DETERMINATION OF **MERCURY** IN SOIL, BOTTOM SEDIMENTS, AND GEOLOGICAL MATERIALS WITH RP-91C AND PYRO-915+ ATTACHMENTS

INTRODUCTION

Analysis of soils and bottom sediments for mercury content is one of the most common analyses in the monitoring of environmental pollution. Background mercury concentrations in these objects are 10–100 μg/kg and in the polluted areas they exceed 10,000 μg/kg, the ultimate tolerable mercury concentration in soil being 2,100 μg/kg (in Russia).

MEASURING METHOD

This method of mercury determination in soil is based on the atomization of mercury contained in a sample in an **RP-91C** or **PYRO-915+ attachment** and subsequent mercury determination by atomic absorption spectrometry employed in a **mercury analyzer RA-915+/915M**. The mercury AAS analyzer RA-915+/915M with the Zeeman background correction equipped with a thermal decomposition attachment RP-91C/PYRO-915+ provides determination of mercury in soil and other similar samples without sample preparation and mercury accumulation on a sorbent.
Mercury content in the sample is determined from the integrated analytical signal with due account of the preset calibration coefficient (from any reference mercury sample).

The mercury content is measured by an RA-915+/915M mercury analyzer within 2 minutes.

ANALYSIS FEATURES

- No sample preparation is necessary.
- Direct mercury determination without its preliminary accumulation on a gold sorbent.
- Wide dynamic measurement range: more than 3 orders of magnitude.
- The detection limit is by a factor of several tens lower than the background mercury content in soil and bottom sediments.
- Possible use of a special analytical cell for analysis of heavily polluted samples (up to 1 g/kg).
- No cylinders with compressed oxygen or other gas are necessary.
- Visualization of mercury release from the sample via a user-friendly computer interface.
- The calibration coefficient is preset from a reference mercury sample of any composition.

ANALYTICAL CHARACTERISTICS

Sample weight	Up to 500 mg
Detection limit	0.5–1 μg/kg
Upper limit of the measurement range	10,000 μg/kg *
Measurement time	< 2 min
Air flow rate	1 l/min

* It is possible to analyze samples with concentration up to up to 1g/kg using a special analytical cell with a path length of 0.7 cm for RP-91C attachment or using a special step by step heating Mode for PYRO-915+ attachment.

MEASUREMENTS PROCEDURES

The sample is weighed and put into injection spoon of the RP-91C/PYRO-915+ attachment. Integration of the analytical signal is turned on and the injection spoon is placed into the attachment. After the analytical signal comes back to the baseline (for 30–60 s), the integration is completed.

The validity of the method is proved by agreement between the measured and certified mercury concentrations in various reference samples

No	Reference sample code	Sample weight, mg	C, μg	C_{co}, μg	Δ, %
1	Soil	240	40.0	41±7	–2.5
2	Bottom sediments IAEA 405	271	803	810±40	–1
3	Sewage sediments CRM 143R	53	1,050	1,100± 70	–5