

Valid Values Best Management Practices in an Environmental Data Management System

“Why valid values are critical to successful data management systems”

Introduction

For some, valid values may seem like a small detail in the big picture of data management, but the data-management community recognizes that a solid system to manage valid values is one of the basic building blocks of a successful data-management system.

This white paper describes best practices for managing valid values in an Environmental Data-Management System (EDMS). It is designed to assist environmental data managers and teams in designing, documenting, and improving their valid values-management program. The primary goal is to increase the reliability of EDMS data.

Valid values are specific data types, ranges, conditions, and terms that limit what data can be entered into certain fields within an EDMS. The primary data types include numeric, date and time, and text fields. Some numeric fields have specific value ranges or formats, such as the pH scale or decimal degrees. Likewise, text fields have character limits, specific formats like phone numbers, or require specific, established values. These values are all controlled by the system.

A well-managed valid values program includes developing, maintaining, and communicating consistent and well-defined terms. This valid values management program plays an important role in maintaining EDMS data quality by ensuring that all parties understand and use terms consistently and correctly. Establishing and documenting a process for managing valid values is important. The process may involve a data-management team that can access a variety of resources to develop the valid value definitions.

The focus of this white paper is to provide some best management practices for managing and maintaining valid values as an important part of an environmental data-management system. This includes typical database fields controlled by valid values, suggestions for incorporating a valid value-management process as part of your EDMS, and some additional practices for communicating information about valid values so they are known and so that higher quality data is obtainable in an efficient, cost-effective manner.

Finally, this white paper identifies some of the common challenges associated with communicating valid value information, managing valid value synonyms, the downstream effects of modifying valid values, and additional challenges our team plans to address in future white papers. The best management practices discussed in this white paper will assist environmental data managers and data-management teams with implementing valid values-management processes that ensure their data are technically and legally defensible and are consistent for sharing across other departments and agencies, as necessary.

Common Valid Value Terminology

Valid values, within any particular EDMS, are referred to by various terms, depending upon the EDMS (consumer off-the shelf or custom) or the managing organization. Valid values refer to having a proper value entered in a database field constrained by a set of business rules for that database field. Additional constraints on the list of valid values may include data type (text, numeric, date etc.), or for numeric values, a numeric range that may be programmed to control the valid values. When valid values are constrained to only include certain values in a list for a database field, they can be referred to differently with the same meaning and intent. Here are some examples of common terms used that represent the meaning of valid values:

Allowed or Allowable Values	Pertains to a list of certain values that are allowed for data entry in a given database field.
Controlled Lists	Refers to a list of certain values for data entry in a database field that may be managed in a table with a database relationship to a given field so it limits or “controls” the values that can be selected during data entry.
Domain Values	Geographic Information Systems (GIS) sometimes refer to metadata fields of a feature class attribute table as domain fields and the specified values that can be selected for entering in these fields can be referred to as “Domain Values.”
Enumerated Lists	Refer to valid values that are specifically listed to be used for populating a database field during data entry. “Enumerated Lists” is a term referred to when a set list of valid values is programmed within a data entry application for controlling the selectable list which appears during data entry. These “Enumerated Lists” are often “Yes/No/NA” values or other shorter lists that don’t require a database table to manage.
Lookup Values and Lookup Tables	“Lookup Values” are often referred to when valid values are stored on a “Lookup Table” in a database that has a database join/relationship to a data field on another database table which limits the values that can be entered into a respective field.
Lookup Lists	“Lookup Lists” are similar to “Enumerated Lists” and represent data entry fields controlled by a limited, and sometimes selectable, list of values for a given database field during data entry.
Reference Values and Reference Tables	Like lookup values and lookup tables, reference values are also referred to as valid values stored on a reference table in an EDMS database that has a database join/relationship to a data table field on another database table limiting the values that can be entered into a respective field.

In the context of this white paper for the best management practices of valid values, all of these terms are considered synonyms representing valid values. It is suggested that data-management teams, organizations, agencies and others managing valid values should define database fields that use valid values using consistent terminology in the EDMS data dictionary and documentation.

Common Valid Values Types

Certain data fields in EDMSs benefit from the use of valid values to control the information allowed to be stored and queried. These valid value types are grouped into categories most commonly used in a EDMS. This is by no means considered an exhaustive list as some types of valid values might be under a different name familiar to you or some types might be gradational or overlap with valid value types in other systems.

Related to Analytical Chemistry

Valid Value Type	Valid Value Description and Examples
Chemical, Analyte, Characteristic, or Parameter Code	Unique identifier for a chemical or parameter. The CAS Registry Number (CAS RN or CAS Number) is the preferred identifier since it is universal, but some parameters do not have a CAS RN and either do not use an identifier or use an alternate identifier such as the EPA Internal Tracking Number or a system-specific code. We advise that you limit your CAS RN field to CAS Numbers if your EDMS has an alternate primary key field for each chemical or parameter code. Ex. 11119-70-3, 37680-65-2
Chemical, Analyte, Characteristic, or Parameter Name	Common and consistent spelling of a chemical or parameter name to be used with consistent meaning in all documents, tables, and reports the EDMS is used to prepare. Some systems use a synonym table, which allows for other spellings and abbreviations (e.g., TCE instead of Trichloroethene. Even in these cases, a common spelling and consistent case is advised for the primary name. Ex. PCB-118, 1,1'-Biphenyl, 2,2',5-trichloro-, 2,2',5-Trichlorobiphenyl.
Speciation, Method Speciation	Portion or component of the chemical measured in a sample. Ex. "as NO ₃ ," "as N" (<i>45mg/L Nitrate as NO₃ X 0.255 = 10 mg/L Nitrate as N</i>).
Analytical Method, Result Method	Procedure or method used to derive a result. Can include lab (analytical), field (measurement), and derivation (calculated) methods. Generally has a method code and description. (Ex. SW8260B)
Preparation Method	Field or laboratory procedure or method used to prepare a sample for measurement or analysis. Oftentimes the preparation method is part of the analytical method and is not stated separately. Generally has a method code and description. Ex. FILTER.45um (Filtered with 0.45 micron filter (material unspecified)), EPA SW3510C (Separatory Funnel Liquid-Liquid Extraction, Revision 3).
Data Qualifiers, Result Data Qualifier	Data qualifiers are used by laboratories and also by third-party data validators to verify, qualify, and validate the data. These qualifiers are generally letter codes used in representing the quality of the data based on the analytical methods and procedures followed, and other quality- control factors recorded by the field team and

