Title: Stream chemistry concentrations and fluxes using proportional sampling in the Andrews Experimental Forest, 1968 to present

Abstract:

Stream chemistry sampling and analysis was initiated at the H.J. Andrews Experimental Forest in 1968 in two small watersheds (Watersheds 9, 10). Sampling has expanded as additional paired watershed studies (Watersheds 1, 2, 6, 7, 8) and monitoring (Mack, Lookout Cr) were initiated over time. Water samples are collected proportionally to streamflow as a function of stage height and composited at each stream gauging site. Composite sample periods are generally three weeks and 3 one-week samples are commonly composited in the lab before analysis. Water samples are analyzed at the Cooperative Chemical Analytical Lab (CCAL) (http://www.ccal.oregonstate.edu/ ). Concentrations of analytes include dissolved and particulate nitrogen, phosphorus, carbon, as well pH, conductivity, suspended sediment, and full suite of cations and anions. Monthly and annual mean concentrations are calculated by weighting 3-week periods by streamflow. Fluxes are calculated using concentrations and flow. The original objective was to examine the nutrient budgets for small watersheds and to evaluate changes in average concentrations and fluxes following timber harvest in comparison with unharvested reference watersheds. This study is conducted in conjunction with Andrew's precipitation chemistry (CP002) and the U.S. National Atmospheric Deposition Program (NADP).

Keywords: Discharge; Dissolved load; Hydrology; Water; Logging; Long-Term Ecological Research (LTER); Nutrients; Solution transport; Streamflow; Timber harvesting; Water; Water chemistry; Inorganic nutrients; Organic matter; Long-Term Ecological Research (LTER); Hydrology; Water chemistry; Suspended solids; Discharge; Streamflow; Timber harvest; Inorganic nutrients; Nutrients; Dissolved nutrients; Water;

Date data commenced: 1968-10-02

Date data terminated: 2019-05-22

Principal Investigator: Sherri L. Johnson

List of Entities:
1. Proportional stream water sample nutrient concentrations
2. Stream water nutrient mean monthly concentrations
3. Stream water nutrient mean annual concentrations
4. Stream water nutrient monthly outflow (kg/ha)
5. Stream water nutrient outflow (kg/ha) for each proportional sampling interval
6. Stream water sample log sheet: field and laboratory comments

1. Proportional stream water sample nutrient concentrations

This is the raw proportional sample concentration data collected periodically (usually every three weeks). Please see mean monthly concentration data provided in entity 2.

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2. Stream water nutrient mean monthly concentrations

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4. Stream water nutrient monthly outflow (kg/ha)
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5. Stream water nutrient outflow (kg/ha) for each proportional sampling interval

Data are calculated outflow fluxes for each proportional sample period. Alternatively, please consider use of monthly outflow fluxes provided in entity 4.

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Y N char(6) place

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N N numeric(4,0) range 1969.0000 2018.0000 number

**DATE_TIME**

Y N datetime range 10/9/1968 10/1/2018 12:00:00 PM 12:00:00 AM YYYY-MM-DD hh:mm:ss

**LABNO**

N Y char(4) freetext

**TYPE**

N N char(2) enum

**Q_AREA_CM**

N Y numeric(6,2) range 0.0000 116.3100 cm

**QCODE**

N Y char(1) enum

**ALK_OUTPUT**

N Y numeric(6,2) range 0.0000 115.7000 kg/ha

**ALKCODE**

N Y char(1) enum
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<th>Key</th>
<th>Type</th>
<th>Range</th>
<th>Description</th>
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<td>SSED_OUTPUT</td>
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<td>0.0000 9467.0000</td>
<td>kg/ha</td>
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<td>Y</td>
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<td>enum</td>
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<td>Y</td>
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<tr>
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<td>enum</td>
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<tr>
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<td>Y</td>
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<td>kg/ha</td>
</tr>
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<td>Y</td>
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<td></td>
<td>enum</td>
</tr>
<tr>
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<td>Y</td>
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<tr>
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<td>PO4P_OUTPUT</td>
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<td>Y</td>
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<td>TDN_OUTPUT</td>
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<td>enum</td>
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<td>DON_OUTPUT</td>
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<td>Y</td>
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</tr>
<tr>
<td>DONCODE</td>
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<td>Y</td>
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<td></td>
<td>enum</td>
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<td>PARTN_OUTPUT</td>
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<td>Y</td>
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<td>NO3N_OUTPUT</td>
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<td>Y</td>
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<td>0.0000 1.1480</td>
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<td>enum</td>
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<tr>
<td>KCODE</td>
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<td>enum</td>
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<tr>
<td>CA_OUTPUT</td>
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<td>Y</td>
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<td>0.0000 21.8200</td>
<td>kg/ha</td>
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<tr>
<td>CACODE</td>
<td>N</td>
<td>Y</td>
<td>char(1)</td>
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</tbody>
</table>
5. Stream water sample log sheet: field and laboratory comments

**Attribute List:**

- **STCODE N N char(5) enum**
- **ENTITY N N numeric(1,0) range 6.0000 6.0000 number**
- **SITECODE Y N char(6) place**
- **WATERYEAR N N numeric(4,0) range 1969.0000 2020.0000 number**
- **DATE_TIME Y N datetime range 10/9/1968 12:00:00 PM 1/9/2020 8:20:00 AM YYYY-MM-DD hh:mm:ss**
- **LABNO N Y char(4) freetext**
- **TYPE N N char(2) enum**
- **QCCODE N N char(2) enum**
- **QA_SAMPLE N Y char(6) freetext**
- **SAMPLER_TYPE N N char(2) enum**
- **LOW_VOLUME N N char(1) enum**
- **FIELD_COMMENTS N Y char(254) freetext**
- **LAB_COMMENTS N Y char(254) freetext**
- **SEQ_INDEX N N numeric(5,0) range 1.0000 9231.0000 number**

Attributes Definitions:

**ALK**

Alkalinity as calcium carbonate (CaCO3); method: electrometric titration to pH 4.5; all data is converted from the formerly used units of bicarbonate carbon (HCO3-C)

**ALK_MO**

Mean monthly alkalinity concentration as CaCO3 (calcium carbonate)

**ALK_OUT_MO**

Total monthly alkalinity outflow as CaCO3 (calcium carbonate). All units are now converted from HCO3-C (bi-carbonate)

**ALK_OUTPUT**

Alkalinity outflow as CaCO3 (calcium carbonate)

**ALK_YR**
Mean annual alkalinity concentration as CaCO₃ (calcium carbonate). All units are now converted from HCO₃-C (bi-carbonate).

**ALKCODE**
Alkalinity value qualifier code

**ALKCODE_MO**
Monthly alkalinity qualifier value code

**ALKCODE_YR**
Annual alkalinity qualifier value code

**ANCA**
Anion-cation ratio: micro equivalence ratio of anions to cations by calculation - provided only as an analytical check. Requires anions: ALK, SO₄S, CL, NO₃N, PO₄P, cations: pH, Na, K, Ca, Mg, NH₄N

**ANCACODE**
Anion-cation ratio qualifier code

**CA**
Ca, dissolved calcium (filtrable) concentration; method flame atomic absorption spectroscopy

**CA_MO**
Mean monthly calcium concentration

**CA_OUT_MO**
Total monthly calcium outflow

**CA_OUTPUT**
Calcium outflow

**CA_YR**
Mean annual calcium concentration

**CACODE**
Ca value qualifier code

**CACODE_MO**
Monthly calcium value qualifier code

**CACODE_YR**
Annual Ca value qualifier code

**CL**
Chloride (dissolved) concentration; method: ion chromatography (automated ferric thiocyanate before 1993)

**CL_MO**
Mean monthly chloride concentration

**CL_OUT_MO**
Total monthly chloride outflow

**CL_OUTPUT**
Chloride outflow

**CL_YR**
Mean annual chloride concentration
CLCODE
  Cl value qualifier code
CLCODE_MO
  Monthly chloride value qualifier code
CLCODE_YR
  Annual Cl value qualifier code
COND
  Specific conductance; method: wheatstone bridge
COND_MO
  Mean monthly specific conductivity concentration
COND_YR
  Mean annual specific conductivity concentration
CONDCODE
  Conductivity value qualifier code
CONDCODE_MO
  Monthly conductivity value qualifier code
CONDCODE_YR
  Annual conductivity value qualifier code
DATE_TIME
  Collection date and time (PST) of the stream water sample - sample collected proportionally to streamflow from the previous sample date and time. Assume beginning date of first sample period for each collector is October 1st.
DOC
  DOC, dissolved organic carbon concentration; method: combustion
DOC_MO
  Mean monthly dissolved organic carbon concentration
DOC_OUT_MO
  Total monthly dissolved organic carbon outflow
DOC_OUTPUT
  Dissolved organic carbon outflow
DOC_YR
  Mean annual dissolved organic carbon concentration
DOCCODE
  DOC value qualifier code
DOCCODE_MO
  Monthly dissolved organic carbon value qualifier code
DOCCODE_YR
  Annual DOC value qualifier code
DON
Dissolved organic nitrogen - not measured analytically; mathematically determined by subtracting NH3-N and NO3-N from Total dissolved nitrogen. Values before May 2005 are determined by TKN minus NH3-N.

**DON_MO**
Mean monthly dissolved organic N concentration - not measured analytically; mathematically determined by subtracting NH3-N and NO3-N from Total dissolved nitrogen. Values before May 2005 are determined by TKN minus NH3-N.

**DON_OUT_MO**
Total monthly dissolved organic N outflow - not measured analytically; mathematically determined by subtracting NH3-N and NO3-N from Total dissolved nitrogen. Values before May 2005 are determined by TKN minus NH3-N.

**DON_OUTPUT**
Dissolved organic N outflow - not measured analytically; mathematically determined by subtracting NH3-N and NO3-N from Total dissolved nitrogen. Values before May 2005 are determined by TKN minus NH3-N.

**DON_YR**
Mean annual dissolved organic N concentration - not measured analytically; mathematically determined by subtracting NH3-N and NO3-N from Total dissolved nitrogen. Values before May 2005 are determined by TKN minus NH3-N.

