Information about the master's thesis

Interlaboratory comparative tests to determine the content of metals in blood serum

Speaker: Markova Olga Vladimirovna
Group: MENM-112703

- My supervisor is ***Sobina Alena Vyacheslavovna***, head of the laboratory of physical and chemical methods for metrological certification of standard samples, scientific custodian of the state primary standard GET 176-2019, Ph.D.
- ***Ural Research Institute of Metrology*** operates as an ***interlaboratory comparison test*** (ICT) provider and is accredited in the national accreditation system as an ICT provider.

Ural Research Institute of Metrology, Yekaterinburg, Russia

ICT provider

Develops
a program for conducting ICT

Forms
list of ICTparticipants based on applications from laboratories

Creates or acquires a control sample (CS)

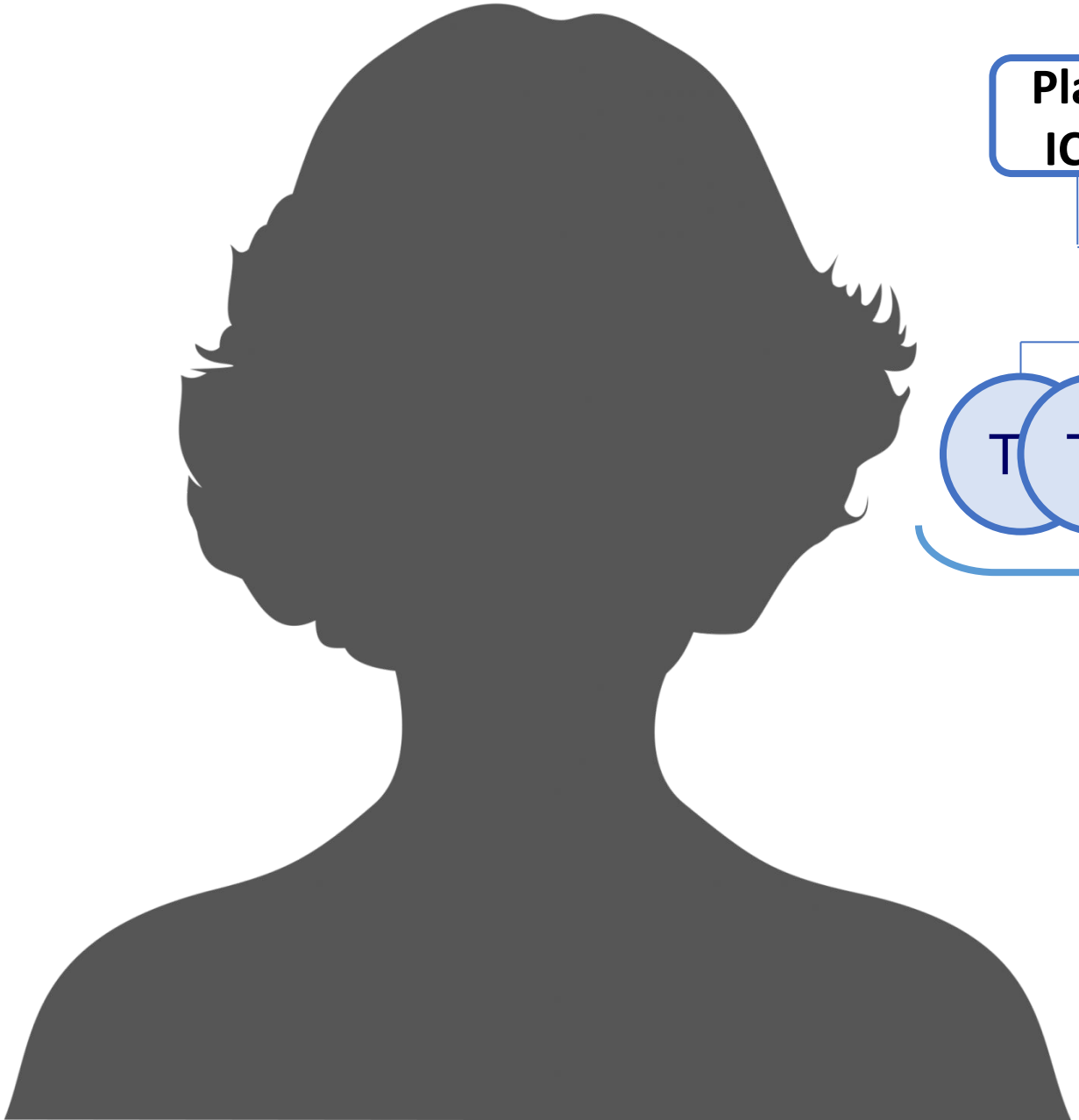
Makes up
Instructions for testing CS

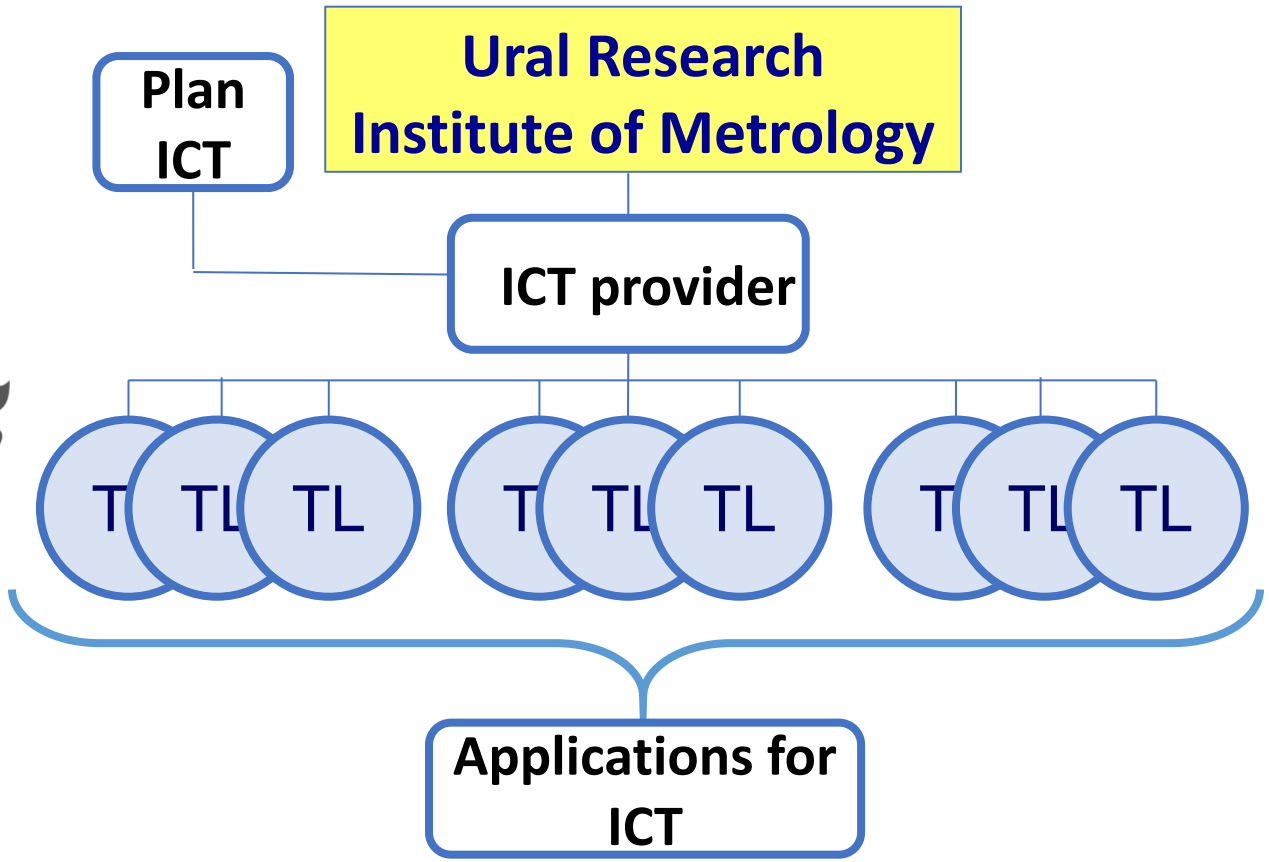
Conducts
Mailing CS with instructions

Conducts
Processing and summarizing the results of the ICT

The object of MSI is lyophilized human blood serum, weighing at about 0.6 g.

