QAQC WEB SERVICES

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INTRODUCTION TO QAQC WEB SERVICES

In September 2021, the Water Quality Exchange (WQX) Team released a new quality assurance and quality check (QA/QC) service for the WQX. This innovative service provides critical feedback to data submitters on potential data errors in their submitted data, thereby improving the overall quality of water quality monitoring data shared publicly. Historically, WQX required users to fully document the metadata for any data shared, but this new service takes this one step further by conducting deeper analysis on the data by looking for values outside a valid range, incorrect units, incorrect locations, duplicate locations, duplicate results, and data consistency checks. The QA/QC service provides a user-friendly downloadable report for both locations and sample results. Both reports provide detailed information about any errors identified in the data sets. The QAQC web service is automatically applied to any data submitted through WQX. Work is underway to add this capability to any data downloaded from the Water Quality Portal in 2024. Also proposed in 2025 is to publish the QAQC web services as a standalone or PRE-submission service, providing critical feedback to data providers prior to a successful WQX submission.
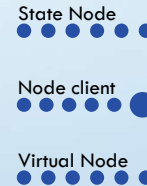
Dataflow for the QAQC web services

I have an XML file

Node/Node Client Virtual Node — Custom XML generation scripting mapping to WQX standard

NAAS ID (email)

NodeHelpdesk 1-877-827-0260 or email nodehelpdesk@epacdx.net

XML

EPA Node (WQX data flow)

"Authenticated endpoint"

QAQC (POST-submission) services 2021

State Node

Node client

Virtual Node

CDX

WQX Database

Public endpoint

QAQC (PRE-submission) services 2025

I have a spreadsheet or XML file

Web Browser WQX Web & API services — CSV or spreadsheet transformed to WQX standard

CDX Username firstnamelastname

CDXHelpdesk 888-890-1995 or email helpdesk@epacdx.net

XML

EPA Node (WQX data flow)

QAQC (CACHED) services 2024

Public endpoint

Water Quality Portal

WQP

www.waterqualitydata.us
WQX, STORET, NWIS, STEWARDs,…

Data Dictionary for QAQC POST web services

TABLE 1. "LOCATION": QAQCLOCATION.CSV

Location Elements (DATA submission)	Definition
Organizationformalname	A designator used to describe the unique name, number, or code assigned to identify the organization, agency or data owner.
MonitoringLocationIdentifier	A designator used to describe the unique name, number, or code assigned to identify the monitoring location.
MonitoringLocationName	The designator specified by the sampling organization for the site at which sampling or other activities are conducted.
MonitoringLocationType	The descriptive name for a type of monitoring location.
Latitude	The measure of the angular distance on a meridian north or south of the equator.
Longitude	The measure of the angular distance on a meridian east or west of the prime meridian.

Data Dictionary for QAQC POST web services

CONTINUED TABLE 1. "LOCATION" METADATA

Location Elements (DATA submission)	Definition
LastChangeDate	The Unique ID for the user responsible for the last change to data in this row
TransactionIdentifier	The CDX Transaction ID that was responsible for the last change to data in this row
Country	A code designator
State	A code designator used to identify a principal administrative subdivision of the United States, Canada, or Mexico.
County	A code designator used to identify a U.S. county or county equivalent.
HUCEightDigitCode	The 8 digit federal code used to identify the hydrologic unit of the monitoring location to the cataloging unit level of precision.

Data Dictionary for QAQC POST web services
CONTINUED TABLE 1. "LOCATION"

Location Elements (GENERATED)	Definition
GEO_LATSCALED GEO_LONGSCALED GEO_COUNTRY GEO_STATE GEO_COUNTY GEO_HUCTWELVEDIGITCODE GEO_REACHCODE	Table: QAQCLatLongValidation UNPUBLISHED domain value service • "N/A" is prefixed for any unregistered lat/long proximity points

Review Domain Spreadsheet for report: QAQCLocations.zip
1. ftp://newftp.epa.gov/storet/wqx/domain_alerts/qaqc/
   a. CACHED reverse geocoding metadata for all lat/long proximity points

