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# AQUATOX JSON Structure Documentation

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## Architecture

An AQUATOX segment is a customizable object including state variables and data structures that describe the physical characteristics of the site. This design allows for the creation multiple AQUATOX Segments in a linked system.



Figure . AQUATOX Segment Object Design

## Type Bindings

Because state variables in the state-variable array may have different types, the type of each state variable must be defined as the first line within its JSON text (JSON.NET TypeNameHandling = Objects). Some examples of the JSON syntax follow:

"$type": "AQUATOXSegment"   
"$type": "TNH4Obj"

Note also that valid JSON files are included in the DOCS folder of each of the AQUATOX sub-models included in HMS. These files can be customized or used as reference for valid HMS inputs.

The full list of valid JSON types and their context follows:

| **Valid Type Name** | **Object Location** | **Description** | **Required for** |
| --- | --- | --- | --- |
| AQUATOXSegment | Main JSON object | Primary AQUATOX object | **All Simulations** |
| ChemicalRecord | ChemRec variable in AQUATOXSegment | Required parameters for chemical model | Chemcal Simulations |
| Diagenesis\_Rec | Diagenesis\_Params variable in AQUATOXSegment | Required parameters for diagenesis model | Diagenesis Simulations |
| TParameter | Each parameter within the Diagenesis\_Rec | value, symbol, name, comment, units | Diagenesis Simulations |
|  |  |  |  |
| TAQTSite | Location variable in AQUATOXSegment | Required site parameters and data | **All Simulations** |
| SiteRecord | Locale variable in TAQTSite | Required site parameters | **All Simulations** |
| ReminRecord | Remin variable in AQUATOXSegment | Parameters about organic matter | **Simulations with Nutrients, Chemicals, Organic Matter, Diagenesis** |
| Setup\_Record | PSetup variable in AQUATOXSegment | Simulation setup such as start and end date | **All Simulations** |
|  |  |  |  |
| DetritalInputRecordType | InputRecord variable in TDissRefrDetr State Variable | Input data for "suspended and dissolved" organic matter | Organic Matter Model |
|  |  |  |  |
| TStateVariable | Within "SV" array in AQUATOXSegment | Base object for all state variables |  |
| AQUATOXTSOutput | State Variable in "SV" array | AQUATOX time-series output | n/a; Holds Output |
| LoadingsRecord | LoadsRec variable in TStateVariable | External Loadings and time series for state variable | All State Variables |
| TLoadings | Loadings or Alt\_Loadings[] in LoadingsRecord | Constant loading or time series external loading | All State Variables |
| SortedList  <DateTime, double> | list variable in Tloadings | Time-series loading input, classic AQUATOX format | SV with time-series input |
| TimeSeriesInput | "ITSI" state variable in Loadings Record | Time-series loading input, data from HMS models | SV with HMS inputs |
| TimeSeriesOutput | "InputTimeSeries" in TimeSeriesInput | Time-series loading input, data from HMS models | SV with HMS inputs |
|  |  |  |  |
| TCO2Obj | State Variable in "SV" array | Carbon Dioxide in mg/L | Nutrients, pH, Chemicals |
| TCOD | State Variable in "SV" array | Chemical oxygen demand in g O2 equiv. / m3 | Diagenesis, optional |
| TDissLabDetr | State Variable in "SV" array | Dissolved Labile Detritus in mg/L | Organic Matter Model |
| TDissRefrDetr | State Variable in "SV" array | Dissolved Refractory Detritus in mg/L | Organic Matter Model |
| TLight | State Variable in "SV" array | Light input at water surface in Ly/d | Chemicals / Plants |
| TMethane | State Variable in "SV" array | Methane in g O2 equiv. / m3 | Diagenesis Simulations |
| TNH4\_Sediment | State Variable in "SV" array | Ammonia in sediment in g N / m3 | Diagenesis Simulations |
| TNH4Obj | State Variable in "SV" array | Nutrate in the water column in mg N/L | Nutrient Simulations |
| TNO3\_Sediment | State Variable in "SV" array | Nitrate in sediment in g N / m3 | Diagenesis Simulations |
| TNO3Obj | State Variable in "SV" array | Nutrate in the water column in mg N/L | Nutrient Simulations |
| TO2Obj | State Variable in "SV" array | Oxygen in the water column in mg/L | Nutrients, Chemicals |
| TpHObj | State Variable in "SV" array | pH of the water column | Nutrients, Chemicals |
| TPO4\_Sediment | State Variable in "SV" array | Ammonia in sediment in g N / m3 | Diagenesis Simulations |
| TPO4Obj | State Variable in "SV" array | Total Soluble P in water in mg/L | Nutrient Simulations |
| TPOC\_Sediment | State Variable in "SV" array | Particulate Carbon in sediment in g C / m3 | Diagenesis Simulations |
| TPON\_Sediment | State Variable in "SV" array | Particulate Nitrogen in sediment in g N / m3 | Diagenesis Simulations |
| TPOP\_Sediment | State Variable in "SV" array | Particulate Phosphate in sediment in g P / m3 | Diagenesis Simulations |
| TSalinity | State Variable in "SV" array | Water column salinity in PPT | *Optional*, Chem., Nutr. |
| TSedLabileDetr | State Variable in "SV" array | Sedimented Labile Detritus in g/m2 | Organic Matter |
| TSedRefrDetr | State Variable in "SV" array | Sedimented Refractory Detritus in g/m2 | Organic Matter |
| TSilica\_Sediment | State Variable in "SV" array | Silica concentration in sediment in g/m3 | Diagenesis Simulations |
| TSulfide\_Sediment | State Variable in "SV" array | Sulfide in sediment in g O2 equiv. / m3 d | Diagenesis Simulations |
| TSuspLabDetr | State Variable in "SV" array | Suspended Particulate Labile Detritus in mg/L | Organic Matter |
| TSuspRefrDetr | State Variable in "SV" array | Suspended Particulate Refractory Detritus in mg/L | Organic Matter |
| TTemperature | State Variable in "SV" array | Temperature of water column in deg. C | **All Simulations** |
| TToxics | State Variable in "SV" array | Freely-dissolved chemical in water in ug/L | Chemical Simulat8ions |
| TVolume | State Variable in "SV" array | Water volume of site in cubic meters | **All Simulations** |
| TWindLoading | State Variable in "SV" array | Wind loading of site in m/s at a height of 10 m | Chemicals / Plants |

