Alaska Department of Environmental Conservation

Alaska Consolidated Assessment and Listing Methodology (CALM) for 2018 Integrated Report on Water Quality

June 18, 2017

Contents

Purpose

The purpose of this document is to provide guidance to DEC staff in their analysis of water quality data for the Alaska Integrated Water Quality Monitoring and Assessment Report (Integrated Report) under Clean Water Act sections 303(d) and 305(b). This guidance was prepared to more explicitly define minimum data requirements and simplify the analysis used in an effort to streamline the Integrated Report development process. This CALM approach employs a two-step process where DEC evaluates data to determine if sufficient and credible data exists, followed by an assessment of the data. The assessment should yield transparent and reproducible recommendations based on clear numeric thresholds allowing decisions to be largely data driven. This guidance aligns with EPA's Consolidated Assessment and Listing Methodology (2002) recommendations.

Section 1 (Data Qualification Process) provides direction on when sufficient and credible data exists to determine how a water should be placed in the categories contained within the Integrated Report. Section 2 (Exclusions) provides the list of criteria that should not be evaluated using this guidance. Section 3 (Impairment Thresholds) provides the minimum data requirements and exceedance thresholds for conventional and toxic pollutants to determine if a water should be categorized as impaired (category 4 or 5), attaining (category 1 or 2) or if there is insufficient information (category 3). Section 4 (Overwhelming Evidence Policy) indicates the final analysis that should be considered to determine if overwhelming evidence exists which could result in an impairment finding even with limited data.

Section 1. Data Qualification Process

In order for data to be considered as the primary evidence for a waterbody determination for impairment or attainment decisions, a quality assurance plan and the appropriate metadata must be submitted including

- Waterbody name, identification and location,
- Sampling location identifiers including latitude/longitude (if available),
- Date and time each sample was collected,
- Type of sample,
- Parameters analyzed and analytical methods,
- QA/QC data and any data qualifiers, and
- Standard operating procedures (SOPs) used (e.g. data rejection procedures).

Laboratory data transmittals, chain of custody forms, calibration records and laboratory qualifications should be available upon request. Non direct measurements such as photos, weather conditions and waterbody conditions (such as flow) may be requested as supporting documentation for establishing the data quality for impairment or attainment determinations.

EPA has indicated that states have the ability to consider data that may be older (> five years) than what is generally considered applicable to a listing determination. DEC has established similar language in various listing determinations (e.g., pathogens, turbidity) provided that

natural/anthropogenic conditions have not changed in a substantive manner since the original sampling event(s).

As a means of explicitly defining how Alaska will evaluate available data and/or information from other sources when determining the attainment status of a water, the following approach may be used.

Table 1. Water Quality Data Qualification Process

Data Use	Data Level	Technical Component	Spatial and Temporal Coverage	Data Quality
Screening Purposes (Category 3 only)	1	Monitoring via grab sampling	Low spatial and temporal coverage: • Limited number of sampling locations • Quarterly or less frequent sampling with limited period of record (e.g.,. 1 day • Limited data representing critical conditions • Sampling personnel not trained • Data older than 5 years	• Low precision and sensitivity • QAPP not adequate or not followed • QA/QC results are inadequate • Methods not documented • Inadequate metadata
Screening or Overwhelming Evidence (Category 3 or 5)	2	Use of one of the following: • Grab sampling • Rotating basin surveys based on single visit • Verified volunteer data	Moderate spatial and temporal coverage: • Adequate assessment unit coverage, several sites within assessment unit • Sampling only during a key period (e.g., high and/or low flow) • Data that are likely to reflect current conditions, but may be older than five (5) years	• Low precision and sensitivity • QAPP available • QA/QC results adequate • Approved SOPs used in field and lab • Adequate metadata

Data Use	Data Level	Technical Component	Spatial and Temporal Coverage	Data Quality
Assessment Purposes (Category 2, 4 or 5)	3	One (1) of the following: • Water quality monitoring using grab samples • Rotating basin surveys involving multiple visits or automatic sampling • Calibrated models (calibration data greater than 5 years old) • Limited use of continuous monitoring instrumentation	Broad spatial and temporal coverage of sites with sufficient frequency and coverage to capture acute events: • Representative site(s) within an assessment unit • Sampling during key periods (e.g., critical hydrological regimes), multiple samples at high and low flows • Minimum of 10 representative data point total (all years, all sites, after averaging) from multiple sampling events representing a minimum three-week seasonal period of concern • Samples collected during at least 2 years, not necessarily consecutive years • Period of sampling adequate to monitor for chronic conditions for the specific parameter of concern • Data that are likely to reflect current conditions, but may be older than five (5) years	• Moderate precision and sensitivity • QAPP adequate • QA/QC protocols followed, QA/QC results adequate • Approved SOPs used for field and lab • Adequate metadata
Assessment Purposes (Category 1, 2, 4 or 5)	4	Water quality monitoring using composite samples, a series of grab samples, and/or continuous monitoring devices	Broad spatial and temporal (at least 2 years) coverage of fixed sites with sufficient frequency and coverage to capture acute events, chronic conditions, and other potential chemical/ physical impacts: • Representative site(s) within an assessment unit • Sampling during key periods (e.g., critical hydrological regimes), including multiple samples at high and low flows • Minimum of 20 representative data points total (all years, all sites, after averaging) from multiple sampling events representing a minimum three-week seasonal period of concern • Samples collected during at least 2 years, not necessarily consecutive years • Data five (5) years old or less	High precision and sensitivity • Approved QAPP • QA/QC protocols followed, QA/QC results adequate • Approved SOPs used for field and lab; samplers well trained • Adequate metadata