	laboratory, such as hold times, concentrations detected in field, and laboratory quality-control samples. Ex. J (Analyte was positively identified and the reported result value is an estimate)
Data Validation Level, Result Validation Level	Level to which data were validated by a third party or other qualified data validator, often U.S. EPA National Functional Guidelines. Ex. EPA Level 1, EPA Level 2A.
Fraction Analyzed, Sample Fraction	Indicates the fraction of an aqueous sample that was analyzed. Also includes analyses performed on lab-generated leachates derived from solid samples. Ex. Filtered, Non-Filtered, Total, Dissolved, Trace, Suspended, TCLP
Result Weight Basis, Result Basis	Form or portion of sample associated with result value. Ex. Dry, Wet, Unknown.
Result Statistical Basis, Statistical Base	Method used to calculate derived results. Ex. Mean, Max, Min, etc.
Reporting Limit Type	Reporting limit is the minimum concentration at which detection of a parameter is reported. Ex. Method Reporting Limit (MRL), Practical Quantitation Limit (PQL)
Detection Limit Type	Detection limit is the minimum quantity of a parameter that can be distinguished from background. Ex. Method Detection Limit (MDL), Limit of Detection (LOD)
Analysis Test Type, Lab Replicate	Lab replicate samples Ex. Diluted, re-analyzed, re-extracted.
Result Status	Ex. Raw, Provisional, Final, etc.
Result Type	Ex. Target Analyte, Surrogate, Tentatively Identified Compound.
Units of Measure, Units	Units of measure associated with the value. Ex. milligrams per liter (mg/l), degrees Celsius (deg C).
Laboratory Company Code, Lab Name	The identifier of the laboratory responsible for performing tests on the sample. A Laboratory table typically includes laboratory code, laboratory name, address, primary point of contact, and phone number.
Laboratory Sample Matrix	It is sometimes relevant to distinguish the matrix of a sample in the lab from the matrix of the same sample at the point of collection. Typically seen as more “simplified” version of the sample matrix. (i.e., Water, Solid, Biota)
Lab Sample Type, Lab QC Type	Type of sample analyzed. Ex. Normal Field Sample, Duplicate (Dup), BLK (Blank), BS (Blank Spike), BSD (Blank Spike Duplicate), TB (Trip Blank), FD (Field Duplicate)

Related to Biological Assessment Data

Valid Value Type	Valid Value Description and Examples
Taxonomic Name	Scientific name or common name of the subject organism. Ex. <i>Oncorhynchus keta</i> , chum salmon
Taxonomic Identifier	Taxonomic Serial Number (TSN/ITIS), AphiaID (WoRMS)
Taxonomic Level	The level in the taxonomic hierarchy of the subject organism. Ex. Genus, Species
Life Stage	The life stage of the subject organism. Ex. Adult, Egg, Juvenile
Gender	Gender of the subject organism. Ex. M, F
Tissue Type, Tissue Anatomy	Type of tissue that was analyzed. Ex. Muscular System, Digestive and Excretory System
Habit	Position the organism occupies in a food chain. Ex. Burrower, Clinger
Voltinism	Number of broods or generations of the organism in a year. Ex. Multivoltine (more than one generation in a year)
Cell Shape	Cell shape of phytoplankton organism. Ex. Cylindrical (Drum-shaped cells)
Assemblage or Group	Amphibians, Fish, Invertebrates
Metric Type	The individual values and scores that make up a biological assessment for a specific monitoring location. Ex. Total Taxon Richness, Relative Richness
Index Type	The overall biological assessment score for a specific monitoring location. Ex. BIBI (Benthic Index of Biological Integrity), RIVPACS

Related to Geological, Hydrogeological, and Subsurface Field Characterization

Valid Value Type	Valid Value Description and Examples
Soil Classification or Formation Type	The coding system used to describe soil classifications making up the lithology such as the Unified Soil Classification System (USCS)
Drilling Method	Method of drilling that is related to the drill rig used such as Auger, Sonic, or Air Rotary
Well Type	Type of well such as Monitoring, Production, or Injection

Well Completion Type	A description of how the well was completed such as Screen, Open End, Open Hole
Well Casing Material	Material used in a given segment of the well such as PVC, Stainless Steel, Black Iron
Screen Material	Material used in the water intake screen such as PVC, Stainless Steel
Aquifer Name	Common names used to describe aquifers located in the region or respective study area
Downhole Point Parameter	Measurements captured during drilling such as Resistivity, Gamma Ray, Soil Electric Conductivity

Related to Location Information

Valid Value Type	Valid Value Description and Examples
Location Type	A type description of a sampling or survey data collection location such as Temporary Well, Monitoring Well, Soil Boring
Location State	State abbreviation (NY, BC, MI, etc)
Location County	County Code or Name
Location Country	Country abbreviation (USA, CN, DE)
Coordinate System	Decimal Degrees, State Plane Coordinate System (SPCS), Universal Transverse Mercator (UTM)
State Plane Zone	North, South
UTM Zone	10, 11
Coordinate Datum	WGS 84, NAD83HARN or HARN
Coordinate Accuracy	A value or code to indicate the accuracy level of the coordinates provided.
Coordinate Collection Method	A method for how the coordinates were collected such as GPS, Professional Survey, or Digitized
Coordinate Source Map Scale	If coordinates were digitized from a map the map scale of the source map
Elevation Datum	NAVD88, WGS84, etc. Some systems require the exclusive use of NAVD88, the most current and applicable vertical datum for North America.
Elevation Accuracy	A value or code to indicate the accuracy level of the elevation datum provided
Elevation Collection Method	A method for how the elevation was collected such as GPS, Professional Survey, or Digitized

Surveyor Company Code	A code representing the company that completed the site survey
Facility / Site / Area / Subfacility / or Building Type Codes	Because various users have reason to subdivide data by region or location, some might divide the sites they submit data for by operable units, buildings, or subfacilities. Defining the naming convention for site areas, subfacilities, or building codes is a good practice for an EDMS even though these values will vary from project to project a EDMS wide naming convention will be more efficient to administer.
Foundation and Structure Type	Information about the foundation of a structure building. Ex. Basement, crawlspace, partial basement, slab.

Related to Sample Information

Valid Value Type	Valid Value Description and Examples
Sample Matrix or Media	Soil, Groundwater, Ambient Air
Sample Collection Method, Sampling Equipment, Sample Collection Equipment Name	Bailer, KemmerBottle-PVC, Pump-GW-LowFlow
Sample Container Type	HDPE Bottle (Sample bottle made of High Density Poly Ethylene (HDPE))
Sample Type	Normal or Natural Environmental Samples vs. Field Quality-Control Samples, Equipment Blanks, Trip Blanks, Rinsate Blanks,
Sampling Company Codes	CDM Smith, ERM, Cardno
Sample Preservation Method, Chemical Preservative Used	Procedure or method used to preserve a sample. Ex. IspAlcohol (Isopropyl Alcohol)

Miscellaneous Valid Value Information

Valid Value Type	Valid Value Description and Examples
File Type	When data files can be included in data packages (docs, images, spreadsheets), use the standard file extensions and mime file type codes (.doc, .xls)

Consequential vs. Non-consequential Valid Values

When establishing baseline valid value lists in an EDMS certain database fields have more consequences if they are not filled in completely with accurate and consistent values. For example having incorrect, ambiguously defined, or even missing values in the unit of measure or chemical

parameter database fields has severe consequences to the usability of the analytical results. The result values are not properly defined and there is great uncertainty about the volume of potential chemical or analyte in the environment. Additional measures can be taken within an EDMS to require values in these important database fields and to also apply checks that the values are reasonable given other data in the database.

