



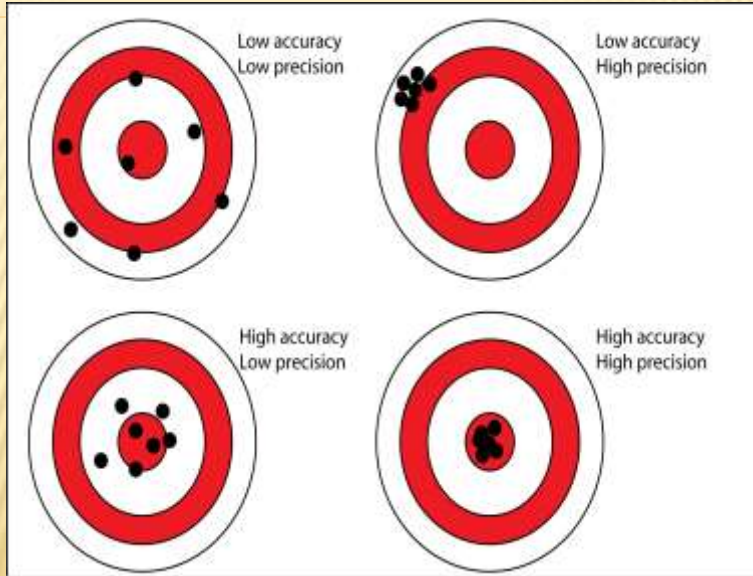
متطلبات تحضير العينات المرجعية وآلية استخدامها

REFERENCE MATERIALS

Reference Materials (RM) are used for:

- ❖ Calibration of instruments or measurement systems;
- ❖ Method development and validation;
- ❖ Staff training;
- ❖ Routine quality control;
- ❖ Proficiency testing
- ❖ Assign reference values to other materials.

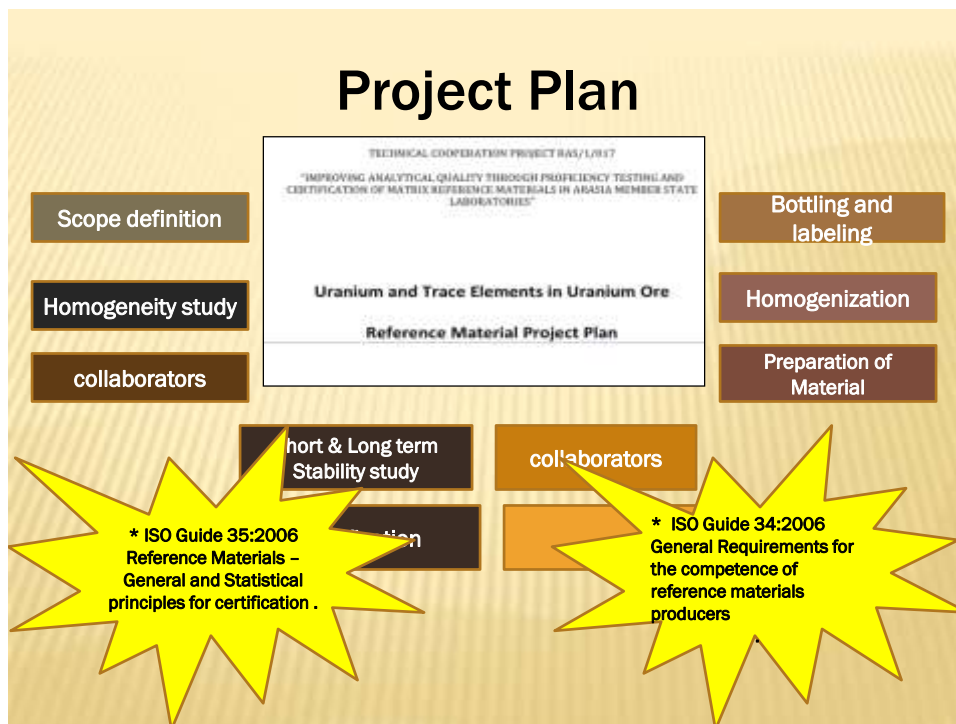




RAS 1017 :Improving Analytical Quality through Proficiency Testing and Certification of Matrix Reference Materials in ARASIA Member State Laboratories



Project Plan



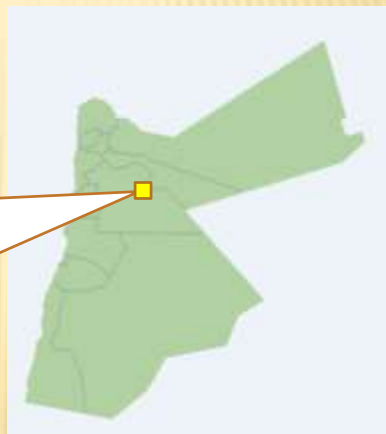
Scope

***Preparation and certification of a reference material of uranium ore from central Jordan.**

- The material will be certified for the mass fractions of **total uranium** and selected **trace elements** in addition to the massic activity of natural radionuclides.
- The targeted combined standard uncertainty is to be **less than 5%** for all analysts of interest.
- According to ISO Guide **34 & 35**.

