WQX Web V.2.0 Tutorial 5

Uploading Results and Working with Errors

United States Environmental Protection Agency

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It is important to note that you must load your Project and Monitoring Location information prior to loading any monitoring results data. Project and Monitoring Location descriptions will only need to be entered once, and only need to be reloaded to modify existing information.

Water Quality Exchange (WQX)/ STORET

The Water Quality Exchange (WQX) is a mechanism for transferring data to, and extracting data from the U.S. Environmental Protection Agency's (EPA's) STOrage and RETrieval (STORET) Data Warehouse. WQX uses computers as connection points or *nodes* to communicate through EPA's National Environmental Information Exchange Network (NEIEN). Monitoring data files must be formatted in Extensible Markup Language (XML), to be submitted through WQX. XML encompasses a flexible text format for organizing and creating structured computer documents. Prior to import to the WQX/ STORET data warehouse, data files must pass through the Central Data exchange (CDX), a doorway which authorizes submissions. Setting up an NEIEN node to submit XML files can be financially unfeasible and technically challenging for smaller groups. Organizations that are unable to generate XML script on their own can still submit data to CDX with the assistance of WQX Web, a tool that converts formatted text files into XML script (**Figure 1**).

The design of WQX Web allows users to monitor the status of their data files throughout the submission process. Upon import, WQX Web performs an inquiry of submitted data files, checks their formatting and organization against the established WQX structure, or schema (**Figure 2**). The WQX Web inquiry assesses inconsistencies between the submitted data and established domain values in the STORET system producing a dataset summary page, detailing errors and successful submissions of files. For a more extensive discussion on submitting data files through WQX Web, please refer to the following URL http://www.epa.gov/storet/wqx/products/WQX_Web_User_Guide_v2.0.pdf.
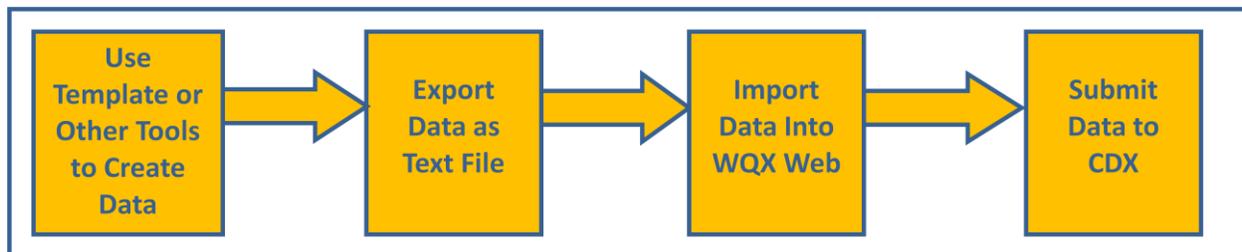
Figure 1. Flow chart outlining the general process for using WQX Web to submit data to the STORET Data Warehouse

Tutorial System Requirements

1. Internet access and a Web browser, such as Microsoft Internet Explorer 7 (IE7) or Firefox
2. Pop-up blockers turned off for this site
3. CDX account
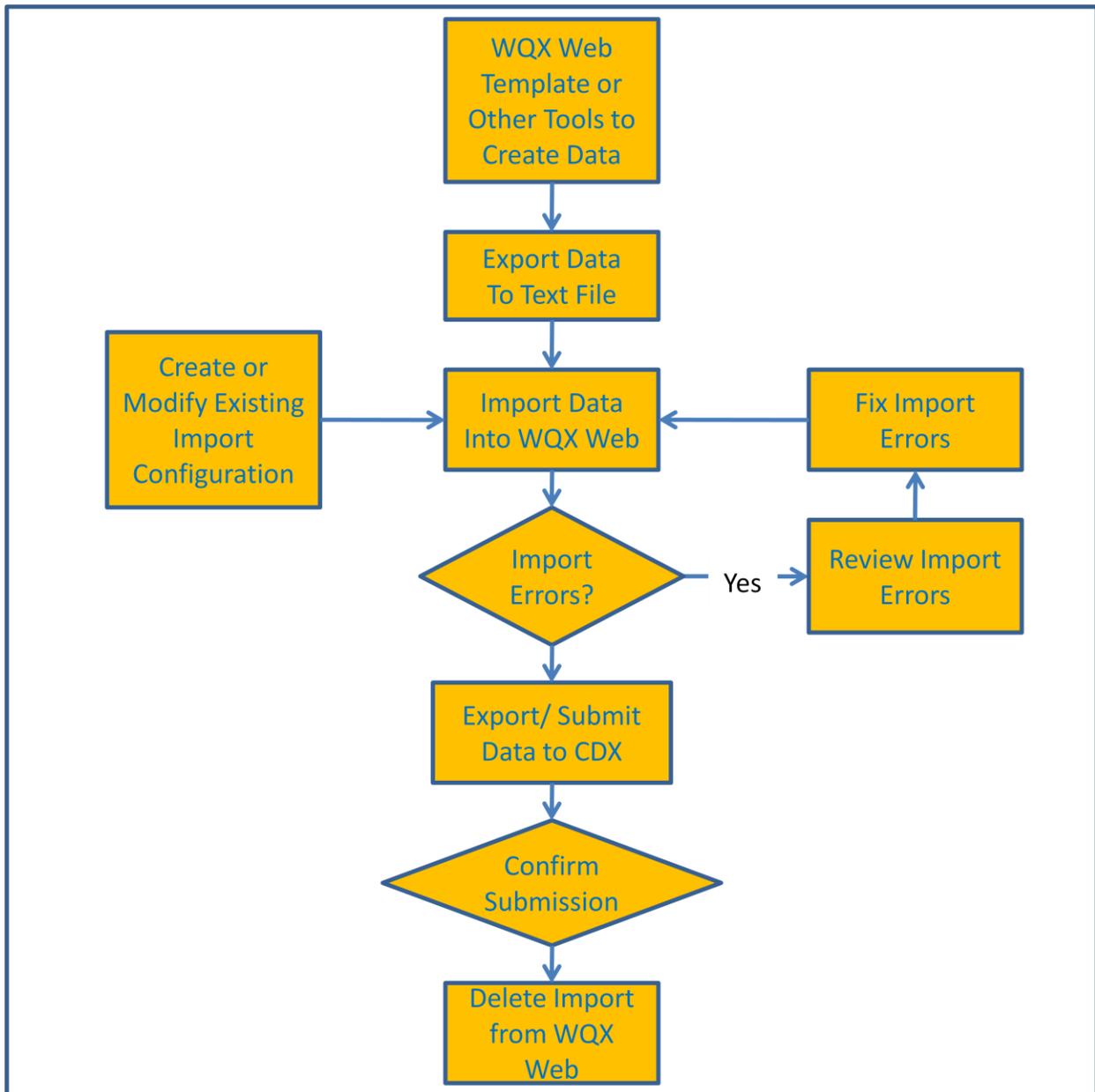
Figure 2. Flow chart outlining the general process for preparing monitoring, project or results data for submission and troubleshooting potential errors through the Central Data Exchange via WQX Web

Getting Started with WQX Web

Monitoring data submitted through WQX Web to the STORET Warehouse requires specific fields and formatting for parameters such as Monitoring Locations, methods and project identification (for a brief overview of using WQX Web, view the WQX Web cheat sheet accessible at the following URL: http://www.epa.gov/storet/wqx/products/WQX%20Web%20Cheat%20Sheet_030210.pdf).

