Gateway Test Result Submission Guide

This guide is intended as a resource for external institutions that have a business need to submit test results to NMDP's Be The Match Registry database. NMDP has developed a submission Gateway that leverages modern message formats and technologies to automate and simplify the submission of test results to NMDP systems from authorized business partners. The guide also highlights features available to facilitate manual file upload of test results and a user submission dashboard to view the status of submissions.

Outline

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- Requesting Authorization as an HML Submitter

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  - Previous Sessions
- Submission Dashboard
  - View Submission Status and History
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HML 1.0.1

Schema Background and Structure

1. General information about HML can be found at https://bioinformatics.bethematchclinical.org/hla-resources/hml/
2. Specific information about the HML 1.0.1 public schema is at http://schemas.nmdp.org/
3. NMDP additional requirements (internal operations schema vs public schema) and other data dependencies are listed below.

HML 1.0.1 Business Specific Values and Validation Requirements

Field	Required	Value
hml version	Yes	1.0.1
hml project-name	Yes	Will be provided by NMDP
hmlid extension and root	Yes	The combination of the two must be unique to each file Note: currently hmlid is reported back to lab on 3029
reporting-center	Yes	must be a 3-digit NMDP-assigned number
sample id	Yes	Restricted to digits and Must be between 1 and 31 digits long
sample center-code	Yes	Must be a 3-digit NMDP-assigned number
collection-method	Yes	Must be between 1 and 64 characters in length Free-form, suggested values include: "swab", "buccal swab", "filter paper", and "blood aliquots"
typing-date	Yes	Must be on or before today's date
gene-family	Yes	Must be either "HLA" or "KIR"
allele-assignment date, allele-db, allele-version	Yes	
GlString result reporting	No*	*Preferred Examples: <glstring>HLA-C*04:01:01:01+HLA-C*16:01:01</glstring> <glstring>HLA-B*35:01:01:01/HLA-B*35:01:01:02+HLA-B*41:01:01</glstring>
Haploid results reporting (if used)		
- haploid method	Yes	DNA or Serology
- haploid locus	Yes	Must be a fully qualified value like "HLA-A" or "HLA-DPB1"
typing-method	Yes	SSO "locus" is required and must be a fully qualified value like "HLA-A" or "HLA-DPB1"
		SSO "scores" are required and must be a sequence of 1's and 8's
		SSP "locus" is required and must be a fully qualified value like "HLA-A" or "HLA-DPB1"
		SSP "scores" are required and must be a sequence of 1's and 8's
		SBT-sanger "locus" is required and must be a fully qualified value like "HLA-A" or "HLA-DPB1"
		SBT-NGS "locus" is required and must be a fully qualified value like "HLA-A" or "HLA-DPB1"
test-id	No	If present test-id-source must be present
test-id-source	No	If present test-id must be present
typing-test-name	Yes	Maximum size accepted is 255 characters

Direct Submission to Secure NMDP REST endpoint

1. NMDP maintains REST endpoints to perform two functions:
    a. Validate - The Validate endpoint allows any external entity to have a "sandbox" to aid in HML development. It is an unsecured endpoint to which test messages may be sent. The sender will receive a REST response indicating successful validation or validation failure and error messages to aid in fixing submission issues.
    b. Submit - The Submit endpoint is a secured REST endpoint that only authorized submitters can access. The endpoint performs the dual function of validating and submitting test results directly to NMDP systems. Like the Validate endpoint, it messages users with a REST response of success or failure along with detailed error messages.

2. Secure REST endpoint values are supplied upon request.

3. Sending software needs to set an HTTP header (which is a name/value pair). The name is "Authorization" and the value is the word "Bearer" followed by a space and the OKTA Refresh token.

4. The request to either the Validate or Submit endpoints requires an HTTPS POST operation with a content-type of "application/xml." The payload is the HML (XML) message itself.

5. Security for the Submit endpoint is based on authorized users having NMDP supplied credentials (user name and password) and a valid OKTA Refresh token.

   General OKTA Refresh introduction https://Okta Refresh.io/introduction/

6. OKTA Refresh tokens are supplied only to institutions that have a business need to submit test results to the NMDP Be The Match Registry. An OKTA Refresh token is obtained by authorized users and is specific to their institution.

7. Third party software vendors will need to provide functionality within their software for the end user to enter the OKTA Refresh token.

Requesting Authorization as an HML Submitter

1. Institutions that wish to electronically submit test results through the NMDP Gateway must register as an authorized user. In order to be approved as an authorized user, institutions must validate a successful HML 1.0.1 test file, and send it to donorlabservices@nmdp.org.

   Developer information can be found here:
   https://github.com/nmdp-bioinformatics/hml

   Schema information can be found here:
   http://schemas.nmdp.org/spec/hml/1.0.1/hml-1.0.1.xsd

2. After an HML 1.0.1 test file is successfully validated and approved, the user must submit the following information to NMDP at donorlabservices@nmdp.org:

   a. First and last name
   b. Email address (if different from requester)
   c. Phone number
   d. Submitting institution (i.e. laboratory, registry, etc.) name
   e. Reason for request

3. NMDP will verify information and communicate credentials directly to the requester, including user name, password, and OKTA Refresh token. All lab and TC users are required to provide this information to access the submit function of the Gateway File Uploader and/or the Submission Dashboard application.

4. Instructions for managing account credentials will be sent directly to the authorized user.

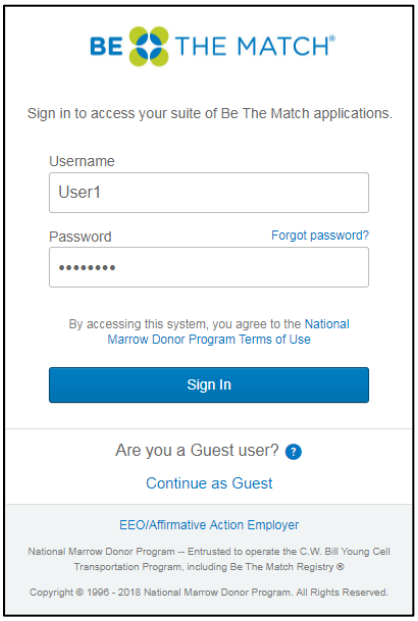
5. The OKTA Refresh token will be valid for a fixed length of time communicated to requester at the time of distribution. A new token must be requested to renew the authorization of the submitter.

The Gateway: File Uploader

Upload HML Files

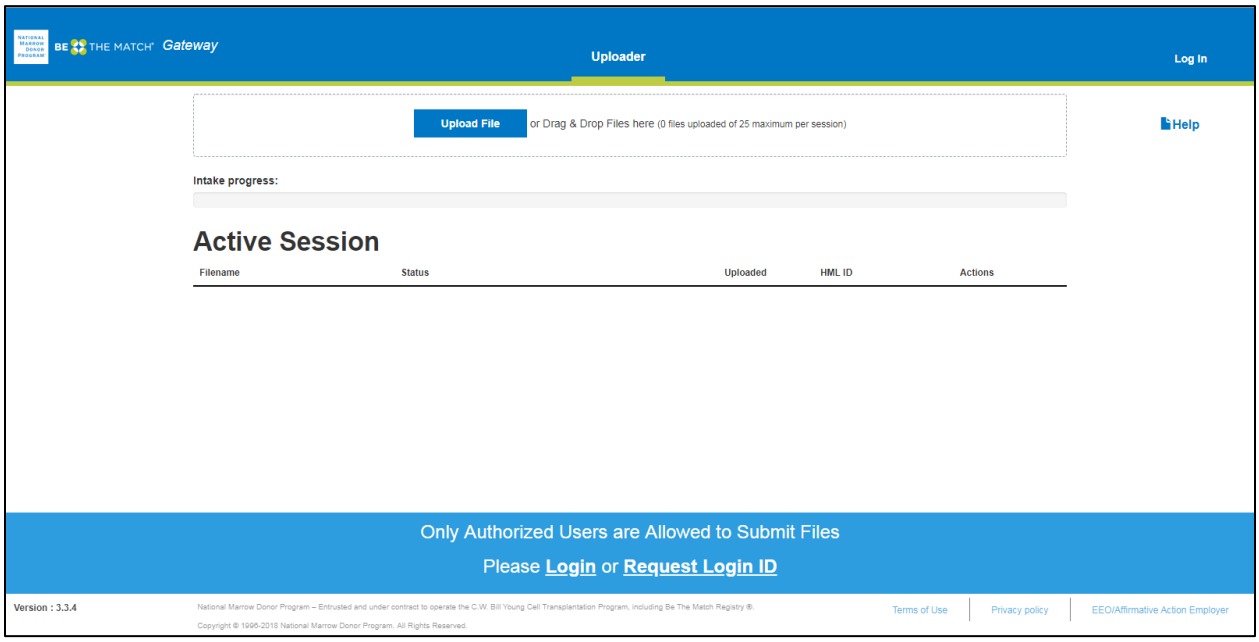
1. Navigate to the Gateway Portal Login page, https://hml.nmdp.org/, and select File Uploader under Test Result Application Links.

2. Enter NMDP supplied credentials to sign in as an Authorized User, or click on 'Continue as Guest' to continue to the Active Session page as a Guest User.