Component	Expected range of mass fraction values, mg/kg	Target relative expanded uncertainty, %
Cu	1-25	25
Zn	1-25	
Mg	50 -400	
Fe	1 –50	
Ni	0,01- 0,3	
Sr	0,1 - 1	
Cd	0,001 - 0,05	
Pb	0,001 - 0,05	




Plan ICT
Ural Research Institute of Metrology
ICT provider
TL
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Applications for ICT

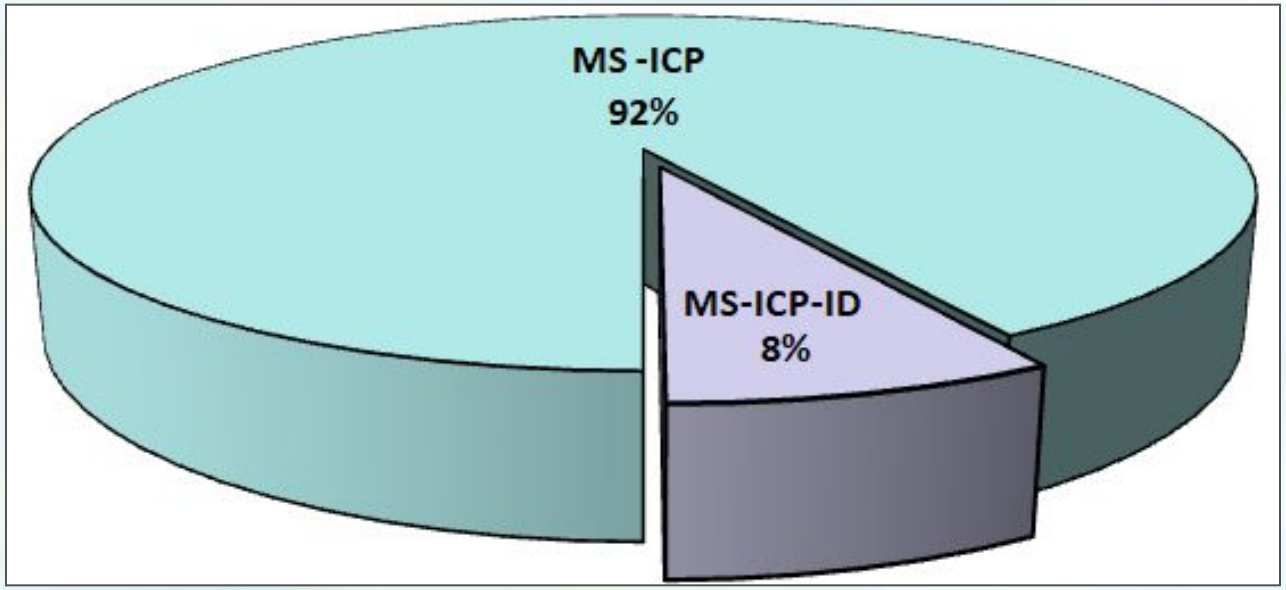
PILOT COMPARISONS FOR MEASURING THE MASS FRACTION OF METALS (Cu, Zn, Mg, Fe, Ni, Sr, Cd, Pb) IN BLOOD SERUM

Purpose of the pilot comparison: comparison of the results of measurements of the mass fraction of metals (Cu, Zn, Mg, Fe, Ni, Sr, Cd, Pb) in blood serum, obtained using a high-precision measurement method of inductively coupled plasma mass spectrometry, including mass -spectrometry with inductively coupled plasma with isotopic dilution.

Name and abbreviation of NMI (comparison participants):

- Healthcare Institution **"National Anti-Doping Laboratory"**, Minsk, Republic of Belarus (HI NAL)
- Federal State Unitary Enterprise **"All-Russian Research Institute of Optical and Physical Measurements"**, Moscow, Russia (ARIOPM)
- **Ural Research Institute of Metrology** - branch of the Federal State Unitary Enterprise "All-Russian Research Institute of Metrology named after V.I. D.I.Mendeleeva, Yekaterinburg, Russia (URIM)