Sampling and Ore Material

- 150 kg of ore sampled from a trench in the center of Jordan by **Jordan Energy Resources Incorporated (JERI)**.



Sample Preparation :

1. Drying :

* Separate sample to 40 samples
then dry 105 °C for 24 hrs.



2. Crushed :

•Crushed sample using a tungsten oxide jaw crusher, milled using a tungsten oxide disk mill .



Sample Preparation :

Using a ball mill with jars and balls coated with tungsten to milled the sample .



Must be 90 % of particle size of sample
Less than 100 μm

Moisture Content

Take 10 Sub-samples to measured the moisture content using **IR moisture balance**. The moisture content should be in range 3.5-4.0 %



Higher than
4.0 %
de-humidified.

Less than
3.5 %
re-homogenized.

Homogenization

The milled bulk material should be mixed for 5 days using a rotating plastic container with a volume of 200 L. 10 balls with 20-30 mm diameter coated with tungsten should be added to the material to improve mixing.



Homogenization

•Bulk Materials Test :

Take 9 sub-samples (3 top, 3 middle, 3 bottom)



* Analyzed by: Gamma Spectroscopy , ICP-
Ms , ICP-OES & XRF .

*Test particle size using laser scattering
technique .



**level of material homogeneity based on ANOVA
calculations and comparisons of statistical F factor
with the critical one.**

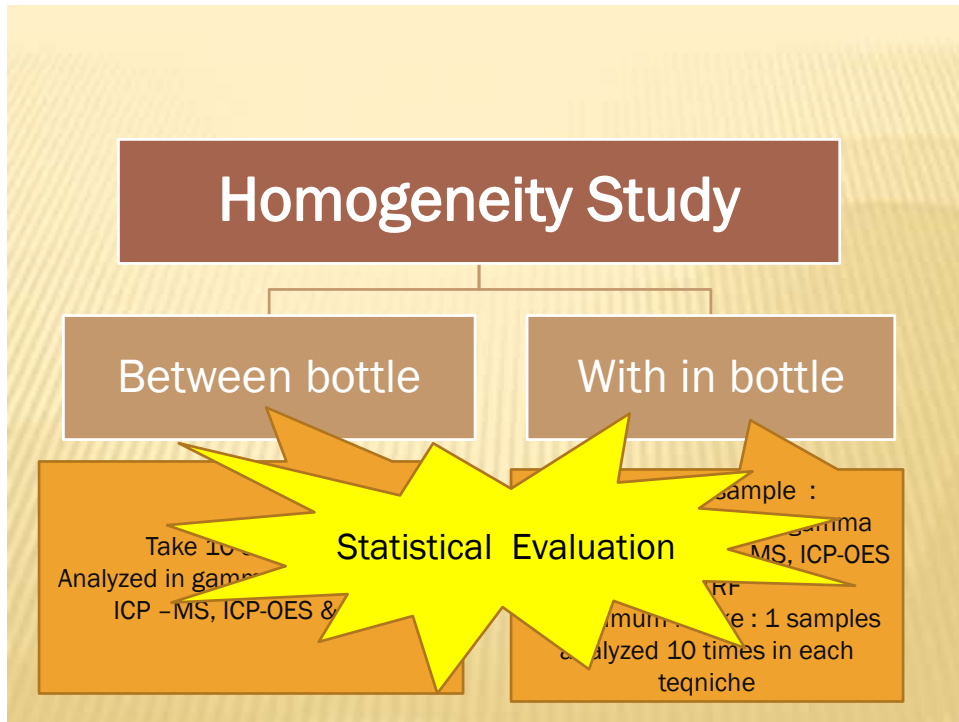
Bottling and labeling

To assure complete homogenization, the homogenization process was repeated for 72 h and the ore material was bottled in 935 bottles with approximately 100 g each