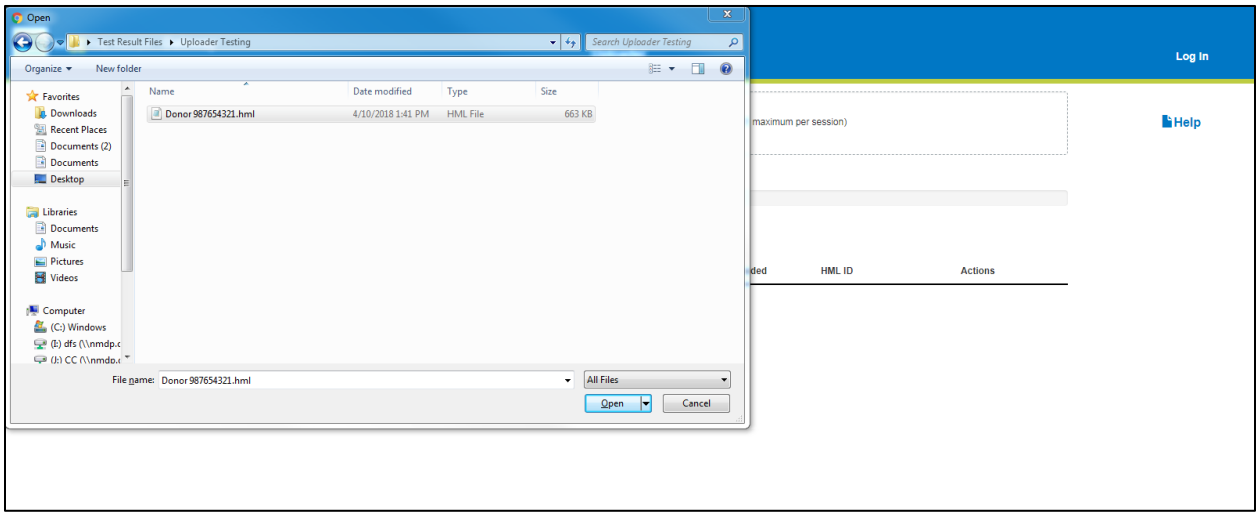


Note: Actions completed as a Guest User will not be visible upon signing in as an Authorized User. **If you intend to use the File Uploader to submit test results, please ensure you're signed in before uploading files.** A banner will display at the bottom of the application prompting you to login if you're not signed in as an Authorized User. The Dashboard link located in the header is also not accessible to Guest Users.

3. Upload CSV or HML files using the 'Upload File or Drag and Drop Files here' box. Multiple files can be uploaded at one time, with up to 25 files allowed per session.



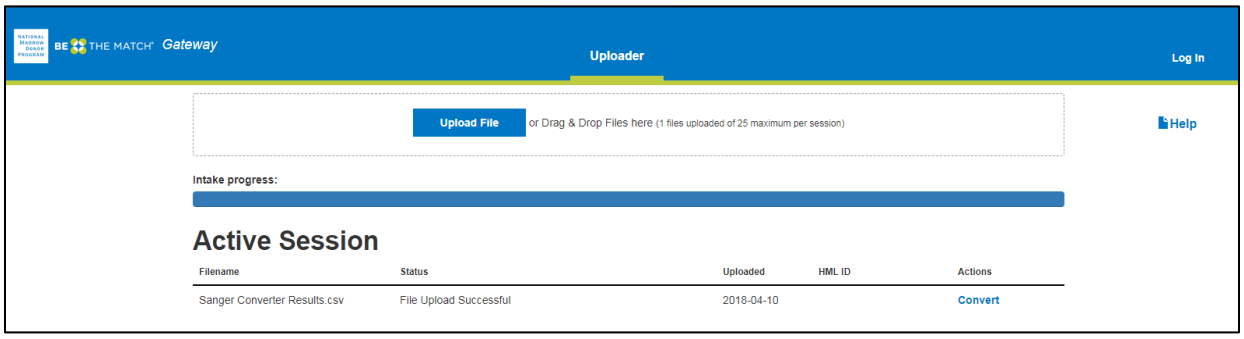
a. Click on the blue 'Upload File' button. A file selection overlay window displays. Select the desired file(s) from your local computer and select 'Open.'



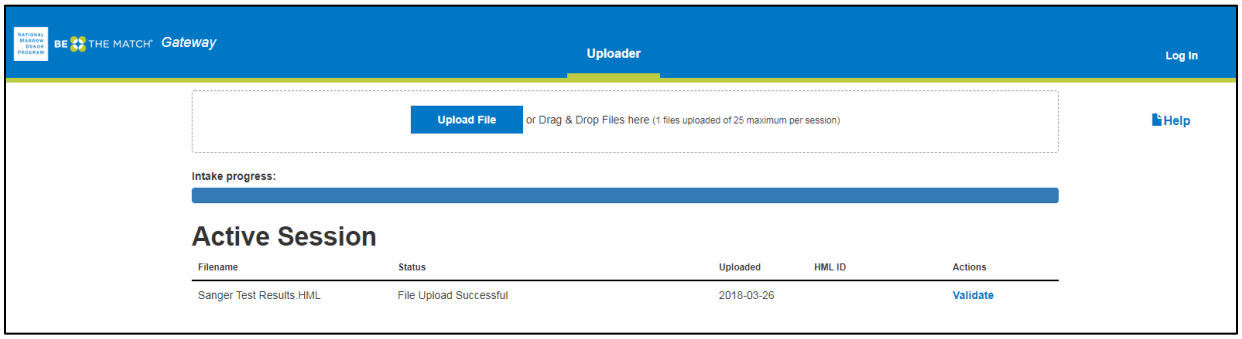
or

b. Drag up to 25 files from your local computer and drop them into the box.

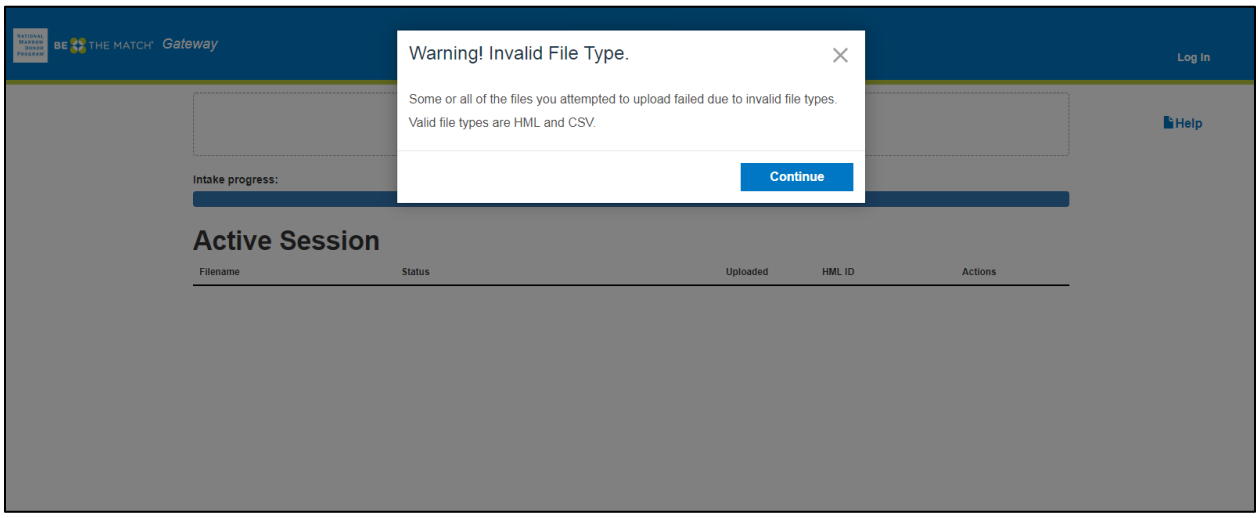
4. The file(s) will automatically upload. A progress bar will display above the Active Session table to show the intake progress. Other actions are prohibited during this time. After the file upload process is complete, the entire intake progress bar will be blue.
    a. If successful, the 'Status' column will display "File Upload Successful." The 'Actions' column will display a 'Convert' button for CSV files,



or a 'Validate' button for HML files.

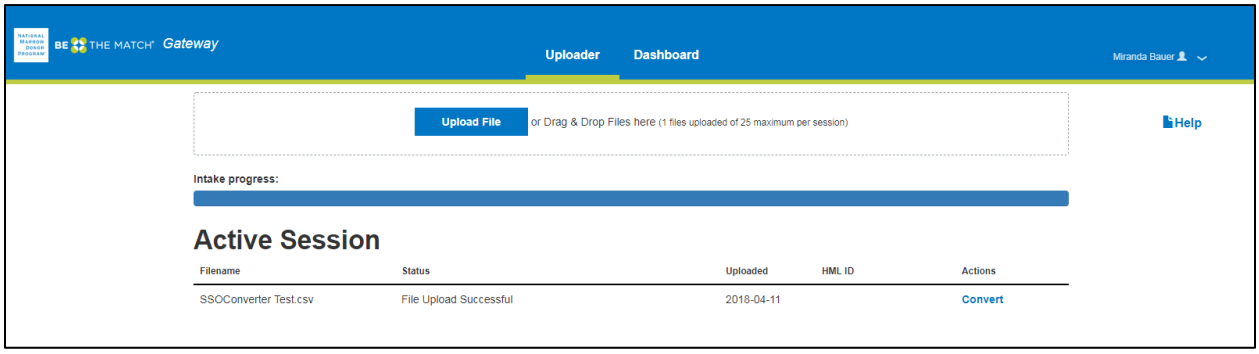


    b. If a file was uploaded that was not an HML or CSV file, a pop-up window with an 'Invalid File Type' warning message will display. This file will not show up in the Active Session table.