There are also some database fields that are less consequential to the data usability, and that include such fields as sampler names and sampler or lab company codes, whereby missing or inconsistent values do not implicate the usability of a given dataset. These database fields often have issues identified with historical data migrations, when data from several sources are brought together to form a single master dataset. During a historical data migration consideration regarding the level of effort to correct values to a consistent value throughout the dataset must be given based on the values affects to overall data usability. For more information on historical data migrations please refer to the [ICEDM Historical Data Migrations Best Management Practices White Paper](#).

Valid Value Authoritative Resources

There are several government agencies at the state and federal level that have published their valid value lists so that organizations needing to submit environmental data to these agencies can reference. These valid value tables may provide good baseline valid values for an organization's EDMS, especially if they are required to export and submit data to one of the respective agencies.

A table containing a list of agencies who have made their reference values available for reference has been provided in [**Appendix A**](#) of this white paper and will continue to be updated on the International Conference for Environmental Data Management Website here: [Insert URL for ICEDM.NET](#)

Government agencies also provide a means for outside organizations to request new valid values that may be missing from an agency's published valid value list. Organizations developing their own EDMS should strongly consider utilizing the published state and federal values as a baseline starting point for their own EDMS valid values to most effectively align their data with the state and federal agency valid values especially if they may be required to submit their data to an agency. Organizations that need to report to multiple state or federal agencies will need a method for reporting multiple variations of valid values to each respective agency. [See mapping synonyms in Section 4.](#) When submitting data to an agency and a valid value doesn't exist in the agency's valid value list, agencies have a process for requesting new valid values. Be sure to research a possible synonym in the agencies valid value list to adopt for the given valid value versus creating a new valid value. Likewise not all agencies have all valid values or may have some legacy valid values that are incorrect and inconsistent. Report these instances to the agency instead of adopting incorrect valid values in your EDMS. This feedback to the agency will assist them with improving their valid value lists. The data management team for each agency should be responsible for communicating changes, both new values and corrections, to their affected data user community as the data stewards ultimately responsible for their valid value lists.

To enhance data sharing across multiple government organizations and industries some authoritative agencies have responsibility for managing certain valid value domains. Some examples of government agencies that have published their valid value lists for use by environmental data managers include USGS, Department of Health, and National Institute of Standards and Technology. For a list of suggested valid values web references and resources to use as authoritative sources for an environmental data management system visit the resources page on [ICEDM.net](#) or see list in [Appendix B](#). As an organization, it is good to standardize your environmental information-management system to incorporate the valid values of some of these agencies and stick with that approach. When in doubt

about which organization to reference, contact the data manager for the EDMS.

Overview of the Valid Value Management Process

Managing valid values in an EDMS takes commitment from the project and data management teams as well as an established valid values management process for the data management team to follow.

Roles and Responsibilities for Managing Valid Values

Within a project, many groups and individuals are involved in the creation and management of valid values. Each group or individual that participates in valid value management has a defined role important to making this process work efficiently and successfully. Members integral to this process include those listed in the table below.

Role	Responsibility	Interest / Motivations
EDMS Stakeholders	EDMS stakeholders are anyone submitting data to a EDMS or relying upon data from the same, and may include Laboratory Data Providers, Field Data Providers, Site Data Managers, Risk Assessors, Data Validators, Data Evaluation Team, and Data Users. These stakeholders work closely with the EDMS Data Management Team to ensure data submittals are consistent with EDMS valid values.	EDMS stakeholders can, in some cases, be responsible for the maintenance of their own EDMS. Accordingly, they can have an interest in being able to receive and submit data that aligns with how valid values are arranged in their system.
EDMS Data Management Team	The EDMS Data Management Team is entrusted with valid value management. This includes enforcement and distribution of established standardization rules and guidelines. The team works closely with stakeholders and subject matter experts to verify accuracy of value additions, complete valid value additions or updates, and communicate valid value updates and changes.	EDMS Data Management Teams can have an interest in providing clarity and managing redundancies in their set of valid values. Distinct valid values describing the same data can cause confusion at the level of reports generated from the data.
Subject Matter Experts (SME)	SMEs are responsible for development or approval of new valid values that adhere to valid value guidelines and standardization rules. They may verify the accuracy of information or assist with	SMEs can have an interest in ensuring that the valid values in the EDMS managed by the data-management team meet the standards set by the relevant regulatory agencies.

	providing context and content. SMEs work closely with data managers to ensure valid values are added correctly and sufficient documentation is collected to support changes.	
Regulatory Agencies	Regulatory agencies like those listed as resources in the Valid Values Resources Appendix A and B, are responsible for maintaining records, public or otherwise, of the valid values which may be used and shared across multiple EDMSs. They serve as a resource to all of the parties listed above as rules are established for the addition and consolidation of valid values.	

Valid Value Management Process

It is critical that the EDMS data -management team (DMT) develop and follow a process for managing valid values. Process guidelines for managing valid values that are established and well-documented ensure standardized and consistent information is recorded in an EDMS. The process documentation should establish a model that can accept growth and manage change. The steps for managing valid values can be incorporated into the overall **data management plan** that enforces data quality on projects. For more information on developing a data management plan see the **ICEDM Environmental Data Management Plan White Paper**. The following is a list of five suggestions a DMT should consider as part of their overall valid value management process

Standards for Creating New Valid Values

The process for adding new valid values to an EDMS begins when the overall EDMS is first established. As mentioned above, careful consideration should be given about the ultimate end state of the data management in an EDMS. If the data are required to be submitted to a regulatory agency adopting the valid values lists of that agency will streamline the overall process. Even when the requirement doesn't exist, a future need may arise, making sense to adopt the local state or EPA region valid values at the creation of an EDMS as the baseline valid values list rather than waiting until later after the data start to be collected and populate the EDMS. In addition to adopting local state and federal valid values per the respective project requirements, careful consideration of adopting certain authoritative sources—such as the EPA Substance Registry Services for Chemical Abstract Numbers and Chemical Naming Conventions or the National Environmental Methods Index (NEMI) for standard analytical method codes and descriptions as an overarching rule—allow the DMT to assist the local state and federal agency when their valid values don't also align with those authoritative source identified in Appendix B.

Process for EDMS Stakeholders to Request New Valid Values

EDMS Stakeholders on the project team may identify a need to add a matrix code or other valid value that already isn't in the current valid value list. Documenting a process that includes the submission of requests for new valid values as outlined in Figure 1 - ICEDM Valid Values Management Process assists in communicating the process to the EDMS Stakeholders and assigns responsibilities to members of the DMT and subject-matter experts to review and vet incoming requests for new valid values.