## AQUATOXSegment JSON

The AQUATOXSegment JSON includes several mandatory variables.

“Location” includes information about the site such as “SiteType.” (See “Enumerated Values” below) Also within “Location” is “Locale,” a “struct” of type “SiteRecord” full of parameters describing the site. Details about these parameters may be found in the “Site\_Record\_Specs” document.

State variables to be solved with the differential equations solver and any required driving variables (input variables and time series) are found in an array named “SV.” More on the State Variable JSON structure may be found below.

PSetup contains information about simulation start time, end time, time step, and other integration details. Details about these parameters may be found in the “Setup\_Record\_Specs” document.

A diagenesis model must include the Diagenesis\_Params object, and whether to calculate the diagenesis top layer using steady-state assumptions or not. There are also optional loadings time series for benthic biomass and animal defecation to the sediment bed (BenthicBiomass\_Link, and AnimalDef\_Link). These loadings may be utilized if a diagenesis model is being run, animals are not directly being simulated, and a user has model estimates or observed data to estimate the impact of animals on the sediment bed.

Finally, The AQUATOXSegment object includes optional parameters and time-series regarding site evaporation rate, mean depth over time, the extent of shading over time, and whether to calculate velocity or use an alternative input time series (UseConstEvap, DynEvap, UseConstZMean, DynZMean, Shade, CalcVelocity, DynVelocity).

## “SV” Array

The SV array contains an array of state variables required for model simulation. See “Data Requirements” below for details of which state variables are required for which type of simulation. Each AQUATOX model includes a “CheckDataRequirements” function that returns an error message if required state variables are not present.

## TStateVariable Object

The TStateVariable object serves as the ancestor for all specialized state variable-objects (chemicals, nutrients, animals, plants, etc.). The important variables within this JSON object are as follows:

