



New Jersey Department of Environmental Protection
**Standards for Drinking Water, Ground Water, Surface
Water, Soil, and Indoor Air**

Barium| CAS#: 7440-39-3

Drinking Water Quality Standards
($\mu\text{g/L}$ or ppb)

Standard: 2,000
Type: Primary
Federal MCL

Ground Water Quality Standards
($\mu\text{g/L}$ or ppb)

Standard: 6,000
Type: Specific
GW-Quality Criterion: 6,000
PQL: 200

Surface Water Quality Standards

($\mu\text{g/L}$ or ppb)

Freshwater
Human Health: 2,000(h)(T)
Aquatic (acute):
Aquatic (chronic):
Aquatic General:

Saline Water
Human Health:
Aquatic (acute):
Aquatic (chronic):
Aquatic General:

Soil Remediation Standards

(mg/kg)

Ingestion-Dermal Exposure Pathway
Residential: 16,000
Nonresidential: 260,000

Inhalation Exposure Pathway
Residential: 870,000
Nonresidential: NA (2)

Migration to Ground Water Exposure Pathway
Soil Remediation Standard: 2,100
Soil Leachate Remediation Standard: 120,000 $\mu\text{g/L}$

Indoor Air Remediation Standards**

($\mu\text{g} / \text{m}^3$)

Vapor Intrusion Exposure Pathway
Residential:
Nonresidential:

Ground Water Standard Footnotes:

a = Asbestos criterion is measured in terms of fibers/liter longer than 10 micrometers (f/L > 10 µm)

Surface Water Standard Footnotes:

(a) Criteria as listed at NJA [7:9B-1.14\(f\)3](#) above as formula

(b) Criteria as listed at NJA [7:9B-1.14\(f\)4](#) above as formula

(d) Criterion is expressed as a function of the Water Effect Ratio (WER). For criterion in the table, WER equates to the default value of 1.0.

(fc) Criteria expressed as free cyanide (as CN)/L

(h) Human health noncarcinogen

(hc) Human health carcinogen

(ol) Organoleptic effect-based criterion with no frequency of exceedance at or above the MA7CD10 flow

(s) Dissolved criterion

(T) Total recoverable criterion

FW1 means those fresh waters, as designated in N.J.A.C. 7:9B-1.15(j), that are to be maintained in their natural state of quality (set aside for posterity) and not subjected to any manmade wastewater discharges or increases in runoff from anthropogenic activities. These waters are set aside for posterity because of their clarity, color, scenic setting, other characteristic of aesthetic value, unique ecological significance, exceptional recreational significance, exceptional water supply significance or exceptional fisheries resource(s).

FW2 means the general surface water classification applied to those fresh waters that are not designated as FW1 or Pinelands Waters.

FW2-TP means FW2 trout production.

FW2-TM means FW2 trout maintenance.

FW2-NT means FW2 non- trout.

PL means Pinelands Waters

SE1 means saline estuarine waters whose designated uses are listed in [N.J.A.C. 7:9B-1.12\(d\)](#).

SE2 means saline estuarine waters whose designated uses are listed in [N.J.A.C. 7:9B-1.12\(e\)](#).

SE3 means saline estuarine waters whose designated uses are listed in [N.J.A.C. 7:9B-1.12\(f\)](#).

SC means the general surface water classification applied to saline coastal waters

Soil Remediation Standards Footnotes:

(1) Not applicable because toxicological information that meets the Site Remediation and Waste Management Program's policy is not available

(2) Not applicable because the calculated health-based criterion exceeds one million mg/kg

(3) Not applicable because the calculated health-based criterion exceeds the soil saturation limit

(4) Not applicable because the calculated health-based soil criterion exceeds the soil saturation limit

(5) Not applicable because ground water remediation standard is a secondary standard

(6) Not applicable because a ground water remediation standard does not exist

(7) Standard is based on natural background

(8) Standard set at reporting limit

(9) Exceeds soil saturation limit; however, health-based criterion based on particulate portion of the equation

(10) Standard based on the Integrated Exposure Uptake Biokinetic (IEUBK) model for lead in children

(11) Standard based on the Adult Lead Model (ALM)

(12) This standard is used for comparison to site soil data that have been converted to sample-specific TCDD-TEQ values through application of the Toxicity Equivalence Factor Methodology (USEPA 2010) and using the WHO 2005 Mammalian Toxic Equivalency Factors (TEFs)

(13) This standard is used for comparison to site soil leachate data that have been converted to sample-specific TCDD-TEQ values through application of the Toxicity Equivalence Factor Methodology (USEPA 2010) and using the WHO 2005 Mammalian Toxic Equivalency Factors (TEFs)

NA: Standard Not Applicable

NR: Chemical Not Regulated

Indoor Air Remediation Standards Footnotes:

(i) Not applicable because toxicological information that meets the Site Remediation and Waste Management's policy is not available

(ii) Standard set at reporting limit

(iii) Value is for elemental mercury

NA: Standard Not Applicable

NR: Chemical Not Regulated

******Indoor air remediation standards are to be used when evaluating the vapor intrusion exposure pathway

NJDEP - Toxicity Factors for Barium

These are the human health toxicity data that were used by the Department to derive its health based criteria.