The WQX Web tool may be used in a 'Demo' mode, which allows users to practice submitting data to an assigned test organization. The WQX Web Demo environment is purely for training, and any data submitted within this environment is not placed in the STORET Warehouse. New users to WQX Web can contact the STORET Helpdesk (Storet@epa.gov) to obtain a username and password for the WQX Web Demo environment. Users also contact the STORET Helpdesk to obtain a real username and password for submitting data all the way to the STORET Warehouse.

Open up your web browser and enter in the URL
http://www.epa.gov/storet/wqx/wqxweb_downloads.html. Download the WQX Web Excel (.xls) data template, and provided data files by selecting the link labeled **WQX Web Tutorials and Example Data Files**. *When usingMicrosoft Excel 2007, or a later version of Microsoft Excel, files will need to be saved in a macro enabled workbook format (.xlsm). The downloaded materials are for users to start with in importing actual monitoring data into WQX Web*.

To access the CDX Website, open your web browser and enter in the URL https://cdx.epa.gov/SSL/cdx/login.asp. Enter your training user name (i.e. wqxwebtraining1) and password into the "User Name" and "Password" fields (for information on registering for CDX/ WQX

Web enter the following URL into your web browser http://www.epa.gov/storet/wqx/wqxweb.html).

Viewing Sample Results Data Text Files

WQX Web provides users with the functionality to import data and send it to the STORET Data Warehouse. The WQXWeb _Results.txt file was created using the WQX Web template, and exported in a form that can be submitted to WQX Web. Open and examine the results file for this tutorial. In examining the text file, notice that there is a header row, or title row identifying each column, that is tab delimited.

Prior to importing results/ activity data into WQX Web, users must establish Projects, Monitoring Locations and sample collection methods in WQX. Agencies and institutions may have unique sampling methods, therefore it is imperative to define and identify the specific procedures used. Organizations are therefore required to reference sampling ID's, names and contexts (owning organizations of a particular method). The following will provide a brief overview of documenting sampling methods into WQX Web.

Inserting a Sample Collection Method into WQX Web

1. Select the "Lookup Tables" link on the left side of the screen to display a list of Data Elements that are allowable values in the STORET system. Some domains (categories) do allow users to input their own unique values/elements.
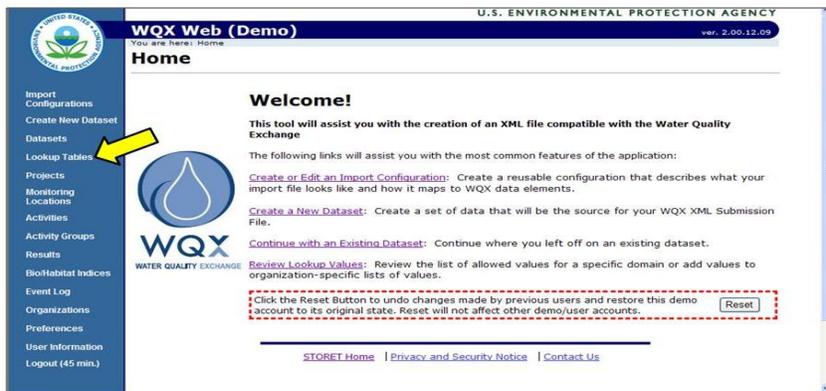
2. Scroll through the "Lookup Tables" list to the "SAMPLE COLLECTION METHOD" link. Using the edit links, users can add or delete their values to or from the domain values list. Select the "Edit" link beside "SAMPLE COLLECTION METHOD", to add a unique Sample Collection Method used by your organization.

3. Choose the name assigned to your organization from the *"Organization"* dropdown menu. This tutorial will be using the sample name "WQXWEBTRAINING1*"* however users should use their own unique organization names when actually submitting their data to WQX.

4. Open the WQX Web template file provided (**Template_WQX_Web.xls**) and notice that the Sample Collection Method used in the demonstration data is named "STNDRD_SCP". This unique Sample Collection Method is not documented in the WQX database, and will have to be entered into WQX Web to create a new allowable value. Enter the following information, then click the "Save" link on the bottom left side of the screen to place the newly created method into the allowable values:

5. Under the "ID" (Identifier) header, enter "*STNDRD_SCP*" into the field.

6. Under the "Context" header, enter "*WQXWEBTRAINING1*" into the field. Note that this field is the owner of the method.

7. Under the header "Name", enter "*Standard SCP Method*" into the field. Under the header "Description", enter "*Standard Sample Collection Method for Salt Lake County Monitoring*" into the field.

8. Under the header "Qualifier Type", enter this information if applicable.

9. **Select "Save".** *Note: To delete data, select the delete link next to the method that is desired to be removed. Keep track of when files were last updated by viewing the "Last Change Date Column".*
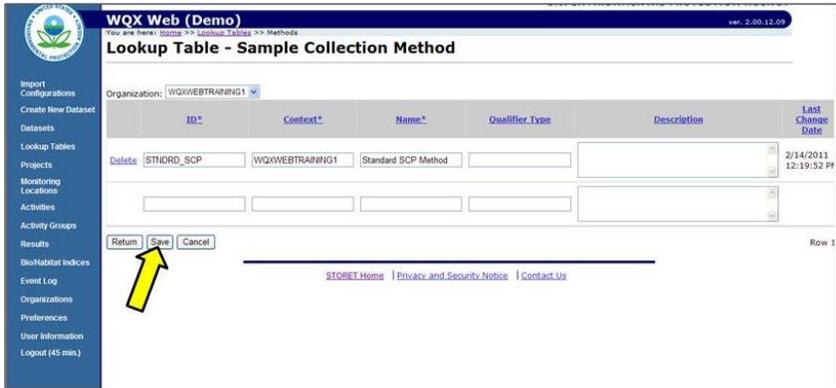
10. Click on the "Home" link at the top of the page to return to the main WQX Web page. The new Sample Collection Method has been successfully added to the allowable values. Now that all of the Sample Collection Methods have been documented, results data can be imported.

Copying a Results Import Configuration

1. Click on the "Import Configurations" link on the left side of the home page.

2. Click on the "Add New" button.

3. Click on the radio button, "by coping an existing one". Choose "Activities and Results" from the "Import Configuration Type" dropdown menu. It is not necessary to click on the "Copy Translation" check box. Translations made for a user's dataset may not apply to your data file, in this case there are no translations in the configuration that you are copying. Click on the "Continue" button.