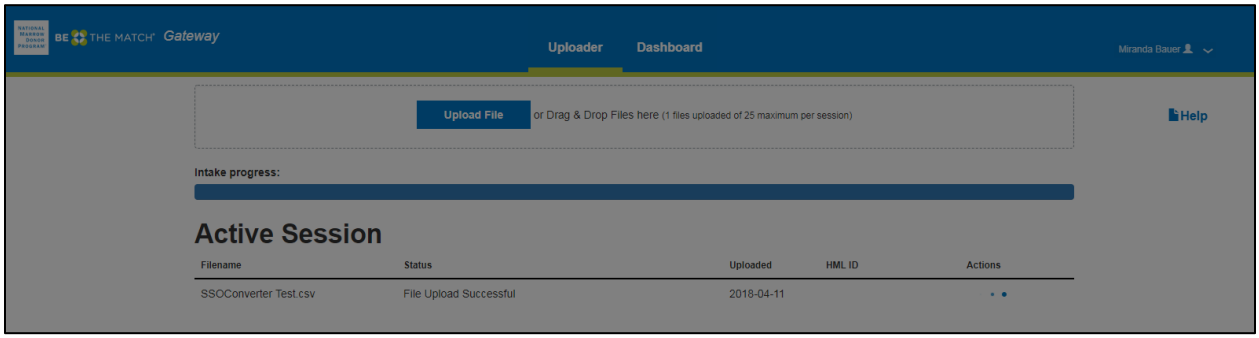


Convert CSV Files

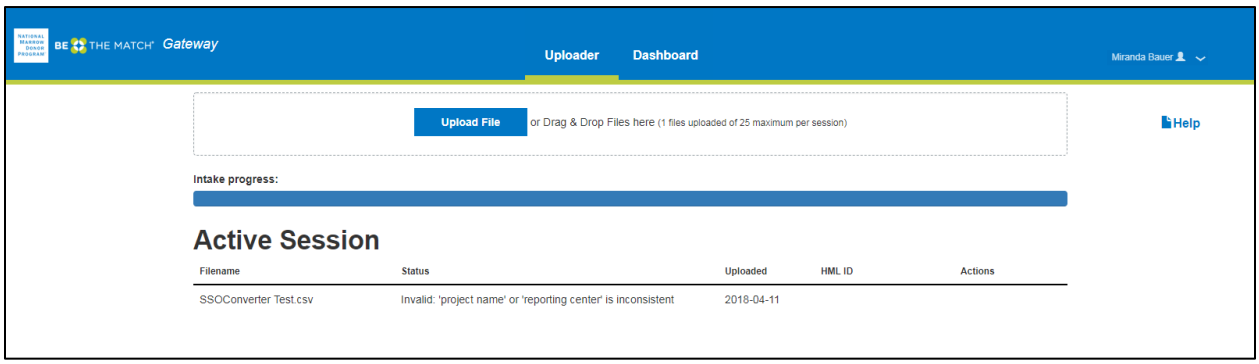
1. After a CSV file has successfully uploaded, a blue 'Convert' button will appear in the actions column. Click the 'Convert' button.



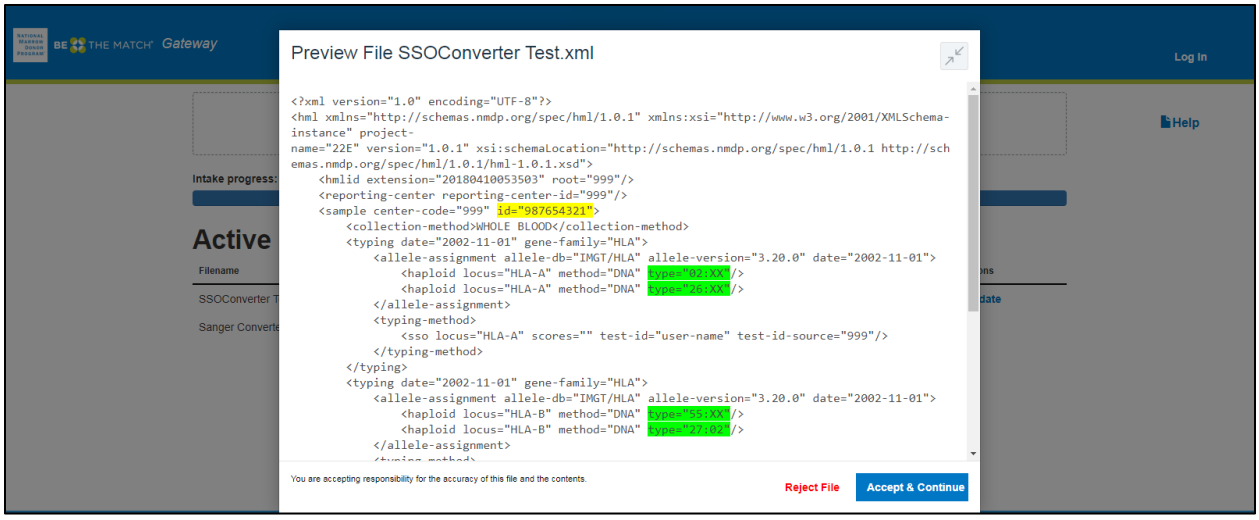
While your file is converting, running blue dots will appear in the 'Actions' column.



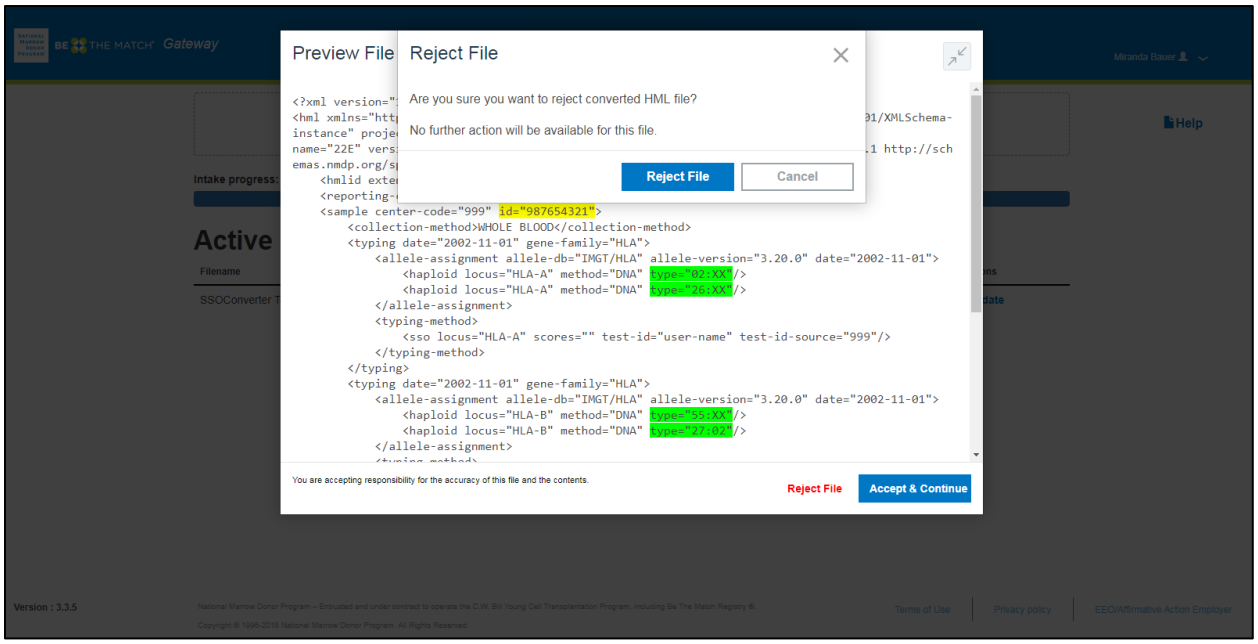
2. If the file contains at least one error, an error message will display under the 'Status' column of the Active Session table. The file conversion process will stop as soon as a single error is found, so any additional errors in the file will not be identified until the next attempt at conversion.



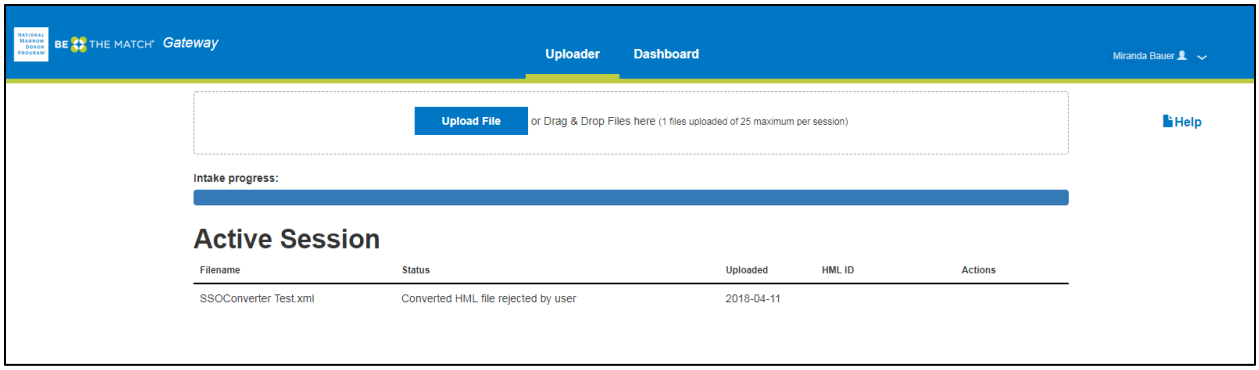
3. If the file is valid CSV format, a 'Preview File' window will appear, showing the converted HML file. The subjects/sample IDs (yellow) and HLA results (green) will be highlighted. Review the content for accuracy.
   a. If you approve the test results reported within the file, click 'Accept & Continue' at the bottom right hand corner of the 'Preview File' window. Proceed to step 3.