Reviewing Valid Value Requests

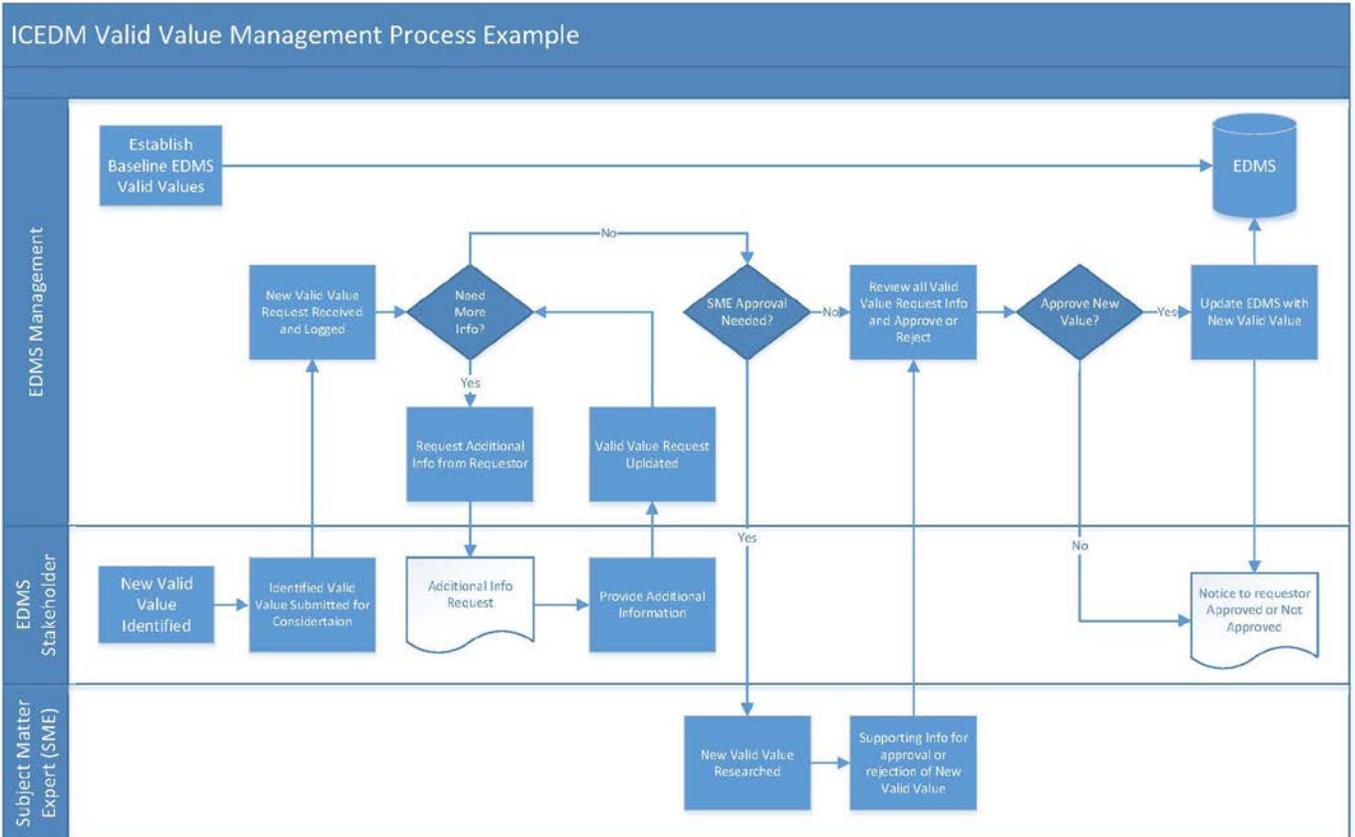
Members of the EDMS data-management team should log all valid value requests to keep track of changes identified to valid value lists. Members of the DMT should be assigned responsibility for review and approval of each valid value request to make sure that a synonymous valid value doesn't already exist in the EDMS valid value tables. If a synonym does exist in the data it should be reported back to the EDMS Stakeholder requesting the new valid value. If the valid value doesn't exist, the DMT member or team members with approval authority should consider whether they can approve adding the valid value because it is in line with industry standards and perhaps those identified in Appendix B "Authoritative Resources." There are certain valid value lists that the DMT may enlist a subject-matter expert to assist in the research of the valid value. For example chemistry SMEs part of the DMT valid values steering committee should be responsible for approving new chemicals and analytical methods. Data validators should be involved in identifying new data validation levels and data validation qualifiers. Geologists should be involved in approving new soil classification codes, again, all of which should be in line with the authoritative resources the EDMS is seeking to maintain.

Process for Adding New Valid Values or Modifying Existing Valid Values

Once a new valid value is approved for addition to the EDMS or an existing valid value to be changed, the DMT should update the valid values request log indicating the resolution and then make the change to the respective table or code in the EDMS to accommodate the new or modified valid value. It is critical that the DMT communicate the change to all EDMS stakeholders who are aligning their data to the EDMS for a given project or submission to a regulatory agency. See Communicating Valid Values in the Additional Considerations section below for best practices on communicating with EDMS stakeholders.

All process components, like those identified above, should be well-documented in supporting guidance materials (for example, a data management plan). A documented process ensures that valid values are normalized into a standard nomenclature, thus allowing users to report data from the data-management system with high confidence. For example, valid value process guidelines will ensure that only one value represents a given parameter rather than multiple values or synonyms being used. ORP and REDOX are two values that represent the same parameter: oxidation reduction potential. If valid value process guidelines are followed properly, only one of these values would be the approved valid value used throughout the EDMS. If valid value processes guidelines are not followed and both values maintained in the EDMS, data could easily be omitted from reporting.

Valid value management should also include process guidance for performing regular audits of valid values in an EDMS. The valid value audit is a very important part of the process. Audits provide both a



method to verify the process and standardization rules are being followed, and a chance to provide feedback (and make changes) if there are any deviations from what is expected. Audits should be regularly scheduled, documented, and performed systematically.

Additional Considerations When Managing Valid Values

The task of managing valid values in an environmental information management system is not an insignificant task. To be able to manage valid values an EDMS requires the database owner to have carefully identified data needs and goals to be achieved. Good valid value management requires a process which is documented, has tools, and has support and commitment from the database owner and data-management team. With the data needs and goals in mind, the data-management team can apply the principles in the valid value management process to ensure a stable, enduring and usable compilation of information.

What happens when valid values are managed well?- If the information collected from the data providers is clearly defined and easily referenced, the job of assembling data into the EDMS is simpler. The easier it is to assemble a data package, the better the data quality will be, and by extension, the easier it will be to manage the EDMS.

What happens when valid values are not managed well? Obviously, the corollary to well-managed valid values is true. Beyond that, poorly managed valid values make it difficult to retrieve data with confidence. Confidence in your the data should be a cornerstone of any EDMS.

Upstream and Downstream Effects of Valid Value Changes

Frequent changes in valid values can have many negative effects on both the upstream and downstream processes of data-management workflow. As mentioned in previous sections, a defined system of managing valid values and tracking valid value changes is crucial to the success of an EDMS.

Unless one is optimizing their data-management system, there are few positive effects generated by valid value changes, because such changes may have compounded effects on both internal and external EDMS. Care and thoughtfulness at the onset of building the data-management system will reduce the number of valid value changes and thus the negative upstream and downstream effects they often generate.

Upstream Effects of Valid Value Changes

What do we mean when we say “upstream effect”? An upstream effect, in terms of a valid value change, is any effect on the data-management system, beginning with the valid value, streaming up in the workflow of the data-management process that is related to that valid value. For example, if a data manager decided to change a valid value in the data system for an analytical method, this change would have an upstream effect on the analytical laboratory producing the electronic data deliverable (EDD). These types of changes in valid values then need to be communicated to the affected upstream party so that the quality and consistency of the data flowing into the EDMS is consistent.