4. Change the name of the Import Configuration to something of your choosing; the name must be different than the original name "TRAINING IMPORT RESULTS". This tutorial will use "*Copy of TRAINING IMPORT RESULTS*" as the new name. Also, change the "Organization ID" to your assigned Organization ID by clicking on the link associated with the default value. Note that this tutorial will continue to refer to "WQXWEBTRAINING1" for purposes of demonstration.
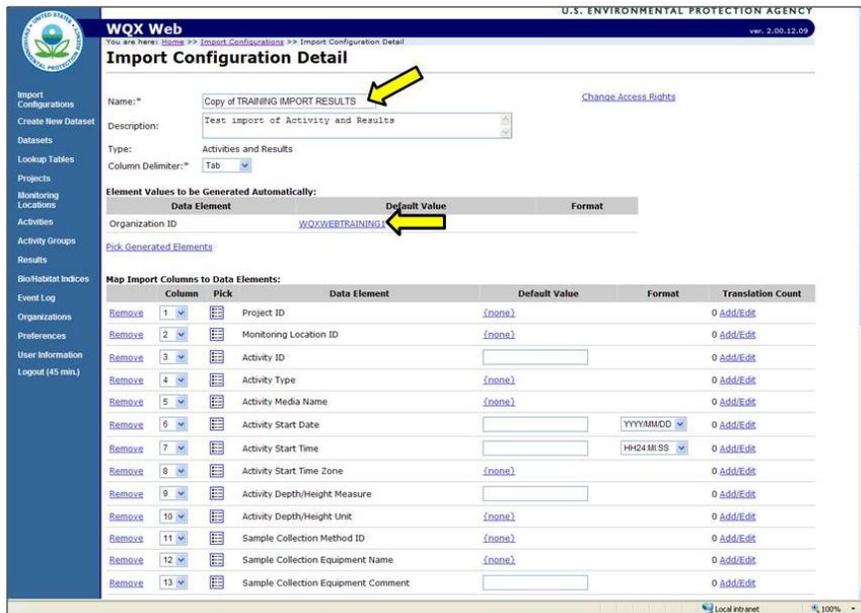
5. Take a few moments to scroll down through the Import Configuration, and notice the different columns that can be set. Do not modify them at this time. Notice that Data Elements can be added, subtracted, and organized based on the how they appear in the text file. This tutorial will later cover modifying Import Configurations to translate values to allowable values in addition to setting default values. Scroll to the bottom of the Import Configuration, click on the "Save" button, and then click on the "Return" button twice
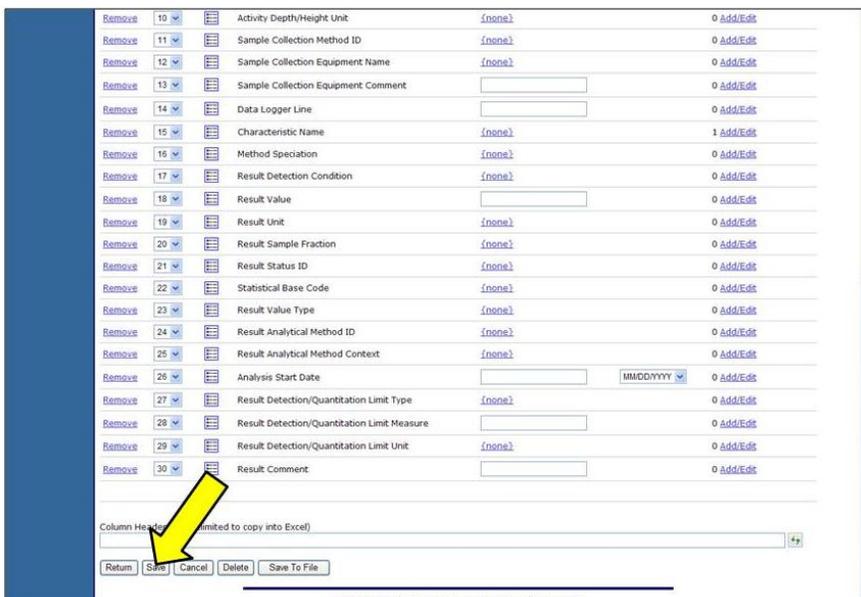
Loading Results Data Text Files into WQX Web

1. Click on the "Create New Dataset" link to begin importing your results data file.
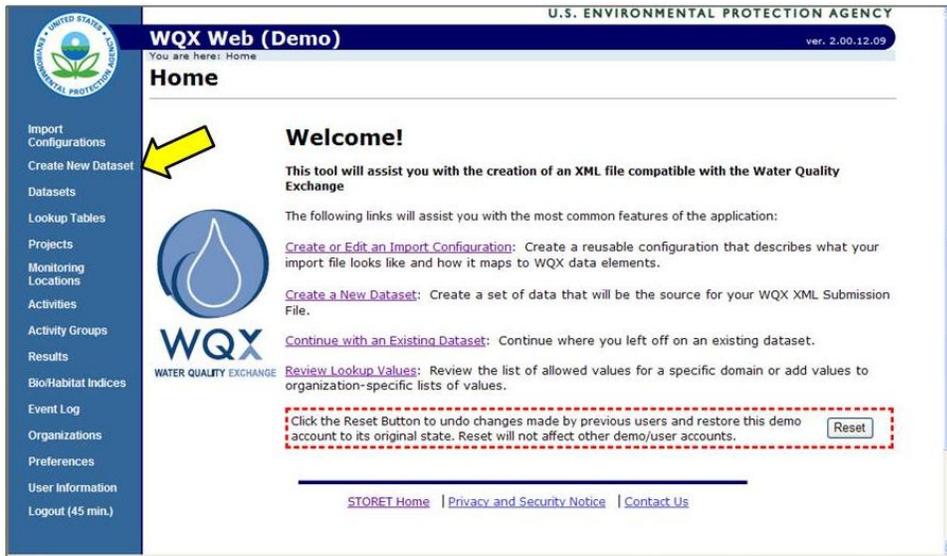
2. Click on the "Import a File of Activities and Results" link under the "To Insert or Update Data" header.
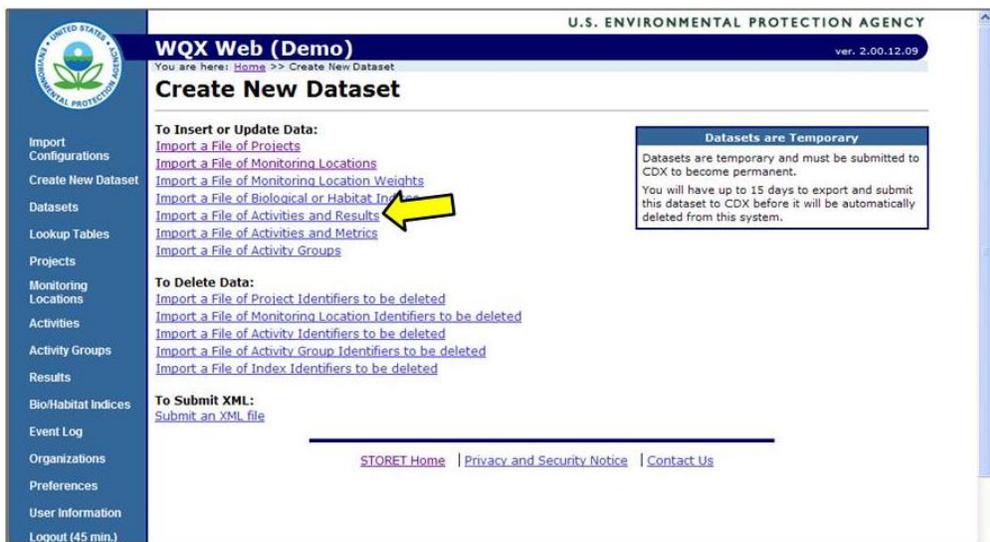
3. Prior to importing your data, ensure that the appropriate Import Configuration, text file to be imported, and delimiter are selected. Use the "Import Configuration" dropdown menu to select "*Copy of TRAINING IMPORT RESULTS*". Click on the "Browse" button to choose the desired file to import. Select the text file that contains results data. In this case, choose "*WQXWeb_Results.txt*", and then click on the "Open*"* button.
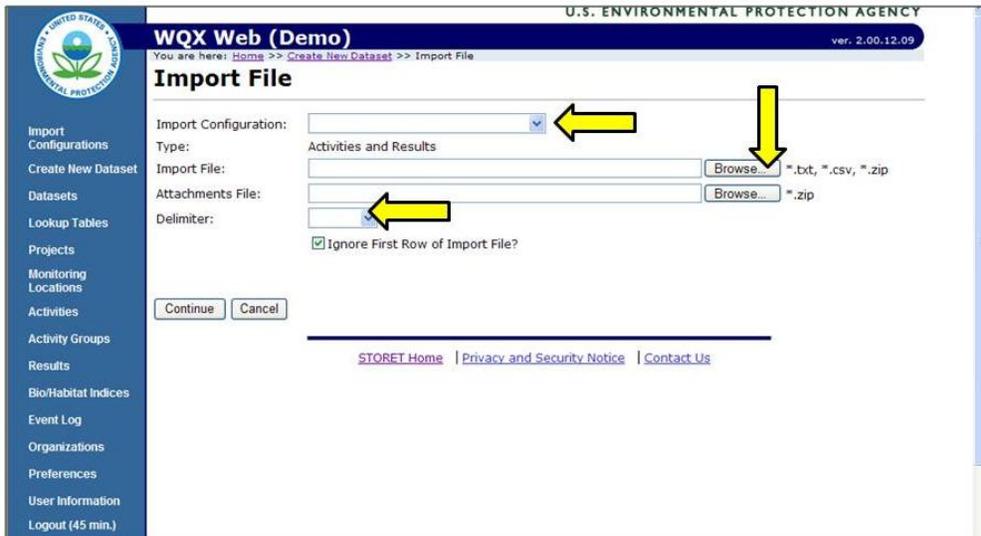
4. Choose "*Tab*" from the "Delimiter" dropdown box because the provided sample text file is tab delimited.