Review Domain value services for report: QAQCResults.zip
1. QAQCCharacteristicValidation (ZIP) | (XML) | (CSV)
   a. Validation rules for measure value ranges, units, speciation, fraction and methods
   b. Guidance info via NOTES_RECOMMENDATION (a work in progress)
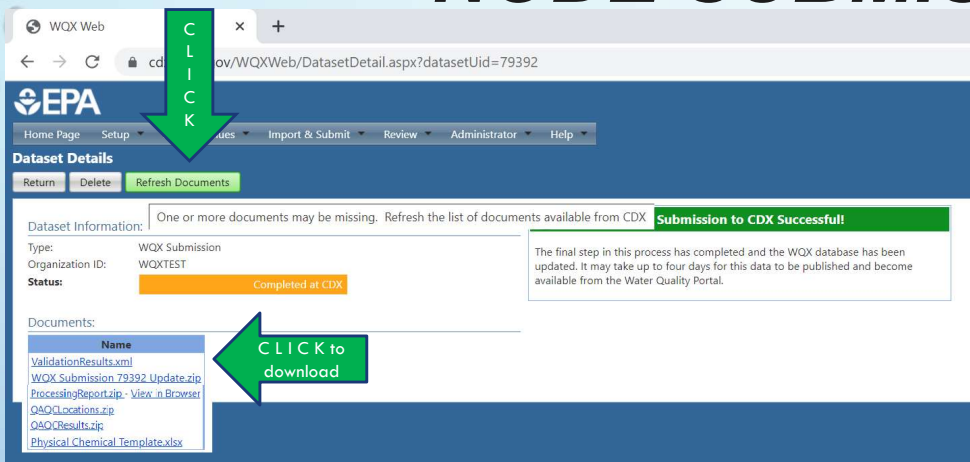
Data Dictionary for QAQC POST web services
CONTINUED TABLE 1. "LOCATION"

Location Elements (Validation)	Criteria / Definition
InvalidUSALatLong	Verify Negative Latitude and Positive Longitude are NOT in USA hemisphere
DuplicateSiteOrg	Identify Organizational Sites with same Lat/Long points within 3 digit decimal precision
NationalSiteDups	Identify National Sites with same Lat/Long points within 3 digit decimal precision
Less3DigitDecimal	Precision and scale for latitude or longitude is less than 3 digits decimal
CountryDISAGREEwLatlong	User Supplied Country disagrees with reverse geo coded lat/long metadada
StateDISAGREEwLatlong	User Supplied State disagrees with reverse geo coded lat/long metadada
CountyDISAGREEwLatlong	User Supplied County disagrees with reverse geo coded lat/long metadada
NOTES_RECOMMENDATION	Guidance info for the allowable / standard domain values

Data Dictionary for QAQC POST web services
NODE SUBMISSION FILES

WQX Web is a trusted application that formats, and transforms submitted excel or other text files into xml schema submission files. In WQX Web, clicking the "Refresh Documents" button creates hyperlinks for downloading individual processing files and QAQC reports.

What are the requirements to access QAQC web services? Currently a user account is required.
Data submitter must successfully submit to the WQX dataflow and map the WQX standard (a XML file).

Processing File(s):
1. WQXSubmission.XML
2. Validation.XML
3. QAQCResult.zip
4. QAQCLocation.zip
5. ProcessingReport.zip

Note: ALL Files are available to download, upon CDX email notification of "Transaction is finished with status: COMPLETED."