* double **InitialCond**: The concentration of the variable at the start of the simulation
* AllVariables (enumerated) **NState**: Each state variable must be assigned to its proper type (See “Enumerated Values” below). This variable is used to locate the state variable when it is needed by other state variables (e.g. the nitrification rate affects both Ammonia and Nitrate, and the temperature state variable affects the nitrification rate.) For animals and plants (TBA), this variable is used to set up the feeding-preferences matrix.
* T\_SVType (enumerated) **SVType**: For most variables this is set to StV or “State Variable” but for organic chemicals, or chemicals sorbed to animals, plants, or organisms (TBA), this is set to OrgTox1..OrgTox20. (See “Enumerated Values” below)
* T\_SVLayer (enumerated) **Layer**: The location of the state variable. For most variables this is set to WaterCol but sediment diagenesis variables may be located in SedLayer1 or SedLayer2. (See “Enumerated Values” below)
* string **PName**: holds the text name of the variable for use in output of results.
* AQUATOXTSOutput **output**: holds the results of the simulation in an HMS ITimeSeriesOutput data structure.
* LoadingsRecord **LoadsRec**: As described below, this object holds boundary-condition loadings of the state variable either in inflow water or from point-source, direct precipitation, or nonpoint-sources. These loadings can be constant or time series can be input.
* bool **UseLoadsRecAsDriver**: Any state variable can be used as a driving variable based on the values in its LoadingsRecord by setting this boolean to true. The state variable will no longer be integrated but will be set to the value in the provided time series. This provides for flexibility in terms of linkage to other models.

Some derived state variables have additional required parameters. The most important parameters are listed here:

| **State Variable Type** | **Variable Name** | **Variable Type** | **Description** |
| --- | --- | --- | --- |
| TVolume | Calc\_Method | VolumeMethType (enum) | Whether to use Manning's coefficient and river flows to estimate segment volume, to keep volume constant, to calculate volume "dynamically" using inflows, outflows, and evaporation, or to set segment volume to a known value or time series of values |
| TpHObj | Alkalinity | double | If pH is estimated, ueq CACO3/L |
| TLight | Calculate Photoperiod | bool | calculate photo period from latitude |
| TLight | UserPhotoPeriod | double | hours of light in day |
| TWindLoading | MeanValue | double | mean wind if fourier series is used |
| TToxics | ChemRec | ChemicalRecord | Relevant Chemical Parameters see ChemicalRecord\_Specs.docx |
| TToxics | JSON \_Link loadings | TLoadings | Six optional linkage timeseries if chemicals sorbed to plants, animals, or OM not modeled |
| TPON\_Sediment, TPOC\_Sediment, TPOP\_Sediment | JSON \_Link loadings | TLoadings | Two optional linkage time series for each state variable to estimate deposition and predation if plants, animals, or OM not modeled |
| TPO4Obj | JSON\_Link loadings | TLoadings | Five optional linkage time series if animals, plants, and/or organic matter are not included to represent rates of assimilation, remineralization, and calcite precipitation |
| TPO4Obj | TP\_IC, TP\_Inflow, TP\_PS, TP\_NPS | bool | Are PO4 inputs in the form of TP or Total Soluble P. If the former, TSP is estimated based on inflow P loadings in OM and algae |
| TNH4Obj | JSON\_Link loadings | TLoadings | Four optional linkage time series if animals, plants, and/or organic matter are not included to represent rates of assimilation and remineralization |
| TNO3Obj | JSON\_Link loading | TLoadings | One optional linkage time series if plants are not explicitly modeled to represent rates of assimilation |
| TNO3Obj | TN\_IC, TN\_Inflow, TNP\_PS, TP\_NPS | bool | Are NO3 inputs in the form of TN? If so, NO3 is estimated based on inflow N loadings in OM and algae |
| TCO2Obj | JSON\_Link loadings | TLoadings | Three optional linkage time series if animals, plants, and/or organic matter are not included to represent rates of assimilation, respiration, and decomposition. |
| TCO2Obj | ImportCO2Equil and CO2Equil | bool and TLoadings | The equilibrium concentration of CO2 in water can be user input using these variables or estimated using AQUATOX equations (213) to (215) |
| TO2Obj | NoLoadOrWash | bool | An experimental variable that allows the user to calculate the oxygen concentration in the water if inflow loadings and washout were not considered. |
| TO2Obj | JSON\_Link loadings | TLoadings | Five optional linkage time series if animals, plants, and/or organic matter are not included to represent rates of photosynthesis, respiration, nitrification, CBOD, and Sediment Oxygen Demand. |
| TDetritus | JSON\_Link loadings | TLoadings | Four optional linkage time series if animals, and/or plants are not included to represent rates of detrital formation, excretion, sedimentation, and gamete loss. |
| TSuspendedDetr and TSedimentedDetr | JSON\_Link loading | TLoadings | Optional linkage time series for predation of suspended or sedimented detritus by animals, if animals are not modeled. |
| TDissRefrDetr | InputRecord | DetritalInput  RecordType | Specialized structure that includes loadings data for all suspended and dissolved organic matter and allows for input as CBOD, OC, or OM, for example. This supersedes individual loading inputs for each of the four suspended and dissolved organic matter state variables. |

## LoadingsRecord Object

The LoadingsRecord object is used to specify boundary-condition inputs for each state variable in the simulation (when relevant). This object can also be used to specify time-series valuations of a variable if it is to be used as a driving variable (set UseLoadsRecAsDriver to true in the TStateVariable JSON).