5. Since the imported text file contains a header row, it is necessary to tell WQX Web to skip this row when importing the file because it does not contain any real data. Make sure to check the "Ignore First Row of Import File*?"* check box.

6. Change the Organization ID to WQXWEBTRAINING1.
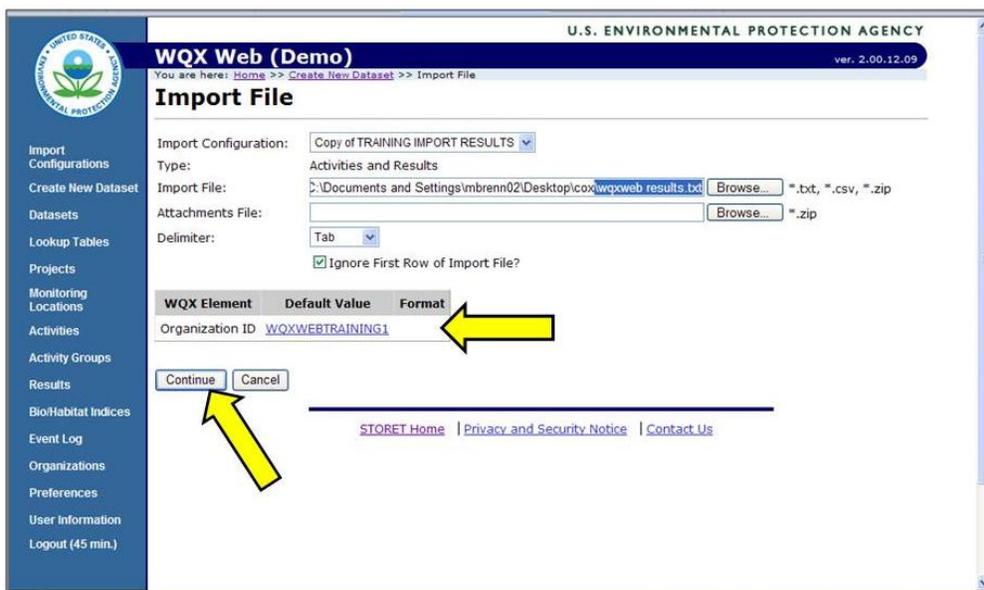
7. Click on the "Continue" button on the bottom left side of the page.

8. A message box will pop up, notifying that the first line of import will be ignored. Click on the OK button because the provided text file contains a header row.

9. If the dataset summary page does not automatically refresh, click on the refresh button of your internet browser for an updated status of your imported file.

10. On the "Dataset Summary page", observe that "Errors, Warnings, and Messages" are displayed under the title "Import*". Notice that there are 36 errors and zero warnings. In order to be successfully exported through CDX, datasets need be errorless. Lower on the page, notice a "Record Counts" box showing that there are 0 "Result" records that are valid according to the schema, and 29 that are invalid. Additionally, notice that there are "0 "Activities" that are valid,

due to multiple results per activity. Valid" according to the schema means that the data submission meets the data structure requirements.
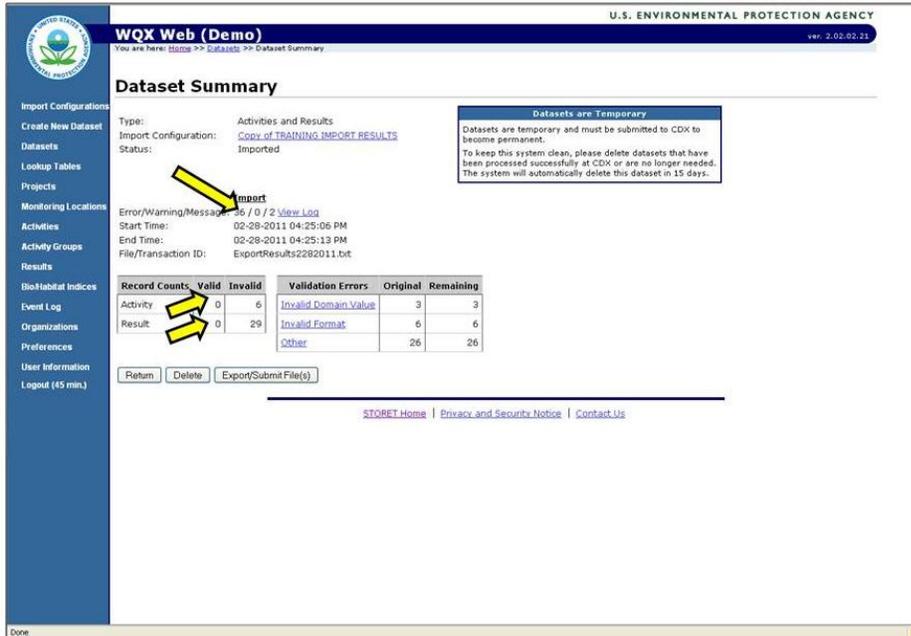
Fixing Validation Errors

The first step in troubleshooting validation errors is to confirm that all Projects, Monitoring Locations and Sample Collection Methods referenced in your results file have been submitted through WQX Web. For more information on establishing these items, please reference the WQX Web Tutorials 1-4.