Data Dictionary for QAQC POST web services
EXAMPLE QAQC REPORTS

Data Dictionary for QAQC web services
TABLE 2. "RESULT": QAQCRESULT.CSV

Result Elements (DATA submission)	Definition
Organizationformalname	A designator used to describe the unique name, number, or code assigned to identify the organization, agency or data owner.
ActivityIdentifier	A designator used to describe the unique name, number, or code assigned to identify the sampling activity.
ActivityStartDate	The calendar date on which the field activity was started.
ActivityType	The text describing the type of activity.
ActivityMediaName	Name or code indicating the environmental medium where the sample was taken.
MonitoringLocationIdentifier	A designator used to describe the unique name, number, or code assigned to identify the monitoring location.
ResultDetectionConditionText	The textual descriptor of a result.
CharacteristicName	The object, property, or substance which is evaluated or enumerated by either a direct field measurement, a direct field observation, or by laboratory analysis of material collected in the field.
ResultSampleFractionText	The text name of the portion of the sample associated with results obtained from a physically-partitioned sample.
ResultMethodSpeciationText	Identifies the chemical speciation in which the measured result is expressed.
ResultMeasureValue	The reportable measure of the result for the chemical, microbiological or other characteristic being analyzed.
ResultMeasureUnitCode	The code that represents the unit for measuring the chemical substance, microbiological substance or other characteristic.
ResultStatusIdentifier	Indicates acceptability of the result with respect to QA/QC criteria.
ResultDepthHeightMeasure	A measurement of the vertical location (measured from a reference point) at which a result is obtained.
StatisticalBaseCode	The code for the method used to calculate derived results.
AnalyticalMethodIdentifier	The identification number or code assigned by the method publisher.
AnalyticalMethodIDContext	Identifies the source or data system that created or defined the identifier.
LastChangeDate	The Unique ID for the user responsible for the last change to data in this row
TransactionIdentifier	The CDX Transaction ID that was responsible for the last change to data in this row

QAQC Report defined sections (I, II, III):

Section I: This group of elements consist of a minimum set of selected elements representing a summary of the current data submission.

Section II: This section consist of validation elements from the QAQC domain value table: QAQCCharacteristicValidation and QAQCLatLongValidation.

Section III: This section consist of binary indicators as column headers. Instead of no (N) and yes (Y), the binary values are sometimes referred to as false and true. A yes (Y) means action is recommended to resolve the flagged indicator.

CONTINUED TABLE 2. "RESULT": QAQCRESULT.CSV

Result Elements (Validation)	Definition
Invalid_CharacteristicName_YN	NOT a valid Characteristic domain value
Invalid_Unit_YN	NOT a valid Measurement Unit domain value
Invalid_Speciation_YN	NOT a valid Method Speciation for the supplied Characteristic domain
Invalid_Fraction_YN	NOT a valid Sample Fraction for the supplied Characteristic domain value
Uncommon_Analytical_Method_YN	NOT a valid Analytical Method for the supplied Characteristic domain value
Result_Special_Characters_YN	Special characters found PREFIXED >~@^< in Result Measure Value
QAPP_NOTApproved_YN	Indicates whether a Quality Assurance Project Plan (QAPP) has been approved for the submitted project.
QAPP_Doc_Missing	Indicates whether a document has been Uploaded for the submitted project.
Below_Lower_Threshold_YN	Indicates Measure Value is below the LowerRange
Exceeds_Upper_Threshold_YN	Indicates Measure Value is above the UpperRange
LowerRange	The lowest number of the range
UpperRange	The highest number of the range
TargetUnitRange	The Target Unit based on Characteristic
UnitConversionFactor	The Conversion Measure Value Formula is (ResultMeasureValue+UnitConversionCoefficient) * UnitConversionFactor
UnitConversionCoefficient	The Conversion Measure Value Formula is (ResultMeasureValue+UnitConversionCoefficient) * UnitConversionFactor
NOTES_RECOMMENDATION	Shows all allowable domain values for a given characteristic

Helpful Resources: https://www.epa.gov/waterdata/water-quality-data-upload-wqx#custom

1. Visit the WQX website to download the Data Exchange Template (xls) (excel file) – for the complete WQX data directory and element definition.
2. WQX Schema Business rules: https://cdx2.epa.gov/WQXWeb/StaticPages/GlossaryWqx.htm#ValidationRules

Introduction to
QAQC Web Services

Do you have
any questions?

Contact: WQX/WQX Web Helpdesk
Water Quality Portal Helpdesk
Support Hours: 8:00 am to 6:00 pm (ET).
By Telephone: Call our toll-free line at
800-424-9067
By E-mail: wqx@epa.gov