



APLAC T066

TOTAL HEAVY METAL ELEMENTS IN SOILS PROFICIENCY TESTING PROGRAM

Total Heavy Metal Elements in Soils Proficiency Testing Programme APLAC T066

1. Nature and Objective of the Programme

Heavy metals contamination not only directly affects soil physical and chemical properties, reduces soil biological activity and decreases nutrient availability, but also poses a serious threat to human health by entering into food chains and to environmental security by leaching into ground water. The objective of this proficiency testing programme is to evaluate the competence of analytical laboratories for quantitative testing trace heavy elements in soil.

The programme will be coordinated by China National Accreditation Service for Conformity Assessment (CNAS) and Institute for Environmental Reference Materials (IERM) of Ministry of Environmental Protection of China under the auspices of Asia-Pacific Laboratory Accreditation Cooperation (APLAC).

2. Responsibilities

CNAS is responsible for submitting proposal to APLAC PT Committee, inviting participants, collecting test results from all participating laboratories, issuing and sending final report to participating accreditation bodies. IERM is responsible for preparing and dispatching samples, performing homogeneity tests and assessment, conducting statistical analysis of data.

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3. Selection of Participants

Invitations will be sent to all APLAC members and other regional accreditation corporations as soon as this proposal is approved by the APLAC PT Committee. Participating accreditation bodies will be asked to nominate laboratories to participate and indicate the accreditation status of the nominated laboratories for the test. A restriction on the number of participating laboratories from each accreditation body may need to be imposed. The number of laboratories shall be preferably limited to **150**.



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4. Preparation of Sample

The test sample will be prepared by IERM and each sample contains about 50 grams dried soil material. Each participating laboratory will get one test sample. The test sample will be stored in a segregated place preserving from all chemicals and other materials contamination.

5. Homogeneity testing

Not less than ten samples will be taken randomly from the prepared test samples and the between-bottle homogeneity testing will be done by IERM according to ISO13528 or ISO Guide 35:2006.

6. Tests

The participating laboratories will be requested to determine the total contents of arsenic, cadmium, chromium, copper, mercury, nickel, lead and zinc in soil according to their preferred methods. The approximate concentration levels of each element are listed as the following:

Element	Concentration level(in dry weight)
Arsenic	5.00~25.0 mg/kg
Cadmium	0.025~0.100 mg/kg
Chromium	25.0~100 mg/kg
Copper	10.0~50.0 mg/kg
Mercury	0.005~0.030 mg/kg
Nickel	10.0~50.0 mg/kg
Lead	10.0~50.0 mg/kg
Zinc	25.0~100 mg/kg

Analysis should be conducted in triplicate and the test results and other details should be reported in the result sheets provided. The samples of this scheme are very stable that it is known from the supervision of relevant reference materials, so the stability testing is unnecessary.

7. Methodology

In this programme, the samples can be tested by the participants' routine method (accredited, validated, in-house, etc) for determining total elements content in soil.. Test results and other technical details should be reported in the result sheets provided.

Information: ISO 14869-1:2001 "Soil quality dissolution for the determination of total element content", USEPA SW846 Method 3052:1996 "Microwave assisted acid digestion of siliceous and organically based matrices", or any other method can be used, if the lab deems the method appropriate for determination of total metal elements.

8. Statistical analysis of results

Robust statistical method will be used in this programme to minimize the influence of outliers on summary statistics. The z-score will be calculated to evaluate the performance of participants, unless they will be inapplicable. The results are commonly interpreted as the following:



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Z-score	Performance of the participant
$ z \leq 2$	Satisfactory
$2 < z < 3$	Questionable
$ z \geq 3$	Unsatisfactory

For laboratories having $|z| \leq 2$, their results are “Satisfactory” performance. Laboratories having a $|z|$ score in the range $2 < |z| < 3$ are encouraged to review their results. Laboratories have $|z| \geq 3$ shall investigate their results and take the corrective actions.

9. Issuance of Reports

Upon the completion of data analysis, an interim report will be drafted by IERM and audited by CNAS, then will be sent to participating laboratories and/or accreditation bodies for comment. After that, a draft final report will be prepared and be submitted to the APLAC PT Committee for review. Upon approval, an electronic copy of the final report will be forwarded to each participating accreditation bodies for distribution to the participating laboratories.

10. Schedule for programme

Event	Period	Action Party
Submission of proposal to APLAC PT Committee for approval	July 2008	CNAS
Preparation of sample	Sep. 2008	IERM
Homogeneity testing	Oct. 2008	IERM
Invitation of participants	Oct. 2008	CNAS
Dispatch of samples	Nov. 2008	IERM
Submission of results	Dec. 2008	IERM
Statistical analysis of results	Jan. 2009	IERM
Drafting Interim report	Feb. 2009	IERM
Submission of draft report to APLAC PT Committee	Mar. 2009	CNAS
Approval of draft report by APLAC Proficiency Committee	Mar. – Apr. 2009	APLAC
Distribution of final report	May 2009	CNAS or APLAC

11. Confidentiality

The identity of participants in this proficiency testing programme is confidential and known only to the minimum number of persons unless the participant waives



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confidentiality. Each laboratory will be assigned with a unique identification code. This unique code will be used throughout the programme. Also, all information supplied by the participants will be treated as confidential. If the laboratories submit their results through their accreditation bodies, their results may be disclosed to and released through their accreditation bodies.