1. To receive a description of the error log in a particular Dataset, select the "View Log" link.
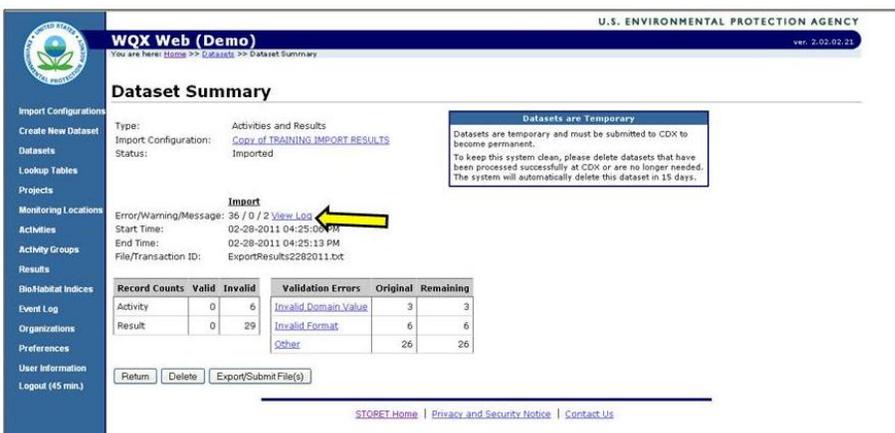
2. The *Event Log Messages* table list provides details on all the errors in the dataset. Notice that there are three different error messages that repeat, "Value for Activity Start Date does not match its required format:…", "Invalid domain value: 'Water Temperature' " and " If Result Value is numeric then Result Value Units and Result Value Type are required"

3. Three different categories of errors are flagged for this dataset, "Invalid Domain Value", "Invalid Format" and "Other". Domain Values and Invalid Formats can be fixed manually on the fly or by adding a translation in the Import Configuration however; other errors may require a user to correct the original data. Click on "Invalid Domain Value" to view the first category of error.

4. Data flagged for an "Invalid Domain Value" infers that a value is not found on the list of allowable values expected by WQX i.e. the value "Water Temperature" is stored in WQX as "Temperature, Water". However, errors will not be fixed using the Domain Resolution function in this tutorial, select "Cancel."

5. Next click on the "*Invalid Format"* link to view errors flagged in that category.
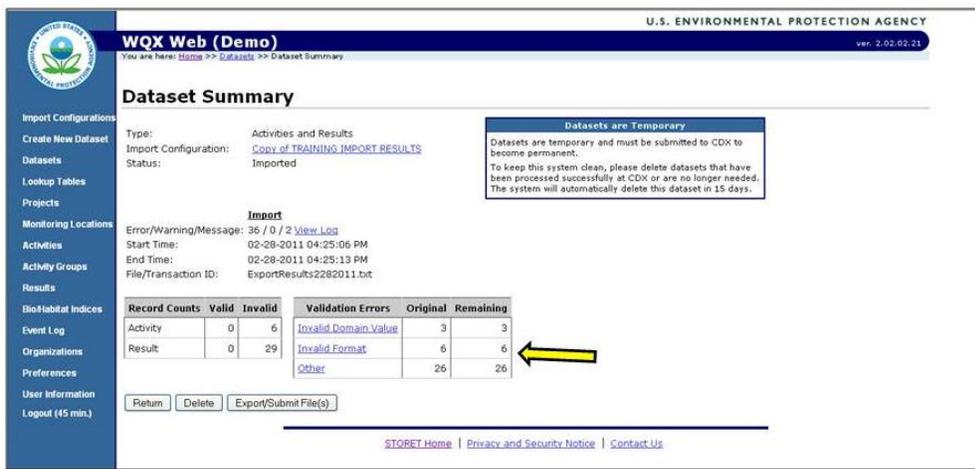
6. Data flagged for an "Invalid Format" means that a value was not consistent with the format indicated in the Import Configuration. The Import Configuration needs to be adjusted to indicate the correct format. Select "Cancel" to return to the dataset summary page.

7. Errors that are not recognized as *Invalid Format* or *Invalid Domain Values* are documented in the *Other* field. Selecting the Other link with revert the user back to the Event log messages. Select the link labeled "*Other*".

8. Other Validation Errors often need to be resolved by making corrections in the original dataset. Errors in this file were caused by violations of two WQX business rules, the first business rule violation, when a result is reported as 'Not Detected' ,' Present above Quantitation Limit' or 'Present Below Quantitation Limit' the detection limit and units of the detection limit must also be reported (i.e. <0.5 mg /L). The second business rule violation, " If Result Value is numeric then Result Value Units and Result Value Type are required". The original datasheet needs to be corrected before re-importing this dataset. Click "Return" to go back to the Dataset Summary Page.

9. Once errors in the Dataset are corrected, the file will need to be re-imported. Leaving the previously submitted file in WQX Web may interfere with the changes that will be made in the Import Configuration addressed in the following steps. Click on the "Delete" button to delete this import from WQX Web.

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10. After the dataset has been deleted, errors from Domain Values and Format Errors can be addressed by altering the Import Configuration. Click on the Import Configuration link on the left side of the screen and select the "Copy of Training Import Results" Import Configuration.

11. To fix the Domain Values, scroll through the Import Configuration and locate the "Characteristic Name" Data Element, which should be number 15 on the list. Click on the "Add/Edit" link in the "Translation Count column" on the right of the configuration.

12. Enter "*Water Temperature*" in the "Translate From: Value from Import File" field. Click on the "{None}" link under the "Translate To: Characteristic Name" header

13. Enter "*Temperature*" into the "Characteristic Name (partial*)"* field. Select *"Show Values"*.

14. Click on the "Select" link next to "Temperature, water" link.
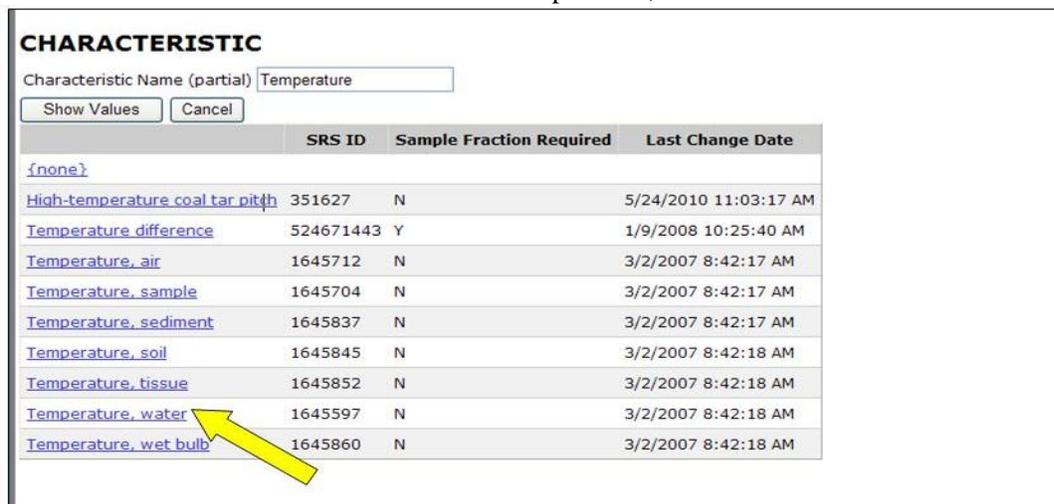
15. Click on the "Save" button. Then select "Return".