The LoadingsRecord object consists of four input time series that are saved as “TLoadings” objects.

* **Loadings:**  Inflow loadings or time-series water column valuations go into this TLoadings object. These loadings have the native unit of the state variable, often mg/L d. This loading is associated with the inflow loading calculated by or input into the AQUATOXVolumeModel.
* **Alt\_Loadings[0]:** Point Source time series, usually in g/d. For the TVolume state variable this register contains inflow water loadings when required in m3/d.
* **Alt\_Loadings[1]:** Direct Precipitation time series usually in g/ m2d, or For the TVolume state variable this register contains outflow water (discharge in m3/d).
* **Alt\_Loadings[2]:** Non-Point Source time series, usually in g/d. (N/A for TVolume)

TLoadings inputs may be input in two formats: a “classic AQUATOX” input for consistency with AQUATOX 3.2 data, and an “ITimeSeriesInput” format so that outputs from other HMS models can be used to drive the HMS AQUATOX components.

Components of the “classic AQUATOX” LoadingsRecord are as follows:

* Hourly: Boolean that specifies whether input data are in hourly or daily format.
* UseConstant: boolean that specifies whether to use a constant loading as opposed to a time series.
* ConstLoad: double that specifies the constant load if UseConstant=true.
* NoUserLoad: Boolean that specifies that there is no loading for this state variable, or to use alternative equations (for light loadings or temperature loadings for example).
* MultLdg: a multiply-loading-by factor that allows for the perturbation of time-series
* list: a SortedList that contains a time series if relevant. If there are gaps in the daily or hourly data AQUATOX will interpolate between them.

If users wish to use HMS model outputs to drive AQUATOX, they may put a TimeSeriesInput into the “ITSI” variable within the TLoadings object. This will supersede other inputs in the TLoadings. Within the TimeSeriesInput JSON, an “input” variable that should contain the TimeSeriesOutput from the HMS model. (An example may be found in line 154 of the file “Lake Jesup FL drive HMS Output.JSON.”)

## HMS Output Format

The AQUATOX HMS Output format is an HMS “TimeSeriesOutput” structure. These outputs are provided for each state variable in the SV array in the “output” variable. An example output follows:

"output": {

"$type": "AQUATOXTSOutput",

"Dataset": "Carbon dioxide",

"DataSource": "AQUATOX",

"Metadata": {

"AQUATOX\_HMS\_Version": "1.0.0",

"SimulationDate": "2018-05-11T14:57:44"

},

"Data": {

"1996-04-08T00:00:00": [

"7.000000E-001"

],

"1996-04-09T00:00:00": [

"6.877901E-001"