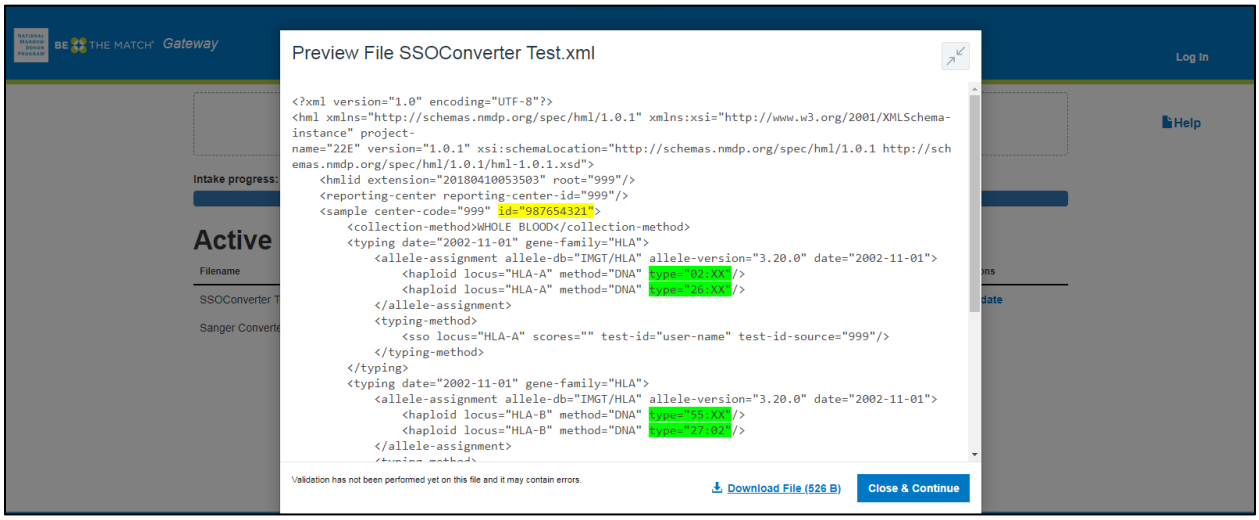
b. If you do not approve the file contents, click the red ‘Reject File’ button. A pop-up window will display asking you to confirm the action. Selecting ‘Cancel’ will take you back to the Preview File screen, where you can continue the CSV file conversion process. Selecting ‘Reject File’ will stop the file conversion process, and you will be redirected back to the Active Session screen.



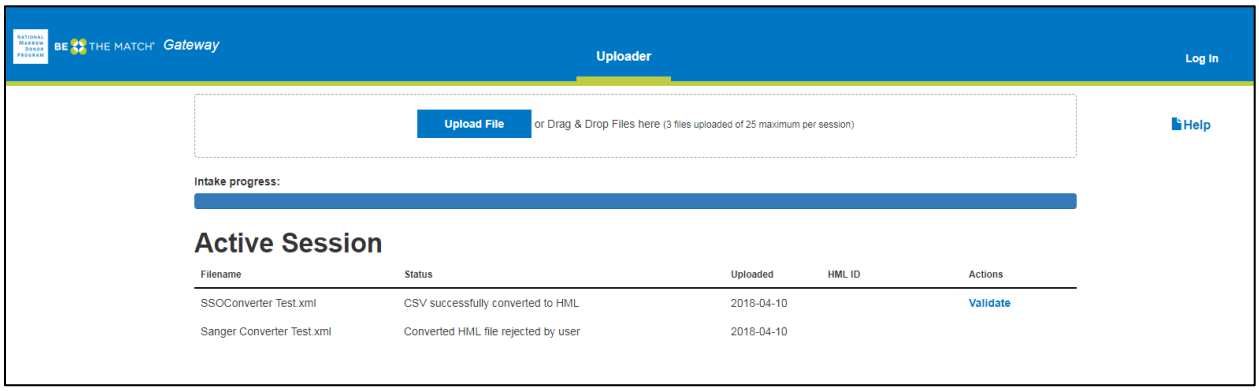
c. The ‘Status’ column in the Active Session table will display “Converted HML file rejected by user,” and no further actions will be available for this file. Edit the contents of the file on your local desktop as needed, and repeat the upload and convert steps.



4. After selecting 'Accept and Continue,' the converted file will continue to display.
   a. (Optional) Click the 'Download File' link at the bottom of the display window to download and save a copy of the converted HML file on your local desktop.
   b. Click 'Close and Continue' to proceed.

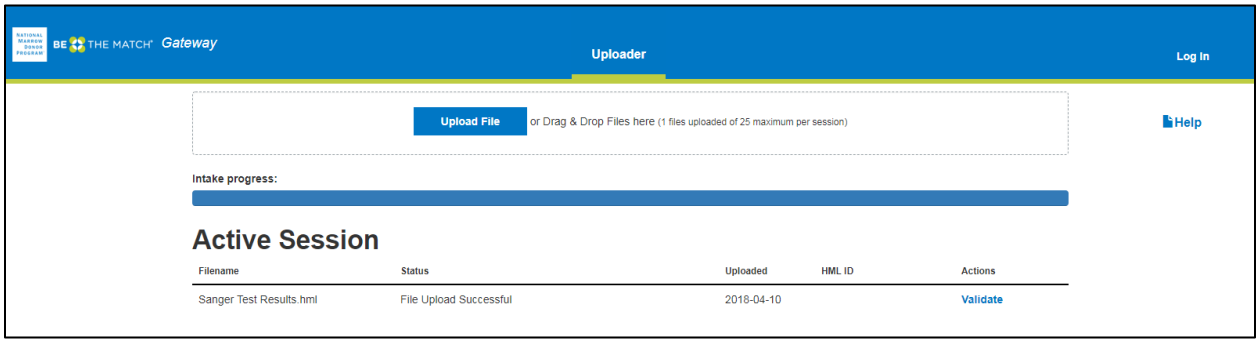


5. The Active Session table will display again with your file name showing an XML extension. The 'Status' column will show "CSV successfully converted to HML." Proceed to the Validate Files section of the guide. If you're an Authorized User and want to submit the file, you may proceed to the Submit Files section.

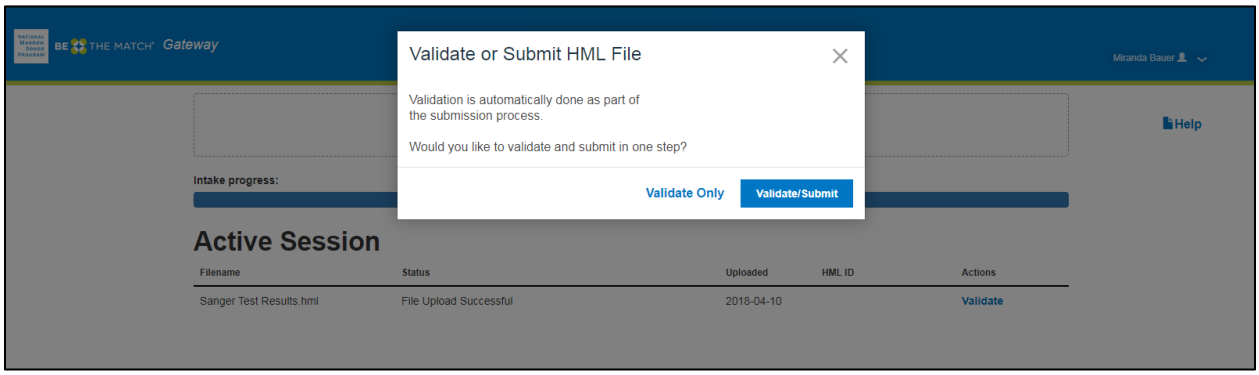


Validate Files:

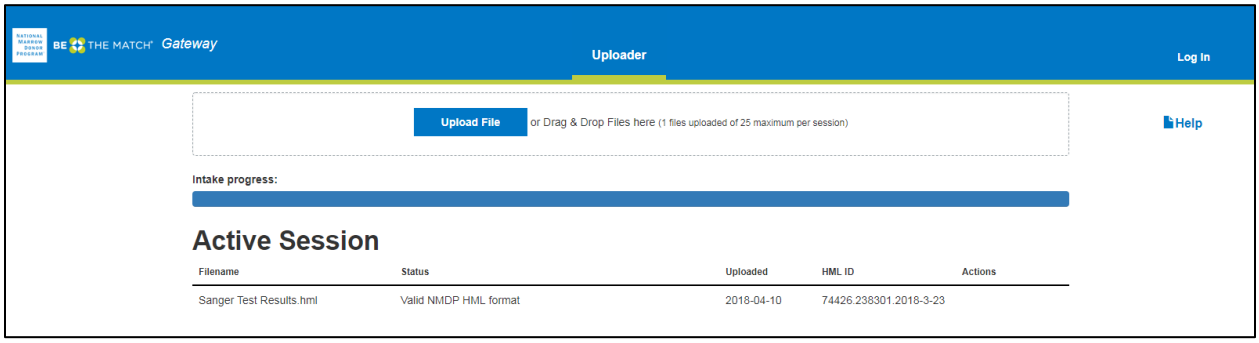
1. After an HML file is successfully uploaded or a CSV file is successfully converted, a blue 'Validate' button will appear in the 'Actions' column. Click the button to proceed.