Downstream Effects of Valid Value Changes

What do we mean when we say “downstream effect”? A downstream effect, in terms of a valid value change, is any effect on the data management system, beginning with the valid value, streaming down in the workflow of the data management process that is related to that valid value. An example of this may include data-reporting workflows. For example, if a consultant has designed a data-management workflow for reporting analytical data, typically that process will involve creating groups of valid values that represent how you want the data reported (e.g., analyte group). If the data manager determines that a valid value associated with an analyte group should change and implements that change in the dataset, the workflow for reporting will be disrupted if the valid value is not also changed in the analyte group selected during the reporting process.

To minimize changes to valid values in the EDMS, be thoughtful in selecting the valid values. Use the available resources (Section 4.1 and Appendix A and B) to assist in defining your valid values and establish a robust system to manage and enforce the valid values in the EDMS.

Communicating Valid Value Updates

Valid value updates should be communicated to system users, especially to those who are submitting or uploading data to a system. There are different levels of updates.

Minor Updates

Many systems receive daily requests for valid value additions. These include individual methods, parameters, taxa, labs, and units, etc. These are considered low-level updates and are usually just communicated back to the requestor.

The entire community should also have access to recent changes through any of several means:

1. valid value change log
2. reference document, file, or table including the new valid values

3. re-compiled format

Global Updates

If a valid value change affects the way data is submitted to a system, this information must be communicated to all system users, preferably in advance of the change. An example is a change to sample matrix. When one organization added sample matrix valid values to cover stormwater monitoring, this changed the way users submitted stormwater-related data. The changes were communicated to users via broadcast email lists. In some cases, it might be helpful to provide guidance specific for using new valid values, to ensure that they are consistently used when submitting data to a system. Global changes should also be communicated in the same ways as minor updates listed above.

Methods for Managing Valid Value Synonyms

As data managers, we are often faced with the need to change valid values or metadata associated with valid values upon the import or export of data to or from the EDMS. This need to change values is common when migrating historical datasets into the EDMS or providing EDDs to other end users, such as regulatory agencies. Data managers must create mechanisms within the EDMS to “translate” the valid values and associated metadata to meet the needs of all applicable EDMS, while not changing the meaning to the data.

Examples of valid values where synonyms or remapping of values is often required are chemical names, CAS numbers, soil-classification standards and analytical and preparation methods.

There are many methods that data managers use to manage valid value synonyms. One such method is a variation table, which allows the data manager to set up multiple ways of presenting the same valid value. There are two examples in the table below. One shows how chemical names can be presented in a different language (French) and the other shows how the chemical abstract services number (CAS) can be presented differently for analytes that do not have a defined CAS number. The `cas_rn` is the valid value, `var_system` is the variation system name, `cas_rn_var` is populated if you want to change how the CAS number is presented and `chemical_name_var` is populated if you want to change how the chemical name is presented. The table would then need to be linked back to the original value table and reporting options incorporated into the data management system to call these values when reporting data.

<code>cas_rn</code>	<code>var_system</code>	<code>cas_rn_var</code>	<code>chemical_name_var</code>
100-41-4	ChemName_French		Éthylbenzène
108-88-3	ChemName_French		Toluène
71-43-2	ChemName_French		Benzène
XYLENES	ChemName_French		Xylenes, Total
8006-61-9	ChemName_French		Composé organique de la gamme essence
PHCF04	Cas_Fuels	FO_No4	
PHCF06	Cas_Fuels	FO_No6	

Another such method is to remap valid values leaving the EDMS to other data systems that are already accepted in the industry or have been clearly defined by a regulatory agency.

remap_name	dB_field	internal_value	external_value
ABC_Regulatory_Agency	analytical_method_name_code	SW8260B	SW8260
ABC_Regulatory_Agency	analytical_method_name_code	SW8260C	SW8260
ABC_Regulatory_Agency	prep_method_name_code	SW5030	SW5030A
ABC_Regulatory_Agency	cas_rn	TURB	TURBIDITY
ABC_Regulatory_Agency	cas_rn	COND	SC
Soil_Class_USDA_to_USCS	material_code	Sand	SP
Soil_Class_USDA_to_USCS	material_code	Loamy Sand	SM
Soil_Class_USDA_to_USCS	material_code	Sandy Loam	SM
Soil_Class_USDA_to_USCS	material_code	Sandy Clay Loam	SC
Soil_Class_USDA_to_USCS	material_code	Sandy Clay	SC
Soil_Class_USDA_to_USCS	material_code	Loam	ML
Soil_Class_USDA_to_USCS	material_code	Silt Loam	ML
Soil_Class_USDA_to_USCS	material_code	Silt	ML
Soil_Class_USDA_to_USCS	material_code	Clay Loam	CL
Soil_Class_USDA_to_USCS	material_code	Silty Clay Loam	CL
Soil_Class_USDA_to_USCS	material_code	Clay	CH
Soil_Class_USDA_to_USCS	material_code	Silty Clay	CH
Soil_Class_USDA_to_USCS	material_code	Peat	Pt
Soil_Class_USDA_to_USCS	material_code	Bedrock	Ro

Please refer to Appendices A and B for links to valid value authoritative resources.

Challenges of dealing with emerging chemicals and identifying appropriate valid values

Managing a list of chemicals and their primary key fields in an environmental information management system can be a daunting task as new chemicals are identified in the environment. These new chemicals are known as emerging contaminants or “[Contaminants of Emerging Concern](#)” (CECs) [that have emerged from new chemical processes, pharmaceuticals and personal care products \(PPCPs\)](#). See also: <https://toxics.usgs.gov/investigations/cec/index.php>

Environmental data-management teams must be nimble in handling new chemical names and primary key fields that may or may not include a chemical abstract society registry number (CAS # or CAS RN). This reinforces two concepts of best valid values management practices:

- 1) Having a predefined naming convention so that you can use it to create the appropriate chemical name, chemical code, or chemical abbreviations.
- 2) Having a process by which valid value synonyms can be managed and the primary valid value code identified and possibly updated should the environmental information-management community use different a naming convention going forward.

Providing Valid Value Help

Finding valid value information within an EDMS

Valid Value Help

Providing documentation that explains what value values are and what resources a user has to locate and use valid values in your system can go a long way toward ensuring that they are properly used. This information can be located on a help page. Information you might want to provide includes:

- What are valid values?
- Where do I find valid values?
- How do I know what values go in what field?
- How do I request a new valid value?

See Appendix C for examples of valid value help

Lookup tables

It is good practice to provide easy access to the valid value lookup tables from your system, such as in the navigation or from your main help page.

Clickable field help

Valid value information should be available to users anywhere they are in a system. Clickable field help (with pop-up windows) is a useful way to quickly see field metadata, including valid values.

How to help users identify the appropriate valid values when entering data

If users are using an EDD to enter data

Include valid values in the EDD documentation

The primary way users get data into an EDMS is by using an Electronic Data Deliverable (EDD). To assist users in correctly populating an EDD, they need to know whether valid values are required for a specific field and if so, what they are. Incorporating this information into the EDD documentation is useful. Short lists are easy to provide within the documentation. For longer lists, you might have to point to a secondary source like a separate worksheet, another file, or an online lookup table.