**DONCODE**
Dissolved organic nitrogen value qualifier code

**DONCODE_MO**
Monthly dissolved organic N value qualifier code

**DONCODE_YR**
Annual dissolved organic N value qualifier code

**ENTITY**
Entity number

**FIELD_COMMENTS**
Field comments related to the collection of the water sample

**INTERVAL**
Proportional sampling interval length in days

**K**
K, dissolved potassium (filtrable) concentration; method flame atomic absorption spectroscopy

**K_MO**
Mean monthly potassium concentration

**K_OUT_MO**
Total monthly potassium outflow

**K_OUTPUT**
Potassium outflow

**K_YR**
Mean annual potassium concentration

**KCODE**
K value qualifier code

**KCODE_MO**
Monthly potassium value qualifier code

KCODE_YR
 Annual K value qualifier code

LAB_COMMENTS
 Laboratory comments related to the handling and analyses of the sample

LABNO
 Lab number code for sample

LOW_VOLUME
 Indicator of a low volume sampler that may restrict the breadth of laboratory analyses

MEAN_LPS
 Mean discharge over the sampling interval

MG
 Mg, dissolved magnesium (filtrable) concentration; method flame atomic absorption spectroscopy

MG_MO
 Mean monthly magnesium concentration

MG_OUT_MO
 Total monthly magnesium outflow

MG_OUTPUT
 Magnesium outflow

MG_YR
 Mean annual magnesium concentration

MGCODE
 Mg value qualifier code

MGCODE_MO
 Monthly magnesium value qualifier code

MGCODE_YR
 Annual Mg value qualifier code

MONTH
 Month of summary

NA
 Na, dissolved sodium (filtrable) concentration; method flame atomic absorption spectroscopy

NA_MO
 Mean monthly sodium concentration

NA_OUT_MO
 Total monthly sodium outflow

NA_OUTPUT
 Sodium outflow
NA_YR
Mean annual sodium concentration

NACODE
Na value qualifier code

NACODE_MO
Monthly sodium value qualifier code

NACODE_YR
Annual Na value qualifier code

NH3N
Ammonia-nitrogen (NH3-N) concentration, ammonia as nitrogen; method: automated phenate

NH3N_MO
Mean monthly ammonia-nitrogen (NH3-N) concentration

NH3N_OUT_MO
Total monthly ammonia-nitrogen (NH3-N) outflow

NH3N_OUTPUT
Ammonia-nitrogen (NH3-N) outflow

NH3N_YR
Mean annual ammonia (NH3-N) concentration

NH3NCODE
NH3-N value qualifier code

NH3NCODE_MO
Monthly ammonia-nitrogen (NH3-N) value qualifier code

NH3NCODE_YR
Annual NH3-N value qualifier code

NO3N
Nitrate-nitrogen (NO3-N), nitrate + nitrite as nitrogen concentration; method: automated cadmium reduction

NO3N_MO
Mean monthly nitrate-nitrogen (NO3-N) concentration

NO3N_OUTPUT
Total monthly nitrate-nitrogen (NO3-N) outflow

NO3N_OUTPUT
Nitrate-nitrogen (NO3-N) outflow

NO3N_YR
Mean annual nitrate-nitrogen (NO3-N) concentration

NO3NCODE
NO3-N value qualifier code

NO3NCODE_MO
Monthly nitrate-nitrogen (NO3-N) value qualifier code

NO3NCODE_YR

Annual NO3-N value qualifier code

PARTN

Particulate N, also known as total suspended nitrogen - not measured analytically; mathematically determined by subtraction of Total dissolved nitrogen (TDN) from Unfiltered Total nitrogen (UTN). Values before May 2005 are determined by UTKN minus TKN.

PARTN_MO

Mean monthly particulate N concentration - not measured analytically; mathematically determined by subtraction of Total dissolved nitrogen (TDN) from Unfiltered Total nitrogen (UTN). Values before May 2005 are determined by UTKN minus TKN.

PARTN_OUT_MO

Total monthly particulate N outflow - not measured analytically; mathematically determined by subtraction of Total dissolved nitrogen (TDN) from Unfiltered Total nitrogen (UTN). Values before May 2005 are determined by UTKN minus TKN.

PARTN_OUTPUT

Particulate N outflow - not measured analytically; mathematically determined by subtraction of Total dissolved nitrogen (TDN) from Unfiltered Total nitrogen (UTN). Values before May 2005 are determined by UTKN minus TKN.

PARTN_YR

Mean annual particulate N concentration - not measured analytically; mathematically determined by subtraction of Total dissolved nitrogen (TDN) from Unfiltered Total nitrogen (UTN). Values before May 2005 are determined by UTKN minus TKN.

PARTNCODE

Particulate N value qualifier code

PARTNCODE_MO

Monthly particulate N value qualifier code

PARTNCODE_YR

Annual particulate N value qualifier code

PARTP

Particulate P, also known as total suspended phosphorus - not measured analytically; mathematically determined by subtraction of Total Dissolved P (TDP) from Unfiltered Total P (UTP)

PARTP_MO

Mean monthly particulate P - not measured analytically; mathematically determined by subtraction of Total Dissolved P (TDP) from Unfiltered Total P (UTP)

PARTP_OUT_MO

Total monthly particulate P outflow - not measured analytically; mathematically determined by subtraction of Total Dissolved P (TDP) from Unfiltered Total P (UTP)

PARTP_OUTPUT

Particulate P outflow - not measured analytically; mathematically determined by subtraction of Total Dissolved P (TDP) from Unfiltered Total P (UTP)

PARTP_YR

Mean annual particulate P - not measured analytically; mathematically determined by subtraction of Total Dissolved P (TDP) from Unfiltered Total P (UTP)

PARTPCODE

Particulate P value qualifier code

PARTPCODE_MO
Monthly particulate P value qualifier code

PARTPCODE_YR

Annual particulate P value qualifier code

PH

pH (hydrogen concentration); method: glass electrode

PH_MO

Mean monthly pH

PH_YR

Mean annual pH

PHCODE

pH value qualifier code

PHCODE_MO

Monthly pH value qualifier code

PHCODE_YR

Annual pH value qualifier code

PO4P

Ortho phosphorus concentration, soluble reactive phosphorus, phosphate (PO4-P); method: ascorbic acid finish

PO4P_MO

Mean monthly ortho phosphorus (PO4-P) concentration

PO4P_OUT_MO

Total monthly ortho phosphorus (PO4-P) outflow

PO4P_OUTPUT

Ortho phosphorus (PO4-P) outflow

PO4P_YR

Mean annual ortho phosphorus (PO4-P) concentration

PO4PCODE

Ortho phosphorus value qualifier code

PO4PCODE_MO

Monthly ortho phosphorus (PO4-P) value qualifier code

PO4PCODE_YR

Annual ortho phosphorus value qualifier code

PVOL

Sample volume from streamflow proportional sampler

PVOLCODE

Sample volume code

Q_AREA_CM

Streamflow in cm for the time interval represented by the proportional sample
Q_AREA_MO
  Total monthly streamflow over watershed area
Q_AREA_YR
  Total annual streamflow for the wateryear
QA_SAMPLE
  Quality assurance sample number assigned if sample water is further analyzed for internal laboratory purposes
QCCODE
  Quality control sample codes are assigned to samples collected for examining integrity of proportional sample analysis
QCODE
  Streamflow value qualifier code
QCODE_MO
  Monthly streamflow value qualifier code
QCODE_YR
  Annual streamflow value qualifier code
SAMPLER_TYPE
  Type of water sampler or method used to collect water
SEQ_INDEX
  Sequential index generated primarily by the temporal order in which samples are collected
SI
  Silica as silicon concentration; method: automated molybdenum blue
SI_MO
  Mean monthly silica concentration
SI_OUT_MO
  Total monthly silica outflow
SI_OUTPUT
  Silica outflow
SI_YR
  Mean annual silica concentration
SICODE
  Silica value qualifier code
SICODE_MO
  Monthly silica value qualifier code
SICODE_YR
  Annual silica value qualifier code
SITECODE
  Gaging station site code
SO4S
SO4-S (dissolved) concentration, sulfate as sulfur; method ion chromatography (automated barium sulfate before 1993)

SO4S_MO
Mean monthly sulfate-sulfur (SO4-S) concentration

SO4S_OUT_MO
Total monthly sulfate-sulfur (SO4-S) outflow

SO4S_OUTPUT
SO4-S (sulfate-sulfur) outflow

SO4S_YR
Mean annual SO4-S (sulfate-sulfur) concentration

SO4SCODE
SO4-S value qualifier code

SO4SCODE_MO
Monthly sulfate-sulfur (SO4-S) value qualifier code

SO4SCODE_YR
Annual SO4-S value qualifier code

SSED
Suspended sediment concentration; method: nonfiltrable residue, gravimetric

SSED_MO
Mean monthly suspended sediment concentration

SSED_OUT_MO
Total monthly suspended sediment outflow

SSED_OUTPUT
Suspended sediment outflow

SSED_YR
Mean annual suspended sediment concentration

SSEDCODE
Suspended sediment value qualifier code

SSEDCODE_MO
Monthly suspended sediment value qualifier code

SSEDCODE_YR
Annual suspended sediment value qualifier code

STCODE
Study code

TDN
Total dissolved nitrogen concentration (filtered sample); method: persulfate digestion and analysis by automated colorimetric analysis; instrument: Technicon Auto-Analyzer II

TDN_MO
Mean monthly total dissolved nitrogen concentration
TDN_OUT_MO
Total monthly total dissolved nitrogen outflow (filtered sample)

TDN_OUTPUT
Total dissolved nitrogen outflow (filtered sample)

TDN_YR
Mean annual total dissolved nitrogen concentration

TDNCODE
Total dissolved nitrogen value qualifier code

TDNCODE_MO
Monthly total dissolved nitrogen value qualifier code

TDNCODE_YR
Annual total dissolved nitrogen value qualifier code

TDP
Total dissolved phosphorus concentration; method: persulfate/H2SO4 digestion, ascorbic acid finish

TDP_MO
Mean monthly total dissolved phosphorus concentration

TDP_OUT_MO
Total monthly total dissolved phosphorus outflow

TDP_OUTPUT
Total dissolved phosphorus outflow

TDP_YR
Mean annual total dissolved phosphorus concentration

TDPCODE
Total dissolved phosphorus value qualifier code

TDPCODE_MO
Monthly total dissolved phosphorus value qualifier code

TDPCODE_YR
Annual total dissolved phosphorus value qualifier code

TKN
Total Kjeldahl nitrogen concentration on filtered sample (dissolved); method: Kjeldahl digestion H2SO4, CuSO4/KCl, nessler finish

TKN_MO
Mean monthly total kjeldahl nitrogen concentration (dissolved)

TKN_OUT_MO
Total monthly total Kjeldahl nitrogen (dissolved) outflow

TKN_OUTPUT
Total Kjeldahl nitrogen (dissolved) outflow

TKN_YR
Total Kjeldahl nitrogen (dissolved) outflow
Mean annual total kjeldahl nitrogen concentration (dissolved)