2. A pop-up will display for Authorized Users only with a prompt to 'Validate Only' or 'Validate/Submit' in one step. Select 'Validate Only' to validate the file without submitting. The 'Validate/Submit' function will be described in the Submit Files section of the guide.

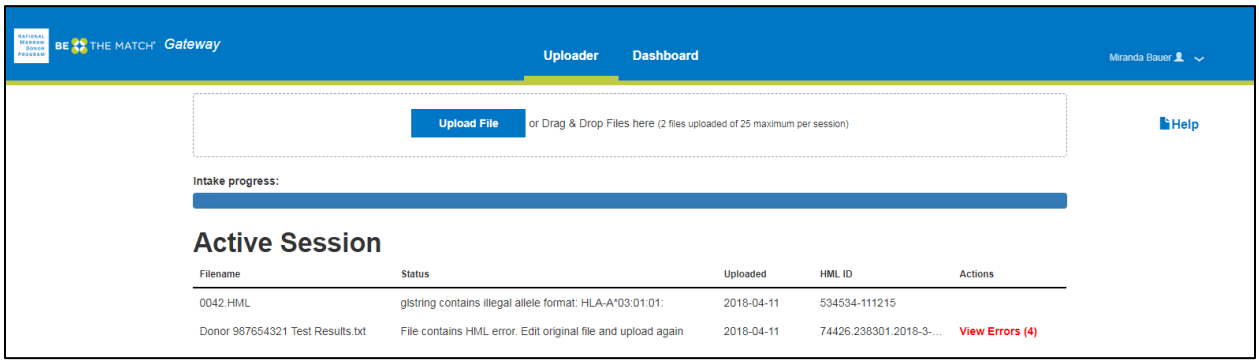


3. Upon successful completion of the 'Validate' function, the 'Status' column will display "Valid NMDP HML format."

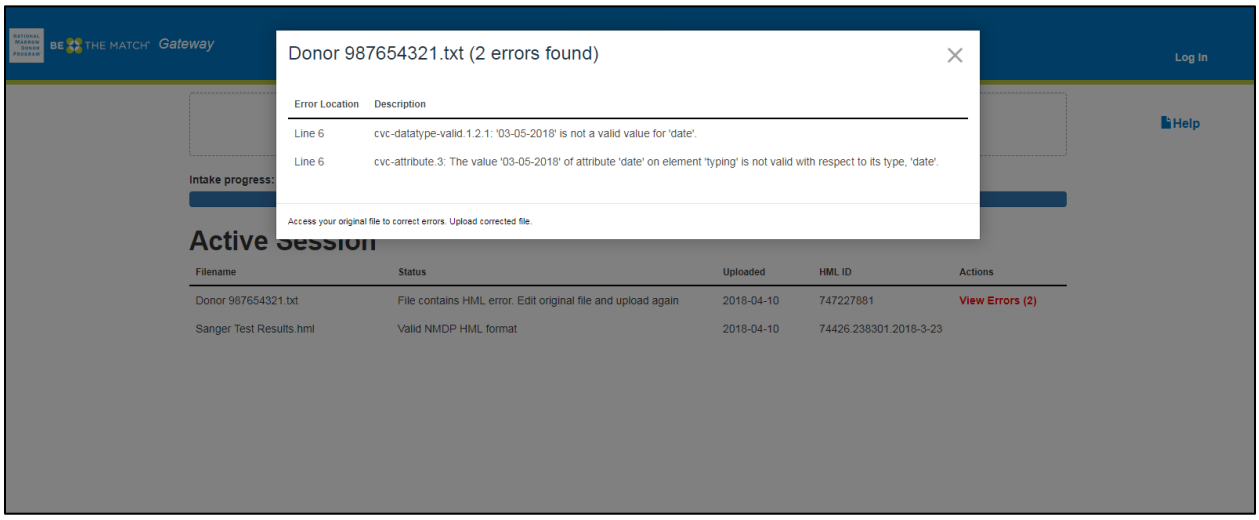


4. If the file does not successfully validate:
   a. For single errors, the message will be reported in the 'Status' column only. You may need to hover over the error message to see the complete text.
   b. If the file contains multiple errors, "File contains HML error. Edit original file and upload again" will display in the 'Status' column, and a red 'View Errors' button

will appear in the ‘Actions’ column with the error count indicated. Click the button to see more detail on the error(s).



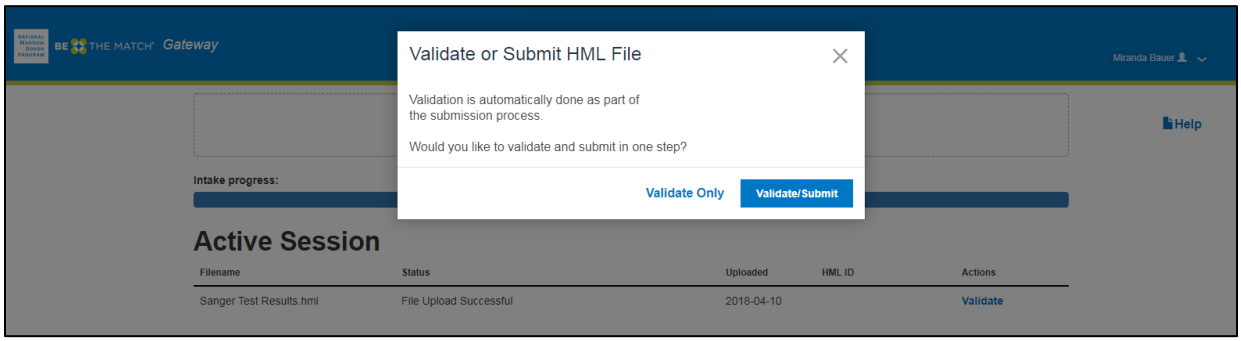
c. A pop-up window will display the error details and the location of the error(s) in the original file by line number. Correct the file contents using the original file before repeating the upload and validate steps.



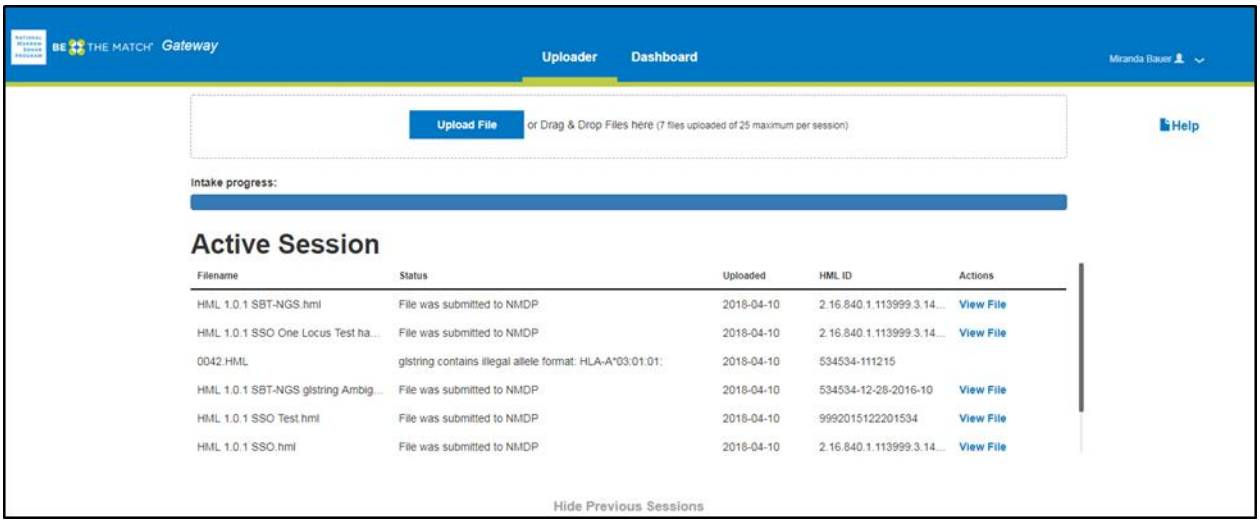
d. No further actions can be taken on this file. Correct the errors in the original file and upload/submit again.

