath, M.S.

Introduction

Given the high capacity of modern next generation sequencing platforms, high throughput library construction of multiplexed next generation sequencing libraries has become standard practice in many facilities. Many Sequencing Core and Services labs have implemented liquid handling automation to streamline their process, lower costs, and reduce the labor burden. However, there's still the challenge of managing the massive amount of data that flows through the library construction process. Tracking and managing sample IDs and their associated meta-data is vital to ensuring that samples are processed correctly. An effective liquid handling data management system enables data tracking, importing, data driven actions, reporting and interaction with a laboratory information management system (LIMS). This poster demonstrates these capabilities through the use of Beckman's Biomek datasets and the Data Acquisition and Reporting Tool.

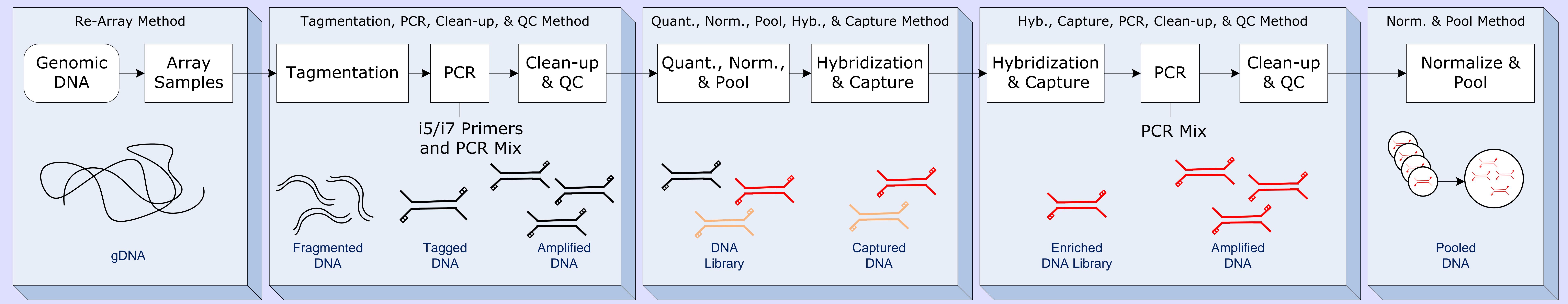


Data Tools

Biomek Datasets are a collection of tools native to the software that allow for the importation and manipulation of data from a variety of sources, including user supplied files and LIMS generated files. Such meta-data, including Agilent Bioanalyzer 2100 RIN scores and concentration data from fluorometric plate readers, can be employed in data-driven transfer tasks like normalization and size selection. DART 2.0 (Data Acquisition and Reporting Tool) is a software package that gathers meta-data and synthesizes runtime information from Biomek log files to capture every manipulation of the sample during the course of the method. DART 2.0 also introduces new steps that can be integrated into Biomek methods which allows for the creation of new datasets for pipetting and reporting functions, the addition of user or LIMS supplied information for data-driven pipetting, and the creation of customizable reports during the course of a Biomek method. These steps also simplify the method writing process by reducing the need for custom scripts. Finally, the addition of DART 2.0 allows the efficient porting of data between Biomek method and between individual liquid handlers, which allows for more complex workflows to be envisioned.