16. Notice that the number of translations has changed to "1" in the "Characteristic Name" row. Click on the "Save" button.

17. A translation has been set in your Import Configuration that will change "Water Temperature" to "Temperature, water". This change will occur for all records where the "Characteristic Name*"* is defined as "Water Temperature" in the imported results text file. A translation only affects specified text records entered in the "Translate From*"* side of the "*Translations"* input screen. Any other values that are in your text file within the translated field are not affected by the translation. Multiple translations may be set for a single field within Import Configurations

18. The Activity Start Date was also flagged as having an error due to the results being in the format "MM/DD/YYYY". Alter the format in the Import Configuration to align with the format of the

Activity Start Date in your results file. After making the change, select "Save". Next you will need to access the original dataset to correct the final errors
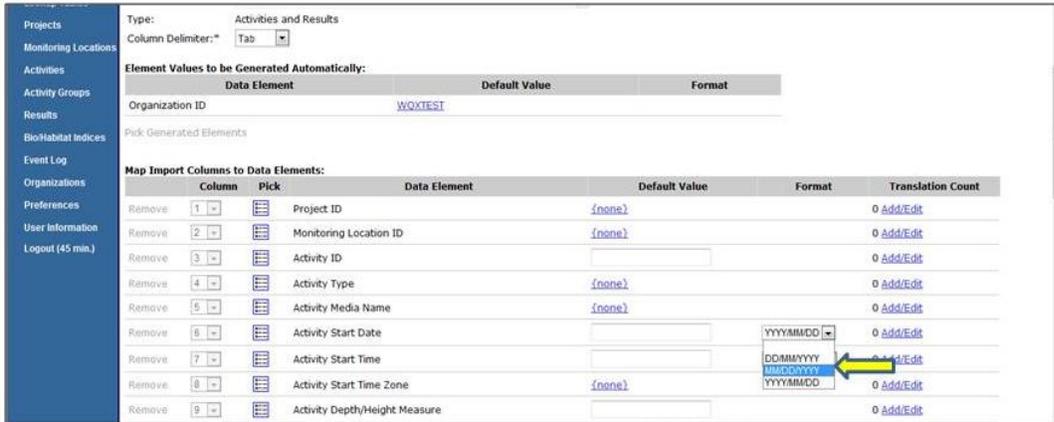
Understanding the Errors in Your Original Data

1. Open the data template titled "**Template_WQX_Web.xls**". The **Template_WQX_Web.xls** file is a tool developed to guide users in formatting and data entry for water monitoring data spreadsheets. The document is organized by color coded tabs located at the bottom of the spreadsheet. Select the "Results" tab colored yellow at the bottom of the spreadsheet.
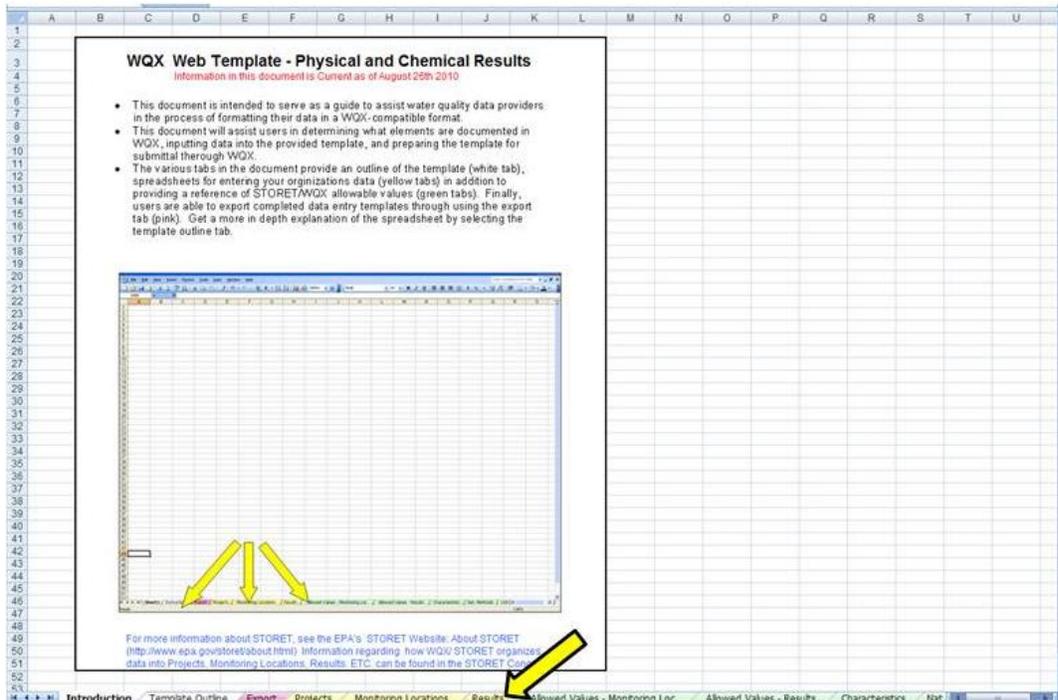
2. Observe how the header row (row 1), in the results document is labeled with different required categories. Categories underlined and colored in blue are hyperlinked to a table of allowable

values for the corresponding category in the STORET system. By accessing these tables, users can look up the values that encompass each category. Select "Activity Media Name".

3. Clicking on "Activity Media Name" hyperlink directs users to a listing of the various values associated with the corresponding category. Users are directed to an appended page, "Allowed Values-Results", alternatively accessible by selecting the corresponding labeled green tab at the bottom of the spreadsheet. Since data values in WQX are case sensitive, it is important to submit values and metrics in the correct formats listed in the "Allowable Values" spreadsheet. Select the yellow tab labeled "Results".

