METHOD #: 249.1	Approved for NPDES (Editorial Revision 1978)
TITLE:	Nickel (AA, Direct Aspiration)
ANALYTE:	CAS # Ni Nickel 7440-02-0
INSTRUMENTATION:	AA
STORET No.	Total 01067 Dissolved 01065 Suspended 01066
Optimum Concentration Range:	0.3-5 mg/L using a wavelength of 232.0 nm
Sensitivity:	0.15 mg/L
Detection Limit:	0.04 mg/L

1.0 Preparation of Standard Solution

1.1 Stock Solution: Dissolve 4.953 g of nickel nitrate, $Ni(NO_3)_2 \cdot 6H_2O$ (analytical reagent grade) in deionized distilled water. Add 10 mL of conc. nitric acid and dilute to 1 liter with deionized distilled water. 1 mL = 1 mg Ni (1000 mg/L).

1.2 Prepare dilutions of the stock nickel 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 Nickel hollow cathode lamp
4.2 Wavelength: 232.0 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 Interferences

6.1 The 352.4 nm wavelength is less susceptible to spectral interference and may be used. The calibration curve is more linear at this wavelength; however, there is some loss of sensitivity.

7.0 Notes

7.1 For levels of nickel below 100 μg/L, either the Special Extraction Procedure, given in part 9.2 of the Atomic Absorption Methods section or the furnace technique, Method 249.2, is recommended.
7.2 Data to be entered into STORET must be reported as μg/L.
7.3 The heptoxime method may also be used (Standard Methods, 14th Edition, p 232).

8.0 Precision and Accuracy

8.1 In a single laboratory (EMSL), using a mixed industrial-domestic waste effluent at concentrations of 0.20, 1.0 and 5.0 mg Ni/L , the standard deviations were ±0.011 , ±0.02 and ±0.04, respectively. Recoveries at these levels were 100%, 97% and 93%, respectively.