Submit Files

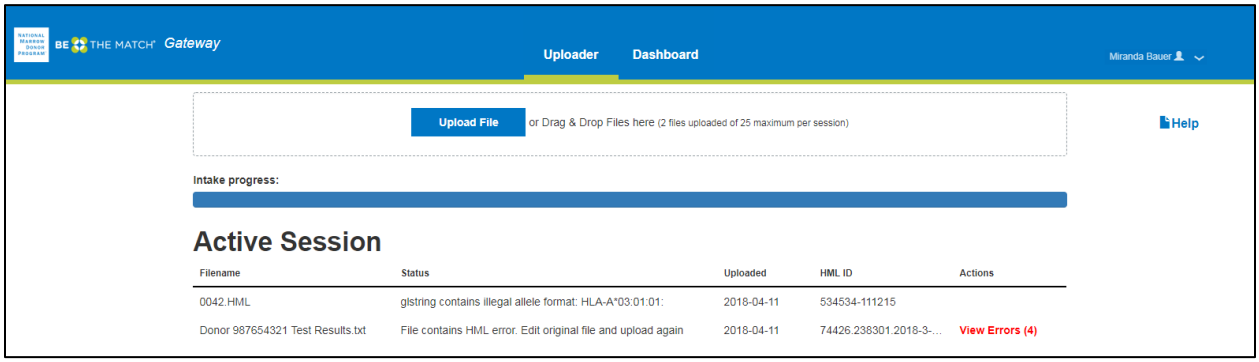
1. Input your user name and password credentials on the login screen to sign in as an Authorized User.
2. Follow the steps to upload a file or multiple files. A 'Validate' button will appear under the 'Actions' column. Click the button to proceed. A 'Validate or Submit HML File' window will pop up.
   a. The default selection is 'Validate/Submit.' Click this button to validate and submit the file in one step. If you're confident the file will validate successfully, this is the most efficient option. If you Validate/Submit in one step, and your file fails validation, you'll have to change the HML ID extension/root combination within the original file in addition to fixing all errors reported in the 'Status' or 'Actions' columns before resubmitting.
   b. Click 'Validate Only' to verify the HML structure and content of the file is correct. This will NOT submit the file for processing. See the Validate File section for more information on this function.



3. If the file successfully submits:
   b. The 'Status' column will display "File was submitted to NMDP."
   c. A 'View File' button will appear in the 'Actions' column. Selecting this button will take you to the raw file in the Gateway's Submission Dashboard.



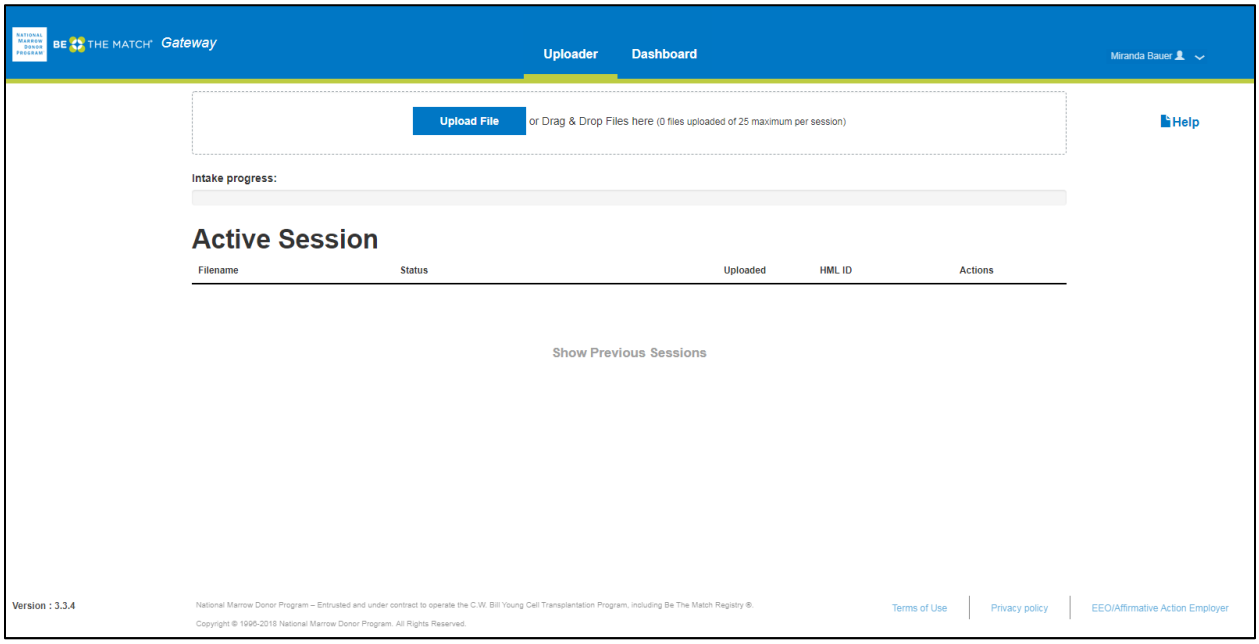
4. If the file does not successfully submit:
   a. For single errors, the message will be reported in the 'Status' column only. You may need to hover over the error message to see the complete text.
   b. If the file contains multiple errors, "File contains HML error. Edit original file and upload again" will display in the 'Status' column and a red 'View Errors' button will appear in the 'Actions' column with the error count indicated. Click the button to see more detail on the error(s).



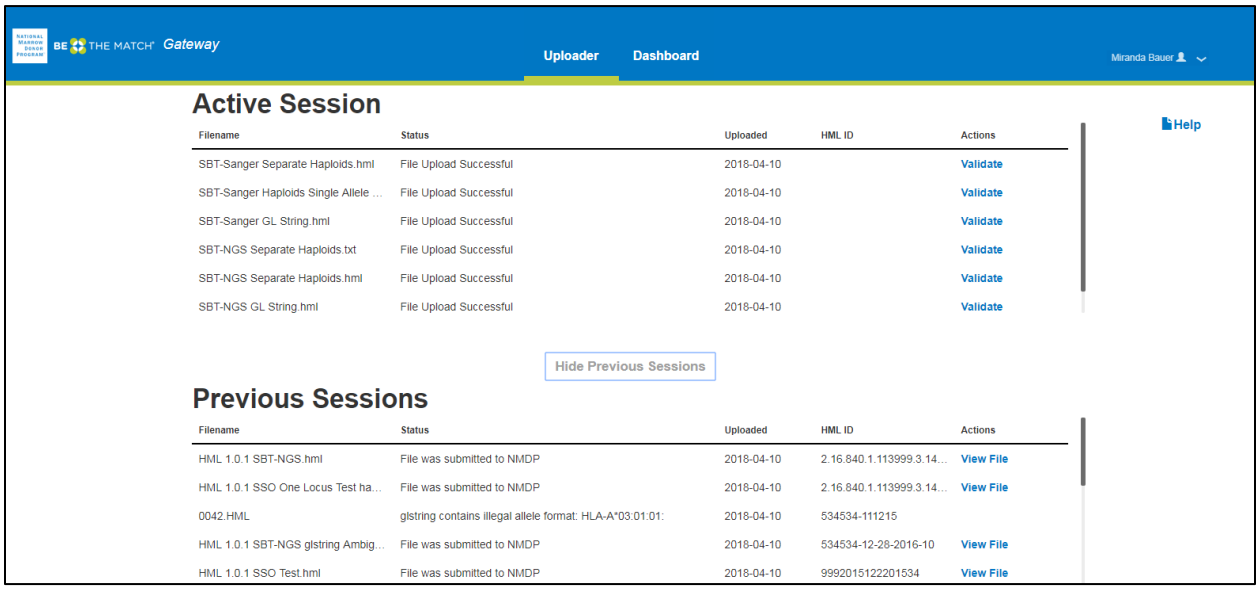
   c. No further actions can be taken on this file. Correct the errors in the original file and upload/submit again.
5. Check the Submission Dashboard for additional information on the submission status. The File Uploader application performs basic content and genomic validation. In depth genomic validation is performed by downstream NMDP processes. To confirm your file is processed successfully, please confirm the Status value in the Submission Dashboard and correct any errors reported there.

Previous Sessions

1. As an Authorized User, you may view files uploaded during your active session, along with files that were uploaded during your previous sessions. Under the Active Session table, there is a 'Show Previous Sessions' button. Select the button to display up to 25 files that were uploaded during previous sessions.



2. Files uploaded in previous sessions may not be converted, validated or submitted, but you may still use the 'View File' function associated with any successful submission. This will redirect you to the raw file in the Submission Dashboard. You may also still use the 'View Errors' function to view detailed error messages associated with previously validated or submitted files.