],

},

},

## HMS AQUATOX Models and Data Requirements

| **Model** | Requirement |
| --- | --- |
| All Models | Valid JSON with type bindings |
| All Models | One or more State Variables in Simulation |
| All Models | Valid PSETUP inputs |
|  |  |
| AQTVolumeModel | Volume State Variable |
| AQTVolumeModel | Valid "Location" object |
| AQTVolumeModel | Valid "Locale" record |
| AQTVolumeModel | Values within "Locale" record |
|  |  |
| Nutrient Model | AQTVolumeModel |
| Nutrient Model | Nitrate and Ammonia State Variables |
| Nutrient Model | and/or TSP State Variable |
| Nutrient Model | Temperature State Variable or Driving Var. |
| Nutrient Model | pH model or Driving Var. |
| Nutrient Model | Oxygen State Variable or Driving Variable |
| Nutrient Model | Organic Matter, soft requirement. |
| Nutrient Model | Animals and Plants, soft requirement |
|  |  |
| Oxygen Model | AQTVolumeModel |
| Oxygen Model | Temperature State Variable or Driving Var. |
| Oxygen Model | Nitrate state variable, soft requirement |
| Oxygen Model | Animals and Plants, soft requirement |
| Oxygen Model | Organic Matter, soft requirement. |
|  |  |
| Carbon Dioxide Model | AQTVolumeModel |
| Carbon Dioxide Model | Temperature State Variable or Driving Var. |
| Carbon Dioxide Model | Oxygen State Variable or Driving Var |
| Carbon Dioxide Model | Animals and Plants, soft requirement |
|  |  |
| pH Model | Carbon Dioxide Model or Driving Var |
| pH Model | Temperature State Variable or Driving Var. |
| pH Model | Dissolved Org Matter or Driving Vars., soft |
|  |  |
| Organic Matter Model | AQTVolumeModel |
| Organic Matter Model | Six OM State Variables |
| Organic Matter Model | pH model or Driving Var. |
| Organic Matter Model | Oxygen model or Driving Var. |
| Organic Matter Model | Animals and Plants, soft requirement |
| Organic Matter Model | Erosion / deposition rates, soft requirement |
|  |  |
| Diagenesis Model | AQTVolumeModel |
| Diagenesis Model | Water Column Nutrients (AQTNutrientModel) |
| Diagenesis Model | POC, PON, POP state variables G1 to G3 |
| Diagenesis Model | Phosphate Ammonia Nitrate L1 and L2 |
| Diagenesis Model | Temperature State Variable or Driving Var. |
| Diagenesis Model | Oxygen State Variable or Driving Variable |
| Diagenesis Model | Detritivores eating sediment bed (soft) |
| Diagenesis Model | Animals Plants, OM depositing to sediment bed (soft requirement) |
|  |  |
| Chemical Fate Model | Chemical in water column state var (TToxics) |
| Chemical Fate Model | AQTVolumeModel |
| Chemical Fate Model | Temperature State Variable or Driving Var. |
| Chemical Fate Model | Oxygen State Variable or Driving Variable |
| Chemical Fate Model | pH model or Driving Var. |
| Chemical Fate Model | Light loadings |
| Chemical Fate Model | Animals Plants, OM sorption and desorption (soft requirement) |

## Enumerated Variables within JSON

AQUATOX HMS follows the design of EPA AQUATOX 3.2 source code and uses enumerated variables extensively to maximize readability of algorithms. Unfortunately these are converted into integers when written to JSON which does not enhance the readability of the JSON text. The following is a list of enumerated variables that are used and their integer values.