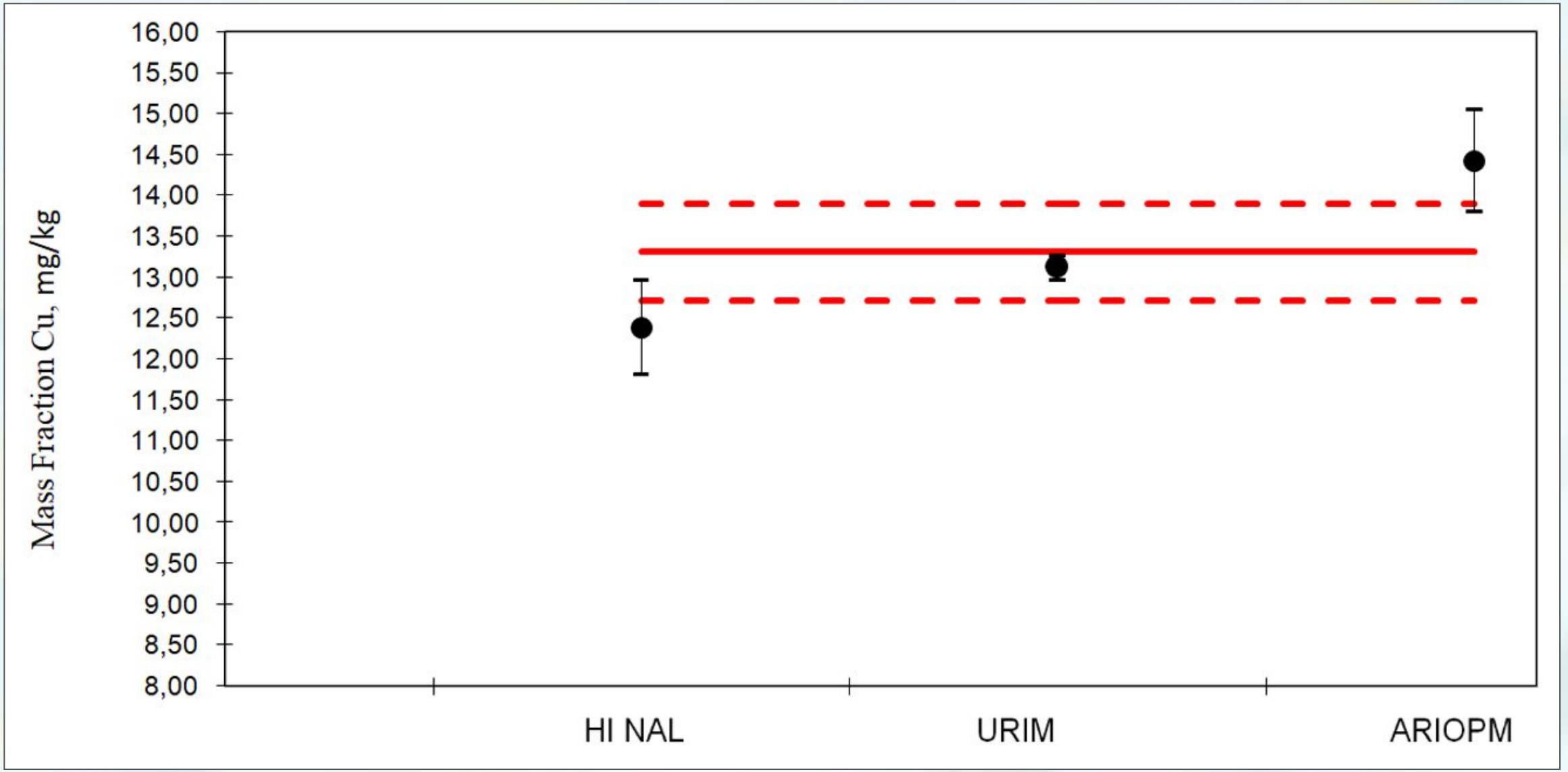
Abbreviation NMI	*Element*	*Method of measurement*
HI NAL	8 components defined	MS ICP
ARIOPM	8 components defined	MS ICP
URIM	Mass fractions of Zn, Cu	MS ICP ID
URIM	Mass fractions of Mg, Fe, Ni, Sr, Cd, Pb were determined	MS ICP