TKNCODE
Total Kjeldahl nitrogen value qualifier code

TKNCODE_MO
Monthly total Kjeldahl nitrogen (dissolved) value qualifier code

TKNCODE_YR
Annual total Kjeldahl nitrogen value qualifier code

TYPE
Sample type indicator

UTKN
Total Kjeldahl nitrogen concentration on unfiltered sample; method: Kjeldahl digestion H2SO4, CuSO4/KCl, nessler finish

UTKN_MO
Mean monthly unfiltered total Kjeldahl nitrogen concentration

UTKN_OUT_MO
Total monthly unfiltered total Kjeldahl nitrogen outflow

UTKN_OUTPUT
Unfiltered total Kjeldahl nitrogen outflow

UTKN_YR
Mean annual unfiltered total Kjeldahl nitrogen concentration

UTKNCODE
Unfiltered total Kjeldahl nitrogen value qualifier code

UTKNCODE_MO
Monthly unfiltered total Kjeldahl nitrogen value qualifier code

UTKNCODE_YR
Annual unfiltered total Kjeldahl nitrogen value qualifier code

UTN
Total nitrogen concentration (unfiltered sample); method: persulfate digestion and analysis by automated colorimetric analysis; instrument: Technicon Auto-Analyzer II

UTN_MO
Mean monthly total nitrogen concentration (unfiltered samples)

UTN_OUT_MO
Total monthly total nitrogen outflow (unfiltered sample)

UTN_OUTPUT
Total nitrogen outflow (unfiltered sample)

UTN_YR
Mean annual total nitrogen concentration (unfiltered samples)

UTNCODE
Unfiltered total nitrogen value qualifier code
UTNCODE_MO
  Monthly unfiltered total nitrogen value qualifier code

UTNCODE_YR
  Annual unfiltered total nitrogen value qualifier code

UTP
  Unfiltered total phosphorus concentration; method: persulfate/H2SO4 digestion, ascorbic acid finish

UTP_MO
  Mean monthly unfiltered total phosphorus concentration

UTP_OUT_MO
  Total monthly unfiltered total phosphorus outflow

UTP_OUTPUT
  Unfiltered total phosphorus outflow

UTP_YR
  Mean annual unfiltered total phosphorus concentration

UTPCODE
  Unfiltered total phosphorus value qualifier code

UTPCODE_MO
  Monthly unfiltered total phosphorus value qualifier code

UTPCODE_YR
  Annual unfiltered total phosphorus value qualifier code

WATERYEAR
  Water year of sample or annual summary (October-September)

YEAR
  Calendar year of annual or monthly summary

Enumerated Domains:

Enumerated Domain for Attribute: ALKCODE
  * Value is below detection limit for analysis (used beginning in 1991)
  A Accepted value
  E Estimated value
  N No analytical measurement
  Q Value is questionable (used beginning in 1991)

Enumerated Domain for Attribute: ANCACODE
  D Derived anion-cation ratio value is based on the full set of anions and cations
  N No anion-cation ratio calculation determined due to missing analytical components
  D* Derived value - mathematically determined from other analytical measurements, one or more of which were below the detection limit
  DE Derived value - mathematically determined from other analytical measurements, one or more of which were estimated values
  DQ Derived value - mathematically determined from other analytical measurements,
one or more of which were questionable values

Enumerated Domain for Attribute: CACODE
  * Value is below detection limit for analysis (used beginning in 1991)
  A Accepted value
  E Estimated value
  N No analytical measurement
  Q Value is questionable (used beginning in 1991)

Enumerated Domain for Attribute: CLCODE
  * Value is below detection limit for analysis (used beginning in 1991)
  A Accepted value
  E Estimated value
  N No analytical measurement
  Q Value is questionable (used beginning in 1991)
  C Value confirmed, contamination or experimental tracer suspected (code use begins May 2007)

Enumerated Domain for Attribute: CONDCODE
  * Value is below detection limit for analysis (used beginning in 1991)
  A Accepted value
  E Estimated value
  N No analytical measurement
  Q Value is questionable (used beginning in 1991)
  C Confirmed value, contamination or experimental tracer suspected (code use begins May 2007)

Enumerated Domain for Attribute: DOCCODE
  * Value is below detection limit for analysis (used beginning in 1991)
  A Accepted value
  E Estimated value
  N No analytical measurement
  Q Value is questionable (used beginning in 1991)

Enumerated Domain for Attribute: KCODE
  * Value is below detection limit for analysis (used beginning in 1991)
  A Accepted value
  E Estimated value
  N No analytical measurement
  Q Value is questionable (used beginning in 1991)

Enumerated Domain for Attribute: MGCODE
  * Value is below detection limit for analysis (used beginning in 1991)
A Accepted value
E Estimated value
N No analytical measurement
Q Value is questionable (used beginning in 1991)

Enumerated Domain for Attribute: NACODE
* Value is below detection limit for analysis (used beginning in 1991)
A Accepted value
E Estimated value
N No analytical measurement
Q Value is questionable (used beginning in 1991)

Enumerated Domain for Attribute: NH3NCODE
* Value is below detection limit for analysis (used beginning in 1991)
A Accepted value
E Estimated value
N No analytical measurement
Q Value is questionable (used beginning in 1991)
C Value confirmed, contamination suspected (code use begins May 2007)

Enumerated Domain for Attribute: NO3NCODE
* Value is below detection limit for analysis (used beginning in 1991)
A Accepted value
E Estimated value
N No analytical measurement
Q Value is questionable (used beginning in 1991)
C Value confirmed, contamination suspected (code use begins May 2011)

Enumerated Domain for Attribute: PO4PCODE
* Value is below detection limit for analysis (used beginning in 1991)
A Accepted value
E Estimated value
N No analytical measurement
Q Value is questionable (used beginning in 1991)
C Value confirmed, contamination suspected (code use begins May 2011)

Enumerated Domain for Attribute: DONCODE
N No derived value is calculated due to missing analytical components
D Derived value - mathematically determined from other analytical measurements
D*  Derived value - mathematically determined from other analytical measurements, one or more of which were below the detection limit
DE  Derived value - mathematically determined from other analytical measurements, one or more of which were estimated values
DQ  Derived value - mathematically determined from other analytical measurements, one or more of which were questionable values
DC  Derived value confirmed, contamination suspected (code use begins May 2007)

Enumerated Domain for Attribute: PHCODE
A  Accepted value
E  Estimated value
N  No analytical measurement
Q  Value is questionable (used beginning in 1991)

Enumerated Domain for Attribute: PARTNCODE
N  No derived value is calculated due to missing analytical components
D  Derived value - mathematically determined from other analytical measurements
D*  Derived value - mathematically determined from other analytical measurements, one or more of which were below the detection limit
DE  Derived value - mathematically determined from other analytical measurements, one or more of which were estimated values
DQ  Derived value - mathematically determined from other analytical measurements, one or more of which were questionable values
DC  Derived value confirmed, contamination suspected (code use begins May 2007)

Enumerated Domain for Attribute: PARTPCODE
N  No derived value is calculated due to missing analytical components
D  Derived value - mathematically determined from other analytical measurements
D*  Derived value - mathematically determined from other analytical measurements, one or more of which were below the detection limit
DE  Derived value - mathematically determined from other analytical measurements, one or more of which were estimated values
DQ  Derived value - mathematically determined from other analytical measurements, one or more of which were questionable values
DC  Derived value confirmed, contamination suspected (code use begins May 2007)

Enumerated Domain for Attribute: PVOLCODE
A  Accepted value for sample volume
E  Sample volume value is estimated
Q  Sample volume value is questionable - typically implies volume is measured correctly, but volume does not proportionally represent the collection period
N  No sample volume value available

Enumerated Domain for Attribute: QCODE
A  Accepted value for streamflow
N  No streamflow available for period
E  Estimated streamflow value
P  Provisional streamflow value is likely to change - used for USGS Lookout Creek streamflow
Q  Streamflow value for the period is questionable

Enumerated Domain for Attribute: SICODE
*  Value is below detection limit for analysis (used beginning in 1991)
<table>
<thead>
<tr>
<th>Enumerated Domain for Attribute: SO4SCODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Value is below detection limit for analysis (used beginning in 1991)</td>
</tr>
<tr>
<td>A Accepted value</td>
</tr>
<tr>
<td>E Estimated value</td>
</tr>
<tr>
<td>N No analytical measurement</td>
</tr>
<tr>
<td>Q Value is questionable (used beginning in 1991)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Enumerated Domain for Attribute: SSEDCODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Accepted value</td>
</tr>
<tr>
<td>E Estimated value</td>
</tr>
<tr>
<td>N No analytical measurement</td>
</tr>
<tr>
<td>Q Value is questionable (used beginning in 1991)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Enumerated Domain for Attribute: STCODE</th>
</tr>
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<tbody>
<tr>
<td>CF002 Study code CF002</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Enumerated Domain for Attribute: TKNCODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Value is below detection limit for analysis (used beginning in 1991)</td>
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<tr>
<td>A Accepted value</td>
</tr>
<tr>
<td>E Estimated value</td>
</tr>
<tr>
<td>N No analytical measurement</td>
</tr>
<tr>
<td>Q Value is questionable (used beginning in 1991)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Enumerated Domain for Attribute: TDPCODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Value is below detection limit for analysis (used beginning in 1991)</td>
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<tr>
<td>A Accepted value</td>
</tr>
<tr>
<td>E Estimated value</td>
</tr>
<tr>
<td>N No analytical measurement</td>
</tr>
<tr>
<td>Q Value is questionable (used beginning in 1991)</td>
</tr>
<tr>
<td>C Value confirmed, contamination suspected (code use begins May 2011)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Enumerated Domain for Attribute: TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>QB Quality control samples taken below turbulence box</td>
</tr>
<tr>
<td>QS Quality control sample taken through sampler</td>
</tr>
<tr>
<td>QL Quality control sample taken through sampler and left in gage house until next collection</td>
</tr>
<tr>
<td>QA Quality control sample taken above flume</td>
</tr>
<tr>
<td>Code</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>C</td>
</tr>
<tr>
<td>G</td>
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<td>S</td>
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</tr>
<tr>
<td>F</td>
</tr>
<tr>
<td>YE</td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>P</td>
</tr>
</tbody>
</table>

### Enumerated Domain for Attribute: UTKCODE
- * Value is below detection limit for analysis (used beginning in 1991)
- A Accepted value
- E Estimated value
- N No analytical measurement
- Q Value is questionable (used beginning in 1991)

### Enumerated Domain for Attribute: UTPCODE
- * Value is below detection limit for analysis (used beginning in 1991)
- A Accepted value
- E Estimated value
- N No analytical measurement
- Q Value is questionable (used beginning in 1991)
- C Value confirmed, contamination suspected (code use begins May 2011)