Link to lookup tables from the EDD documentation

If valid value information cannot be provided within the EDD documentation, such as for long lists like parameters, then providing a link to a searchable lookup table is helpful. Linking to a “live” table is preferable, as values are always current. If security is an issue, you can point toward a nightly copy. Static lists are OK, but they need to be updated on a regular schedule.

Provide valid values export

Providing the capability to export valid values from the lookup tables is also a useful tool.

If users are using a form to enter data

If data is entered using an online form, providing drop-down or auto-complete lists for fields with valid values is essential. Drop-down lists are great for short lists; auto-complete lists are better for long lists.

Help for using valid values consistently

One of the challenges of valid values is using them consistently. For certain data types, it can be useful to provide supplementary help that shows users how to use valid values to ensure consistent data entry. These protocols should be determined by your organization.

How to request new valid values

Provide an email address for a contact person or a link to a form where users can request new valid values.

Appendix A - State and Federal Agency Valid Value Lists

A list of state and federal agencies that have made their EDMS valid values publicly available for checking data prior to submission to the agency. Copy the links to your browser in order to navigate to the respective website without compatibility issues between your browser and this PDF file.

- Delaware Natural Resources and Environmental Control (DNREC) - http://www.dnrec.delaware.gov/dwhs/SIRB/Pages/SIRB_EQuIS.aspx
- EPA Region 2 - <https://www.epa.gov/superfund/region-2-superfund-electronic-data-submission>
- EPA Region 3 - <https://www.epa.gov/superfund/region-3-superfund-electronic-data-submission>
- EPA Region 4 - <https://www.epa.gov/superfund/region-4-superfund-electronic-data-submission>
- EPA Region 5 - <https://www.epa.gov/superfund/region-5-superfund-electronic-data-submission>
- EPA Region 7 - <https://www.epa.gov/superfund/region-7-superfund-electronic-data-submission>
- EPA Region 9 - <https://www.epa.gov/superfund/region-9-superfund-electronic-data-submission>
- EPA Water Quality Exchange (WQX) - <https://www.epa.gov/waterdata/storage-and-retrieval-and-water-quality-exchange>
- Florida Department of Environmental Protection - <http://www.dep.state.fl.us/waste/ADaPT/>
- Louisiana Department of Environmental Quality - <http://www.deq.louisiana.gov/portal/DIVISIONS/UndergroundStorageTankandRemediationDivision/RemediationServices/LEADMSResourcePage.aspx>
- Montana Department of Environmental Quality (MTDEQ) - <http://deq.mt.gov/Water/WQINFO/datamgmt/mtewqx>
- New York State Department of Environmental Conservation (NYSDEC) - <http://www.dec.ny.gov/chemical/62440.html>
- New Jersey Department of Environmental Protection - <http://www.nj.gov/dep/srp/hazsite/>
- Texas Commission of Environmental Quality (TCEQ) - <https://www.tceq.texas.gov/remediation/teds/teds.html>
- Washington Department of Ecology - <http://www.ecy.wa.gov/eim/>

Appendix B - Valid Value Authoritative Resources

Analytical Chemistry Resources:

- [ALS Environmental \(formerly Columbia Analytical\) Chemical Search](http://www.caslab.com/Chemical-Search/) of chemicals compounds and elements by chemical name or CAS number.
<http://www.caslab.com/Chemical-Search/>
- [CAMEO Chemical Search](https://cameochemicals.noaa.gov/) – a search of response information for thousands of hazardous materials developed and managed by the National Oceanic and Atmospheric Administration (NOAA) Office of Response and Restoration.
<https://cameochemicals.noaa.gov/>
- [Chemindustry](http://www.chemindustry.com/index.html) – A search engine of several chemical websites for articles and publications regarding chemicals that are searched.
<http://www.chemindustry.com/index.html>
- [EPA Substance Registry Services \(SRS\)](https://iaspub.epa.gov/sor_internet/registry/substreg/searchandretrieve/substancesearch/search.do) – EPA’s central system for information about substances that are tracked or regulated by EPA or other sources.
https://iaspub.epa.gov/sor_internet/registry/substreg/searchandretrieve/substancesearch/search.do
- [Hazardous Substances Data Bank \(HSDB\)](https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm) – A toxicology database focused on the toxicology of potentially hazardous chemicals
<https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm>
- [National Environmental Methods Index \(NEMI\)](https://www.nemi.gov/home/) – A searchable database to find and compare analytical and field methods for all phases of environmental monitoring.
<https://www.nemi.gov/home/>
- [National Institute of Occupational Safety and Health \(NIOSH\) Pocket Guide to Chemicals](https://www.cdc.gov/niosh/npg/) – Presents key data for chemicals or substance groupings found in workplaces. Developed by the Center for Disease Control (CDC)
<https://www.cdc.gov/niosh/npg/>
- [National Institute of Standards and Technology \(NIST\) Chemistry Web Book](http://webbook.nist.gov/chemistry/) – Provides a thermochemical, thermophysical, and ion energetics data compiled by NIST under the Standard Reference Data Program.
<http://webbook.nist.gov/chemistry/>
- [National Library of Medicine ChemIDplus](https://toxnet.nlm.nih.gov/) – provides access to structure and nomenclature authority files used to identify chemical substances cited in the National Library of Medicine (NLM).
<https://toxnet.nlm.nih.gov/>
- [Toxicology Data Network \(TOXNET\)](https://toxnet.nlm.nih.gov/) – A search engine resource for searching databases on toxicology, hazardous chemicals, environmental health, and toxic releases.
<https://toxnet.nlm.nih.gov/>
- [U.S. National Library of Medicine PubChem](https://pubchem.ncbi.nlm.nih.gov/) – An open chemistry database chemical search.
<https://pubchem.ncbi.nlm.nih.gov/>

Geology Resources:

- [National Geologic Map Database \(NGMDB\)](#) – a collaborative effort involving the USGS and the Association of American State Geologists (AASG) to develop methods and standard practices

for creating digital maps representing geologic information.

https://ngmdb.usgs.gov/ngmdb/ngmdb_home.html

- American Society for Testing and Materials ASTM D422 – Standard Test Method for Particle-Size (Grain Size) Analysis
<https://www.astm.org/TRAIN/filtrexx40.cgi?+-P+ID+156+traindetail.frm>
- American Society for Testing and Materials ASTM D4287 – Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System (USCS))
<https://www.astm.org/Standards/D2487.htm>
- Data Interchange for Geotechnical and GeoEnvironmental Specialists (DIGGS) - a GML (XML-based) geospatial standard schema for the transfer of geotechnical and geoenvironmental data within an organization or between multiple organizations.
<http://diggsml.org/>
- International Standards Organization (ISO) 14688-1:2002 – Geotechnical Investigation and Testing – Identification and classification of soil – Part 1: Identification and description.
<https://www.iso.org/standard/25260.html>
- International Standards Organization (ISO) 14688-2:2004 – Geotechnical Investigation and Testing – Identification and classification of soil – Part 2: Principles of classification.
<https://www.iso.org/obp/ui/#iso:std:iso:14688:-2:ed-1:v1:en>

