METHOD #: 239.1	Approved for NPDES and SDWA (Ed. Rev. 1974, 1978)
TITLE:	Lead (AA, Direct Aspiration)
ANALYTE:	CAS # Pb Lead 7439-92-1
INSTRUMENTATION:	AA
STORET No.	Total 01051 Dissolved 01049 Suspended 01050
Optimum Concentration Range:	1-20 mg/L using a wavelength of 283.3 nm
Sensitivity:	0.5 mg/L
Detection Limit:	0.1 mg/L

1.0 Preparation of Standard Solution

1.1 Stock Solution: Carefully weigh 1.599 g of lead nitrate, $Pb(NO_3)_2$ (analytical reagent grade), and dissolve in deionized distilled water. When solution is complete acidify with 10 mL redistilled HNO_3 and dilute to 1 liter with deionized distilled water. 1 mL = 1 mg Pb (1000 mg/L).

1.2 Prepare dilutions of the stock solution to be used as calibration standards at the time of analysis. The calibration standards should be prepared using the same type of acid and at the same concentration as will result in the sample to be analyzed either directly or after processing.

2.0 Sample Preservation

2.1 For sample handling and preservation, see part 4.1 of the Atomic Absorption Methods section of this manual.

3.0 Sample Preparation

3.1 The procedures for preparation of the sample as given in parts 4.1.1 thru 4.1.4 of the Atomic Absorption Methods section of this manual have been found to be satisfactory.

4.0 Instrumental Parameters (General)

4.1 Lead hollow cathode lamp
4.2 Wavelength: 283.3 nm
4.3 Fuel: Acetylene
4.4 Oxidant: Air

4.5 Type of flame: Oxidizing

5.0 Analysis Procedure

5.1 For analysis procedure and calculation, see "Direct Aspiration", part 9.1 of the Atomic Absorption Methods section of this manual.

6.0 Notes

6.1 The analysis of this metal is exceptionally sensitive to turbulence and absorption bands in the flame. Therefore, some care should be taken to position the light beam in the most stable, center portion of the flame. To do this, first adjust the burner to maximize the absorbance reading with a lead standard. Then aspirate a water blank and make minute adjustments in the burner alignment to minimize the signal.

6.2 For levels of lead below 200 μg/L, either the Special Extraction Procedure given in part 9.2 of the Atomic Absorption Methods section or the furnace technique, Method 239.2, is recommended.

6.3 The following lines may also be used: 217.0 nm Relative Sensitivity 0.4 261.4 nm Relative Sensitivity 10.

6.4 For quality control requirements and optional recommendations for use in drinking water analyses, see part 10 of the Atomic Absorption Methods section of this manual.

6.5 Data to be entered into STORET must be reported as μg/L.

7.0 Precision and Accuracy

7.1 An interlaboratory study on trace metal analyses by atomic absorption was conducted by the Quality Assurance and Laboratory Evaluation Branch of EMSL. Six synthetic concentrates containing varying levels of aluminum, cadmium, chromium, copper, iron, manganese, lead and zinc were added to natural water samples. The statistical results for lead were as follows:

Number as of Labs	True Values μg/Liter	Standard Mean Value μg/Liter	Deviation μg/Liter	Accuracy % Bias
74	367	377	128	2.9
74	334	340	111	1.8
64	101	101	46	-0.2
64	84	85	40	1.1
61	37	41	25	9.6
60	25	31	22	25.7