
Draft Jamaican Standard
Specification
for
Ambient freshwater and marine water quality



BUREAU OF STANDARDS JAMAICA

COMMENT PERIOD:
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Bureau of Standards Jamaica
6 Winchester Road
P.O. Box 113
Kingston 10
JAMAICA, W. I.
Tel: (876) 926 -3140-5/ 618 - 1534 / 632- 4275
Fax: (876) 929 -4736
Website: www.bsj.org.jm
E-mail: info@bsj.org.jm

Month 202X

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This standard was circulated in the draft form for comment under the reference DJS 370: 2023. Jamaican Standards establish requirements in relation to commodities, processes and practices, but do not purport to include all the necessary provisions of a contract.

The attention of those using this standard specification is called to the necessity of complying with any relevant legislation.

Amendments

No.	Date of Issue	Remarks	Entered by and date

Contents

Foreword.....	i
Committee representation.....	i
Acknowledgement.....	ii
Related documents.....	ii

Specification

1 Scope.....	1
2 Terms and definitions.....	1
3 Ambient freshwater quality specification.....	Error! Bookmark not defined.
4 Ambient marine water quality specification.....	1
5 Sampling.....	3
6 Analysis.....	4

Annex

Annex A: Method of development of ambient water quality.....	5
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Tables

1 Surface water requirement limits.....	2
2 Groundwater requirement limits.....	2
3 Marine water requirement limits.....	3

Foreword

The Water Resources Authority (WRA) proposed that a national standard for ambient water quality be developed with the support of the Bureau of Standards Jamaica (BSJ). In keeping with its mandate, the BSJ agreed to facilitate local participation in the development of a National Ambient Water Quality Standard for fresh and marine water bodies in Jamaica through the establishment of a National Water Quality Technical Committee (NWQTC). This document was prepared by the National Water Quality Technical Committee (NWQTC) which comprises members of various governmental MDAs, academia, industries and NGOs.

The framework for the development of this national Standard was taken from the Draft Jamaica National Ambient Water Quality Standard - Freshwater, (2009) and the Draft Jamaica National Ambient Water Quality Standard - Marine Water, (2009). This standard defines the upper limits and ranges for ambient freshwater and marine water quality and will function as an important tool in the multifaceted effort to manage the quality of Jamaica's water resources. This standard is intended to function as an environmental goal and benchmark to maintain Jamaica's high water quality where it presently occurs and represents the general target of all efforts to improve water quality where degradation is already occurring. When compared or measured against this National Standard, water quality can be determined to be in early or advanced stages of deterioration, depending on the significance of the parameters being considered.

The water quality specifications included in this standard were developed based on a desire to maintain the ecosystem health of Jamaica's fresh and marine water bodies. Decisions taken were limited by the unavailability of data relating to the toxicities of pollutants, tolerable concentrations for ubiquitous contaminants such as nutrients which, while often not toxic, can lead to significant degradation in water quality, and information on the biodiversity within Jamaica's aquatic ecosystems. Data from other jurisdictions with similar climatic conditions to Jamaica were sought but very few were found and the relevance of these data to Jamaica's ecosystems was unknown. Therefore, the committee relied heavily on Jamaica's historical water quality data which were obtained from the various organisations involved in the management of Jamaica's water bodies. It should be noted that those data were compiled from various databases, were found in various formats, lacked critical information about their quality and often did not include data to clearly identify them as being associated with either fresh or marine waters. This made their use difficult, and a significant portion of the data set had to be rejected as unfit for the committee's purposes. Such limitations could be reduced in the future if sustained efforts are made to collect data on ecosystem health and establish a managed central database for Jamaica.

This standard is voluntary.

Committee representation

The preparation of this standard for the Standards Council, established under the Standards Act of 1969, was carried out under the supervision of the National Water Quality Technical Committee which at the time comprised the following members:

Acknowledgement

Acknowledgement is made to the International Organization for Standardization (ISO), American Geophysical Union (AGU), ASEAN Secretariat, European Geosciences Union (EGU), United Nation Environment Programme – Caribbean Environment Programme (UNEP-CEP), Water Environment Partnership in Asia, World Health Organization (WHO), United Nations Educational, Scientific and Cultural Organization (UNESCO) and United Nations Environment Programme (UNEP) for the use of their material.