### Enumerated Domain for Attribute: UTNCODE
- * Value is below detection limit for analysis (used beginning in 1991)
- A Accepted value
- E Estimated value
- Q Value is questionable (used beginning in 1991)
- D Derived value - mathematically determined from other analytical measurements
- D* Derived value - mathematically determined from other analytical measurements, one or more of which were below the detection limit
- DE Derived value - mathematically determined from other analytical measurements, one or more of which were estimated values
- DQ Derived value - mathematically determined from other analytical measurements, one or more of which were questionable values
- N No analytical measurement or no derived value calculated due to missing analytical components
C  Value confirmed, contamination suspected (code use begins May 2011)

Enumerated Domain for Attribute: TDNCODE
  *  Value is below detection limit for analysis (used beginning in 1991)
A  Accepted value
E  Estimated value
Q  Value is questionable (used beginning in 1991)
D  Derived value - mathematically determined from other analytical measurements
D* Derived value - mathematically determined from other analytical measurements, one or more of which were below the detection limit
DE Derived value - mathematically determined from other analytical measurements, one or more of which were estimated values
DQ Derived value - mathematically determined from other analytical measurements, one or more of which were questionable values
N  No analytical measurement or no derived value calculated due to missing analytical components
C  Value confirmed, contamination suspected (code use begins May 2007)

Enumerated Domain for Attribute: STCODE
CF002  Study code CF002

Enumerated Domain for Attribute: TYPE
QB Quality control samples taken below turbulence box
QS Quality control sample taken through sampler
QL Quality control sample taken through sampler and left in gage house until next collection
QA Quality control sample taken above flume
C  Sample combined with preceeding saved sample(s) for analysis - not used after 1981
G  Grab sample taken in lieu of proportional sample
S  Sample saved to combine with following collection (type 'C') due to insufficient water (not used after 1981). Nutrient concentrations of the following stream water sample are used to determine fluxes for this period.
N  No sample is collected for this period
F  Complete, full sample. Sampler operational throughout sampling period.
YE Year end marker allows summary by water year - this is not a sample. Flux values are calculated from streamflow ending Sep 30 and use analyte concentrations from the following sample. ‘Y’ markers are inserted every Sep30
A  Augmented sample - grab sample added to insufficient proportional sample (rarely used after 1987)
P  Partial sample - proportional sampler did not operate successfully over entire period
B  Biased sample - consecutive samples are proportionally separated and combined based on streamflow - code use begins WY 2008 to approx. two 3-week sampling intervals (where one sample is for 4 wks and the next for 2 wks)

Enumerated Domain for Attribute: ALKCODE_MO
A  Accepted monthly value
* Monthly value includes one or more values measured below the detection limit
E  Monthly value includes estimated values
I  Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N  No analyses conducted for proportional samples taken during the month
Q  Monthly value includes questionable sample values

Enumerated Domain for Attribute: CACODE_MO
A  Accepted monthly value
E  Monthly value includes estimated values
I  Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N  No analyses conducted for proportional samples taken during the month
Q  Monthly value includes questionable sample values
IE Monthly value incomplete - only 6-25 days are proportionally sampled in the month; one or more values estimated

Enumerated Domain for Attribute: CLCODE_MO
A  Accepted monthly value
I  Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N  No analyses conducted for proportional samples taken during the month
E  Monthly value includes estimated values

Enumerated Domain for Attribute: CONDCODE_MO
A  Accepted monthly value
E  Monthly value includes estimated values
I  Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N  No analyses conducted for proportional samples taken during the month
Q  Monthly value includes questionable sample values
IE Monthly value incomplete - only 6-25 days are proportionally sampled in the month; one or more values estimated

Enumerated Domain for Attribute: DOCCODE_MO
A  Accepted monthly value
I  Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N  No analyses conducted for proportional samples taken during the month
Q  Monthly value includes questionable sample values
E  Monthly value includes estimated values

Enumerated Domain for Attribute: DONCODE_MO
D  Monthly value based on derived values
D* Monthly value based on derived values; one or more values measured below the detection limit
DE Monthly value based on derived values; one or more values estimated
DQ Monthly value based on derived values; one or more values questionable
DQ* Monthly value based on derived values; one or more values questionable; one or more values measured below the detection limit
ID Monthly value incomplete - only 6-25 days are proportionally sampled in the month; monthly value based on derived values
ID* Monthly value incomplete - only 6-25 days are proportionally sampled in the month; monthly value based on derived values of which one or more values measured below the detection limit
N No analyses conducted for proportional samples taken during the month
DE* Monthly value based on derived values; one or more values estimated

Enumerated Domain for Attribute: KCODE_MO
A Accepted monthly value
E Monthly value includes estimated values
I Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N No analyses conducted for proportional samples taken during the month
Q Monthly value includes questionable sample values

Enumerated Domain for Attribute: MGCODE_MO
A Accepted monthly value
E Monthly value includes estimated values
I Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N No analyses conducted for proportional samples taken during the month
Q Monthly value includes questionable sample values

Enumerated Domain for Attribute: NACODE_MO
A Accepted monthly value
E Monthly value includes estimated values
I Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N No analyses conducted for proportional samples taken during the month
Q Monthly value includes questionable sample values

Enumerated Domain for Attribute: NH3NCODE_MO
A Accepted monthly value
* Monthly value includes one or more values measured below the detection limit
E Monthly value includes estimated values
I Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N No analyses conducted for proportional samples taken during the month
Q* Monthly value includes questionable sample values
I* Monthly value incomplete - only 6-25 days are proportionally sampled in the month; one or more values measured below the detection limit
E* Monthly value includes estimated values; one or more values measured below the detection limit

Enumerated Domain for Attribute: NO3NCODE_MO
A Accepted monthly value
* Monthly value includes one or more values measured below the detection limit
* Monthly value includes one or more values measured below the detection limit
E Monthly value includes estimated values
I Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N No analyses conducted for proportional samples taken during the month
Q Monthly value includes questionable sample values

Enumerated Domain for Attribute: OCODE_MO
A Accepted monthly value
E Monthly value includes estimated values
I Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N No analyses conducted for proportional samples taken during the month
Q Monthly value includes questionable sample values
P Monthly value includes provisional values subject to change

Enumerated Domain for Attribute: SICODE_MO
A Accepted monthly value
I Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N No analyses conducted for proportional samples taken during the month
Q Monthly value includes questionable sample values
IQ Monthly value incomplete - only 6-25 days are proportionally sampled in the month; one or more values questionable
E Monthly value includes estimated values
EQ Monthly value includes estimated values; one or more values were questionable

Enumerated Domain for Attribute: SO4SCODE_MO
A Accepted monthly value
E Monthly value includes estimated values
I Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N No analyses conducted for proportional samples taken during the month

Enumerated Domain for Attribute: SSEDCODE_MO
A Accepted monthly value
E Monthly value includes estimated values
I Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N No analyses conducted for proportional samples taken during the month
Q Monthly value includes questionable sample values

Enumerated Domain for Attribute: TDNCODE_MO
* Monthly value includes one or more values measured below the detection limit
D Monthly value based on derived values
D* Monthly value based on derived values; one or more values measured below the detection limit
DE Monthly value based on derived values; one or more values estimated
DQ Monthly value based on derived values; one or more values questionable
DQ* Monthly value based on derived values; one or more values questionable; one or more values measured below the detection limit
I Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
ID Monthly value incomplete - only 6-25 days are proportionally sampled in the month; monthly value based on derived values
ID* Monthly value incomplete - only 6-25 days are proportionally sampled in the month; monthly value based on derived values of which one or more values measured below the detection limit
IDE Monthly value incomplete - only 6-25 days are proportionally sampled in the month; monthly value based on derived values of which one or more values are estimated
N No analyses conducted for proportional samples taken during the month
Q Monthly value includes questionable sample values
E Monthly value includes estimated values
DE* Monthly value based on derived values; one or more values estimated
Q* Monthly value includes questionable sample values; one or more values measured below the detection limit
A Accepted monthly value
I* Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary; one or more values measured below the detection limit
E* One or more values estimated; one or more values measured below the detection limit

Enumerated Domain for Attribute: TDPCODE_MO
A Accepted monthly value
E Monthly value includes estimated values
I Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N No analyses conducted for proportional samples taken during the month
Q Monthly value includes questionable sample values

Enumerated Domain for Attribute: TKNCODE_MO
A Accepted monthly value
* Monthly value includes one or more values measured below the detection limit
E Monthly value includes estimated values
I Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N No analyses conducted for proportional samples taken during the month
Q Monthly value includes questionable sample values

Enumerated Domain for Attribute: UTKNCODE_MO
A Accepted monthly value
* Monthly value includes one or more values measured below the detection limit
E Monthly value includes estimated values
I  Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N  No analyses conducted for proportional samples taken during the month
Q  Monthly value includes questionable sample values

Enumerated Domain for Attribute: UTNCODE_MO
-  Monthly value includes one or more values measured below the detection limit
D  Monthly value based on derived values
D*  Monthly value based on derived values; one or more values measured below the detection limit
DE  Monthly value based on derived values; one or more values estimated
DQ  Monthly value based on derived values; one or more values questionable
DQ*  Monthly value based on derived values; one or more values questionable; one or more values measured below the detection limit
I  Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
ID  Monthly value incomplete - only 6-25 days are proportionally sampled in the month; monthly value based on derived values
ID*  Monthly value incomplete - only 6-25 days are proportionally sampled in the month; monthly value based on derived values of which one or more values measured below the detection limit
IDE  Monthly value incomplete - only 6-25 days are proportionally sampled in the month; monthly value based on derived values of which one or more values are estimated
N  No analyses conducted for proportional samples taken during the month
Q  Monthly value includes questionable sample values

Enumerated Domain for Attribute: UTPCODE_MO
-  Accepted monthly value
E  Monthly value includes estimated values
DE*  Monthly value based on derived values; one or more values estimated; one or more values measured below the detection limit
Q*  Monthly value includes questionable sample values; one or more values measured below the detection limit
A  Accepted monthly value
I*  Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary; one or more values measured below the detection limit
E*  One or more values estimated; one or more values measured below the detection limit

Enumerated Domain for Attribute: ALKCODE_YR
N  No analyses conducted in water year
Q  Annual value includes questionable sample values

Enumerated Domain for Attribute: ALKCODE_YR
-  Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
A  Accepted monthly value
E  Monthly value includes estimated values
I  Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N  No analyses conducted for proportional samples taken during the month
Q  Monthly value includes questionable sample values
IE  Monthly value incomplete - only 6-25 days are proportionally sampled in the month; one or more values estimated
included in annual summary