4. Next examine the results data to find the errors listed on the Dataset Summary Page.

Method Speciation Name	Result Detection Condition	Result Measure	Result Unit	Result Sample Fraction	Result Status ID	Statistical Base Code	Result Value Type	Result Analytical Method ID	Result Analytical Method Context
		6.6	mg/l		Final				360.1 USEPA
		0.319	mg/l	Dissolved	Final				160.1 USEPA
		8.57	None		Final				150.1 USEPA
		0.24	mg/l		Final			2520-B	APHA
		70.16	deg F		Final				2550 APHA
		35	NTU		Final				2130 APHA
		8.52	mg/l		Final				360.1 USEPA
		0.313	mg/l	Dissolved	Final				160.1 USEPA
		8.95	None		Final				150.1 USEPA
		0.23	mg/l		Final			2520-B	APHA
		61.25	deg F		Final				2550 APHA
		7.16	mg/l		Final				360.1 USEPA
		0.367	mg/l	Dissolved	Final				160.1 USEPA
		8.55	None		Final				150.1 USEPA
		0.27	mg/l		Final			2520-B	APHA
		49.46	deg F		Final				2550 APHA
		43	NTU		Final				2130 APHA
		0.9022	mg/l	Dissolved	Final			4500-NH3(C)	APHA
		7.2	mg/l	Dissolved	Final				353.3 USEPA
		4.46	mg/l	Dissolved	Final			4500-O-G	APHA
		11.3	mg/l	Total	Final				354.1 USEPA
		0.8022	mg/l	Dissolved	Final			4500-NH3(C)	APHA
		6.2	mg/l	Dissolved	Final				353.3 USEPA
		3.46	mg/l	Dissolved	Final			4500-O-G	APHA
		10.3	mg/l	Total	Final				354.1 USEPA
		1.0022	mg/l	Dissolved	Final			4500-NH3(C)	APHA
	Not Detected	<.001	mg/l	Dissolved	Final				353.3 USEPA
		5.46	mg/l	Dissolved	Final			4500-O-G	APHA
		12.3	mg/l	Total	Final				354.1 USEPA

Introduction / Template Outline / Export / Projects / Monitoring Locations / **Results** / Allowed Values - Monitoring Loc / Allowed Values - Results / Characteristics / Nat.

5. The first error listed in the "Event Log Messages*"* is "**Result Measure Unit Code and Result Value Type Name are required when Result Measure Value contains a numeric value**." This means that, when there is a number listed as your result, both units and the "Result Value Type" must be listed. Notice that the values in the "Result Measure" column have numeric values listed. Also note that the "Result Unit" measure code is already populated with units, while the "Result Value Type" name column is blank. Finally observe that one of the Result Measure records does not have a numeric value, but instead is reported as "<.001". This will be discussed later in the tutorial, but a value type is still assigned to this record.

6. Examples of allowable values for the *Result Value Type* are "Actua*l*", "Estimated", and "Calculated". In this case, they are all "Actual" values that were determined during the monitoring. In the Import Configuration, make "Actual" the default value so "Actual" can be automatically entered in all records for the *Result Value Type* field.

			Field	Value		Count	
Remove	15		Characteristic Name	{none}		1	Add/Edit
Remove	16		Method Speciation	{none}		0	Add/Edit
Remove	17		Result Detection Condition	{none}		0	Add/Edit
Remove	18		Result Value			0	Add/Edit
Remove	19		Result Unit	{none}		0	Add/Edit
Remove	20		Result Sample Fraction	{none}		0	Add/Edit
Remove	21		Result Status ID	{none}		0	Add/Edit
Remove	22		Statistical Base Code	{none}		0	Add/Edit
Remove	23		Result Value Type	Actual		0	Add/Edit
Remove	24		Result Analytical Method ID	{none}		0	Add/Edit
Remove	25		Result Analytical Method Context	{none}		0	Add/Edit
Remove	26		Analysis Start Date		YYYY/MM/DD	0	Add/Edit
Remove	27		Result Detection/Quantitation Limit Type	{none}		0	Add/Edit
Remove	28		Result Detection/Quantitation Limit Measure			0	Add/Edit
Remove	29		Result Detection/Quantitation Limit Unit	{none}		0	Add/Edit
Remove	30		Result Comment			0	Add/Edit

7. The next error in the "Event Log Messages" states: "**Either Result Measure Value or Result Detection Condition Text must be reported, but not both**." Examine the template file and fix.

8. When scrolling through the "Result Detection Condition" and "Result Measure" fields, notice that there is a record that has been populated for both. The "Result Detection Condition" field states "Not Detected", whereas the "Result Measure Value" field contains the value "<.001". Both of these fields may not be populated. One of these can be changed to a blank cell. In this case, it appears that this record for Nitrogen, Nitrate (NO_3^-) as N, is a non-detect, and that the detection limit is intended to be <0.001 mg/l.

9. Note that the detection limit of this analytical method is .001 mg/l. It will be important to remember that to fix the next error. Delete the (<.001) in the "Result Measure" field for this particular record.

10. The final error in the "Event Log Messages" states: "**When Result Condition Text is 'Not Detected', 'Present Above Quantitation Limit', or 'Present Below Quantitation Limit', then**

the Detection Quantitation Limit Type Name and Detection Quantitation Limit Measure must be reported." In other words, when reporting a non-detect, the type of detection limit or quantitation limit, the detection limit itself, and the units of the detection limit must be provided.

11. Scrolling to the right in the template, notice that the "Result Detection /Quantitation Limit Type", "Result Detection / Quantitation Limit Measure", and "Result Detection Quantitation Limit Unit" columns are blank. Fill in these three fields for the previously corrected record. Note that none of the other records require these fields to be filled because they all have quantifiable results.

12. Use the dropdown menu in the "Result Detection Quantitation Limit Type" column to fill the appropriate record with the allowable value "*Method Detection Level*".

13. Fill in the detection limit of "0.001" in the "Result Detection /Quantitation Limit Measure" column for the appropriate record. Then, use the dropdown menu in the "Result Detection Quantitation Limit Unit" column to select the units to "mg/l"

14. Save your work in the template. Select the "Export Data" tab.

15. Click on the "Export Results" button.

16. On your hard drive, navigate to the desired location to save the text file. Name the file "**WQXWeb_Results.txt**", overwriting the original file.
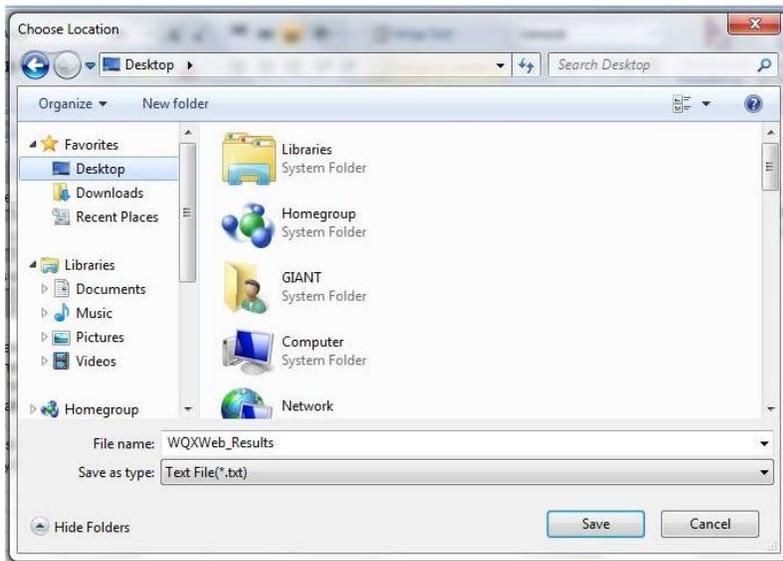
17. After correcting the provided results file, close the WQX Template.

Re- importing Your Corrected File

1. Follow Steps 1 through 10 of the *Loading Results Data Text Files into WQX Web* section. to re-import the file "WQXWeb_Results.txt", using the recently modified Import Configuration (Copy of Training Import Results).