7440-39-3

Drinking water

Carcinogen Group:
Oral Slope Factor: (mg/kg/day)⁻¹
Oral Reference Dose: (mg/kg/day)
Basis: FEDERAL

Ground water

Carcinogen Group: D
Oral Slope Factor: (mg/kg/day)⁻¹
Oral Reference Dose: 0.07 (mg/kg/day)
Basis: Previous IRIS

Surface water

Carcinogen Group: D
Oral Slope Factor: (mg/kg/day)⁻¹
Oral Reference Dose: 0.07 (mg/kg/day)
Basis: NPDWR

Soil

| <u>Oral</u> | <u>Inhalation</u> |
|---|--|
| Carcinogen Group D | Carcinogen Group : non-carcinogen |
| Slope Factor: (mg/kg/day) ⁻¹ | Unit Risk Factor (ug/m ³) ¹ |
| Reference Dose: 0.2 (mg/kg/day) | Reference Concentration: 0.5 (ug/m) ³ |
| Basis: Current IRIS | Basis: HEAST 97 |

* Reference Doses for Group C chemicals are shown with uncertainty factor of 10 for possible carcinogenicity included. These are the Reference Doses used to derive criteria for all media. In the Basis and Background documents for these criteria, these Reference Doses may or may not be shown with this uncertainty factor incorporated.

Drinking Water - Notes

1. The Reference Doses for the Group C chemicals incorporate an additional uncertainty factor of 10 for possible carcinogenicity.
2. Toxicity factors were developed by the NJDWQI under the A-280 process for the following chemicals, but MCLs were not adopted for unrelated reasons, such as lack of a standardized analytical method for drinking water: Ethylene glycol, formaldehyde, hexane, methyl ethyl ketone, and 2,4,6-trichlorophenol.
3. The New Jersey MCL for 1,4-Dichlorobenzene was adopted from USEPA, but New Jersey did not necessarily agree with the USEPA RfD, so it is not included on this table

Ground Water - Footnotes

a = from USEPA, Health Effects Assessment Summary Tables, FY 1997 Update, OSWER 9200.6.303 (97-1), EPA-540-R-97-036, PB97-921199, July 1997.
b = existing drinking water Maximum Contaminant Level Goal (MCLG) (CFR Part 141 - National Primary Drinking Water Regulations). For beryllium see Section IV-d of the Basis and Background.
c = developed by the Department for calculating ISCs. For details on developing specific RfD, slope factor, or carcinogen class equivalent to USEPA categorization, see support document available by request to the Department.
d = Slope factor and carcinogen group of arsenic are those listed in IRIS under arsenic (inorganic); RfDs of chromium, mercury, and nickel are those listed in IRIS under chromium (VI), mercuric chloride, and nickel (soluble salts), respectively. The RfD for thallium was developed by the Department based on the RfD of thallium(I) sulfate in IRIS.
e = derived by multiplying the IRIS slope factor of B(a)P of 7.3 (mg/kg-day)⁻¹ with the "estimated order of potential potency" for the individual Group B2 PAHs recommended in USEPA "Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons", Office of Research and Development, EPA/600/R-93/089. The relative potencies based on that of benzo(a)pyrene as 1.0 are as follows: benzo(a)anthracene, 0.1; benzo(b)fluoranthene, 0.1; benzo(k)fluoranthene, 0.01; chrysene, 0.001; dibenz(a,h)anthracene, 1.0; indeno(1,2,3-c,d)pyrene, 0.1.
f = Group D categorization of mercury based on USEPA National Primary Drinking Water Regulations; Final Rule. 56 FR 3537, Jan 30, 1991. For detailed discussion on Group D categorization of mercury, see Section IV-o in this Basis and Background.
** = The carcinogen group assigned to acrolein in IRIS is the descriptor, "data are inadequate for an assessment of human carcinogenic potential" which is equivalent to Group D.7

Surface Water - Footnotes

^ The carcinogen group assigned to acrolein in IRIS is the descriptor, "data are inadequate for an assessment of human carcinogenic potential" which is equivalent to Group D.
+ See text on cadmium. For RfD for cadmium, "(w)" stands for water. "(f)" stands for food.
The BCF for MTBE was derived from its octanol-water partition coefficient of 1.05 (New Jersey Drinking Water Quality Institute. Maximum Contaminant Level Recommendations for Hazardous Contaminants in Drinking Water. September 26, 1994. Appendix A, Health-Based Maximum Contaminant Level Support Documents and Addenda. p. A-32) based on the equations given in the USEPA's Draft Water Quality Criteria Methodology: Human Health. EPA 822-Z-98-001. August 1998.
* The criterion for lead remains unchanged. The criteria for nickel are based on data from 2002 Calculation Matrix updated by the current fish consumption rate of 17.5 g/day.

Soil - Footnotes

1. Carcinogen Classification - All classifications are based on IRIS unless stated otherwise
1999 Cancer Draft Guidelines:
KNOWN - Known carcinogen
CANDET - Can not determine carcinogenic classification
LIK - Likely to be a human carcinogen
NLIK - Not likely to be a carcinogen
INAD - Inadequate data
ORL - Oral exposure route
INHL - Inhalation exposure route
1986 Cancer Guidelines:
Group A - Human carcinogen
Group B - Probable human carcinogen
Group B2 - Sufficient evidence from animal studies and inadequate or no data from epidemiologic studies
Group C - Possible human carcinogen
Group D - Not classifiable as to human carcinogenicity
Group E - Evidence on non-carcinogenicity for humans
2. References:
IRIS - Integrated Risk Information System
HEAST- Health Effects Assessment Summary Tables
NCEA - National Center for Environmental Assessment/EPA Provisional Value
DEP- NJ Department of Environmental Protection
NR02- EPA National Recommended Water Quality Criteria 2002
^ - DEP C Carcinogen Policy: RfD includes an additional safety factor of 10
A-280 - Chemicals regulated under A-280 Amendments to NJ Safe Drinking water Act (P. L. 1983, c.443)
Blanks indicate that no information is available
Mercury* - standard is based on RfD for mercuric chloride (CAS# 007847-94-7)

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