|  |  |
| --- | --- |
| **StreamTypes (now strings)** |  |
| “Concrete Channel” | 0 |
| “Dredged Channel” | 1 |
| “Natural Channel” | 2 |
|  |  |
| **SiteTypes** |  |
| Pond, | 0 |
| Stream, | 1 |
| Reservr1D, | 2 |
| Lake, | 3 |
| Enclosure, | 4 |
| Estuary, | 5 |
| TribInput, | 6 |
| Marine | 7 |
|  |  |
| **AllVariables** |  |
| H2OTox, | 0 |
| H2OTox2..20 deprecated | 1-19 |
| Ammonia, | 20 |
| Nitrate, | 21 |
| Phosphate, | 22 |
| CO2, | 23 |
| Oxygen, | 24 |
| PoreWater, | 25 |
| ReDOMPore, | 26 |
| LaDOMPore, | 27 |
| Sand, | 28 |
| Silt, | 29 |
| Clay, | 30 |
| TSS, | 31 |
| Silica, | 32 |
| Avail\_Silica, | 33 |
| COD, | 34 |
| TAM, | 35 |
| Methane, | 36 |
| Sulfide, | 37 |
| POC\_G1, | 38 |
| POC\_G2, | 39 |
| POC\_G3, | 40 |
| PON\_G1, | 41 |
| PON\_G2, | 42 |
| PON\_G3, | 43 |
| POP\_G1, | 44 |
| POP\_G2, | 45 |
| POP\_G3, | 46 |
| Cohesives, | 47 |
| NonCohesives, | 48 |
| NonCohesives2, | 49 |
| Salinity, | 50 |
| SedmRefrDetr, | 51 |
| SedmLabDetr, | 52 |
| DissRefrDetr, | 53 |
| DissLabDetr, | 54 |
| SuspRefrDetr, | 55 |
| SuspLabDetr, | 56 |
| BuriedRefrDetr, | 57 |
| BuriedLabileDetr, | 58 |
| Diatoms1, | 59 |
| Diatoms2, | 60 |
| Diatoms3, | 61 |
| Diatoms4, | 62 |
| Diatoms5, | 63 |
| Diatoms6, | 64 |
| Greens1, | 65 |
| Greens2, | 66 |
| Greens3, | 67 |
| Greens4, | 68 |
| Greens5, | 69 |
| Greens6, | 70 |
| BlGreens1, | 71 |
| BlGreens2, | 72 |
| BlGreens3, | 73 |
| BlGreens4, | 74 |
| BlGreens5, | 75 |
| BlGreens6, | 76 |
| OtherAlg1, | 77 |
| OtherAlg2, | 78 |
| Macrophytes1, | 79 |
| Macrophytes2, | 80 |
| Macrophytes3, | 81 |
| Macrophytes4, | 82 |
| Macrophytes5, | 83 |
| Macrophytes6, | 84 |
| SuspFeeder1, | 85 |
| SuspFeeder2, | 86 |
| SuspFeeder3, | 87 |
| SuspFeeder4, | 88 |
| SuspFeeder5, | 89 |
| SuspFeeder6, | 90 |
| SuspFeeder7, | 91 |
| SuspFeeder8, | 92 |
| SuspFeeder9, | 93 |
| DepFeeder1, | 94 |
| DepFeeder2, | 95 |
| DepFeeder3, | 96 |
| Veliger1, | 97 |
| Veliger2, | 98 |
| Spat1, | 99 |
| Spat2, | 100 |
| Clams1, | 101 |
| Clams2, | 102 |
| Clams3, | 103 |
| Clams4, | 104 |
| Snail1, | 105 |
| Snail2, | 106 |
| SmallPI1, | 107 |
| SmallPI2, | 108 |
| PredInvt1, | 109 |
| PredInvt2, | 110 |
| PredInvt3, | 111 |
| PredInvt4, | 112 |
| SmForageFish1, | 113 |
| SmForageFish2, | 114 |
| LgForageFish1, | 115 |
| LgForageFish2, | 116 |
| SmBottomFish1, | 117 |
| SmBottomFish2, | 118 |
| LgBottomFish1, | 119 |
| LgBottomFish2, | 120 |
| SmGameFish1, | 121 |
| SmGameFish2, | 122 |
| SmGameFish3, | 123 |
| SmGameFish4, | 124 |
| LgGameFish1, | 125 |
| LgGameFish2, | 126 |
| LgGameFish3, | 127 |
| LgGameFish4, | 128 |
| Fish1, | 129 |
| Fish2, | 130 |
| Fish3, | 131 |
| Fish4, | 132 |
| Fish5, | 133 |
| Fish6, | 134 |
| Fish7, | 135 |
| Fish8, | 136 |
| Fish9, | 137 |
| Fish10, | 138 |
| Fish11, | 139 |
| Fish12, | 140 |
| Fish13, | 141 |
| Fish14, | 142 |
| Fish15, | 143 |
| Volume, | 144 |
| Temperature, | 145 |
| WindLoading, | 146 |
| Light, | 147 |
| pH, | 148 |
| NullStateVar | 149 |
|  |  |
| **T\_SVType** |  |
| StV, | 0 |
| Porewaters, | 1 |
| OrgTox1, | 2 |
| OrgTox2, | 3 |
| OrgTox3, | 4 |
| OrgTox4, | 5 |
| OrgTox5, | 6 |
| OrgTox6, | 7 |
| OrgTox7, | 8 |
| OrgTox8, | 9 |
| OrgTox9, | 10 |
| OrgTox10, | 11 |
| OrgTox11, | 12 |
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| OrgTox17, | 18 |
| OrgTox18, | 19 |
| OrgTox19, | 20 |
| OrgTox20, | 21 |
| NTrack, | 22 |
| PTrack | 23 |
|  |  |
| **T\_SVLayer** |  |
| WaterCol, | 0 |
| SedLayer1, | 1 |
| SedLayer2, | 2 |
|  |  |
| **VolumeMethType** |  |
| Manning, | 0 |
| KeepConst, | 1 |
| Dynam, | 2 |
| KnownVal | 3 |
|  |  |
| **Alt\_LoadingsType Integer** |  |
| PointSource, or Inflow(TVolume) | 0 |
| DirectPrecip, or Discharge(TVolume) | 1 |
| NonPointSource | 2 |