Bottling and labeling





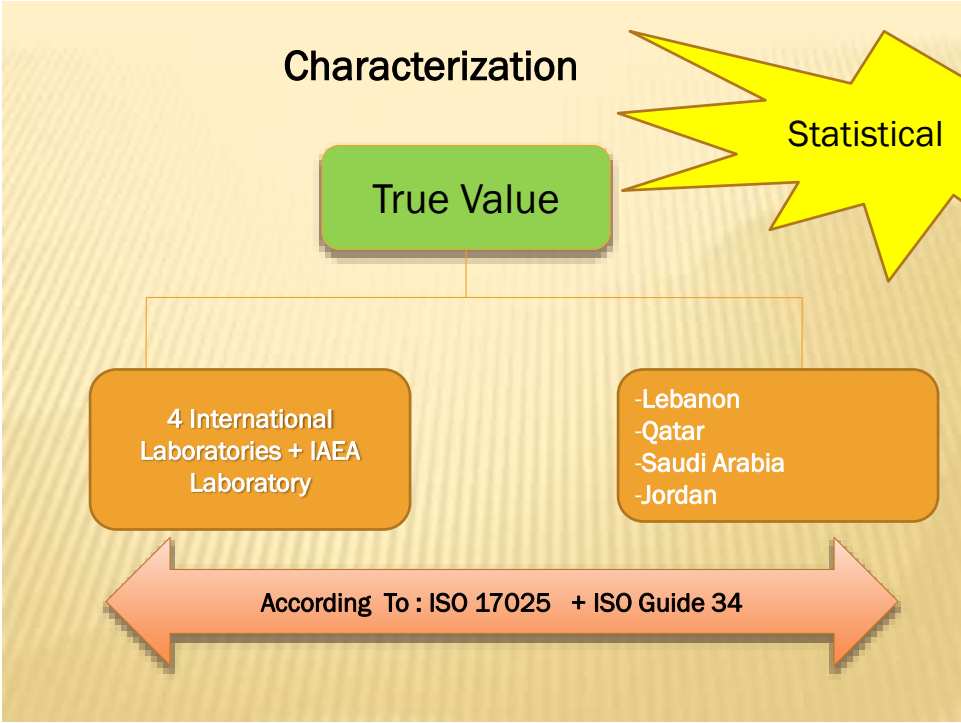
Homogeneity Study

Repeatability Conditions

Measurements on all samples should be carried out by:

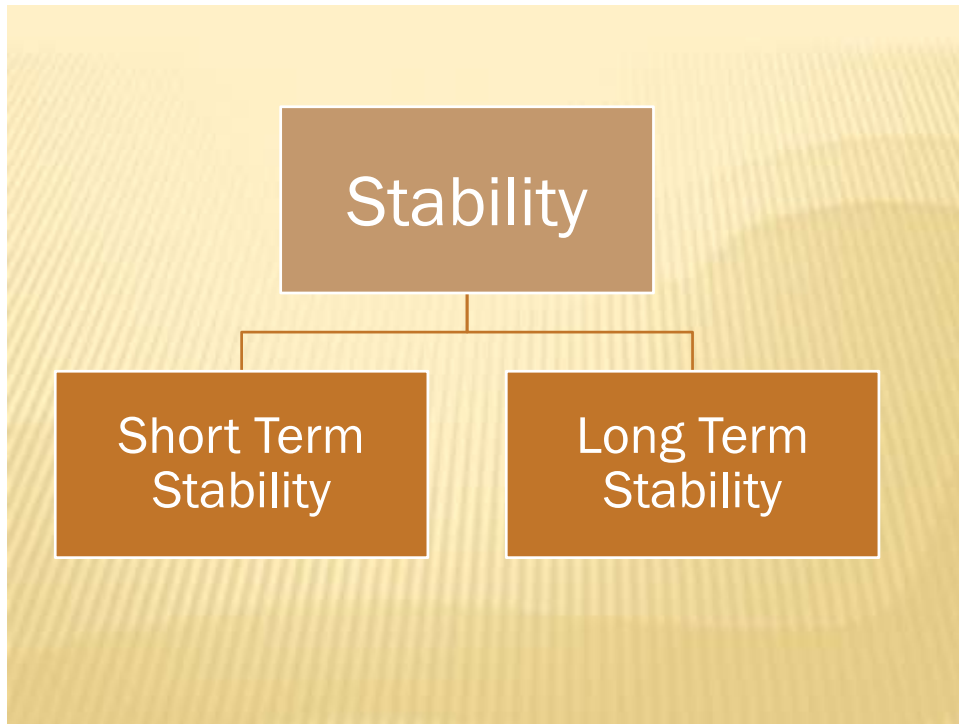
1. the same operator,
2. against the same calibration,
3. on the same instrument (s),
4. within the same analysis run,

to ensure the optimum conditions for repeatable measurements.



Characterization

Country	Institution
Belgium	Centre of Nuclear Studies
Hungary	Food and Fedd Safety Office
Austria	Terrestrial Environment Laboratory/IAEA
Jordan	Jordan Atomic Energy Commission
Lebanon	Department of Environment Control
Qatar	Ministry of Environment
Saudi Arabia	King Abdul-Aziz City for Sciences and Technology
USA	Department of Energy



Short Term Stability

- Short-term stability (transport conditions):
Carried out at different temperatures (-50°C – 70°C).
Takes typically 1 to 2 months.

	2,0 months	1,5 months	1,0 months	0,5 months	0 months
-20 °C	X				
20 °C	X	X	X	X	
40 °C	X	X	X	X	
60 °C	X	X	X	X	

Long Term Stability

-Long-term stability (storage conditions):

Lasts for 12 to 36 months.

Repeatability conditions must apply, to lower uncertainty.

	12 months	10 months	08 months	06 months	04 months	02 months	0 months
-20 °C	X						
20 °C	X						
		X					
			X				
				X			
					X		

True Value \pm Uncertainty

Significance level of 0.05

$$U_{CRM} = k\sqrt{u_{char}^2 + u_{bb}^2 + u_{lts}^2 + u_{sts}^2}$$

U char. : characterization.

U bb : between bottle.

U lts : Long term stability.

U sts : Short term stability.