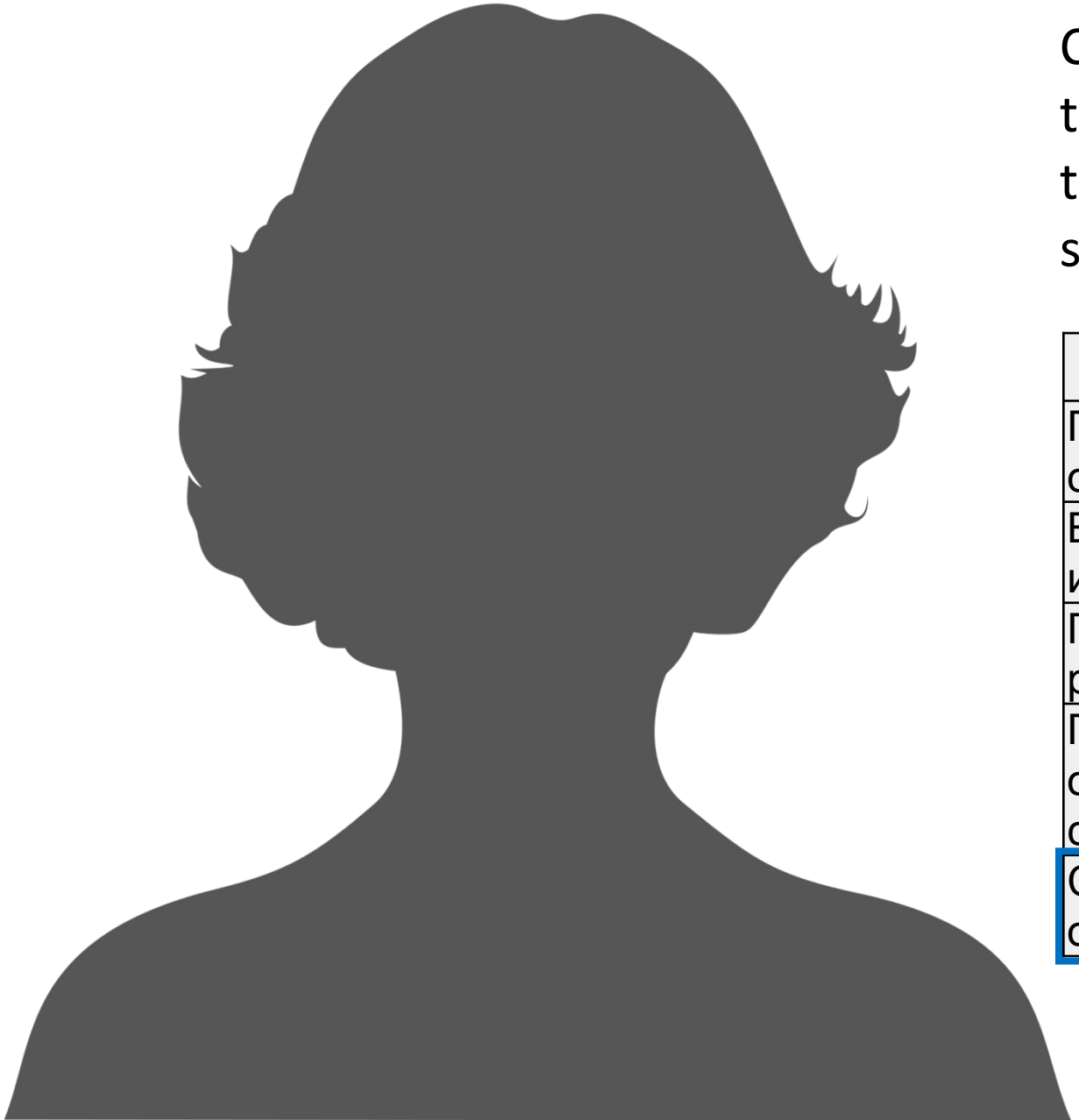


<u>Method of measurement</u>:

1. Inductively coupled plasma mass spectrometry (MS ICP)
2. Inductively coupled plasma mass spectrometry with isotope dilution (MS ICP ID)

Element	URIM		ARIOPM		HI NAL	
	X_1, mg/kg	U_1 (k=2), mg/kg	X_2, mg/kg	U_2 (k=2), mg/kg	X_3, mg/kg	U_3 (k=2), mg/kg
Cu	13,12	0,29	14,42	1,25	12,39	1,15
Zn	10,88	0,42	10,70	4,37	11,17	1,11
Mg	149,26	8,09	175,54	6,03	180,20	19,86
Fe	26,50	1,67	48,19	1,76	41,21	2,51
Ni	0,148	0,022	0,339	0,097	0,190	0,021
Sr	0,33	0,05	0,84	0,10	0,50	0,02
Cd	0,034	0,005	0,107	0,065	0,035	0,005
Pb	0,019	0,003	0,037	0,018	0,027	0,001


Mass Fraction Cu, mg/kg
16,00
15,50
15,00
14,50
14,00
13,50
13,00
12,50
12,00
11,50
11,00
10,50
10,00
9,50
9,00
8,50
8,00
HI NAL
URIM
ARIOPM



Comparison participants confirmed the stated measurement ranges of the mass fraction of metals in blood serum.

Мероприятие	Период сличений
Подготовка и отправка образцов	декабрь 2021 г.
Выполнение измерений	январь – апрель 2022 г.
Представление результатов	20 марта 2022 г.
Предварительный отчет А по пилотным сличениям	апрель – октябрь 2022 г. *
Согласование и оформление отчета В	ноябрь - апрель 2023 г. **

Thank you for your attention!