Section 2. Exclusions

The CALM procedures will not be used for the following pollutants at this time:

- Pathogens- DEC has developed pollutant specific methodology scheduled to be revised in 2018 due to changes in water quality standards for recreational criteria.
- Petroleum Hydrocarbons- Pollutant-specific methodology has been developed.
- Toxic Pollutants in Sediment- DEC is in the process of developing pollutant specific methodology.
- Temperature- DEC is planning to develop pollutant-specific methodology due to common use of continuous data and litigation regarding natural conditions and temperature refugia.
- Turbidity- Specific methodology has been developed.
- Residues – Specific methodology has been developed, but standard has changed and has not been approved or disapproved by EPA.
- Nutrients (nitrates, total nitrogen, ammonia, phosphates/phosphorus) – Nutrients are non-conservative parameters that can be taken up or released by biological processes.
    - Nitrate/nitrites may be evaluated for the drinking water use only based on the drinking water criterion without averaging (i.e. exceedance is determined using individual measurements) due to acute toxic effects.
- Volatile Organic Compounds (VOCs) – VOCs are non-conservative parameters, and rapidly volatilize or biodegrade.

Section 3. Impairment Thresholds

In most cases, data should meet the qualifications for data level 3 or 4 in Table 1 to be evaluated for a decision on waterbody impairment. Data meeting qualifications for data level 2 may be considered for "threatened" impairment status if the data demonstrates overwhelming evidence (see Section 4) or there are multiple lines of evidence (e.g. biological studies, other less qualified data confirming exceedances) that indicate impairment.

Waterbody attainment decisions for data evaluations falling below impairment thresholds will require:

- Data level 4 quality for initial assessments (category 3 to 2)
- Data level 3 or the level of data originally used to designate an impairment for reassessments following a period with no pollution control actions (category 5 to 2).
- Data level 3 quality for reassessment following recovery actions (e.g. BMPs installed, new restrictions in effect) under a TMDL or other pollution controls. Only one year of data is

required if waterbody conditions (e.g. flow, fishery status, pollutant source) are considered representative of expected future conditions (category 4 to 2).

Conventional Pollutants

Averaging Period: Daily or as appropriate based on pollutant criteria document in the Assessment Unit; daily minimum and maximum for pH

Frequency Thresholds

- 10 Samples: >20% exceedances defines impairment
- 11-19 samples: >15% exceedances defines impairment
- 20 or more samples: >10% exceedances defines impairment

Other considerations:

- Spatial considerations of the water being characterized should consider the effect of an intervening tributary, outfall, or pollution source
- If naturally occurring pollutant, a natural reference site is preferred or required if part of water quality criteria. Data minimums do not apply to reference sites, but the chosen site must meet criteria for a reference site in ***Guidance for the Implementation of Natural Condition-Based Water Quality Standards (DEC, 2006)*** at http://dec.alaska.gov/water/wqsar/pdfs/NaturalConditionsGuidance.pdf.

Toxic Pollutants

Averaging Period: Averaging only required if sampling frequency is > 1 sample within any 4 day period in the Assessment Unit. Averaging period is set by the duration of the water quality criterion in question.

- Acute aquatic life criteria – instantaneous
- Chronic aquatic life criteria – Daily or 4-day average depending on sampling frequency
- Human Health and Drinking Water criteria - Arithmetic average of all data in assessment unit or daily average depending on toxicity endpoint of pollutant

Frequency Thresholds

- Acute aquatic life – not more than once in the most recent three year period
- Chronic aquatic life – at least two exceedances and >5% exceedance frequency (confirmed by a binomial test) in the most recent 3 year period
- Human Health and Drinking Water – Average of the most recent 3 years of data may not exceed criterion

Other considerations:

- Spatial considerations of the water being characterized should consider the effect of an intervening tributary, outfall, or pollution source

- If naturally occurring pollutant, a natural reference site is preferred or required if part of water quality criteria. Data minimums do not apply to reference sites, but the chosen site must meet criteria for a reference site in ***Guidance for the Implementation of Natural Condition-Based Water Quality Standards (DEC, 2006)*** at http://dec.alaska.gov/water/wqsar/pdfs/NaturalConditionsGuidance.pdf

Section 4. Overwhelming Evidence Policy

Data used for overwhelming evidence must meet at least data level 2 qualification in Table 1.

Conventional Pollutants:

- 100% of at least 5 samples exceeding or more than one exceedance of 10x criterion
- Data are not associated with wastewater treatment system upset or other short-term event.

Toxic Pollutants:

- >1 instantaneous exceedance of acute criterion for aquatic life
- Case by case for drinking water and human health criteria
- Data are not associated with wastewater treatment system upset or other short-term event.

Appendix A Data Considerations

Topic	Action
Non-detect results	0.5 x detection limit (MDL or method detection limit) will be used if a binomial test is being conducted. If 90% (conventionals) of the results are ND, and/or the 3 highest results (Toxics) do not exceed acute, chronic or human health/drinking water criteria, then no binomial test needs to be conducted.
Zero or negative turbidity results	A value of 0.1 will be used in the data analysis so that formula log calculations work.
Quality assurance samples	The highest of the regular sample and QA sample will be used, not both.
Hardness	If hardness as CaCO3 was not calculated by the laboratory and a hardness value is needed for metals evaluation against WQC, it will be calculated (when data is available) by multiplying the calcium result in mg/L by 2.48 and the magnesium result in mg/L by 4.11 and then adding these results to yield total hardness as CaCO3.