**E** Annual value includes estimated values

**A** Accepted annual value

* Annual value includes one or more values measured below the detection limit

**I** Annual value incomplete; one or more values are missing for part of the year; one or more values measured below the detection limit

**IE** Annual value incomplete; one or more values are missing for part of the year; one or more values estimated

**IQ** Annual value incomplete; one or more values are missing for part of the year; one or more values questionable

Enumerated Domain for Attribute: CACODE_YR

**N** No analyses conducted in water year

**Q** Annual value includes questionable sample values

**I** Annual value incomplete; values are missing for part of the year and not included in annual summary

**E** Annual value includes estimated values

**A** Accepted annual value

* Annual value includes one or more values measured below the detection limit

**I** Annual value incomplete; one or more values are missing for part of the year; one or more values measured below the detection limit

**IE** Annual value incomplete; one or more values are missing for part of the year; one or more values estimated

**IQ** Annual value incomplete; one or more values are missing for part of the year; one or more values questionable

Enumerated Domain for Attribute: CLCODE_YR

**N** No analyses conducted in water year

**Q** Annual value includes questionable sample values

**I** Annual value incomplete; values are missing for part of the year and not included in annual summary

**E** Annual value includes estimated values

**A** Accepted annual value

* Annual value includes one or more values measured below the detection limit

**I** Annual value incomplete; one or more values are missing for part of the year; one or more values measured below the detection limit

**IE** Annual value incomplete; one or more values are missing for part of the year; one or more values estimated

**IQ** Annual value incomplete; one or more values are missing for part of the year; one or more values questionable

Enumerated Domain for Attribute: CONDCODE_YR

**N** No analyses conducted in water year

**Q** Annual value includes questionable sample values

**I** Annual value incomplete; values are missing for part of the year and not included in annual summary

**E** Annual value includes estimated values

**A** Accepted annual value

* Annual value includes one or more values measured below the detection limit
I* Annual value incomplete; one or more values are missing for part of the year; one or more values measured below the detection limit
IE Annual value incomplete; one or more values are missing for part of the year; one or more values estimated
IQ Annual value incomplete; one or more values are missing for part of the year; one or more values questionable

Enumerated Domain for Attribute: DOCCODE_YR
N No analyses conducted in water year
Q Annual value includes questionable sample values
I Annual value incomplete; values are missing for part of the year and not included in annual summary
E Annual value includes estimated values
A Accepted annual value
* Annual value includes one or more values measured below the detection limit
I* Annual value incomplete; one or more values are missing for part of the year; one or more values measured below the detection limit
IE Annual value incomplete; one or more values are missing for part of the year; one or more values estimated
IQ Annual value incomplete; one or more values are missing for part of the year; one or more values questionable

Enumerated Domain for Attribute: KCODE_YR
N No analyses conducted in water year
Q Annual value includes questionable sample values
I Annual value incomplete; values are missing for part of the year and not included in annual summary
E Annual value includes estimated values
A Accepted annual value
* Annual value includes one or more values measured below the detection limit
I* Annual value incomplete; one or more values are missing for part of the year; one or more values measured below the detection limit
IE Annual value incomplete; one or more values are missing for part of the year; one or more values estimated
IQ Annual value incomplete; one or more values are missing for part of the year; one or more values questionable

Enumerated Domain for Attribute: MGCODE_YR
N No analyses conducted in water year
Q Annual value includes questionable sample values
I Annual value incomplete; values are missing for part of the year and not included in annual summary
E Annual value includes estimated values
A Accepted annual value
* Annual value includes one or more values measured below the detection limit
I* Annual value incomplete; one or more values are missing for part of the year; one or more values measured below the detection limit
IE Annual value incomplete; one or more values are missing for part of the year; one or more values estimated
IQ Annual value incomplete; one or more values are missing for part of the year; one or more values questionable

Enumerated Domain for Attribute: NACODE_YR
N  No analyses conducted in water year
Q  Annual value includes questionable sample values
I  Annual value incomplete; values are missing for part of the year and not included in annual summary
E  Annual value includes estimated values
A  Accepted annual value
*  Annual value includes one or more values measured below the detection limit
I* Annual value incomplete; one or more values are missing for part of the year; one or more values measured below the detection limit
IE Annual value incomplete; one or more values are missing for part of the year; one or more values estimated
IQ Annual value incomplete; one or more values are missing for part of the year; one or more values questionable

Enumerated Domain for Attribute: NH3NCODE_YR
N  No analyses conducted in water year
Q  Annual value includes questionable sample values
I  Annual value incomplete; values are missing for part of the year and not included in annual summary
E  Annual value includes estimated values
A  Accepted annual value
*  Annual value includes one or more values measured below the detection limit
I* Annual value incomplete; one or more values are missing for part of the year; one or more values measured below the detection limit
IE Annual value incomplete; one or more values are missing for part of the year; one or more values estimated
IQ Annual value incomplete; one or more values are missing for part of the year; one or more values questionable

Enumerated Domain for Attribute: NO3NCODE_YR
N  No analyses conducted in water year
Q  Annual value includes questionable sample values
I  Annual value incomplete; values are missing for part of the year and not included in annual summary
E  Annual value includes estimated values
A  Accepted annual value
*  Annual value includes one or more values measured below the detection limit
I* Annual value incomplete; one or more values are missing for part of the year; one or more values measured below the detection limit
IE Annual value incomplete; one or more values are missing for part of the year; one or more values estimated
IQ Annual value incomplete; one or more values are missing for part of the year; one or more values questionable

Enumerated Domain for Attribute: PO4PCODE_YR
N  No analyses conducted in water year
Q  Annual value includes questionable sample values
I  Annual value incomplete; values are missing for part of the year and not included in annual summary
E  Annual value includes estimated values
A  Accepted annual value
*  Annual value includes one or more values measured below the detection limit
I*  Annual value incomplete; one or more values are missing for part of the year; one or more values measured below the detection limit
IE  Annual value incomplete; one or more values are missing for part of the year; one or more values estimated
IQ  Annual value incomplete; one or more values are missing for part of the year; one or more values questionable

Enumerated Domain for Attribute: DONCODE_YR
N  No derived values are calculated for the entire water year
D  Annual value based on derived values
D*  Annual value based on derived values; one or more values measured below the detection limit
DE  Annual value based on derived values; one or more values estimated
DQ  Annual value based on derived values; one or more values questionable
ID  Annual value incomplete; one or more values are missing for part of the year; annual value based on derived values
ID*  Annual value incomplete; one or more values are missing for part of the year; annual value based on derived values of which one or more values measured below the detection limit
IDE  Annual value incomplete; one or more values are missing for part of the year; annual value based on derived values of which one or more values are estimated
IDQ  Annual value incomplete; one or more values are missing for part of the year; annual value based on derived values of which one or more values are questionable

Enumerated Domain for Attribute: PHCODE_YR
N  No analyses conducted in water year
Q  Annual value includes questionable sample values
I  Annual value incomplete; values are missing for part of the year and not included in annual summary
E  Annual value includes estimated values
A  Accepted annual value
IE  Annual value incomplete; one or more values are missing for part of the year; one or more values estimated
IQ  Annual value incomplete; one or more values are missing for part of the year; one or more values questionable

Enumerated Domain for Attribute: PARTNCODE_YR
N  No derived values are calculated for the entire water year
D  Annual value based on derived values
D*  Annual value based on derived values; one or more values measured below the detection limit
DE  Annual value based on derived values; one or more values estimated
DQ  Annual value based on derived values; one or more values questionable
ID  Annual value incomplete; one or more values are missing for part of the year; annual value based on derived values
ID*  Annual value incomplete; one or more values are missing for part of the year; annual value based on derived values of which one or more values measured below the detection limit
IDE  Annual value incomplete; one or more values are missing for part of the year; annual value based on derived values of which one or more values are estimated
IDQ  Annual value incomplete; one or more values are missing for part of the year; annual value based on derived values of which one or more values are questionable
### Enumerated Domain for Attribute: `PARTPCODE_YR`

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>No derived values are calculated for the entire water year</td>
</tr>
<tr>
<td>D</td>
<td>Annual value based on derived values</td>
</tr>
<tr>
<td>D*</td>
<td>Annual value based on derived values; one or more values measured below the detection limit</td>
</tr>
<tr>
<td>DE</td>
<td>Annual value based on derived values; one or more values estimated</td>
</tr>
<tr>
<td>DQ</td>
<td>Annual value based on derived values; one or more values questionable</td>
</tr>
<tr>
<td>ID</td>
<td>Annual value incomplete; one or more values are missing for part of the year; annual value based on derived values</td>
</tr>
<tr>
<td>ID*</td>
<td>Annual value incomplete; one or more values are missing for part of the year; annual value based on derived values of which one or more values measured below the detection limit</td>
</tr>
<tr>
<td>IDE</td>
<td>Annual value incomplete; one or more values are missing for part of the year; annual value based on derived values of which one or more values are estimated</td>
</tr>
<tr>
<td>IDQ</td>
<td>Annual value incomplete; one or more values are missing for part of the year; annual value based on derived values of which one or more values are questionable</td>
</tr>
</tbody>
</table>

### Enumerated Domain for Attribute: `QCODE_YR`

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>No streamflow available for period</td>
</tr>
<tr>
<td>E</td>
<td>Total includes estimated streamflow values</td>
</tr>
<tr>
<td>I</td>
<td>Incomplete, parts of year missing from annual summary</td>
</tr>
<tr>
<td>A</td>
<td>Accepted value - all streamflow is included and not estimated for the water year</td>
</tr>
<tr>
<td>P</td>
<td>Provisional streamflow is included (subject to change) used for USGS Lookout Creek streamflow</td>
</tr>
</tbody>
</table>

### Enumerated Domain for Attribute: `SICODE_YR`

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>No analyses conducted in water year</td>
</tr>
<tr>
<td>Q</td>
<td>Annual value includes questionable sample values</td>
</tr>
<tr>
<td>I</td>
<td>Annual value incomplete; values are missing for part of the year and not included in annual summary</td>
</tr>
<tr>
<td>E</td>
<td>Annual value includes estimated values</td>
</tr>
<tr>
<td>A</td>
<td>Accepted annual value</td>
</tr>
<tr>
<td>*</td>
<td>Annual value includes one or more values measured below the detection limit</td>
</tr>
<tr>
<td>I*</td>
<td>Annual value incomplete; one or more values are missing for part of the year; one or more values measured below the detection limit</td>
</tr>
<tr>
<td>IE</td>
<td>Annual value incomplete; one or more values are missing for part of the year; one or more values estimated</td>
</tr>
<tr>
<td>IQ</td>
<td>Annual value incomplete; one or more values are missing for part of the year; one or more values questionable</td>
</tr>
</tbody>
</table>