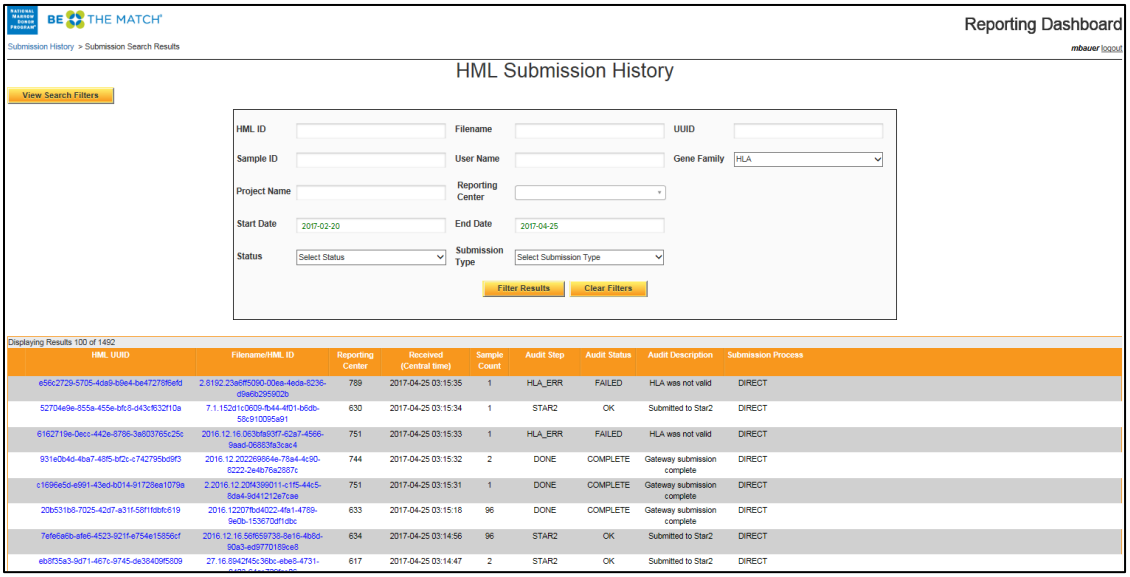
Gateway Portal: The Submission Dashboard

1. Navigate to the Gateway Portal Login page: https://hml.nmdp.org/
    a. Select Reporting Dashboard under the Test Result Application Links

Or

    b. From the File Uploader application, select the 'Dashboard' link in the header at the top of the screen.

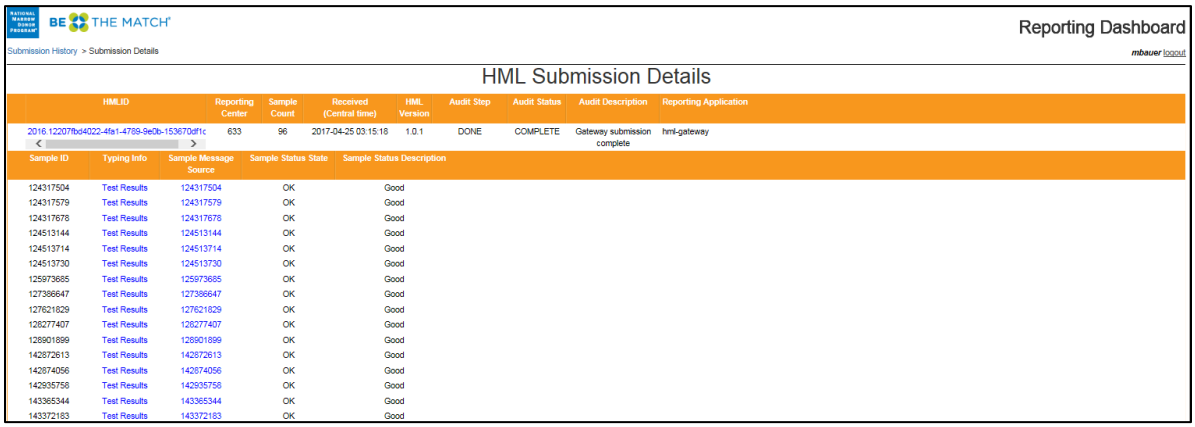
2. All HML files submitted by the user are displayed with the most recent at the top.



The NMDP assigned UUID and lab assigned Filename/HML ID are displayed. Audit Status shows the submission status, while the Audit Description gives a brief summary

of the file's status. The Reporting Center, Date Received, Sample Count, Audit Step, Audit Status and the Submission Process are also shown on this page. To check the status of a sample, or if the Audit Status is FAILED, click on the HML UUID to get to the sample level page.

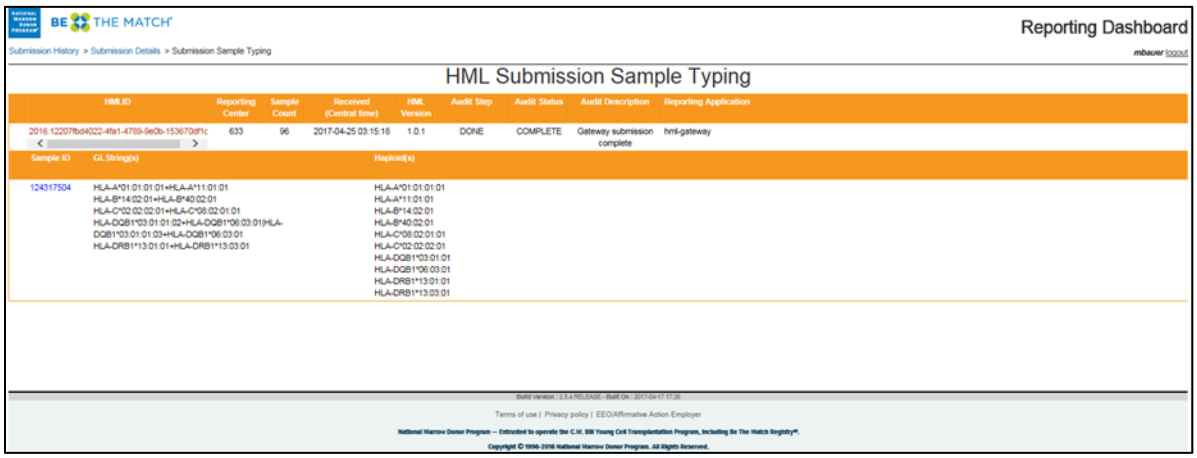
3. On the sample level page, the Sample ID, Sample Status and Sample Status Description are displayed for each sample ID.
    a. Any errors will be indicated under the Sample Status Description. If one sample has an error, the whole file will have to be resubmitted.



HMLID	Reporting Center	Sample Count	Received (Central time)	HML Version	Audit Step	Audit Status	Audit Description	Reporting Application
2016.12207fbd4022-4fa1-4789-9e0b-153670df1c	633	96	2017-04-25 03:15:18	1.0.1	DONE	COMPLETE	Gateway submission complete	hml-gateway

Sample ID	Typing Info	Sample Message Source	Sample Status State	Sample Status Description
124317504	Test Results	124317504	OK	Good
124317579	Test Results	124317579	OK	Good
124317678	Test Results	124317678	OK	Good
124513144	Test Results	124513144	OK	Good
124513714	Test Results	124513714	OK	Good
124513730	Test Results	124513730	OK	Good
125973685	Test Results	125973685	OK	Good
127386647	Test Results	127386647	OK	Good
127621829	Test Results	127621829	OK	Good
128277407	Test Results	128277407	OK	Good
128901899	Test Results	128901899	OK	Good
142872613	Test Results	142872613	OK	Good
142874056	Test Results	142874056	OK	Good
142935758	Test Results	142935758	OK	Good
143365344	Test Results	143365344	OK	Good
143372183	Test Results	143372183	OK	Good

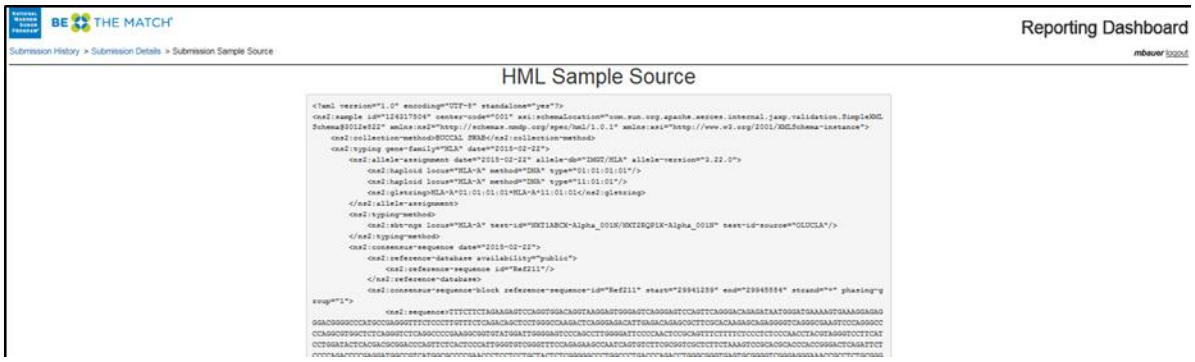
    b. Under the Typing Info column, click on Test Results to see the Haploid(s) and/or GLString(s) submitted for that sample ID as applicable