Related documents

This standard makes reference to the following:

- a) American Geophysical Union (AGU) Publications, Journal of Geophysical Research: Oceans – Inter-Annual Caribbean salinity in satellite data and model simulations, 2014
- b) ASEAN Secretariat, ASEAN Marine Water Quality - Management Guidelines and Monitoring Manual, 2008
- c) International Organization for standardization, ISO 6107:2021 - Water quality — Vocabulary
- d) United Nation Environment Programme – Caribbean Environment Programme (UNEP-CEP), CEP Technical Report - Environmental quality criteria for Coastal zones in the wider Caribbean Region -14, 1992
- e) Water Environment Partnership in Asia, Water Environment Partnership in Asia-database (wepa-db), Water standards
- f) World Health Organization (WHO), Guidelines for Drinking Water Quality, 4th Edition, 2017
- g) World Health Organization (WHO), UNESCO & United Nations Environment Programme, Water Quality assessments- A Guide to the use of biota, sediments and water in Environmental Monitoring, 1996

Draft Jamaican Standard Specification for Ambient freshwater and marine water quality

1. Scope

This standard specifies ambient ranges for selected chemical, physical and biological parameters that occur in fresh and marine waters, the exceedance of which may indicate potential adverse impacts on ecosystem health. It also includes requirements for the sampling and analysis of these ambient waters.

This standard would not apply to mixing zones of freshwater and marine water.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply:

2.1

ambient water

surface water (rivers, ponds, lakes, streams and coastal waters) and groundwater with naturally occurring physical parameters and concentrations of substances

2.2

ecosystem health

integrates environmental conditions with the impacts of anthropogenic activities to guide sustainable use and management of natural resources

2.3

freshwater

any naturally occurring water with total dissolved solids concentration of less than 1000 mg/L (~1650 uS/cm)

2.4

groundwater

water that is stored in, and can usually be recovered from, an underground formation

2.5

marine water

any naturally occurring coastal water with salinity from 33 to 37

3 Ambient freshwater quality specification

3.1 Ambient freshwater quality of groundwater and surface water shall be sought to maintain ecosystem health.

3.2 Where relevant, ambient freshwater quality shall comply with the limits specified in either Table 1 or 2.

Table 1 – Surface water requirement limits

Parameter	Limits	Units
Conductivity	540	µS/cm
pH	6.5 – 8.5	-
Turbidity	5	NTU
Alkalinity	240	mg CaCO ₃ /L
Sodium	45	mg /L
Chloride	50	mg/ L
Phosphate	0.02	mg P/L
Nitrate	0.8 - 4.0	mg N/L
Faecal Coliform	100	MPN/100 mL
BOD ₅	1.6	mg O ₂ /L

Table 2- Groundwater requirement limits

Parameter	Limits	Units
Conductivity	800	µS/cm
pH	6.5 – 8.5	-
Alkalinity	300	mg CaCO ₃ /L
Sodium	45	mg/L
Chloride	50	mg/L
Sulphate	30	mg SO ₄ /L
Nitrate	2.3	mg N/L
	<1.1	MPN/100 mL
Faecal Coliform	0	CFU/100 ml

4 Ambient marine water quality specification

4.1 Ambient marine water quality shall be sought to maintain ecosystem health.

4.2 Ambient marine water quality shall comply with the limits specified in table 3.

Table 3 – Marine water requirement limits

Marine water		
Parameter	Limits	Units
Salinity*	33-37	
Phosphate	0.03	mg P/L
Total Phosphorus	0.09	mg P/L
Total Nitrogen	0.1	mg N/L
BOD ₅	1.16	mg O ₂ /L
pH*	8.0 - 8.4	-
Faecal Coliform	<13	MPN/100mL
Turbidity*	<5	NTU
Dissolved Oxygen*	>80%	% saturation
Chlorophyll α	<1	μ g/L
<p>NOTE The following parameters should not be detected in ambient marine water when using standard marine water analytical methods:</p> <ol style="list-style-type: none"> i. Pesticides ii. <i>E. coli</i> iii. Petroleum residue iv. Oil and grease v. Poly-chlorinated biphenyls (PCB) vi. Poly-aromatic hydrocarbons (PAH) vii. Floatables (inorganics) <p>* Parameters shall be measured at the water body (<i>in situ</i>).</p>		