### Enumerated Domain for Attribute: `SO4SCODE_YR`

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>No analyses conducted in water year</td>
</tr>
<tr>
<td>Q</td>
<td>Annual value includes questionable sample values</td>
</tr>
<tr>
<td>I</td>
<td>Annual value incomplete; values are missing for part of the year and not included in annual summary</td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>A</td>
<td>Accepted annual value</td>
</tr>
<tr>
<td>E</td>
<td>Annual value includes estimated values</td>
</tr>
<tr>
<td>IE</td>
<td>Annual value incomplete; one or more values are missing for part of the year; one or more values estimated</td>
</tr>
<tr>
<td>IQ</td>
<td>Annual value incomplete; one or more values are missing for part of the year; one or more values questionable</td>
</tr>
<tr>
<td>*</td>
<td>Annual value includes one or more values measured below the detection limit</td>
</tr>
<tr>
<td>I</td>
<td>Annual value incomplete; values are missing for part of the year and not included in annual summary</td>
</tr>
<tr>
<td>N</td>
<td>No analyses conducted in water year</td>
</tr>
<tr>
<td>Q</td>
<td>Annual value includes questionable sample values</td>
</tr>
<tr>
<td>I*</td>
<td>Annual value incomplete; one or more values are missing for part of the year; one or more values measured below the detection limit</td>
</tr>
<tr>
<td>IE*</td>
<td>Annual value incomplete; one or more values are missing for part of the year; one or more values estimated; one or more values measured below the detection limit</td>
</tr>
<tr>
<td>IQ*</td>
<td>Annual value incomplete; one or more values are missing for part of the year; one or more values questionable; one or more values measured below the detection limit</td>
</tr>
</tbody>
</table>

**Enumerated Domain for Attribute: SSEDCODE_YR**

- **N**: No analyses conducted in water year
- **Q**: Annual value includes questionable sample values
- **I**: Annual value incomplete; values are missing for part of the year and not included in annual summary
- **E**: Annual value includes estimated values
- **A**: Accepted annual value
- **IE**: Annual value incomplete; one or more values are missing for part of the year; one or more values estimated
- **IQ**: Annual value incomplete; one or more values are missing for part of the year; one or more values questionable

**Enumerated Domain for Attribute: STCODE**

- **CF002**: Study code CF002

**Enumerated Domain for Attribute: TKNCODE_YR**

- **N**: No analyses conducted in water year
- **Q**: Annual value includes questionable sample values
- **I**: Annual value incomplete; values are missing for part of the year and not included in annual summary
- **E**: Annual value includes estimated values
- **A**: Accepted annual value
- **IE**: Annual value incomplete; one or more values are missing for part of the year; one or more values estimated
- **IQ**: Annual value incomplete; one or more values are missing for part of the year; one or more values questionable

**Enumerated Domain for Attribute: TDPCODE_YR**

- **N**: No analyses conducted in water year
- **Q**: Annual value includes questionable sample values
- **I**: Annual value incomplete; values are missing for part of the year and not included in annual summary
- **E**: Annual value includes estimated values
- **A**: Accepted annual value
- **IE**: Annual value incomplete; one or more values are missing for part of the year; one or more values estimated
- **IQ**: Annual value incomplete; one or more values are missing for part of the year; one or more values questionable
IE: Annual value incomplete; one or more values are missing for part of the year; one or more values estimated
IQ: Annual value incomplete; one or more values are missing for part of the year; one or more values questionable

Enumerated Domain for Attribute: UTKNCODE_YR
N: No analyses conducted in water year
Q: Annual value includes questionable sample values
I: Annual value incomplete; values are missing for part of the year and not included in annual summary
E: Annual value includes estimated values
A: Accepted annual value
*: Annual value includes one or more values measured below the detection limit

Enumerated Domain for Attribute: UTPCODE_YR
N: No analyses conducted in water year
Q: Annual value includes questionable sample values
I: Annual value incomplete; values are missing for part of the year and not included in annual summary
E: Annual value includes estimated values
A: Accepted annual value
*: Annual value includes one or more values measured below the detection limit

Enumerated Domain for Attribute: UTNCODE_YR
N: No analyses conducted in water year
Q: Annual value includes questionable sample values
I: Annual value incomplete; values are missing for part of the year and not included in annual summary
E: Annual value includes estimated values
A: Accepted annual value
*: Annual value includes one or more values measured below the detection limit
D: Annual value based on derived values
D*: Annual value based on derived values; one or more values measured below the detection limit
DE: Annual value based on derived values; one or more values estimated
DQ: Annual value based on derived values; one or more values questionable
I*: Annual value incomplete; one or more values are missing for part of the year; one or more values measured below the detection limit
ID Annual value incomplete; one or more values are missing for part of the year; annual value based on derived values
ID* Annual value incomplete; one or more values are missing for part of the year; annual value based on derived values of which one or more values measured below the detection limit
IDE Annual value incomplete; one or more values are missing for part of the year; annual value based on derived values of which one or more values are estimated
IDQ Annual value incomplete; one or more values are missing for part of the year; annual value based on derived values of which one or more values are questionable
IE Annual value incomplete; one or more values are missing for part of the year; one or more values estimated
IQ Annual value incomplete; one or more values are missing for part of the year; one or more values questionable

Enumerated Domain for Attribute: TDNCODE_YR
N No analyses conducted in water year
Q Annual value includes questionable sample values
I Annual value incomplete; values are missing for part of the year and not included in annual summary
E Annual value includes estimated values
A Accepted annual value
* Annual value includes one or more values measured below the detection limit
D Annual value based on derived values
D* Annual value based on derived values; one or more values measured below the detection limit
DE Annual value based on derived values; one or more values estimated
DQ Annual value based on derived values; one or more values questionable
I* Annual value incomplete; one or more values are missing for part of the year; one or more values measured below the detection limit
ID Annual value incomplete; one or more values are missing for part of the year; annual value based on derived values
ID* Annual value incomplete; one or more values are missing for part of the year; annual value based on derived values of which one or more values measured below the detection limit
IDE Annual value incomplete; one or more values are missing for part of the year; annual value based on derived values of which one or more values are estimated
IDQ Annual value incomplete; one or more values are missing for part of the year; annual value based on derived values of which one or more values are questionable
IE Annual value incomplete; one or more values are missing for part of the year; one or more values estimated
IQ Annual value incomplete; one or more values are missing for part of the year; one or more values questionable

Enumerated Domain for Attribute: STCODE
CF002 Study code CF002

Enumerated Domain for Attribute: TYPE
QB Quality control samples taken below turbulence box
QS Quality control sample taken through sampler
QL Quality control sample taken through sampler and left in gage house until next collection
QA Quality control sample taken above flume
C Sample combined with preceeding saved sample(s) for analysis - not used after 1981
G Grab sample taken in lieu of proportional sample
S Sample saved to combine with following collection (type 'C') due to insufficient water (not used after 1981). Nutrient concentrations of the following stream water sample are used to determine fluxes for this period.
N No sample is collected for this period
F Complete, full sample. Sampler operational throughout sampling period.
YE Year end marker allows summary by water year - this is not a sample. Flux values are calculated from streamflow ending Sep 30 and use analyte concentrations from the following sample. 'Y' markers are inserted every Sep30
A Augmented sample - grab sample added to insufficient proportional sample (rarely used after 1987)
P Partial sample - proportional sampler did not operate successfully over entire period
B Biased sample - consecutive samples are proportionally separated and combined based on streamflow - code use begins WY 2008 to approx. two 3-week sampling intervals (where one sample is for 4 wks and the next for 2 wks)

Enumerated Domain for Attribute: ALKCODE_MO
A Accepted monthly value
* Monthly value includes one or more values measured below the detection limit
E Monthly value includes estimated values
I Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N No analyses conducted for proportional samples taken during the month
Q Monthly value includes questionable sample values

Enumerated Domain for Attribute: CACODE_MO
A Accepted monthly value
E Monthly value includes estimated values
I Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N No analyses conducted for proportional samples taken during the month
Q Monthly value includes questionable sample values
IE Monthly value incomplete - only 6-25 days are proportionally sampled in the month; one or more values estimated

Enumerated Domain for Attribute: CLCODE_MO
A Accepted monthly value
I Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N No analyses conducted for proportional samples taken during the month
E Monthly value includes estimated values

Enumerated Domain for Attribute: DOCCODE_MO
A Accepted monthly value
I Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N No analyses conducted for proportional samples taken during the month
Q  Monthly value includes questionable sample values
E  Monthly value includes estimated values

Enumerated Domain for Attribute: DONCODE_MO
D  Monthly value based on derived values
D*  Monthly value based on derived values; one or more values measured below the detection limit
DE  Monthly value based on derived values; one or more values estimated
DQ  Monthly value based on derived values; one or more values questionable
DQ*  Monthly value based on derived values; one or more values questionable; one or more values measured below the detection limit
ID  Monthly value incomplete - only 6-25 days are proportionally sampled in the month; monthly value based on derived values
ID*  Monthly value incomplete - only 6-25 days are proportionally sampled in the month; monthly value based on derived values of which one or more values measured below the detection limit
N  No analyses conducted for proportional samples taken during the month
DE*  Monthly value based on derived values; one or more values estimated

Enumerated Domain for Attribute: KCODE_MO
A  Accepted monthly value
E  Monthly value includes estimated values
I  Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N  No analyses conducted for proportional samples taken during the month
Q  Monthly value includes questionable sample values

Enumerated Domain for Attribute: MGCODE_MO
A  Accepted monthly value
E  Monthly value includes estimated values
I  Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N  No analyses conducted for proportional samples taken during the month
Q  Monthly value includes questionable sample values

Enumerated Domain for Attribute: NACODE_MO
A  Accepted monthly value
E  Monthly value includes estimated values
I  Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N  No analyses conducted for proportional samples taken during the month
Q  Monthly value includes questionable sample values

Enumerated Domain for Attribute: NH3NCODE_MO
A  Accepted monthly value
*  Monthly value includes one or more values measured below the detection limit
E  Monthly value includes estimated values
I  Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N  No analyses conducted for proportional samples taken during the month
Q* Monthly value includes questionable sample values
I* Monthly value incomplete - only 6-25 days are proportionally sampled in the month; one or more values measured below the detection limit
E* Monthly value includes estimated values; one or more values measured below the detection limit

Enumerated Domain for Attribute: NO3NCODE_MO
A  Accepted monthly value
*  Monthly value includes one or more values measured below the detection limit
E  Monthly value includes estimated values
I  Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N  No analyses conducted for proportional samples taken during the month
Q  Monthly value includes questionable sample values
Q* Monthly value includes questionable sample values
I* Monthly value incomplete - only 6-25 days are proportionally sampled in the month; one or more values measured below the detection limit
E* Monthly value includes estimated values; one or more values measured below the detection limit

