# Procedure for Development of a Draft Analytical Interim Practical Quantitation Levels (PQL)

## Strontium

### CAS #7440-24-6

1) A draft health-based Interim Specific Ground Water Quality Criterion for Strontium of 1500 µg/L has been developed by Office of Science toxicologists. For additional information, please see the draft Interim Ground Water Quality Criterion Document (ISGWQC), for Strontium.

2) A Published Methods Database is searched to determine if the requested contaminant is a listed parameter in any analytical method. A variety of different organizations contribute to this database, for example; USEPA, USGS, APHA (Standard Methods), AOAC (Association of Official Analytical Chemists), and NIOSH (Air Methods).

a. National Environmental Methods Index (NEMI), is a free, searchable clearinghouse of methods and procedures for both regulatory and non-regulatory monitoring purposes for water, sediment, air and tissues. It is jointly funded by the U.S. Geological Survey and U.S. Environmental Protection Agency.

b. NEMI is used by Office of Science scientists to compare and contrast the performance and relative cost of analytical methods, review the full text of the procedure to determine implementation, and review sampling methods that require specialized techniques for environmental monitoring.

**Basis for PQL**

Strontium appears as a listed parameters in several USEPA methods. The table below shows the analytical methods, instrument configurations, and detection or quantification levels published in the cited methods. The most common certified analytical methods use Inductively Coupled Plasma/ Optical Emission Spectrometry (ICP/OES) technology. Twenty one (21) laboratories are certified for method 200.7 which is run by the state primacy laboratory at the NJDOH/PHEAL laboratory. In addition, SW-846 Method 6010C ICP/AES has 34 laboratories certified by NJDEP/OQA.

| Method | Instrumentation | MDL/MRL | Detection/ Reporting Limit | Spike Concentration |
|---|---|---|---|---|
| I-1472-85 | Metals, dissolved, water, ICP-AES (Archive method) | 0.5 µg/L | LL | 100.00 µg/L |
| I-1472-87 | Metals in Water by ICP | 0.5 µg/L | LT-MDL | |
| I-2477-92 | Determination of metals in Water by ICP-MS | 0.008 mg/L | MRL | 0.20 mg/L |
| I-4471-97 | Metals in Water by Inductively Coupled Plasma/Optical Emission Spectrometry, Whole-Water Recoverable | 0.5 µg/L | MDL | |
| 3111B | Metals in water by FLAA | 0.03 mg/L | IDL | 1.00 mg/L |
| I-4472-97 | Metals in Water by Inductively Coupled Plasma/Mass Spectrometer, Whole-Water Recoverable | 0.04 µg/L | MDL | |
| I-7800 | Strontium, suspended recoverable, atomic absorption spectrometric | 10 µg/L | RL | |
| I-3800 | Strontium, total recoverable, atomic absorption spectro-metric | 10 µg/L | RL | 55.00 µg/L |
| 6010 C | Trace elements in solution by ICP AES | 0.28 µg/L | DL | |
| I-1800 | Strontium, dissolved, atomic absorption spectrometric | 10 µg/L | RL | 55.00 µg/L |
| 3120 B (total) | Metals (total recoverable) in Water by ICP | 0.3 µg/L | EDL | |
| 200.7 | Metals in Water by ICP-AES | 0.3 µg/L | MDL | |

Source: National Environmental Methods Index (NEMI)

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(Continued)

Seven of the certified laboratories were contacted to determine their current performance information to generate a pooled interlaboratory MDL. The following results are from a statistical analysis of the interlaboratory data.

LCL = Lower Confidence Limit
XBAR = Average
UCL = Upper Confidence Limit
CONF = Confidence
NREP = Number of Repetitions in the Bootstrap technique.

| LCL | XBAR | UCL | CONF | NREP |
|---|---|---|---|---|
| 0.19 | 0.38 | 0.57 | 95.5 | 2000 |

Upper confidence interval (UCL) for 7 lab interlaboratory MDLs is 0.57 µg/L. This MDL is multiplied by a factor of five (5) to calculate the PQL. Using this method, the PQL = 0.57 X 5 = 3 µg/L for Strontium that can be achieved by 96% of the labs using USEPA Method 200.7. However, current calibration procedures for the state primacy laboratory and Site Remediation Program contractual laboratories use a reporting limit of 5 ppb for this parameter. The PQL of 5 ppb is recommended to be consistent with these current calibration practices.

**DRAFT ISGWQC:** 1500 µg/L

**DRAFT Interim PQL:** 5 µg/L

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