PROCESS

Illumina® Nextera Rapid Capture Automated Method



DATA

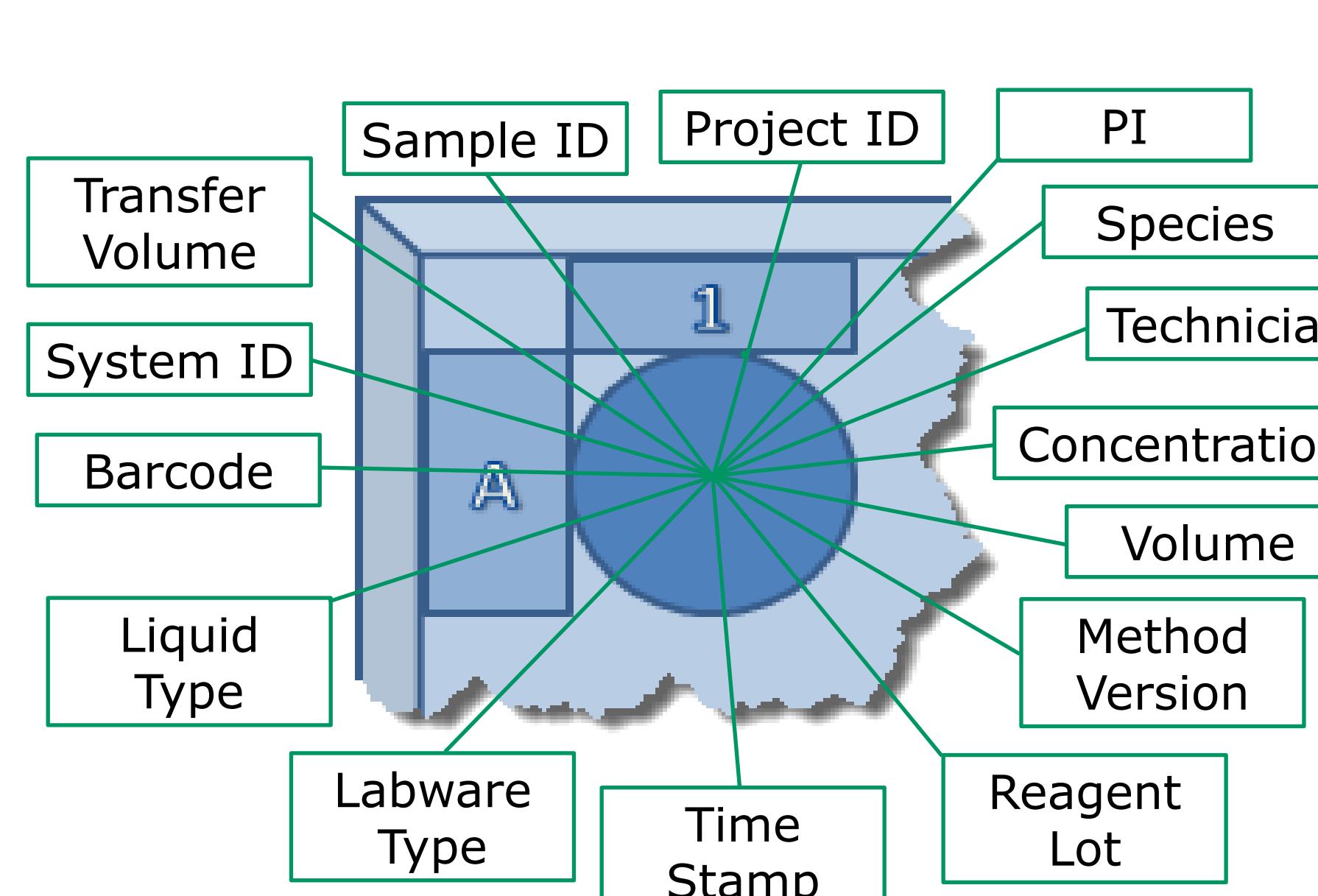
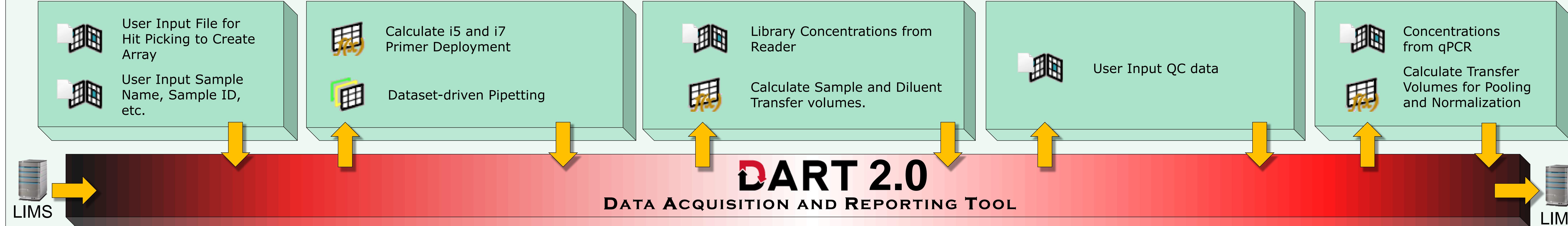


Figure 1: Examples of Sample and Run data that can be managed and reported via DART 2.0

Wells											
Plate Map List											
Well property: iReport1											
1	2	3	4	5	6	7	8	9	10	11	12
A E501	E501	E501	E501	E501	E501	E501	E501	E501	E501	E501	E501
B E502	E502	E502	E502	E502	E502	E502	E502	E502	E502	E502	E502
C E503	E503	E503	E503	E503	E503	E503	E503	E503	E503	E503	E503
D E504	E504	E504	E504	E504	E504	E504	E504	E504	E504	E504	E504
E E505	E505	E505	E505	E505	E505	E505	E505	E505	E505	E505	E505
F E506	E506	E506	E506	E506	E506	E506	E506	E506	E506	E506	E506
G E507	E507	E507	E507	E507	E507	E507	E507	E507	E507	E507	E507
H E508	E508	E508	E508	E508	E508	E508	E508	E508	E508	E508	E508

Figure 2: i5 and i7 primer deployment by the Biomek method as shown in the DART 2.0 Web Browser