2. After importing the file successfully with no errors, the file will have to be exported to CDX. Upon examination of the "Dataset Summary*"*, notice that there were zero errors and zero warnings found during the import validation. Also, there are 29 Valid Results and 6 Valid Activities in this import. The next step is to submit the data to CDX.
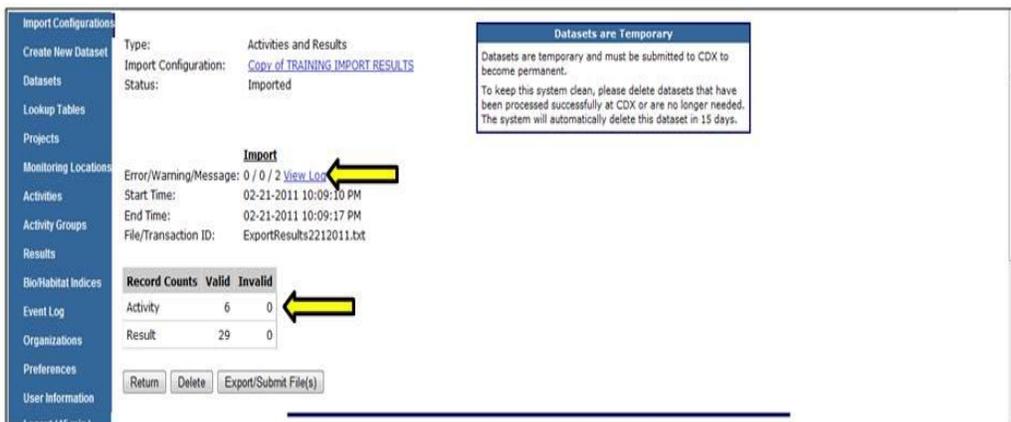
3. To submit the data to CDX, click on the "Export/Submit File(s)" button at the bottom of the "Dataset Summary page.
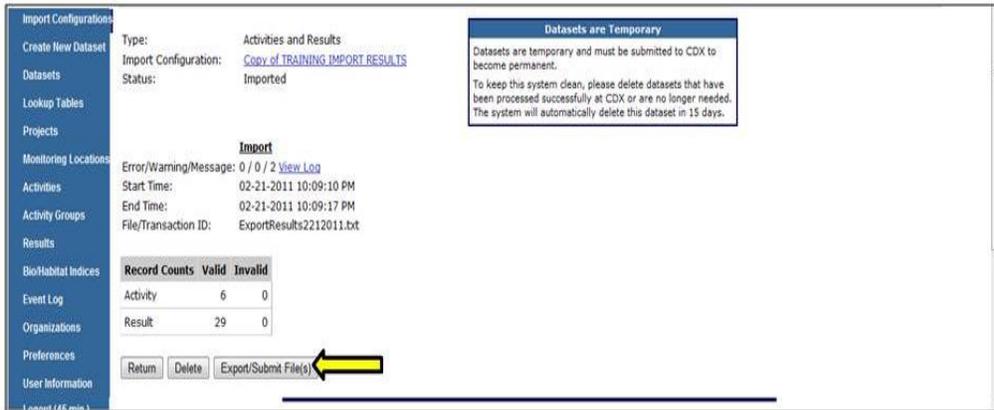
4. Under the WQX XML File heading, click the "Export and Submit to CDX" radio button. Make sure corresponding information is filled in for "Author", "Organization" and "Contact Info" (email address). Click the "Continue" button on the left side of the screen.

5. If the dataset summary page does not automatically refresh, click on the refresh button of your internet browser for an updated status of your imported file.

Viewing Report Errors

1. Notice that your status on the Dataset Summary page is "Complete at CDX", which indicates a successful upload.

2. Click on the "ProcessingReport.zip" link to confirm that your dataset had no errors. Save it to your hard drive and open it.

The processing report will reaffirm that your data was transmitted successfully, or completed at the top of the document. Towards the middle of the document, counts of items processed and errors encountered are given. Towards the bottom of the document are details on processing failures and errors. Note the absence of any invalid submissions or red boxes titled "Error". This means that your submission to CDX was successful.

Importing an XML File

XML files can also be submitted through WQX WQB. Example XML files can be found at The URL: http://www.epa.gov/storet/wqx/products/WQX_Web_Tutorials_ExampleData.zip). The provided example XML files are pre-populated with results data (WQXWeb_Results.xml), Monitoring Locations (WQXWeb_MonLocs.xml) and project information (WQXWeb_Project.xml). To practice loading example XML files, see the following steps.

1. Click on the "Create New Dataset" link to begin importing your XML results data file

2. Click on the "Submit an XML file" link under the "To Submit XML" header.
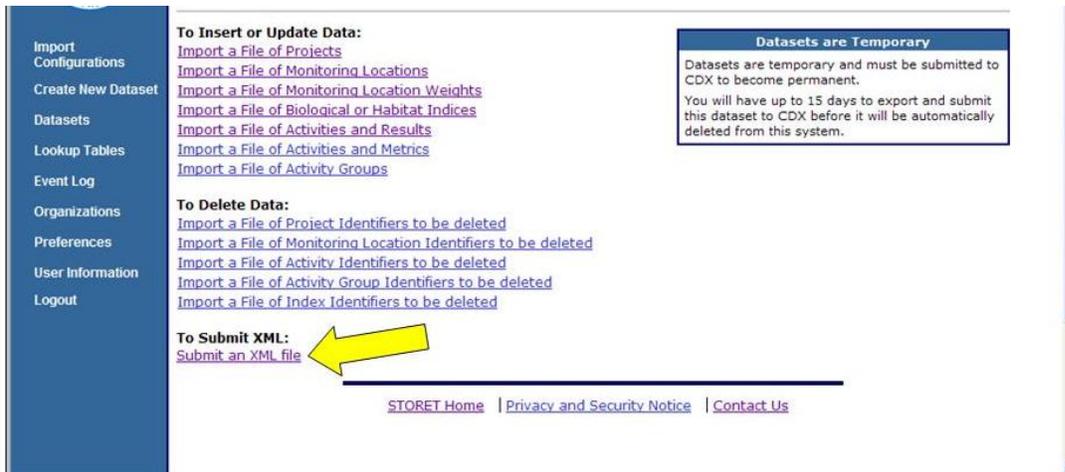
3. Click on the "Browse" button to select the file to import, this tutorial will use example data file WQXWeb_Projects.XML. Click "Continue" to import your file into CDX.

4. After clicking import, you will notice on the Dataset Summary page your status is "Complete at CDX", which indicates a successful upload.

Troubleshooting

Note: excessive traffic in the site from multiple organizations uploading simultaneously sometimes may affect the success of your upload. If your file does not successfully upload at first, try uploading it a second time before troubleshooting.

If you receive the error "connection was forcibly closed by the remote host." Submit your data again after a few moments. This error often comes due to high amounts of traffic.

Summary

   Congratulations! The Uploading Results and Working With Errors tutorial is now complete. This tutorial, provided guidance on defining sample collection methods in WQX Web, coping and working with Import Configurations, using translations and defaults, submitting a XML file via WQXWeb, and troubleshooting errors that could occur during the import and submission process. Please refer to WQX Web tutorials 1-4 for guidance on creating and modifying Import Configurations, and importing Project and Monitoring Location data. For an extensive discussion on submitting data files through WQX Web, please refer to the following URL
http://www.epa.gov/storet/wqx/products/WQX_Web_User_Guide_v2.0.pdf.