Enumerated Domain for Attribute: PARTNCODE_MO
D  Monthly value based on derived values
D* Monthly value based on derived values; one or more values measured below the detection limit
DE Monthly value based on derived values; one or more values estimated
DQ Monthly value based on derived values; one or more values questionable
ID Monthly value incomplete - only 6-25 days are proportionally sampled in the month; monthly value based on derived values
N  No analyses conducted for proportional samples taken during the month
DQ* Monthly value based on derived values; one or more values measured below the detection limit; one or more values questionable
ID* Monthly value incomplete - only 6-25 days are proportionally sampled in the month; monthly value based on derived values; one or more values measured below the detection limit
DE* Monthly value incomplete - only 6-25 days are proportionally sampled in the month; monthly value based on derived values; one or more values estimated

Enumerated Domain for Attribute: PARTPCODE_MO
D  Monthly value based on derived values
DE Monthly value based on derived values; one or more values estimated
DQ Monthly value based on derived values; one or more values questionable
ID Monthly value incomplete - only 6-25 days are proportionally sampled in the month; monthly value based on derived values
IDE Monthly value incomplete - only 6-25 days are proportionally sampled in the month; monthly value based on derived values of which one or more values are estimated
N  No analyses conducted for proportional samples taken during the month

Enumerated Domain for Attribute: PO4PCODE_MO
A Accepted monthly value
* Monthly value includes one or more values measured below the detection limit
E Monthly value includes estimated values
I Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N No analyses conducted for proportional samples taken during the month
Q Monthly value includes questionable sample values

Enumerated Domain for Attribute: QCODE_MO
A Accepted monthly value
E Monthly value includes estimated values
I Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N No analyses conducted for proportional samples taken during the month
Q Monthly value includes questionable sample values
P Monthly value includes provisional values subject to change

Enumerated Domain for Attribute: SICODE_MO
A Accepted monthly value
I Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N No analyses conducted for proportional samples taken during the month
Q Monthly value includes questionable sample values
IQ Monthly value incomplete - only 6-25 days are proportionally sampled in the month; one or more values questionable
E Monthly value includes estimated values
EQ Monthly value includes estimated values; one or more values were questionable

Enumerated Domain for Attribute: SO4SCODE_MO
A Accepted monthly value
E Monthly value includes estimated values
I Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N No analyses conducted for proportional samples taken during the month

Enumerated Domain for Attribute: SSEDCODE_MO
A Accepted monthly value
E Monthly value includes estimated values
I Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
N No analyses conducted for proportional samples taken during the month
Q Monthly value includes questionable sample values

Enumerated Domain for Attribute: TDNCODE_MO
* Monthly value includes one or more values measured below the detection limit
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>Monthly value based on derived values</td>
</tr>
<tr>
<td>D*</td>
<td>Monthly value based on derived values; one or more values measured below the detection limit</td>
</tr>
<tr>
<td>DE</td>
<td>Monthly value based on derived values; one or more values estimated</td>
</tr>
<tr>
<td>DQ</td>
<td>Monthly value based on derived values; one or more values questionable</td>
</tr>
<tr>
<td>DQ*</td>
<td>Monthly value based on derived values; one or more values questionable; one or more values measured below the detection limit</td>
</tr>
<tr>
<td>I</td>
<td>Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary</td>
</tr>
<tr>
<td>ID</td>
<td>Monthly value incomplete - only 6-25 days are proportionally sampled in the month; monthly value based on derived values</td>
</tr>
<tr>
<td>ID*</td>
<td>Monthly value incomplete - only 6-25 days are proportionally sampled in the month; monthly value based on derived values of which one or more values are estimated below the detection limit</td>
</tr>
<tr>
<td>IDE</td>
<td>Monthly value incomplete - only 6-25 days are proportionally sampled in the month; monthly value based on derived values of which one or more values are questionable</td>
</tr>
<tr>
<td>N</td>
<td>No analyses conducted for proportional samples taken during the month</td>
</tr>
<tr>
<td>Q</td>
<td>Monthly value includes questionable sample values</td>
</tr>
<tr>
<td>E</td>
<td>Monthly value includes estimated values</td>
</tr>
<tr>
<td>DE*</td>
<td>Monthly value based on derived values; one or more values estimated</td>
</tr>
<tr>
<td>Q*</td>
<td>Monthly value includes questionable sample values; one or more values measured below the detection limit</td>
</tr>
<tr>
<td>A</td>
<td>Accepted monthly value</td>
</tr>
<tr>
<td>I*</td>
<td>Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary; one or more values measured below the detection limit</td>
</tr>
<tr>
<td>E*</td>
<td>One or more values estimated; one or more values measured below the detection limit</td>
</tr>
</tbody>
</table>

**Enumerated Domain for Attribute: TDPCODE_MO**

- **A**: Accepted monthly value
- **E**: Monthly value includes estimated values
- **I**: Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
- **N**: No analyses conducted for proportional samples taken during the month
- **Q**: Monthly value includes questionable sample values

**Enumerated Domain for Attribute: TKNCODE_MO**

- **A**: Accepted monthly value
  - **•**: Monthly value includes one or more values measured below the detection limit
- **E**: Monthly value includes estimated values
  - **•**: Monthly value includes one or more values measured below the detection limit
- **I**: Monthly value incomplete - at least 5 days available, but 25 or fewer days available for month summary
- **N**: No analyses conducted for proportional samples taken during the month
- **Q**: Monthly value includes questionable sample values

**Enumerated Domain for Attribute: UTKNCODE_MO**

- **A**: Accepted monthly value
  - **•**: Monthly value includes one or more values measured below the detection limit
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Monthly value includes estimated values</td>
</tr>
<tr>
<td>I</td>
<td>Monthly value incomplete - at least 5 days available, but 25 or fewer days</td>
</tr>
<tr>
<td></td>
<td>available for month summary</td>
</tr>
<tr>
<td>N</td>
<td>No analyses conducted for proportional samples taken during the month</td>
</tr>
<tr>
<td>Q</td>
<td>Monthly value includes questionable sample values</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Enumerated Domain for Attribute: UTNCODE_MO</strong></td>
</tr>
<tr>
<td></td>
<td>* Monthly value includes one or more values measured below the detection</td>
</tr>
<tr>
<td></td>
<td>limit</td>
</tr>
<tr>
<td>D</td>
<td>Monthly value based on derived values</td>
</tr>
<tr>
<td>D*</td>
<td>Monthly value based on derived values; one or more values measured below</td>
</tr>
<tr>
<td></td>
<td>the detection limit</td>
</tr>
<tr>
<td>DE</td>
<td>Monthly value based on derived values; one or more values estimated</td>
</tr>
<tr>
<td>DQ</td>
<td>Monthly value based on derived values; one or more values questionable</td>
</tr>
<tr>
<td>DQ*</td>
<td>Monthly value based on derived values; one or more values questionable; one</td>
</tr>
<tr>
<td></td>
<td>or more values measured below the detection limit</td>
</tr>
<tr>
<td>I</td>
<td>Monthly value incomplete - at least 5 days available, but 25 or fewer days</td>
</tr>
<tr>
<td></td>
<td>available for month summary</td>
</tr>
<tr>
<td>ID</td>
<td>Monthly value incomplete - only 6-25 days are proportionally sampled in the</td>
</tr>
<tr>
<td></td>
<td>month; monthly value based on derived values</td>
</tr>
<tr>
<td>ID*</td>
<td>Monthly value incomplete - only 6-25 days are proportionally sampled in the</td>
</tr>
<tr>
<td></td>
<td>month; monthly value based on derived values of which one or more values</td>
</tr>
<tr>
<td></td>
<td>measured below the detection limit</td>
</tr>
<tr>
<td>IDE</td>
<td>Monthly value incomplete - only 6-25 days are proportionally sampled in the</td>
</tr>
<tr>
<td></td>
<td>month; monthly value based on derived values of which one or more values</td>
</tr>
<tr>
<td></td>
<td>are estimated</td>
</tr>
<tr>
<td>N</td>
<td>No analyses conducted for proportional samples taken during the month</td>
</tr>
<tr>
<td>Q</td>
<td>Monthly value includes questionable sample values</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Enumerated Domain for Attribute: UTPCODE_MO</strong></td>
</tr>
<tr>
<td></td>
<td>A Accepted monthly value</td>
</tr>
<tr>
<td></td>
<td>DE* Monthly value based on derived values; one or more values estimated; one</td>
</tr>
<tr>
<td></td>
<td>or more values measured below the detection limit</td>
</tr>
<tr>
<td></td>
<td>Q* Monthly value includes questionable sample values; one or more values</td>
</tr>
<tr>
<td></td>
<td>measured below the detection limit</td>
</tr>
<tr>
<td>A</td>
<td>Accepted monthly value</td>
</tr>
<tr>
<td>I*</td>
<td>Monthly value incomplete - at least 5 days available, but 25 or fewer days</td>
</tr>
<tr>
<td></td>
<td>available for month summary</td>
</tr>
<tr>
<td></td>
<td>one or more values measured below the detection limit</td>
</tr>
<tr>
<td>E*</td>
<td>One or more values estimated; one or more values measured below the</td>
</tr>
<tr>
<td></td>
<td>detection limit</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Enumerated Domain for Attribute: ALKCODE</strong></td>
</tr>
<tr>
<td></td>
<td>* Value is below detection limit for analysis (used beginning in 1991)</td>
</tr>
<tr>
<td>A</td>
<td>Accepted value</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
E Estimated value
N No analytical measurement
Q Value is questionable (used beginning in 1991)

Enumerated Domain for Attribute: CACODE
* Value is below detection limit for analysis (used beginning in 1991)
A Accepted value
E Estimated value
N No analytical measurement
Q Value is questionable (used beginning in 1991)

Enumerated Domain for Attribute: CLCODE
* Value is below detection limit for analysis (used beginning in 1991)
A Accepted value
E Estimated value
N No analytical measurement
Q Value is questionable (used beginning in 1991)
C Value confirmed, contamination or experimental tracer suspected (code use begins May 2007)

Enumerated Domain for Attribute: DOCCODE
* Value is below detection limit for analysis (used beginning in 1991)
A Accepted value
E Estimated value
N No analytical measurement
Q Value is questionable (used beginning in 1991)

Enumerated Domain for Attribute: KCODE
* Value is below detection limit for analysis (used beginning in 1991)
A Accepted value
E Estimated value
N No analytical measurement
Q Value is questionable (used beginning in 1991)