Surface Water Body Resources:

- USGS National Hydrography Dataset (NHD) and Watershed Boundary Dataset (WBD) Dataset a good source of surface water drainage network information including rivers, streams, canals, lakes, ponds, coastline, dams, and stream gages.
<https://nhd.usgs.gov/index.html>
- USGS Current Water Data for the Nation, National Water Information Water Web Interface.
<https://nhd.usgs.gov/index.html>

Taxonomy Resources:

- World Registry of Marine Species (WoRMS) a good resource for marine organisms maintained at the Flanders Marine Institute.
<http://www.marinespecies.org/index.php>
- Integrated Taxonomic Information System (ITIS) – a good resource for vascular plant species, freshwater fish, and amphibians.
<https://www.itis.gov/>
- NADED (North American Diatom Ecological Database) – a good resource for diatom information and is used by the National Water-Quality Assessment Program (NAWQA)/USGS for diatoms.
<http://diatom.acnatsci.org/>
<https://water.usgs.gov/nawqa/about.html>
- AlgaeBASE is a good resource for periphyton.
<http://www.algaebase.org/>
- NatureServe provides a wealth of information on species and natural communities for use by researchers, agencies, businesses, and the public. Explore their data at:
<http://www.natureserve.org/biodiversity-science/conservation-topics/data>

Appendix C - Examples of Valid Value Help

For data entry via EDD

Short valid value list in EDD help, from Washington Department of Ecology's EIM system.

Column	Title	Definition	Requirements and Format	Valid Values	Examples and Comments
X	Sample Matrix	Describes the general environmental medium which was measured or from which a sample was taken.	REQUIRED. 14 alpha/numeric. Valid values.	Air/Gas, Other Liquid, Habitat, Solid/Sediment, Tissue, Water	Tip: the matrix for porewater is solid sediment

Medium-length valid value list on separate worksheet in EDD help, from Washington State Department of Ecology's EIM system.

Column	Title	Definition	Requirements and Format	Valid Values	Examples and Comments
Y	Sample Source	Describes the environmental resource which was measured or from which a sample was taken. More specific than Sample Matrix.	REQUIRED. 30 alpha/numeric. Valid values.	Click here to see "Sample Source values" worksheet in this Excel file for valid values and descriptions.	
Sediment					
Freshwater Sediment					
Brackish Sediment					
Salt/Marine Sediment					
Freshwater Porewater					
Brackish Porewater					
Salt/Marine Porewater					
Elutriate					
Supernatant of a sediment and lab water mixture (this is not porewater).					
Soil/Substrate					
Rock/Gravel					
Soil					

Long list of valid values links to a searchable lookup table from EDD help. From Washington State Department of Ecology's EIM system.

Column	Title	Definition	Requirements and Format	Valid Values	Examples and Comments
AH	Result Parameter Name	Name of the parameter reported for the result. Parameters are most often thought of as chemicals but also include things like temperature, fish weight, flow, etc.	REQUIRED. 254 alpha/numeric. Valid values.	Click here to search or download valid values from the Parameter Lookup Table	Ex: "Cadmium" or "Fish, Number in Composite Sample" Use "Unable to measure" for Observations. Data from a deployed instrument that collected continuous, time-series measurements must be submitted to EIM using the Time Series Template. If you have a parameter that is not in the Reference Tables, contact your EIM Data Coordinator.

Parameters

Filter Options

Name Contains Include Alias

CAS Number Contains

Usage

Units Type

Category

Sub Category

Inactive?

|

Name <input type="button" value="v"/>	CAS Number <input type="button" value="v"/>
PCB, Dichlorobiphenyls	25512-42-9
PCB, Heptachlorobiphenyls	28655-71-2
PCB, Hexachlorobiphenyls	26601-64-9
PCB, Monochlorobiphenyls	27323-18-8

Valid value download, from Washington State Department of Ecology's EIM system.

Export to Excel 



	Parameter Name	Parameter CAS Number	Parameter Synonym List
2558	PCB-005	16605-91-7	Synonym: 1,1'-Biphenyl, 2,3-dichloro- Synonym Type: Synonym;Synonym: 2,3-Dichlorobiphenyl Synonym Type: Synonym;Synonym: PCB-5 Synonym Type: Synonym
2559	PCB-005/008		Synonym: PCB-5/8 Synonym Type: Synonym
2560	PCB-006	25569-80-6	Synonym: 1,1'-Biphenyl, 2,3'-dichloro- Synonym Type: Synonym;Synonym: 2,3'-Dichlorobiphenyl Synonym Type: Synonym;Synonym: PCB-6 Synonym Type: Synonym
2561	PCB-007	33284-50-3	Synonym: 1,1'-Biphenyl, 2,4-dichloro- Synonym Type: Synonym;Synonym: 2,4-Dichlorobiphenyl Synonym Type: Synonym;Synonym: PCB-7 Synonym Type: Synonym
2562	PCB-007/009		Synonym: PCB-7/9 Synonym Type: Synonym
2563	PCB-008	34883-43-7	Synonym: 1,1'-Biphenyl, 2,4'-dichloro- Synonym Type: Synonym;Synonym: 2,4'-Dichlorobiphenyl Synonym Type: Synonym;Synonym: PCB-8 Synonym Type: Synonym

EPA's valid value lookup for STORET leads the user to an XML file.

Results								
Row Nu	Template Column Name/WQX Web Element Name	Included in 1 or more WQX Web Templates?	WQX Domain Values Web Service	WQX Web Lookup Tables	Optionality	Max Length	Data Type	Description
2	Activity Type	Yes	ActivityType	ACTIVITY TYPE	Required	70	Allowable Values	Type of Activity
3	Activity Media Name	Yes	ActivityMedia	ACTIVITY MEDIA	Required	20	Allowable Values	Medium in wh
4	Activity Media Subdivision Name	--	ActivityMediaSubdivision	ACTIVITY MEDIA SUBDIVISION	Optional	45	Allowable Values	Name or cod
7	Activity Start Time Zone	Yes	TimeZone	TIME ZONE	Conditional	4	Allowable Values	Time Zone for
10	Activity End Time Zone	--	TimeZone	TIME ZONE	Conditional	4	Allowable Values	Time Zone for
11	Activity Relative Depth Name	--	ActivityRelativeDepth	RELATIVE DEPTH	Optional	15	Allowable Values	The name tha
13	Activity Depth/Height Unit	Yes	MeasureUnit	MEASUREMENT UNIT	Conditional	12	Allowable Values	Units for Activ
15	Activity Top Depth/Height Unit	--	MeasureUnit	MEASUREMENT UNIT	Conditional	12	Allowable Values	Units for Activ

Link to EPA example (WQXWeb Tempate Dictionaryv3.xls in ZIP file):

https://www.epa.gov/sites/production/files/2015-09/wqxweb_physical_chemical_package.zip

For data entry via form

Clickable field help, from Washington Department of Ecology's EIM system.