Report Builder on (local)\DART - Table - SeqPooling											
File Advanced Data Integration About...											
Report on: Wells											
Fields Filters Sorting											
Available Fields:											
Name Type Filter											
Run-ID	Number										
Well-Plate1_i5_source	Text										
Well-Plate1_i7_destruction	Text										
Well-Plate1_i5_destruction	Text										
Well-Plate2_i5_source	Text										
Well-Plate2_i7_destruction	Text										
Well-Plate2_i5_destruction	Text										
Well-Plate1_i5_barcode	Text										
Well-Plate1_i7_barcode	Text										
Well-Plate2_i5_barcode	Text										
Well-Plate2_i7_barcode	Text										
Well-Plate1_i5_dilution	Text										
Well-Plate2_i5_dilution	Text										
Well-Plate1_i5_norm	Text										
Well-Plate2_i5_norm	Text										
Well-SampleID	Text										
Well-SampleName	Text										
Well-SampleBarcode	Text										
Well-SampleLocation	Text										
Well-SampleType	Text										
Well-Species	Text										
Well-Plate1_i5_barcode	Text										
Well-Plate2_i5_barcode	Text										
Well-Plate1_i5_norm	Text										
Well-Plate2_i5_norm	Text										
Well-Plate1_i5_norm_barcode	Text										
Well-Plate2_i5_norm_barcode	Text										
Well-Plate1_i5_norm_location	Text										
Well-Plate2_i5_norm_location	Text										
Well-Plate1_i5_norm_type	Text										
Well-Plate2_i5_norm_type	Text										
Well-Plate1_i5_norm_species	Text										
Well-Plate2_i5_norm_species	Text										
Well-Plate1_i5_norm_barcode	Text										
Well-Plate2_i5_norm_barcode	Text										
Well-Plate1_i5_norm_norm	Text										
Well-Plate2_i5_norm_norm	Text										
Well-Plate1_i5_norm_norm_barcode	Text										
Well-Plate2_i5_norm_norm_barcode	Text										
Well-Plate1_i5_norm_norm_location	Text										
Well-Plate2_i5_norm_norm_location	Text										
Well-Plate1_i5_norm_norm_type	Text										
Well-Plate2_i5_norm_norm_type	Text										
Well-Plate1_i5_norm_norm_species	Text										
Well-Plate2_i5_norm_norm_species	Text										
Well-Plate1_i5_norm_norm_norm	Text										
Well-Plate2_i5_norm_norm_norm	Text										
Well-Plate1_i5_norm_norm_norm_barcode	Text										
Well-Plate2_i5_norm_norm_norm_barcode	Text										
Well-Plate1_i5_norm_norm_norm_location	Text										
Well-Plate2_i5_norm_norm_norm_location	Text										
Well-Plate1_i5_norm_norm_norm_type	Text										
Well-Plate2_i5_norm_norm_norm_type	Text										
Well-Plate1_i5_norm_norm_norm_species	Text										
Well-Plate2_i5_norm_norm_norm_species	Text										
Well-Plate1_i5_norm_norm_norm_norm	Text										
Well-Plate2_i5_norm_norm_norm_norm	Text										
Well-Plate1_i5_norm_norm_norm_norm_barcode	Text										
Well-Plate2_i5_norm_norm_norm_norm_barcode	Text										
Well-Plate1_i5_norm_norm_norm_norm_location	Text										
Well-Plate2_i5_norm_norm_norm_norm_location	Text										
Well-Plate1_i5_norm_norm_norm_norm_type	Text										
Well-Plate2_i5_norm_norm_norm_norm_type	Text										
Well-Plate1_i5_norm_norm_norm_norm_species	Text										
Well-Plate2_i5_norm_norm_norm_norm_species	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_barcode	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_barcode	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_location	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_location	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_type	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_type	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_species	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_species	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm_barcode	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm_barcode	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm_location	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm_location	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm_type	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm_type	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm_species	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm_species	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm_norm	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm_norm	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm_norm_barcode	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm_norm_barcode	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm_norm_location	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm_norm_location	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm_norm_type	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm_norm_type	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm_norm_species	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm_norm_species	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm_norm_norm	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm_norm_norm	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm_norm_norm_barcode	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm_norm_norm_barcode	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm_norm_norm_location	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm_norm_norm_location	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm_norm_norm_type	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm_norm_norm_type	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm_norm_norm_species	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm_norm_norm_species	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm_norm_norm_norm	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm_norm_norm_norm	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm_norm_norm_norm_barcode	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm_norm_norm_norm_barcode	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm_norm_norm_norm_location	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm_norm_norm_norm_location	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm_norm_norm_norm_type	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm_norm_norm_norm_type	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm_norm_norm_norm_species	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm_norm_norm_norm_species	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm_norm_norm_norm_norm	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm_norm_norm_norm_norm	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm_norm_norm_norm_norm_barcode	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm_norm_norm_norm_norm_barcode	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm_norm_norm_norm_norm_location	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm_norm_norm_norm_norm_location	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm_norm_norm_norm_norm_type	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm_norm_norm_norm_norm_type	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm_norm_norm_norm_norm_species	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm_norm_norm_norm_norm_species	Text										
Well-Plate1_i5_norm_norm_norm_norm_norm_norm_norm_norm_norm_norm_norm	Text										
Well-Plate2_i5_norm_norm_norm_norm_norm_norm_norm_norm_norm_norm_norm	Text	</td									