5 Sampling

5.1 The sampling protocols and techniques shall comply with an internationally accepted sampling protocol.

5.2 Metadata shall be collected for all samples, and shall include, but not be restricted to the following:

- a. Sample time,
- b. Water temperature,

- c. Weather conditions,
- d. Geo-location (geographic coordinates and place name),
- e. Sample date,
- f. A record of *in situ* measurements, and
- g. Comments.

6 Analysis

All ambient water samples shall be tested using the relevant internationally accepted test method(s) for determining the measurands.

END OF DOCUMENT

Annex A: (Informative)

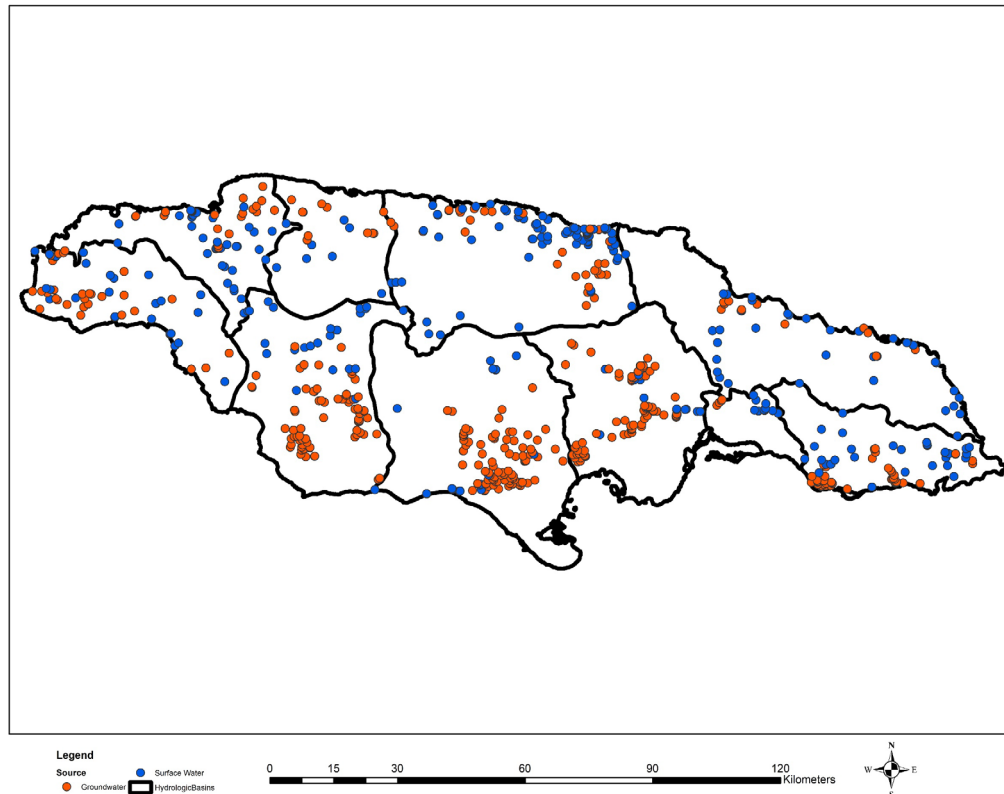
Method of development of ambient water quality

A.1 AMBIENT FRESHWATER QUALITY

The following methodology was used to select sample points and determine the ranges of values for the selected parameters for freshwater sources.