The screenshot shows a data entry form with a help popup for the 'Sample Source' field. The form fields on the left include: Field Collector *, Field Collection Start Date *, Field Collection End Date, Field Collection Comment, Field Collection Area, Field Collection Reference P, Field Collection Upper Depth, Sample ID *, Sample Field Replicate ID, Sample Sub ID, Storm Event Qualifier, Sample Matrix *, Sample Source *, and Sample Use. The help popup for 'Sample Source' contains the following information:

- Field:** Sample Source
- Description:** Describes the environmental resource which was measured or from which a sample was taken. More specific than Sample Matrix.
- Example:** Animal Tissue, Groundwater, Source (like a point source or discharge), Pit Water (water from a test pit or excavation). For more information, see help documents 'Entering Pit Water Data' OR 'Stormwater and Combined Sewer Data' at <http://www.ecy.wa.gov/dsp/helpDocs.htm>
- Specification:** REQUIRED FIELD. Alpha/numeric, 20 characters. Valid values:
 - AIR/GAS
 - Indoor Air
 - Outdoor Air
 - Landfill Gas
 - Soil Gas
 - ANIMAL/PLANT
 - Animal Tissue
 - Animal Tissue - Lab Exposure
 - Plant Tissue
 - Periphyton
 - Freshwater Taxonomy
 - Salt/Marine Taxonomy
 - Habitat Metrics
 - SEDIMENT
 - Excavator Equipment

The 'Sample Source' field in the form is currently set to 'Groundwater' and is circled in blue. A blue arrow points from the 'Sample Source *' label to the help popup. Another blue circle highlights the 'Specification' section of the help popup.

Drop-down list of valid values in a form (good for shorter lists). From Washington State Department of Ecology's EIM system.

The screenshot shows a data entry form with a drop-down list of valid values for the 'Sample Source' field. The form fields on the left include: Field Collection Reference Point, Field Collection Upper Depth, Sample ID *, Sample Field Replicate ID, Sample Sub ID, Storm Event Qualifier, Sample Matrix *, Sample Source *, Sample Use, Sample Collection Method, Sample Preparation Method, Sample Method Other, Sample Taxon, and Sample Tissue Type. The drop-down list for 'Sample Source' contains the following values:

- Animal Tissue
- Animal Tissue - Lab Exposure
- Brackish Porewater
- Brackish Sediment
- Brackish Water
- CSS Outfall
- CSS Catch Basin
- CSS In-Line
- Elutriate
- Fresh/Surface Water
- Freshwater Porewater
- Freshwater Sediment
- Freshwater Taxonomy
- Groundwater
- Habitat Metrics
- Indoor Air
- Industrial Discharge
- Landfill Gas
- Landfill HGCS Groundwater
- Landfill Leachate
- Outdoor Air
- Periphyton
- Pit Water
- Plant Tissue
- Precipitation
- Rock/Gravel
- Salt/Marine Porewater
- Salt/Marine Sediment
- Salt/Marine Taxonomy

The 'Sample Source' field in the form is currently set to 'Groundwater' and is circled in blue. A blue arrow points from the 'Sample Source *' label to the drop-down list. To the right of the form, there are several other fields: Field Collection Lower Depth, Sample Replicate Flag (set to 'No'), Sample Composite Flag * (set to 'Unknown'), and several 'Clear Method' and 'Clear Taxon' buttons.

Auto-complete list of valid values in a form (good for longer lists). From Washington State Department of Ecology's EIM system.

The screenshot shows a web form interface for an information management system. At the top, it says "Please double click on row to get the value." Below this is a search area with a dropdown menu labeled "Parameter Name" containing the text "chloride". To the right of the input field are buttons for "Contains", "Search", and "Reset". A list of parameter names is displayed below the search area, with "Chloride" highlighted. A blue arrow points from the search input field to the highlighted row in the list.

Parameter Name
2,4,6-Trichloroaniline hydrochloride
2,4-Dimethylaniline hydrochloride
2-Butenoyl chloride
3,4,5-Trimethoxybenzoyl chloride
4-Chlorobenzotrichloride
9,12-Octadecadienoyl chloride, (Z,Z)-
Allyl Chloride
Benzyl chloride
Carbon Tetrachloride
Chloride
Cyanogen Chloride
Dansyl chloride
Dibutyltin Dichloride
Mepiquat chloride
Mercuric chloride
Methapyrilene hydrochloride
Methylene Chloride
Methylmercury chloride
Monobutyltin Trichloride
Paraquat dichloride

For promoting consistent data entry

For instructing users to use valid values consistently, this example demonstrates how enter a Fecal Coliform result with the proper data qualifier for the condition “Too Numerous to Count.” From Washington State Department of Ecology's EIM system.

EIM Help – Bacteria Too Numerous to Count (TNTC)

Version 1.0
November 2013

In samples with very high bacterial concentrations, labs are often unable to get accurate counts and report the results as “too numerous to count” (TNTC). While the best solution is to collect another sample so that the lab can dilute it in order to get a more accurate count, this might not always be possible. **If you can't collect another sample and you want to submit your TNTC bacteria data to EIM, follow these guidelines:**

- In EIM, you must enter a number in the Result Value field (column AM). Contact your lab to get an estimate of the value, such as 10,000 or 20,000 CFU/100mL (colony forming units per 100 milliliters) or MPN/100mL (most probable number per 100 milliliters).
- Enter a Result Data Qualifier (column AS) of “G.” G means the “Value is likely greater than the reported result. Reported result may be biased low.”
- Enter a Result Value Comment (column AZ) of “TNTC - too numerous to count.”

EXAMPLE: Fecal coliform sample with an estimated bacterial concentration of 10,000 colony forming units per 100 milliliters.

Result Parameter Name (AH)	Result Value (AM)	Result Value Units (AN)	Result Data Qualifier (AS)	Result Comment (AZ)
Fecal Coliform	10000	CFU/100mL	G	TNTC - Too numerous to count

For requesting new valid values

For requesting new valid values, example of contact form where users can make such requests. From Washington State Department of Ecology's EIM system.

Email (required) Email is required to process your request.

Name (optional)

Category (required) Reference Tables

Comment (required)

I need this parameter entered into the system: 1,1'-Biphenyl, 2',4'-dichloro-2,4,6-trimethyl- (CASRN 75601-31-9)

[Submit](#)

For requesting new valid values, this info in the EDD documentation points users to a contact (in this case, they know who their data coordinator is). From Washington State Department of Ecology's EIM system.

Column	Title	Definition	Requirements and Format	Valid Values	Examples and Comments
AH	Result Parameter Name	Name of the parameter reported for the result. Parameters are most often thought of as chemicals but also include things like temperature, fish weight, flow, etc.	REQUIRED. 254 alpha/numeric. Valid values.	External submitters - log into the Data Loader to see valid values in the Parameter reference table. Ecology staff - reference tables are in the Editor or Loader.	Ex. "Cadmium" or "Fish, Number in Composite Sample" Use "Unable to measure" for Observations. Data from a deployed instrument that collected continuous, time-series measurements must be submitted to EIM using the Time Series Template . If you have a parameter that is not in the Reference Tables, contact your EIM Data Coordinator.