Enumerated Domain for Attribute: MGCODE
* Value is below detection limit for analysis (used beginning in 1991)
A Accepted value
E Estimated value
N No analytical measurement
Q Value is questionable (used beginning in 1991)
Enumerated Domain for Attribute: NACODE
* Value is below detection limit for analysis (used beginning in 1991)
A Accepted value
E Estimated value
N No analytical measurement
Q Value is questionable (used beginning in 1991)

Enumerated Domain for Attribute: NH3NCODE
* Value is below detection limit for analysis (used beginning in 1991)
A Accepted value
E Estimated value
N No analytical measurement
Q Value is questionable (used beginning in 1991)
C Value confirmed, contamination suspected (code use begins May 2007)

Enumerated Domain for Attribute: NO3NCODE
* Value is below detection limit for analysis (used beginning in 1991)
A Accepted value
E Estimated value
N No analytical measurement
Q Value is questionable (used beginning in 1991)
C Value confirmed, contamination suspected (code use begins May 2011)

Enumerated Domain for Attribute: PO4PCODE
* Value is below detection limit for analysis (used beginning in 1991)
A Accepted value
E Estimated value
N No analytical measurement
Q Value is questionable (used beginning in 1991)
C Value confirmed, contamination suspected (code use begins May 2011)

Enumerated Domain for Attribute: DONCODE
N No derived value is calculated due to missing analytical components
D Derived value - mathematically determined from other analytical measurements
D* Derived value - mathematically determined from other analytical measurements, one or more of which were below the detection limit
DE Derived value - mathematically determined from other analytical measurements, one or more of which were estimated values
DQ Derived value - mathematically determined from other analytical measurements, one or more of which were questionable values
DC Derived value confirmed, contamination suspected (code use begins May 2007)
Enumerated Domain for Attribute: PARTNCODE
N  No derived value is calculated due to missing analytical components
D  Derived value - mathematically determined from other analytical measurements
D* Derived value - mathematically determined from other analytical measurements, one or more of which were below the detection limit
DE Derived value - mathematically determined from other analytical measurements, one or more of which were estimated values
DQ Derived value - mathematically determined from other analytical measurements, one or more of which were questionable values
DC Derived value confirmed, contamination suspected (code use begins May 2007)

Enumerated Domain for Attribute: PARTPCODE
N  No derived value is calculated due to missing analytical components
D  Derived value - mathematically determined from other analytical measurements
D* Derived value - mathematically determined from other analytical measurements, one or more of which were below the detection limit
DE Derived value - mathematically determined from other analytical measurements, one or more of which were estimated values
DQ Derived value - mathematically determined from other analytical measurements, one or more of which were questionable values

Enumerated Domain for Attribute: QCODE
A  Accepted value for streamflow
N  No streamflow available for period
E  Estimated streamflow value
P  Provisional streamflow value is likely to change - used for USGS Lookout Creek streamflow
Q  Streamflow value for the period is questionable

Enumerated Domain for Attribute: SICODE
* Value is below detection limit for analysis (used beginning in 1991)
A  Accepted value
E  Estimated value
N  No analytical measurement
Q  Value is questionable (used beginning in 1991)

Enumerated Domain for Attribute: SO4SCODE
* Value is below detection limit for analysis (used beginning in 1991)
A  Accepted value
E  Estimated value
N  No analytical measurement
Q  Value is questionable (used beginning in 1991)

Enumerated Domain for Attribute: SSEDCODE
A  Accepted value
E  Estimated value
N  No analytical measurement
Q Value is questionable (used beginning in 1991)

Enumerated Domain for Attribute: STCODE
  CF002 Study code CF002

Enumerated Domain for Attribute: TKNCODE
  * Value is below detection limit for analysis (used beginning in 1991)
  A Accepted value
  E Estimated value
  N No analytical measurement
  Q Value is questionable (used beginning in 1991)

Enumerated Domain for Attribute: TDPCODE
  * Value is below detection limit for analysis (used beginning in 1991)
  A Accepted value
  E Estimated value
  N No analytical measurement
  Q Value is questionable (used beginning in 1991)
  C Value confirmed, contamination suspected (code use begins May 2011)

Enumerated Domain for Attribute: TYPE
  QB Quality control samples taken below turbulence box
  QS Quality control sample taken through sampler
  QL Quality control sample taken through sampler and left in gage house until next collection
  QA Quality control sample taken above flume
  C Sample combined with preceding saved sample(s) for analysis - not used after 1981
  G Grab sample taken in lieu of proportional sample
  S Sample saved to combine with following collection (type ‘C’) due to insufficient water (not used after 1981). Nutrient concentrations of the following stream water sample are used to determine fluxes for this period.
  N No sample is collected for this period
  F Complete, full sample. Sampler operational throughout sampling period.
  YE Year end marker allows summary by water year - this is not a sample. Flux values are calculated from streamflow ending Sep 30 and use analyte concentrations from the following sample. “Y” markers are inserted every Sep30
  A Augmented sample - grab sample added to insufficient proportional sample (rarely used after 1987)
  P Partial sample - proportional sampler did not operate successfully over entire period
  B Biased sample - consecutive samples are proportionally separated and combined based on streamflow - code use begins WY 2008 to approx. two 3-week sampling intervals (where one sample is for 4 wks and the next for 2 wks)

Enumerated Domain for Attribute: UTKNCODE
  * Value is below detection limit for analysis (used beginning in 1991)
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Accepted value</td>
</tr>
<tr>
<td>E</td>
<td>Estimated value</td>
</tr>
<tr>
<td>N</td>
<td>No analytical measurement</td>
</tr>
<tr>
<td>Q</td>
<td>Value is questionable (used beginning in 1991)</td>
</tr>
<tr>
<td>C</td>
<td>Value confirmed, contamination suspected (code use begins May 2011)</td>
</tr>
</tbody>
</table>

**Enumerated Domain for Attribute: UTPCODE**

- A: Accepted value
- E: Estimated value
- N: No analytical measurement
- Q: Value is questionable (used beginning in 1991)
- C: Value confirmed, contamination suspected (code use begins May 2011)

**Enumerated Domain for Attribute: UTNCODE**

- A: Accepted value
- E: Estimated value
- Q: Value is questionable (used beginning in 1991)
- D: Derived value - mathematically determined from other analytical measurements
- D*: Derived value - mathematically determined from other analytical measurements, one or more of which were below the detection limit
- DE: Derived value - mathematically determined from other analytical measurements, one or more of which were estimated values
- DQ: Derived value - mathematically determined from other analytical measurements, one or more of which were questionable values
- N: No analytical measurement or no derived value calculated due to missing analytical components
- C: Value confirmed, contamination suspected (code use begins May 2011)

**Enumerated Domain for Attribute: TDNCODE**

- A: Accepted value
- E: Estimated value
- Q: Value is questionable (used beginning in 1991)
- D: Derived value - mathematically determined from other analytical measurements
- D*: Derived value - mathematically determined from other analytical measurements, one or more of which were below the detection limit
- DE: Derived value - mathematically determined from other analytical measurements, one or more of which were estimated values
- DQ: Derived value - mathematically determined from other analytical measurements, one or more of which were questionable values
- N: No analytical measurement or no derived value calculated due to missing analytical components
- C: Value confirmed, contamination suspected (code use begins May 2007)

**Enumerated Domain for Attribute: STCODE**
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>QB</td>
<td>Quality control samples taken below turbulence box</td>
</tr>
<tr>
<td>QS</td>
<td>Quality control sample taken through sampler</td>
</tr>
<tr>
<td>QL</td>
<td>Quality control sample taken through sampler and left in gage house until next collection</td>
</tr>
<tr>
<td>QA</td>
<td>Quality control sample taken above flume</td>
</tr>
<tr>
<td>C</td>
<td>Sample combined with preceeding saved sample(s) for analysis - not used after 1981</td>
</tr>
<tr>
<td>G</td>
<td>Grab sample taken in lieu of proportional sample</td>
</tr>
<tr>
<td>S</td>
<td>Sample saved to combine with following collection (type 'C') due to insufficient water (not used after 1981). Nutrient concentrations of the following stream water sample are used to determine fluxes for this period.</td>
</tr>
<tr>
<td>N</td>
<td>No sample is collected for this period</td>
</tr>
<tr>
<td>F</td>
<td>Complete, full sample. Sampler operational throughout sampling period.</td>
</tr>
<tr>
<td>YE</td>
<td>Year end marker allows summary by water year - this is not a sample. Flux values are calculated from streamflow ending Sep 30 and use analyte concentrations from the following sample. 'Y' markers are inserted every Sep 30</td>
</tr>
<tr>
<td>A</td>
<td>Augmented sample - grab sample added to insufficient proportional sample (rarely used after 1987)</td>
</tr>
<tr>
<td>P</td>
<td>Partial sample - proportional sampler did not operate successfully over entire period</td>
</tr>
<tr>
<td>B</td>
<td>Biased sample - consecutive samples are proportionally separated and combined based on streamflow - code use begins WY 2008 to approx. two 3-week sampling intervals (where one sample is for 4 wks and the next for 2 wks)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
<td>Water sample is not a quality control sample</td>
</tr>
<tr>
<td>QA</td>
<td>Quality control water sample taken above the flume</td>
</tr>
<tr>
<td>QB</td>
<td>Quality control water sample taken below the turbulence box</td>
</tr>
<tr>
<td>QL</td>
<td>Quality control water sample taken through the sampler and left in the gage house until the next collection</td>
</tr>
<tr>
<td>QS</td>
<td>Quality control water sample taken through the sampler</td>
</tr>
<tr>
<td>QZ</td>
<td>Additional or miscellaneous quality control water sample</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GR</td>
<td>Grab sample taken manually from the flume</td>
</tr>
<tr>
<td>RI</td>
<td>Instantaneous sample collected through the battery-powered proportional water sampler</td>
</tr>
<tr>
<td>RM</td>
<td>Proportional water sample taken through the battery-powered proportional water sampler with reed switch assembly and mechanical timer</td>
</tr>
<tr>
<td>RS</td>
<td>Proportional water sample taken through the battery-powered proportional water sampler with reed switch assembly and solid state time and circuit board</td>
</tr>
<tr>
<td>SG</td>
<td>Proportional water sample taken through Sigma sampler with timing controlled by a Campbell Scientific data logger</td>
</tr>
<tr>
<td>SI</td>
<td>Instantaneous water sample taken through Sigma sampler</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Sample is of sufficient volume for laboratory analyses</td>
</tr>
<tr>
<td>Y</td>
<td>Sample is low volume and laboratory analyses may be limited</td>
</tr>
</tbody>
</table>