- Data available for freshwater sources (wells, springs, and rivers) were collated from various sources, with collection dates ranging from 1954 to 2021.
- Eligible sources were defined from the collated data based on the following criteria:
 - Surface water sources with at least four measurements for at least one of the selected parameters in any calendar year.
 - Groundwater sources with at least two measurements for at least one of the selected parameters in any calendar year.
- Selected eligible sites were further screened by removing sites located in known pollution areas as per the Water Resources Authority's pollution extent shapefile, indicating regions of known saline intrusion, caustic contamination from bauxite refinery waste, high nitrate from sewage absorption pits, and historical sugar production dunder effluent pollution. The final number of screened eligible sources was 432 groundwater sources and 346 surface water sources for a total of 778 freshwater sampling points. These are presented in Figure A.1 (a).
- The eligible sources were further classified by hydrological basin, and the median value for all available data for the selected parameters were determined for each basin and water type (i.e., groundwater and surface water for each basin). The median value was selected to limit the influence of outliers and pollution impacts which may have escaped the prior pollution screening.
- The median values determined in the previous step were further processed to assess two standard deviations of the mean of the basin median values for each parameter and source type. This served as the range for the ambient standard of the selected parameters.
- Some parameters had insufficient data to create a representative range.
- Groundwater data were not disaggregated by aquifer type (limestone vs alluvium). This may be further considered.

Figure A.1.a Representation of the Freshwater Sample Points Used in the Determination of the Ambient Water Quality Standards for Fresh Waters in Jamaica



A.2 AMBIENT MARINE WATER QUALITY

Extensive research was conducted to establish Jamaica's marine water parameters and specifications. The process involved considering past marine standards for Jamaica, standards in other jurisdictions with similar climates to Jamaica's and historical data on Jamaica's coastal waters. Based on satellite data, the salinities of the Northern Caribbean oceans range from 34-36. However, a range of 33-37 was chosen to accommodate measurement uncertainties.

To develop the specifications, toxicological approaches used in Australia, Canada, New Zealand and the USA were evaluated along with specifications from some South-East Asian countries (unfortunately there was no information available on the approaches employed by these countries as to how they arrived at their specifications). Jamaica's previous standards and historical data (2008-2021) of coastal waters were compared with the reviewed specifications. The dataset analysed consisted of numerous observations (1400-2500) obtained from various sampling sites, including locations near major beaches and developments that may have anthropogenic impacts. All these factors were taken into account in determining the final specifications.

General characterisation parameters (salinity and pH) and parameters used to quantify eutrophication were selected. Other parameters that could indicate possible contamination of coastal waters and should not be detectable were also selected. It should be noted that temperature is included in the required metadata.

SOURCE: European Geosciences Union (EGU), Sea-surface salinity variations in the northern Caribbean Sea across the Mid-Pleistocene Transition. *Climate of the Past*, 7 (1), pp.75-90, 2011)

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Standards Council

The Standards Council is the controlling body of the Bureau of Standards Jamaica and is responsible for the policy and general administration of the Bureau.

The Council is appointed by the Minister in the manner provided for in the Standards Act, 1969. Using its powers in the Standards Act, the Council appoints committees for specified purposes.

The Standards Act, 1969 sets out the duties of the Council and the steps to be followed for the formulation of a standard.

Preparation of standards documents

The following is an outline of the procedure which must be followed in the preparation of documents:

1. The preparation of standards documents is undertaken upon the Standard Council's authorisation. This may arise out of representation from national organisations or existing Bureau of Standards' Committees of Bureau staff. If the project is approved it is referred to the appropriate sectional committee or if none exists a new committee is formed, or the project is allotted to the Bureau's staff.
2. If necessary, when the final draft of a standard is ready, the Council authorises an approach to the Minister in order to obtain the formal concurrence of any other Minister who may be responsible for any area which the standard may affect.
3. The draft document is made available to the general public for comments. All interested parties, by means of a notice in the Press, are invited to comment. In addition, copies are forwarded to those known, interested in the subject.
4. The Committee considers all the comments received and recommends a final document to the Standards Council
5. The Standards Council recommends the document to the Minister for publication.
6. The Minister approves the recommendation of the Standards Council.
7. The declaration of the standard is gazetted and copies placed on sale.
8. On the recommendation of the Standards Council the Minister may declare a standard compulsory.
9. Amendments to and revisions of standards normally require the same procedure as is applied to the preparation of the original standard.

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Kingston 10
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