

**INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

HJ 876-2017

**Technical regulation of investigation on children soil ingestion
rate Tracer element method**

儿童土壤摄入量调查技术规范 示踪元素法

(English Translation)

Issued on: November 28, 2017

Implemented on: November 28, 2017

Issued by: Ministry of Ecology and Environment

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Foreword

In order to carry out the Environmental Protection Law of the People's Republic of China, promote environmental health risk management, standardize the investigation of children's soil intake, Develop this standard.

This standard specifies the work procedures, survey content, survey methods and technical requirements of children's soil intake survey.

This standard is released for the first time.

This standard is formulated by the Ministry of Environmental Protection Science and Technology Standards Division.

This standard is mainly drafted by. Beijing Normal University, China Institute of Environmental Sciences, University of Chinese Academy of Sciences, China Disease Prevention and Control Center for Environment and Health Related Product Safety, Beijing University of Science and Technology.

This standard was approved by the MEP on November 28, 2017.

This standard shall be implemented as of the date of promulgation.

This standard is responsible for the interpretation of the Ministry of Environmental Protection.

Children's soil intake survey technical specifications trace element method

1 Scope of application

This standard specifies the work procedures, survey content, survey methods and technical requirements of children's soil intake survey.

This standard applies to aluminum, cerium, scandium, vanadium and yttrium as trace elements, tracer element method for people aged 3 to 17 years of soil uptake Survey.

2 Normative references

This standard references the following documents in the terms. For undated references, valid versions (including amendments) apply this standard.

National food safety standards - Determination of multi - elements in foods GB/T 4883 statistical data processing and interpretation of normal sample outliers to determine and deal with GB/T 8170 rounded repair rules and limit values of the representation and judgment HJ 25.2 Technical Guidelines for Site Environmental Monitoring HJ 700 Water quality - Determination of 65 elements - Inductively coupled plasma mass spectrometry HJ 776 Water quality - Determination of 32 elements - Inductively coupled plasma atomic emission spectrometry HJ 803 Determination of 12 metal elements in soil and sediments Aqua regia - inductively coupled plasma mass spectrometry HJ 839 Environmental and Health Site Survey Technical Specifications Cross-sectional survey HJ 877 Exposure Parameter Investigation Technical Specifications HJ/T 166 Soil Environmental Monitoring Technical Specifications Guidelines for collection and handling of WS/T 348 urine specimens

3 Terms and definitions

The following terms and definitions apply to this standard.

Soil ingestion rate

Refers to the unit of time unconsciously or consciously ingested soil quality.

Tracer element method Refers to the analysis of children's exposure to the soil trace element concentration, excreted urine quality of children, the quality of food intake and excrement and the concentration of tracer elements in foods, and the method of quantifying children's soil intake.

Tracer element tracer element Refers to the body is not metabolized or absorbed and the content of food and soil content ratio is low, used to track the elements of the process of running and changing elements.

Duplicate plate method Means to collect the survey of all food intake during the survey method. Prepare two copies of the same food, one for the respondent to eat, and the other One is mixed into one equal quality food sample and weighed for laboratory testing.

Gastrointestinal transit time Also referred to as stool lag time, refers to the intake of (food, soil, etc.) from the intake of human body time to excreted in vitro form of the time time.

4 Working procedures

Children's soil intake survey includes survey preparation, on-site investigation, laboratory tests, children's soil intake estimation and quality control and quality Quantitative evaluation of five parts, working procedures shown in Figure 1.

Figure 1 working procedures

5.1 Data Collection

- a) The population, age structure and age structure of the 3-17-year-old population living in the survey area (living in the survey area for 6 months and above) and gather information
Sample Collection Soil samples Sample preparation laboratory material preparation
Sample digestion Instrumental Analysis Estimation of soil intake for children Calculation of soil individual intake of children data processing Prepare sampling material to determine the child population survey Food Sample Stool Sample Urine Sample Sample site preservation and processing Sample transport on-site training Distribution.
- b) The number and location of kindergartens, primary and secondary schools, and the number and distribution of pupils in the surveyed area should be collected.
- c) The distribution, area and types of outdoor activities of 3-17-year-olds in the surveyed area should be collected (such as soil surface, cement ground, Plastic floor, etc.).

5.2.1 Stratification factors

Stratification factors should be selected in combination with the socio-demographic characteristics and geographical conditions that affect the level of soil intake, such as urban and rural areas, gender, age Paragraph and so on.

5.2.2 Sample size estimation

- a) The minimum sample size the minimum sample size is calculated according to formula (1).

Where. n - the minimum sample size per layer;

The corresponding standard normal difference for $\alpha/2$ -significant level of 95%, taken as 1.96;

- The standard deviation of children's soil intake can be obtained through literature review or pre-investigation;

δ - allowable error, generally take 20%;

- The arithmetic mean of children's soil intake can be obtained by consulting the literature or conducting a pre-survey;

deff-- design effect value, generally take 1.0 ~ 2.0, simple random sampling 1.0, other sampling methods to take 1.0 ~ 2.0.

b) The total sample size the total sample size is calculated according to formula (2).

Where. N-- total sample size;

p - loss rate, take 10 to 20%;

n - the minimum sample size per layer q - the product of stratification. Combined with the main factors affecting children's soil intake, such as urban and rural areas can be divided into two samples, by gender can be divided into two samples, the product of the stratification factor is $2 \times 2 = 4$ layers.

5.2.3 Sampling method

According to the actual situation, we can use simple random sampling, systematic sampling, cluster sampling and stratified sampling in one or several combinations Perform population sampling.

5.3 Informed consent

Involving human investigation should be consistent with "people involved in biomedical research ethics audit approach" (Health and Family Planning Commission.2016 Decree No. 11) Yes the relevant provisions of the child guardian signed informed consent.

5.4 Sampling Materials

a) Soil. Soil sampling materials are prepared in accordance with HJ/T 166; hardened ground soil sampling materials are prepared in accordance with HJ 839 requirements.

b) Food. prepare plastic boxes and labels with a sealing capacity of not less than 2L.

c) Urine. Urine samples should be prepared in accordance with WS/T 348, and the urine collection container should have a volume of not less than 3 L.

d) Excrement. Prepare a medical portable excrement collector with a collecting bag of a size matching the excrement collector at a concentration of 6 mol/L hydrochloric acid, Tags and so on.

6.1 Sampling period

a) Food and urine collection should begin at 06.00 with a continuous sampling time of not less than 3 days (72 h) and at least 1 rest day (Saturday or Sunday).