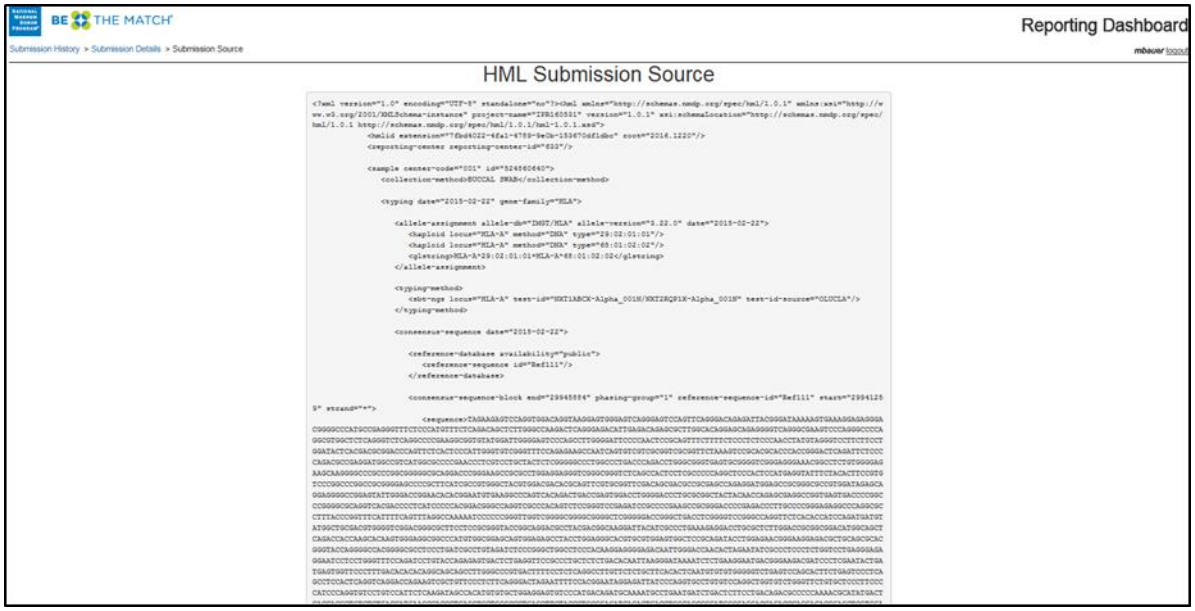
HMLID	Reporting Center	Sample Count	Received (Central time)	HML Version	Audit Step	Audit Status	Audit Description	Reporting Application
2016.12207fbd4022-4fa1-4789-9e0b-153670df1c	633	96	2017-04-25 03:15:18	1.0.1	DONE	COMPLETE	Gateway submission complete	hml-gateway

Sample ID	GL String(s)	Haploid(s)
124317504	HLA-A*01:01:01:01+HLA-A*11:01:01 HLA-B*14:02:01+HLA-B*40:02:01 HLA-C*02:02:02:01+HLA-C*08:02:01:01 HLA-DQB1*03:01:01:02+HLA-DQB1*06:03:01)HLA-DQB1*03:01:01:03+HLA-DQB1*06:03:01 HLA-DRB1*13:01:01+HLA-DRB1*13:03:01	HLA-A*01:01:01:01 HLA-A*11:01:01 HLA-B*14:02:01 HLA-B*40:02:01 HLA-C*08:02:01:01 HLA-C*02:02:02:01 HLA-DQB1*03:01:01 HLA-DQB1*06:03:01 HLA-DRB1*13:01:01 HLA-DRB1*13:03:01

    c. Under the Sample Message Source column, click on the ID to see the HML message for that sample

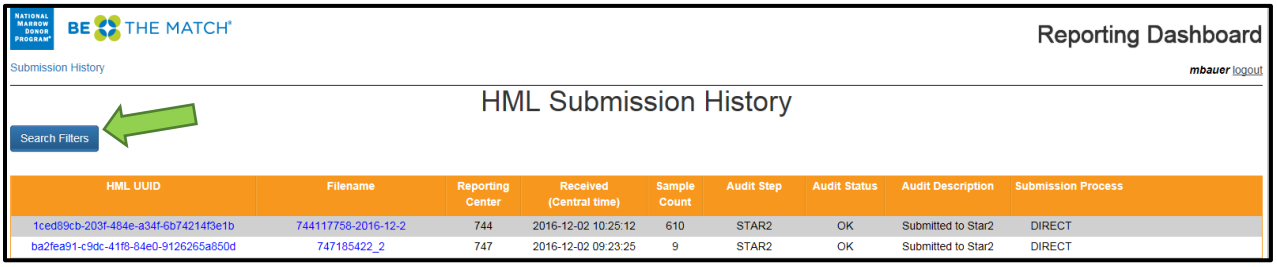


4. Click File Name/HMLID to see the entire HML source message for all submitted samples in a given submission.

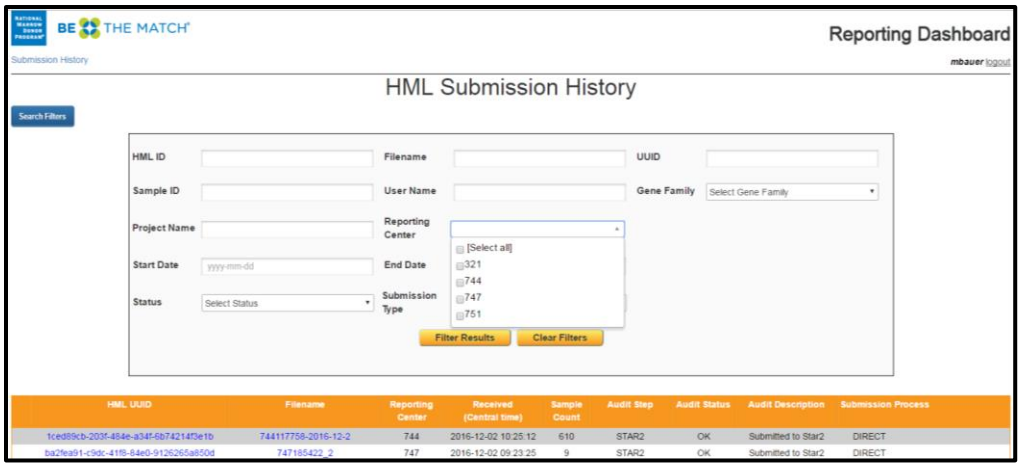


Dashboard Search Function

To access the search filters, click the blue button on the upper left side of the screen

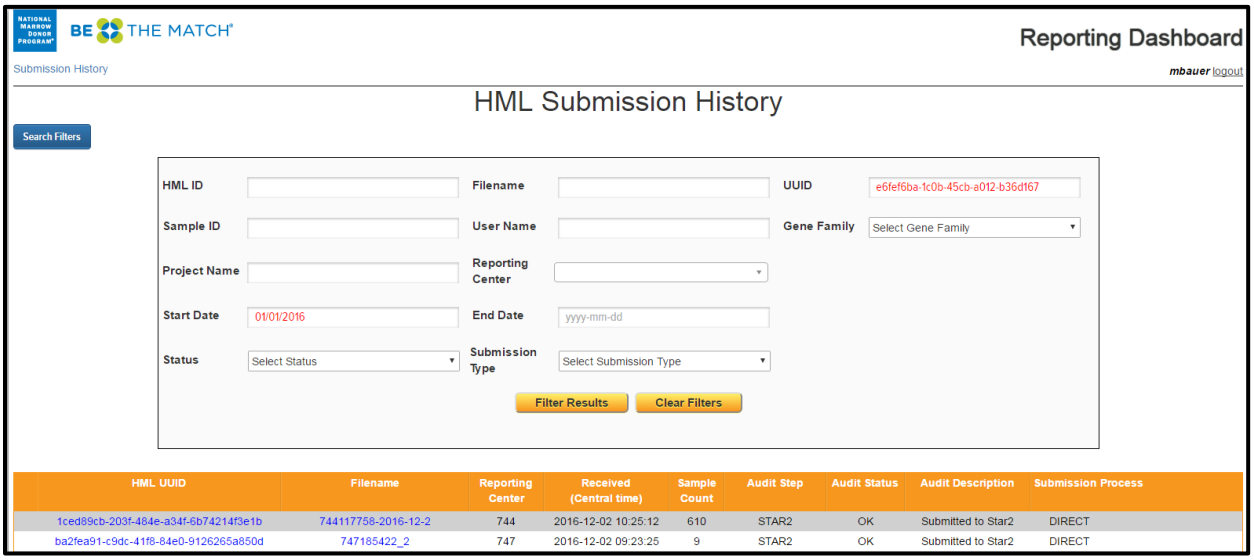


Searching can be carried out via one or more of the search boxes



Partial searches can be carried on HML ID, Project name and Filename fields. No wildcard characters are allowed (e.g. sbt-ngs*)

Search field validation is built into each field. Content that is invalid will be indicated in red. Content that is valid will be indicated in green or black



After inputting valid search criteria, click 'Filter Results.' Any file submitted that matches the selected criteria will display

Reporting Dashboard Search Fields

Field Name	Detail	Definition	Source
HML ID	<text> or <partial text>	HML message hmlid extension and root and concatenated	<hmlid
Filename	<text> or <partial text>	File name included in the HML User Upload submitted file. Not expected in a Soap submitted message. Allows partial data entry.	<property name="uploadFileName"
UUID	<text >	Unique id systematically assigned to the HML message on Submit. Returned to the user on the Upload page or, in the Soap response.	Submit web service response
Sample ID	<text >	Sample ID from the HML message	<sample id=
Username	<text>	e.g. mboomer, mrottach	
Gene Family	<dropdown list> Select Gene Family	e.g. KIR, HLA, ABO, CCR	<ns2:typing gene-family="HLA" date="2015-02-22">
Reporting Center	<text > or <partial text>	Reporting center id from the HML message	<reporting-center reporting-center-id
Project Name	<text > or <partial text>	Project Name from XML header	ns2:hml version="1.0.1" project-name="ABDR"
Start Date	<text>	Starting date from which results will be returned. If no End Date entered will return from Start Date through current date.	User data entry in format yyyy-mm-dd
End Date	<text >	End date through which results will be returned. Requires Start Date	User data entry in format yyyy-mm-dd
Status	<dropdown list> Select Status Ok Failed	Processing status	Submit web service response
Submission Type	<dropdown list> Select Submission Type	e.g. Product Submission, Test Submission	